Department of Primary Industries
and Regional Development

NSW GOVERNMENT

Winter crop variety sowing guide 2025

NSW DPI MANAGEMENT GUIDE

Peter Matthews, Kathi Hertel and Leigh Jenkins

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

GRDC NATIONAL VARIETY TRIALS™

www.dpi.nsw.gov.au

LongReach Optimus is a new mid-spring maturity variety offering growers a strong grain receivals package and excellent performance across a range of sowing times in NSW and QLD. Major is a slow-mid maturing variety with demonstrated yield performance in both acid and sodic soils, while Tracer is a mid maturity APH variety that's ideal for main season seeding opportunities across NSW.

Visit **pacificseeds.com.au** to find out how these varieties can help take your wheat to the next level.

Pacific Seeds
Growing possibilities

Department of Primary Industries
and Regional Development

Winter crop variety sowing guide 2025

Peter Matthews
Technical Specialist,
Grain Services
NSW DPIRD
Orange NSW 2800
m: 0427 007 395

Kathi Hertel
Research and
Development Agronomist
NSW DPIRD
Trangie NSW 2823
m: 0427 104 344

Leigh Jenkins
Research and
Development Agronomist
NSW DPIRD
Trangie NSW 2823
m: 0419 277 480

Introduction

Welcome to the 2025 edition of the *Winter crop variety sowing guide*, published each year by the NSW Department of Primary Industries and Regional Development (NSW DPIRD).

The aim of this guide is to help grain growers and their advisers make better cropping decisions and gain higher profits from winter crops.

The complexities of modern technology, fluctuating markets and the vagaries of seasonal conditions can influence cropping decisions. Also rising crop input costs and continuing volatility put emphasis on making the best possible decisions regarding paddock selection, crop and variety choice, nutrient, disease, and pest and weed management strategies. These factors all contribute to the winter crop producer's need for careful planning and management to optimise productivity and profitability beyond the current year.

Profit depends on choosing the most suitable variety and sowing time for each paddock and optimising tactical crop management to achieve the variety's water-limited yield potential and producing grain that meets market specifications. This guide is updated with new variety and technical information for the major winter crops. This is, based on the latest research and development results from both NSW DPIRD and industry programs, including the National Variety Trial data for comparative grain yield and disease ratings.

Profitable winter crop growing demands a higher production per unit area at a lower cost per unit of production. This can be achieved by increasing grain yields through adopting new or improved technology, including variety choice and management practices. The goal is not necessarily higher total production, but greater productivity from the resources invested in crop production, along with the farm business's sustainability. Carefully consider the range of information contained in this guide, how it can be applied to your farm business, and consult your local agronomist or farm adviser for more specific advice.

ISSN 1328-9535
jn 17082 V1

Published by NSW Department of Primary Industries and Regional Development-Agriculture and Biosecurity, 2025.

Disclaimer
The information contained in this publication is based on knowledge and understanding at the time of writing (March 2025) and may not be accurate, current or complete. The State of New South Wales (including Department of Primary Industries and Regional Development), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

Because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Primary Industries and Regional Development or the user's independent adviser.

The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement by the department over any equivalent product from another manufacturer.

Always read the label
Users of agricultural chemical products must always read the label and any permit before using the product and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from any compliance with the directions on the label or the conditions of the permit by reason of any statement made or omitted to be made in this publication.

Acknowledgements
We gratefully acknowledge the Grains Research and Development Corporation (GRDC) for their financial support of the many research, extension and industry-based projects from which information has been gathered for this publication. Yield and disease data for this publication is sourced from the National Variety Testing (NVT) program which is a GRDC initiative.

Grains Australia, GrainCorp and Grain Trade Australia provide valuable assistance regarding grain quality assessment, receival standards and marketing.

Front cover main: Flowering canola crop, Wagga Wagga, NSW. Photo Mathew Dunn.

Front cover inset: Canola being direct harvested at Mullaley NSW.

Plant Breeder's Rights

Throughout this guide, varieties protected under Plant Breeder's Rights (PBR) legislation are signified by the symbol ⁽ᵠ⁾

Plant Breeder's Rights are exclusive commercial rights to a registered variety. In relation to propagating material of the registered variety, the breeder has exclusive rights to:

- **a** produce or reproduce the material;
- **b** condition the material for the purpose of propagation (conditioning includes cleaning, coating, sorting, packaging and grading);
- **c** offer the material for sale;
- **d** sell the material;
- **e** import the material;
- **f** export the material; and
- **g** stock the material for any of the purposes described in (a) to (f).

In most instances the breeder will licence these rights to a selected seed company (the licensee).

Exceptions to breeder's rights are the rights of farmers to save seed for sowing future commercial crops. However harvested material derived from farm saved seed will be subject to the End Point Royalty (EPR) applying to that variety.

Where EPRs apply, growers will be required to enter into arrangements with the breeder or licensee whereby royalties are paid on delivery of the grain. Some varieties may have a Seed Royalty (SR) paid on purchase of seed rather than an EPR.

Royalties collected are used to support ongoing research and the breeding of new and improved varieties.

Contents

Interpreting variety trial results

The National Variety Trial (NVT) data presented in the *Winter crop variety sowing guide* are long-term multi-environment trial (MET) results. These results are currently the most accurate and reliable means of interpreting variety performance across sites and years. Within the limitations of the printed guide's format, results are presented for all crop types on a separate yearly regional mean basis (2020, 2021, 2022, 2023 and 2024) and on a combined regional mean basis.

The yearly regional mean values in the guide are extracted from the NVT database. Values are only shown for a variety when the variety was present at sites in that year. The yearly or regional mean values shown in the guide are not adjusted for 'Accuracy', but are filtered for VAF >25%. On the NVT website, within the 'Long-term yield reporter' web tool, readers can filter on accuracy and VAF. Definitions of the filters 'Accuracy' and 'VAF' can be found within the web tool. The default accuracy and VAF values on the tool are set at ≥0.8 and ≥25% respectively. Users can change the default values for accuracy and VAF filters in the web tool, depending on their risk acceptance, using the slide tool option.

Regional mean yields shown in the guide are average varietal performances across trial locations within each year or region. This averaging can mask the variety by environment interaction; that is, the ability of a variety to yield differently at each location across seasons (years). Growers and advisers can further interrogate the NVT results for a variety's performance across the state (NVT website). The 'Long term yield reporter' tool allows users to view data in yield-based groupings and/or seasonal outcomes across states, regions or selected trials down to a single site level.

Individual trial results for 2024 can also be accessed using the interactive map on the NVT website home page and selecting the site of interest.

What's new in 2025

Varietal changes

The *Winter crop variety sowing guide 2025* contains information on commercially available crop varieties that might be suited to NSW; it does not include all varieties available and might not include outclassed varieties, interstate released varieties or niche market varieties. Consult either the owners or commercial licensees of new varieties for further information. Yield performance data is also available from GRDC's NVT website (National Variety Trial) on varieties included and tested in NVT trials across NSW.

GO TO PAGE
NVT website (https://nvt.grdc.com.au/)

When considering a new variety, compare the yield, grain quality and disease resistance of the new variety with currently grown varieties.

Wheat

Seven new spring milling wheats will be available for the 2025 season: Boa^{Φ}, Ironbark^{Φ}, LongReach Optimus^{Φ}, Packer^{Φ}, RGT Healy^{Φ}, RGT Ponsford^{Φ} and Shotgun^{Φ}. Three winter wheats Brighton^{Φ}, Triple 2^{Φ} and Wallaroo^{Φ} were also released, suited to the medium to higher rainfall production zones of NSW.

The variety characteristics and reactions to diseases for wheat in Table 19. Wheat varietal characteristics and reactions to diseases on page 24 lists the quality classification of varieties at the time of publishing. Some newer varieties might not have a final classification for all NSW regions pending further sample testing.

Barley

Four new barley varieties: Bigfoot CL^{Φ}, Granite CL^{Φ}, PegasusAX^{Φ} and RGT Atlantis^{Φ} were released that are adapted to NSW. The following barley varieties have gained accreditation as malt varieties by Grain Australia: Commodus CL^{Φ}, Cyclops^{Φ}, Minotaur^{Φ}, Neo CL^{Φ} and Zena CL^{Φ}. Check before growing any new malt barley variety that local segregation is available for that variety, or if short-term on-farm storage is required, before delivery to a buyer.

Oats

Two new milling oat varieties were released from the national oat breeding program by InterGrain: Goldie^{Φ} and Minnie^{Φ}. Check before growing a new oat variety that local segregation is available for that variety by buyers or be prepared to store the variety on-farm.

Canola

There are 9 new variety releases for 2025:

- Triazine-tolerant hybrid variety Pioneer® PY429T
- Imidazolinone (Clearfield®), 3 new hybrid varieties Pioneer® PN526C, Pioneer® PY327C and VICTORY® V75-05CL
- Imidazolinone and triazine tolerant hybrid variety Nuseed Griffon TTI
- Truflex® + LibertyLink® Technology varieties, 2 new hybrids InVigor® LR 3540P and InVigor® LR 5040P
- Roundup Ready® Technology hybrid variety Pioneer® PY428R
- Optimum GLY® Technology hybrid variety DG Buller G.

Chickpea

There are no new chickpea variety releases for 2025. CBA Captain^{Φ} (released in 2020) continues to perform strongly as a high-yielding medium-sized desi type suited to both northern and southern chickpea growing regions in NSW. Despite a wet winter in some areas of NSW, the drier conditions in spring 2024 did not favour any further development of the 3 key chickpea diseases: ascochyta blight, phytophthora root rot and *Sclerotinia*, which can be difficult to control in wet or waterlogged conditions. Selecting varieties with better *Ascochyta* resistance (CBA Captain^{Φ} and PBA Seamer^{Φ} have both retained their MS rating) and using a preventative fungicide at the initial seedling stage are still the 2 most critical factors for successful chickpea production in 2025.

Faba bean

There are no new faba bean variety releases for the 2025 season. FBA Ayla[Φ] and PBA Nasma[Φ], continue to show broad adaptability, extending into central and southern NSW, particularly in shorter seasons. Their seed size is larger than other varieties (except PBA Amberley[Φ]). Both varieties are rated susceptible to chocolate spot and require close monitoring and active disease management. Check with buyers before growing that local segregation and/or acceptance of larger seeded varieties is available. Short-term on-farm storage might be required. FBA Ayla[Φ] has larger seed than PBA Warda[Φ], but smaller than PBA Nasma[Φ], enabling easier sowing for growers while still retaining market preference. PBA Amberley[Φ] (released in 2019) has proven to be a popular variety for southern NSW due to its excellent disease resistance package.

Field pea

A new field pea variety, APB Bondi[Φ], was released in 2023 by Australian Pea Breeding as a Kaspa-type with non-dimpled dun seed. It is a consistently high yielding variety with good resistance to powdery mildew and downy mildew, in addition to 3 virus types: *Pea seed borne mosaic virus* (PSbMV), *Bean leaf roll virus* (BLRV) and *Bean yellow mosaic virus* (BYMV). APB Bondi[Φ] seed is now available for 2025. The 2 new field pea varieties released in 2021 have again performed consistently well: PBA Taylor[Φ] is a high-yielding variety marketable as a Kaspa-type for human consumption that is resistant to PSbMV and BLRV; PBA Noosa[Φ] is the first blue pea with high grain yield, shatter resistant pods and improved resistance to bleaching, which can also offer yield advantages for growers comparable to mainstream Kaspa-type varieties such as PBA Wharton[Φ].

Lentil

There are no new lentil varieties for the 2025 season. Imidazolinone (Group 2) tolerant, Small Red Premium lentil varieties ALB Terrier[Φ] (released 2024) and GIA Thunder[Φ] consistently outperform the benchmark variety PBA Kelpie XT[Φ] in south-eastern NSW NVT trials since 2021, see Table 77 for details. ALB Terrier[Φ] seed is available for the upcoming season.

Lupin

There are no new lupin varieties for the 2025 growing season. The variety Gidgee[Φ] has been withdrawn. Growers should continue to test their seed for *Cucumber mosaic virus* (CMV) and BYMV. Farmer-retained sowing seed with both narrow-leaf (CMV) and albus lupin (BYMV) can be sent for virus testing to:

Joop van Leur,
NSW DPIRD,
4 Marsden Park Road,
Calala, NSW 2340
t: 02 6763 1100

OR

ATTENTION: Quarantine WA
Seed sample – WA DPIRD
Lupin - insert sample weight here (grams)

DELIVERY TO:
Science Store – College Professional Services
Building 340, Room 1.016
90 South St, Murdoch, WA 6150
m: 0421 158 989.

Approved for pickup by **Nazanin Nazeri**
WA DPIRD FOR ARRANGED INSPECTION
E. nazanin.nazeri@dpird.wa.gov.au

Wheat

Key considerations for 2025

» Aim to sow varieties at the beginning of their sowing window for your locality to maximise grain yield potential for the season.

» Choose locally adapted varieties with the highest possible stripe rust resistance.

» High fusarium crown rot (FCR) levels were detected in 2024 cereal paddocks and will be an issue for growing wheat on wheat in 2025. Test high risk paddocks for FCR before sowing and use the best commercially available seed fungicide to reduce plant infection at the seedling stage.

Variety choice

Varietal performance varies from year to year due to seasonal conditions and many other factors. Use varieties yielding consistently well over several years that offer the best combination of yield potential, grain quality and disease resistance.

To ensure high yields, select varieties by considering:

- grain quality to attract premium payments
- good disease resistance
- maturity suited to sowing time
- tolerance to herbicides
- tolerance to soil acidity
- strong seedling vigour
- tolerance to frost
- resistance to lodging and shattering
- tolerance to pre-harvest sprouting
- good threshing ability.

Varieties for each receival zone

Varieties are classified according to their suitability for the 2 receival zones in New South Wales (NSW): northern and south-eastern. The main reason for this division is environmental growing season differences on grain quality, transport and marketing arrangements. This facilitates deliveries by quality grade, maximising grower returns.

Growers can grow the varieties of their choice regardless of classification zone and deliver them to selected clients on a negotiated basis. If a variety is to be accepted into its classification grade, it must be taken to a receival site where that grade is segregated. Certain quality standards must be met before the variety will be accepted.

Segregation is a separate issue from variety approvals.

Varieties are commonly suited to a range of end uses such as pan bread, steam bread or noodles, whereas others have specific uses such as biscuits or pasta, depending on their quality.

Sow on time

Varieties differ in the time they take from sowing to flowering. Late sown (quicker maturing) varieties take fewer days to flower than early sown (late maturing) varieties. Wheat varieties can be broadly classified into a series of maturity groupings based on differences in phenology (flowering time):

- spring wheats: very quick, quick, mid, slow, very slow
- winter wheats: quick, mid and slow.

The suggested sowing windows in this guide have been developed to support variety selection across NSW production regions in order to maximise grain yields and minimise climatic risk at key crop stages. The sowing windows for different varieties have been developed from consultation with wheat breeders, knowledge of key phenology genes, regional agronomic research on variety sowing time responses and performance in National Variety Trials (NVT).

Sowing time is a management compromise between having the crop flowering soon after the last heavy frost, but early enough to allow adequate grain fill before the onset of moisture stress and heat in spring. Yield drops 4–7% with each week of delay in sowing after the optimum time for a specific variety.

Optimal flowering periods (OFPs) have been identified for locations across NSW and underpin the suggested sowing windows for different varieties. The OFP aims to balance the risks of frost at flowering, moisture stress and heat stress during grain filling. If varieties are sown within the optimum sowing period to match the local OFP, they can produce their

CROP MANAGEMENT

Profitable yields result from good management, of which variety choice is only a minor part. To reach their full potential, varieties must be grown in a rotation that minimises the risks from diseases and weeds, and maximises soil fertility and soil moisture storage.

TIPS AND TRICKS

1. Sow at least 2 different varieties each year. This spreads the risk of frost and disease damage.
2. Sowing towards the earliest part of the recommended sowing window usually results in higher yields.

highest yields. Understanding the flowering risk will help growers make variety choices for their farm to suit sowing time preferences or opportunities.

The best sowing date varies and is influenced locally by topography, local climatic conditions and soil types so the suggested sowing dates might need to be extended (earlier or later) based on those conditions.

Conservation tillage techniques (no-till, minimum till) as well as using moisture-seeking sowing tynes can help growers to sow on time.

Sowing date response of wheat varieties

The research project – 'Optimising grain yield potential of winter cereals in the Northern Grains Region' a joint investment by NSW Department of Primary Industries and Regional Development and GRDC under the Grains Agronomy and Pathology Partnership (GAPP) – investigated wheat phenology responses to sowing time in NSW, highlighting the importance of understanding your OFP and how varieties differ in their development and maturity.

The flowering time and grain yield responses to sowing date for some representative wheat phenology groups from Wagga Wagga are presented in figures 1 and 2 and highlight the importance of selecting the right sowing time for a variety to target your region's OFP.

While every season is different, matching a variety's maturity to the correct sowing window minimises production risk and maximises the grain yield potential over the 4 seasons studied. The shading represents the OFP (blue) and the suggested sowing window (green) to achieve OFP for those varieties and presents flowering date and yield responses across 4 contrasting seasons at Wagga Wagga (2017–2020). For the winter wheat EGA_Wedgetail[Φ] (Figure 1), sowing in early–late April provided the best chance of flowering in the OFP for the Wagga Wagga region and maximised grain yield. Delayed sowing resulted in later flowering and a grain yield penalty. Conversely, sowing a quick variety such as Vixen[Φ] (Figure 2 on page 6) in early April resulted in earlier flowering, increased exposure to frost and a yield penalty. However, when sown in late May, grain yield was maximised and flowering aligned with the OFP.

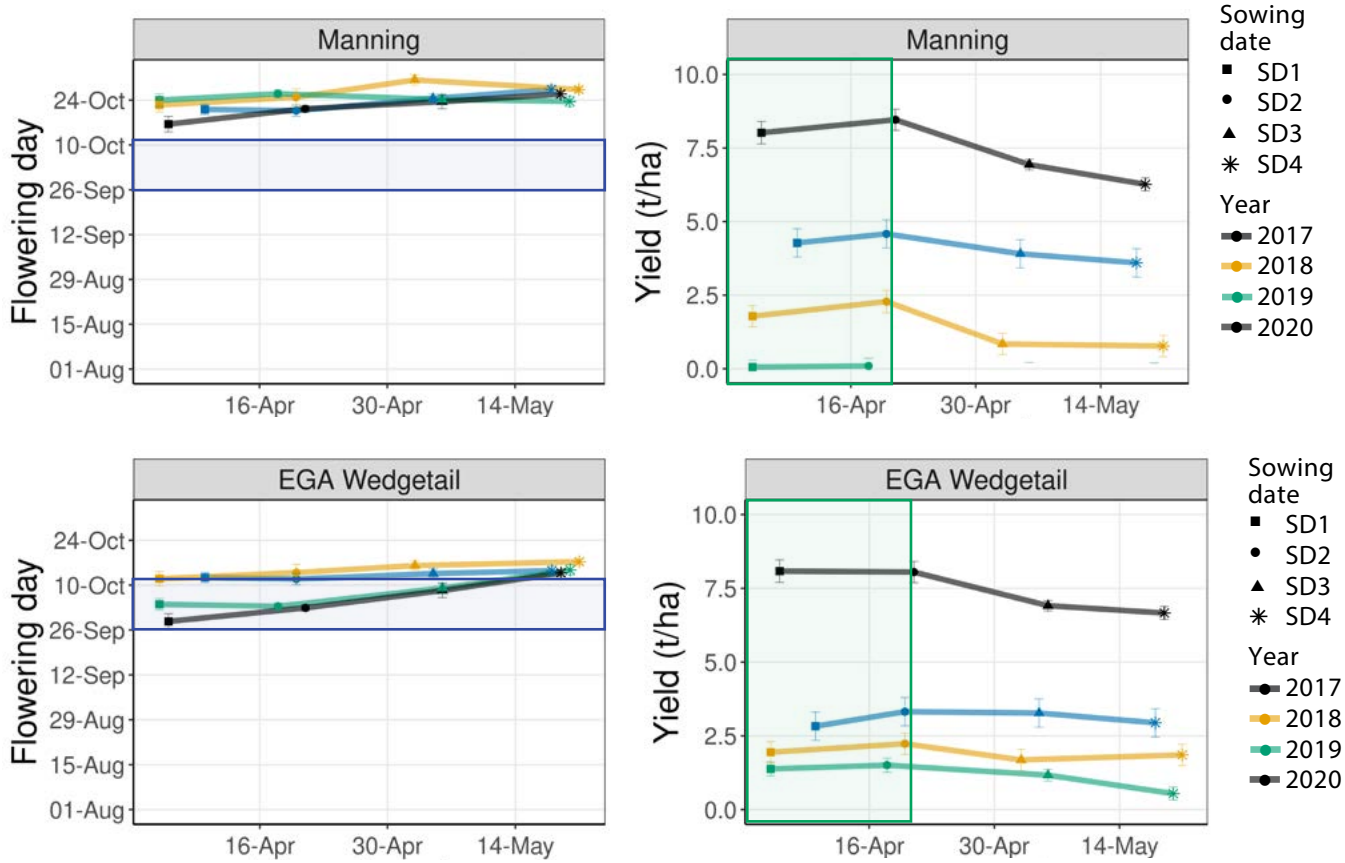


Figure 1. Flowering date and grain yield response of (a) Manning[Φ] and (b) EGA_Wedgetail[Φ] to 4 different sowing dates at Wagga Wagga from 2017 to 2020. The green shaded box indicates the suggested sowing window for the representative variety grouping, e.g. long season very slow winter wheat and mid winter wheat, not specific varieties.

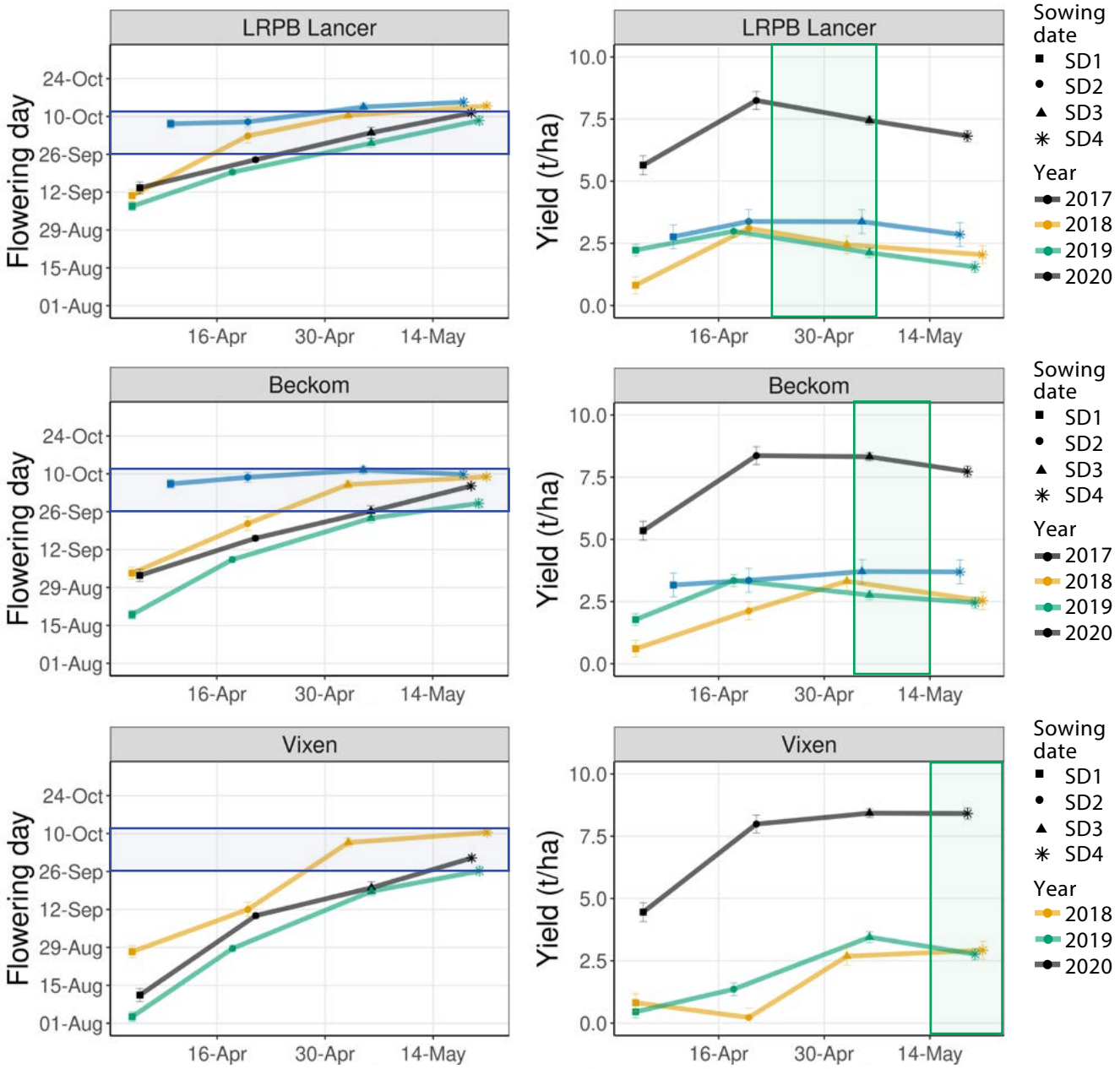


Figure 2. Flowering date and grain yield response of (a) LRPB Lancer(ф), (b) Beckom(ф) and (c) Vixen(ф) to 4 different sowing dates at Wagga Wagga from 2017 to 2020. The green shaded box indicates the suggested sowing window for the representative variety grouping, e.g. mid slow spring wheat, mid spring wheat and a quick spring wheat, not specific varieties.

Disclaimer

The predictions displayed demonstrate the performance of a genotype in an environment where these predictions are composed of both the genotype effect and the environment mean. The environment mean reflects the expected average performance of all the genotypes tested in each environment where an environment is defined as the combination of site, year and sowing date. The possible range of variation around the expected performance of each variety in each environment is displayed in the graphs using small, vertical (error) bars. The vertical error bar for each variety by environment combination denotes the 95% confidence interval.

Acknowledgements

Dr Felicity Harris, Senior Lecturer, Crop Science, Wagga Wagga, Charles Stuart University and Michael Mumford, Biometrician Toowoomba, Queensland Department of Agriculture and Fisheries.

More detailed regional research reports on variety sowing date resonses can be found for southern NSW (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results) and northern NSW (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/ngrt-results)

Sowing rates and plant populations

High yields are possible from a wide range of sowing rates. Wheat can compensate by changing the number of tillers and the size of the head – the number of grains per head in response to the prevailing environment, including weather, fertility and plant competition.

Aim to establish a target number of plants. To achieve this, target a population for the environment and the seasonal conditions. Adjust sowing rates to compensate for:

- sowing date – higher with later sowings
- seed germination
- seed size
- seedling vigour differences
- seedbed conditions
- conservation tillage techniques (no-till, minimum till)
- double cropping
- soil fertility
- soil type
- field losses – under normal conditions, expect to lose up to 20% of seed sown in addition to germination losses. Adjust sowing rates to suit sowing conditions.

Press wheels improve establishment under dry or marginal moisture conditions.

Where herbicide resistance is suspected, higher sowing rates can assist with competition against weeds.

Calculating sowing rates

The following formula can be used to calculate sowing rates, taking into account:

- target plant density (plants/m^2)
- germination percentage (90% = 90 in the formula)
- seed size (1,000 seed weight in grams)
- establishment – usually 80%, unless sowing into adverse conditions (80% = 80 in the formula).

Tip – 1,000 seed weight

- count out 200 seeds
- weigh to at least one decimal point of a gram
- multiply weight in grams by 5.

Example

(1,000 seed weight (grams) .....35..... × target plant population (plants/m^2) .....140..... × 100) ÷ (establishment percentage ..... 80..... × germination percentage .....90.....) = your sowing rate .....68..... kg/ha

Your calculation

(1,000 seed weight (grams) ..... × target plant population (plants/m^2) ..... × 100) ÷ (establishment percentage ..... × germination percentage .....) = your sowing rate ..... kg/ha

Table 1. Wheat sowing rates (kg/ha) for various plant populations (plants/m²) and 1000 seed weight (grams) for different rainfall regions in NSW.

1,000 seed weight (grams)	Target wheat plant population for grain-only crops (plants/m²) ❶													
	Rainfall regions													
	Low					Medium				High and irrigation				
	50	60	70	80	90	100	110	120	130	140	150	160	170	180
20	14	17	19	22	25	28	31	33	36	39	42	44	47	50
22	15	18	21	24	28	31	34	37	40	43	46	49	52	55
24	17	20	23	27	30	33	37	40	43	47	50	53	57	60
26	18	22	25	29	33	36	40	43	47	51	54	58	61	65
28	19	23	27	31	35	39	43	47	51	54	58	62	66	70
30	21	25	29	33	38	42	46	50	54	58	63	67	71	75
32	22	27	31	36	40	44	49	53	58	62	67	71	76	80
34	24	28	33	38	43	47	52	57	61	66	71	76	80	85
36	25	30	35	40	45	50	55	60	65	70	75	80	85	90
38	26	32	37	42	48	53	58	63	69	74	79	84	90	95
40	28	33	39	44	50	56	61	67	72	78	83	89	94	100
42	29	35	41	47	53	58	64	70	76	82	88	93	99	105
44	31	37	43	49	55	61	67	73	79	86	92	98	104	110
46	32	38	45	51	58	64	70	77	83	89	96	102	109	115
48	33	40	47	53	60	67	73	80	87	93	100	107	113	120
50	35	42	49	56	63	69	76	83	90	97	104	111	118	125
52	36	43	51	58	65	72	79	87	94	101	108	116	123	130
54	38	45	53	60	68	75	83	90	98	105	113	120	128	135
56	39	47	54	62	70	78	86	93	101	109	117	124	132	140
58	40	48	56	64	73	81	89	97	105	113	121	129	137	145
60	42	50	58	67	75	83	92	100	108	117	125	133	142	150

❶ Seeding rates (kg/ha) calculated on a 90% germination and 80% establishment basis.

Nutrition

A balance of nutrients is essential for profitable yields. Fertiliser is commonly needed to add phosphorus and nitrogen, which are essential nutrients. The lack of other essential plant nutrients can also limit production in some situations. Growers should soil test before sowing, or if a deficiency is observed in the crop, take plant tissue samples and have them tested. Consult your agronomist on interpreting soil or plant tissue test results.

Knowing a crop's nutrient demand is essential in determining nutrient requirements. Soil testing and nutrient audits help to match nutrient supply to crop demand.

Weed management in winter crops

Herbicide resistance in weeds is a problem that continues to become more widespread throughout NSW, and of which growers need to be aware. It is the biggest threat to cropping-system sustainability. However, this problem can be managed by having good crop and pasture rotations, by rotating herbicide groups and by combining both chemical and non-chemical methods of weed control. See the guide *Weed control in winter crops* for a range of weed management options.

Figure 3. Wheat samples of various sizes; 1000 grain weight.

GO TO PAGE

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Coleoptile length of wheat varieties

Coleoptile length of wheat varieties is an important characteristic when selecting a variety to sow into difficult seedbed conditions. Coleoptile length will affect how deep you can sow a variety before plant emergence is reduced. Coleoptile length has been found to be influenced by several factors including variety, seed size, temperature, low soil moisture and certain seed fungicide dressings. Following are the results of wheat variety screening for coleoptile length as part of the National Variety Testing program, which is funded by GRDC.

Table 2. Predicted mean coleoptile length for durum wheat varieties at 21 NVT sites across Australia from 2010–2015.

Variety	Predicted mean coleoptile length (cm)
Caparoi	7.6
DBA_Aurora	7.6
DBA_Bindaroi	7.6
DBA_Lillaroi	7.9
DBA_Vittaroi	7.5
Jandaroi	7.1
Check varieties	
Federation (long)	9.5
Whistler (short)	6.0

Table 3. Predicted mean coleoptile length for early and long season wheat varieties at 20 NVT sites across Australia from 2008–2015.

Variety	Predicted mean coleoptile length (cm)
Coolah	6.6
DS Faraday	6.1
DS Pascal	5.8
EGA_Gregory	6.3
EGA_Wedgetail	5.9
Flanker	6.2
Gazelle	5.8
Kittyhawk	6.3
Lancer	6.7
Naparoo	6.4
RGT Accroc	6.6
Sunlamb	6.3
Sunmax	6.0
Check varieties	
Federation (long)	9.5
Whistler (short)	5.7

Table 4. Predicted mean coleoptile length for main season wheat varieties at 55 NVT sites from 2008–2015.

Variety	Predicted mean coleoptile length (cm)
Beckom	6.4
Cobra	6.6
Condo	6.5
EGA_Gregory	6.4
Impala	5.7
Janz	7.0
Livingston	6.6
LRPB Oryx	6.0
Mace	6.9
Reliant	6.6
Scepter	6.6
Spitfire	7.1
Suntop	7.1
Check varieties	
Federation (long)	9.8
Whistler (short)	5.9

Grain quality – pre-harvest sprouting and falling numbers

Pre-harvest grain sprouting is a major issue for growers in years when rain is combined with cool temperatures during grain filling, resulting in significant grain downgrading (Figure 4). Wetted mature grain produces an enzyme called alpha-amylase, which affects baking quality; its level is determined by a falling number test. The minimum falling numbers for the major wheat classification grades are shown in Table 5. Additional delivery grades for wheat with low falling numbers can be found on the Grain Trade Australia (GTA) web site.

Table 5. Minimum falling number values for main wheat classification grades.

Wheat classification grade	Minimum falling number (sec)	Comments
Australian Prime Hard (APH1™ & APH2™)	350	
Australian Hard (H1™ & H2™)	300	AUH2™ delivery grade 250
Australian Premium White (APW1™ & APW2)	300	
Australian Standard White (ASW1™)	300	
Australian White Wheat (AWW1)	300	
Australian General Purpose (AGP1™)	200	
Soft wheat (SFT1™ & SFT2)	300	
Durum (DR1™ & DR2)	300	DR3 delivery grade 200
Feed (FED1™)	Not applicable	No minimum number

Source: Grain Trade Australia.

Figure 4. Wheat grain showing pre-harvest sprouting damage.

There are several factors that affect pre-harvest sprouting and falling number:

- Varietal choice – a number of variety attributes can help to maintain falling numbers including:
  - grain dormancy
  - physical characteristics such as the angle of the head as the crop matures
  - ear waxiness
  - absence of awns
  - how tightly the grain is held by the glumes
  - the variety's susceptibility to late-maturity alpha-amylase (LMA).
- **Environment** – rain intensity, frequency and duration combined with associated temperatures can be problematic. Stresses before grain maturation and rain in the lead up to maturation can also influence the grain's susceptibility to sprouting during later rain events. Expression of LMA can occur in different environments, with some varieties suited to northern NSW having increased LMA expression when grown in southern regions.
- **Crop maturity stage** – the susceptibility of a variety to environmental conditions changes in relation to maturation stage. Grain dormancy wears off over time, so the longer the grain is exposed to rainfall, the higher the risk of pre-harvest sprouting.

Managing the risk of pre-harvest sprouting is limited to selecting varieties with a tendency to have high falling numbers and varieties with low susceptibility to LMA, ensuring a variety's maturity is suited to your growing environment and timely harvest.

Falling number index

Researchers from the Department of Primary Industries and Regional Development (DPIRD) of Western Australia have developed a falling number index (FNI). The FNI rates varieties for their ability to maintain falling number under varying conditions. The FNI uses a combination of data from the field, laboratory and through artificial sprouting to determine the risk of a variety exhibiting low falling number on a scale of 1–9; the higher the rating the more likely a variety is to maintain its falling number. Table 6 shows the FNI for selected varieties commonly grown in NSW, from those screened in Western Australia. More information can be found in Wheat grain quality – falling number and pre harvest sprouting resistance.

GO TO PAGES

Grain Trade Australia (http://www.graintrade.org.au)

Wheat grain quality – falling number and pre harvest sprouting resistance (http://www.agric.wa.gov.au/wheat/wheat-grain-quality-falling-number-and-pre-harvest-sprouting-resistance)

Table 6. Falling number index for selected varieties grown in NSW that have been screened by WA DPIRD.

Variety	Falling number index rating
Brumby	6 (P)
Calibre	6 (P)
Catapult	6
DS Pascal	7
Emu Rock	2
Hammer CL Plus	4
Illabo	5
LRPB Cobra	2

Variety	Falling number index rating
LRPB Trojan	5
Mace	5
Razor CL Plus	4
Rockstar	2
Scepter	5
Sheriff CL Plus	4
Valiant CL Plus	2/3 (P)
Vixen	3

(P) Provisional rating based on a single year of data and limited data, treat with caution.

Weathering the fallow

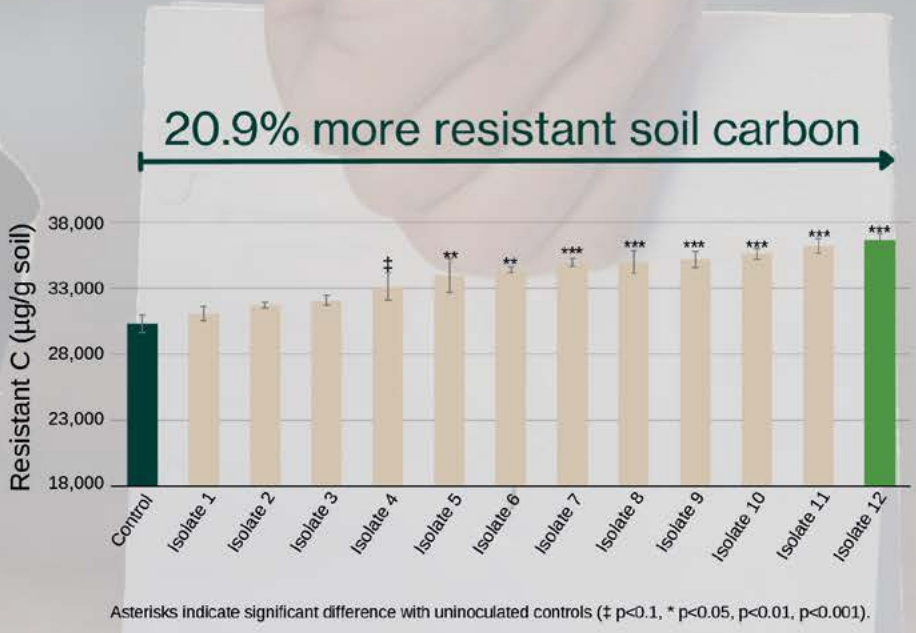
Carbon Builder™ by loam

A team of researchers at Western Sydney University have shown that beneficial fungi can help stabilise soil carbon. During a 135-day soil incubation study, designed to simulate a fallow period, they found that soil which had been inoculated with the fungal treatments, lost less carbon compared to the uninoculated controls. In fact, these treatments increased resistant soil carbon by up to 20.9% compared to the control.

These findings suggest certain fungal treatments can enhance carbon stability, helping guard against carbon losses during both the fallow and subsequent cropping cycles.

The top-performing treatment was isolate 12, the same one found in both CarbonBuilder™ Wheat and CarbonBuilder™ Canola products. Interestingly, soil treated with isolate 12 also had the highest amount of carbon in soil aggregates, which protects the carbon from microbial breakdown, potentially explaining the reduction in carbon losses during the long-term soil incubation study.

This new bio-tech created by Loam's team of scientists is helping farmers across Australia build stable soil carbon.



Asterisks indicate significant difference with uninoculated controls (‡ p<0.1, * p<0.05, p<0.01, p<0.001).

Read the full peer-reviewed publication ▶

Northern NSW – Wheat variety performance

Yield performance experiments from 2020–2024

The yield results presented are NVT 'Production Value' multi-environment trial (MET) data shown on a yearly regional group mean and regional mean basis from 2020–2024. Further results can be found on the NVT website

GO TO PAGE
NVT website
(www.nvtonline.com.au).

Table 7. Long season varieties (north): compared with EGA_Wedgetail = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Wedgetail (t/ha)	**4.65**	**4.25**	**3.79**	**3.56**	**5.50**	**4.28**	
Anapurna ❶	132	125	144	98	119	122	8
BigRed ❶	–	122	137	100	111	120	6
Brighton ❶	–	–	–	110	117	109	3
DS Bennett ❶	105	106	94	110	93	103	8
EGA_Wedgetail ❶	**100**	**100**	**100**	**100**	**100**	**100**	**8**
Illabo ❶	107	111	114	104	117	110	8
Longford ❶	–	115	135	–	–	120	3
Longsword ❶	108	109	124	99	124	111	8
LRPB Kittyhawk ❶	107	102	109	96	101	103	8
LRPB Nighthawk	107	108	116	97	114	107	8
Manning ❶	128	95	100	118	92	109	8
Naparoo ❶	101	96	103	86	86	95	8
RGT Accroc ❶	123	118	119	104	101	114	8
RGT Cesario ❶	–	117	129	97	96	115	6
RGT Waugh ❶	–	110	–	–	–	117	2
Severn ❶	–	107	117	102	110	109	6
Stockade	–	–	–	–	117	114	1
Triple 2 ❶	–	–	–	–	133	125	1

❶ Winter wheat

Table 8. Early season variety trial results northern NSW (sown before 15 May): compared with EGA_Gregory = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	**4.41**	**5.20**	**4.22**	**3.59**	**4.95**	**4.44**	
Brighton ❶	–	–	107	98	108	104	12
Catapult	–	113	93	113	116	110	17
Coolah	108	110	106	107	110	108	22
Coota	110	113	99	110	114	109	22
DS Faraday	102	101	98	102	–	101	19
EG Titanium	102	101	97	101	99	100	22
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**22**
EGA_Wedgetail ❶	81	96	114	78	93	92	19
Genie	–	–	–	104	122	110	8
Illabo ❶	87	103	109	85	105	97	19
Intrigue	–	–	116	112	112	113	12
Jumbuck	–	–	–	112	119	120	8
Leverage	–	–	122	115	120	119	12
Longsword ❶	93	104	73	95	114	96	19
LRPB Flanker	99	101	105	100	103	101	22
LRPB Kittyhawk ❶	88	96	97	85	92	92	19
LRPB Lancer	102	105	101	102	107	103	22
LRPB Major	–	–	–	–	115	113	3
LRPB Nighthawk	97	107	118	94	104	104	22
LRPB Optimus	–	–	117	109	121	114	12
LRPB Raider	111	111	111	109	108	110	22
LRPB Stealth	106	108	105	106	108	107	22
Rockstar	111	114	96	111	119	111	22
Scotch ❷	–	–	121	95	111	105	12
Severn ❶	–	106	109	85	–	98	14
Sundancer	–	–	121	111	117	115	12
Sunflex	109	–	101	108	116	109	17
Sunmax	104	106	101	100	100	103	22
Wallaroo ❶	–	–	–	–	113	107	3
Feed wheats							
RGT Zanzibar	102	120	134	100	124	115	22

❶ Winter wheat
❷ Soft/biscuit wheat variety.

Table 9. Early season variety trial results northern NSW (sown before 15 May): compared with EGA_Gregory = 100%.

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	**4.02**	**5.79**	**4.77**	**2.84**	**5.32**	**4.58**	
Brighton [1]	–	–	–	98	106	105	8
Catapult	116	116	107	108	114	112	26
Coolah	109	110	109	105	109	109	26
Coota	110	114	110	105	112	111	26
DS Faraday	103	101	99	101	–	101	21
EG Titanium	102	101	98	101	99	100	26
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**26**
EGA_Wedgetail [1]	57	92	112	83	90	92	18
Genie	–	–	–	99	119	113	8
Illabo [1]	64	101	117	87	101	99	16
Intrigue	–	–	112	109	112	113	17
Jumbuck	–	–	–	108	119	121	8
Leverage	–	–	123	110	119	120	17
Longsword [1]	74	107	104	91	108	100	18
LRPB Flanker	100	101	104	99	103	102	26
LRPB Kittyhawk [1]	70	94	101	89	90	91	18
LRPB Lancer	100	105	106	100	106	104	26
LRPB Major	–	–	–	111	113	114	10
LRPB Nighthawk	85	105	117	95	102	104	26
LRPB Optimus	–	–	–	–	120	116	5
LRPB Raider	115	111	110	107	108	110	26
LRPB Stealth	107	108	108	103	108	107	26
Rockstar	110	117	112	105	116	113	24
Scotch [2]	–	–	121	95	110	107	17
Sundancer	–	–	120	107	117	116	17
Sunflex	106	–	113	104	113	111	19
Sunmax	97	105	104	101	98	102	24
Wallaroo [1]	–	–	–	–	110	108	5

[1] Winter wheat.

GRDC NATIONAL VARIETY TRIALS

Table 10. Main season variety trial results northern NSW (sown after 14 May): compared with EGA_Gregory = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	**4.60**	**4.86**	**4.55**	**2.44**	**5.25**	**4.40**	
Beckom	105	106	115	111	112	109	23
Boree	101	117	95	108	115	109	23
Borlaug 100	108	104	120	105	115	110	23
Calibre	–	111	104	112	118	111	17
Coolah	104	110	105	101	107	106	23
Coota	100	114	91	105	110	106	23
DS Faraday	102	100	100	100	–	100	19
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**23**
Intrigue	–	–	118	121	114	113	11
Ironbark	–	–	–	117	113	108	8
Jillaroo	–	114	92	112	116	109	17
Jumbuck	–	–	–	111	111	113	8
Leverage	–	–	122	121	114	115	11
LRPB Flanker	102	100	104	102	102	102	23
LRPB Hellfire	99	101	99	104	105	101	23
LRPB Impala ❷	97	–	114	103	103	100	17
LRPB Lancer	–	–	105	103	101	102	11
LRPB Matador	–	–	–	–	112	106	4
LRPB Mustang	101	101	103	115	111	105	23
LRPB Optimus	–	–	111	108	109	108	11
LRPB Oryx ❷	98	100	115	106	108	103	20
LRPB Raider	105	109	109	111	105	107	23
LRPB Reliant	104	100	102	107	105	103	23
LRPB Spitfire	91	97	95	94	99	95	23
LRPB Tracer	–	–	–	111	110	106	8
RGT Healy	–	102	129	114	111	110	17
Rockstar	100	116	93	107	111	107	23
Scepter	104	115	104	–	–	110	15
Shotgun	–	–	–	–	119	112	4
Sunblade CL Plus	107	111	117	114	115	112	23
Suncentral	108	104	126	121	115	112	23
Sunchaser	103	96	120	110	107	105	23
Sundancer	–	–	–	116	111	111	8
Sunmaster	108	110	125	117	117	113	23
Sunprime	102	100	101	110	110	104	23
Suntop	104	104	117	112	109	107	23
Vixen	98	114	93	111	116	107	23
Feed wheats							
SEA Condamine	105	102	115	95	109	105	23
SEA Stockman	95	98	–	94	103	97	20

❷ Soft/biscuit wheat variety.

Table 11. Main season variety trial results northern NSW (sown after 14 May): compared with EGA_Gregory = 100%.

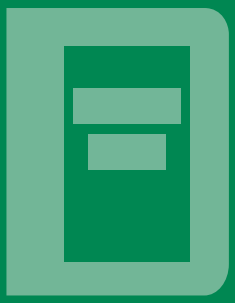
North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	3.96	5.48	5.03	2.27	4.67	4.33	
Beckom	106	107	115	108	112	110	33
Boree	110	110	109	109	116	111	33
Bourlag 100	106	107	120	106	114	111	33
Calibre	–	111	111	113	118	112	26
Condo	100	100	117	105	107	106	33
Coolah	105	106	108	99	107	106	33
Coota	109	106	97	105	109	105	33
DS Faraday	100	101	99	100	–	100	27
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**33**
Intrigue	–	–	110	111	113	111	19
Ironbark	–	–	–	114	112	108	12
Jillaroo	–	109	99	113	115	109	26
Leverage	–	–	119	110	115	115	19
LRPB Flanker	100	102	105	101	102	102	33
LRPB Hellfire	104	98	96	104	103	100	33
LRPB Impala ❷	97	–	115	103	103	103	26
LRPB Lancer	–	–	104	99	101	101	19
LRPB Matador	–	–	–	–	111	106	6
LRPB Mustang	106	101	101	113	109	105	33
LRPB Optimus	–	–	–	104	109	108	12
LRPB Oryx ❷	–	–	117	105	107	106	19
LRPB Raider	105	108	106	102	105	106	33
LRPB Reliant	103	102	99	106	104	102	33
LRPB Spitfire	99	92	95	98	97	95	33
LRPB Tracer	–	–	–	108	109	106	12
RGT Healy	–	107	125	107	111	112	26
Rockstar	109	109	106	106	112	108	33
Scepter	111	110	111	109	116	111	33
Shotgun	–	–	–	–	118	113	6
Sunblade CL Plus	109	110	115	108	114	112	33
Suncentral	107	108	119	112	114	112	33
Sunchaser	101	100	112	106	106	105	33
Sundancer	–	–	–	108	111	110	12
Sunmaster	109	110	121	109	116	114	33
Sunprime	105	101	99	111	108	104	33
Suntop	105	104	110	106	108	106	33
Vixen	110	106	106	113	116	109	33
Feed wheats							
SEA Condamine	103	103	117	99	108	107	33
SEA Stockman	100	95	–	101	101	98	26

❷ Soft/biscuit wheat variety.

NVT tools

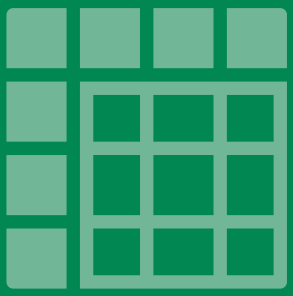
GRDC NATIONAL VARIETY TRIALS™

Harvest Reports & Crop Sowing Guides



Trial results

Long Term Yield Reporter



NVT Disease Ratings

Subscribe

NVT Trial Notification Service

Get an email the moment results for your local NVT trials are available.

NVT publications

Get an email as soon as your selected NVT Harvest Report is published.

nvt.grdc.com.au

@GRDC_NVT

Suggested sowing times – Northern NSW

Aim to sow grain-only crops in the earlier part of the optimum period. The actual date is influenced by location, soil fertility and the likelihood of frost at flowering in a particular paddock. Sowing windows for specific varieties vary across the regions and the tables are provided as a guide. Sowing decisions should be made according to the relative maturity of each variety.

Table 12. Suggested sowing times northern NSW – wheat.

Variety	March				April				May				June				July		
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Slopes																			
Anapurna ❶, Mackellar ❶, Manning ❶, RGT Accroc ❶ RGT Cesario ❶, RGT Waugh ❶	>	★	★	★	★	★	★	★	<										
DS Bennett ❶, Severn ❶		>	★	★	★	★	★	★	★	<									
Brighton❶, EGA_Wedgetail ❶, Illabo ❶, Kittyhawk ❶, Naparoo ❶, Wallaroo ❶		>	>	★	★	★	★	★	★	<									
Sunlamb				>	★	★	★	★	<										
Longsword ❶				>	★	★	★	★	★	<									
Sunmax					>	★	★	★	<	<									
Genie, Lancer, Raider, RGT Zanzibar, Stealth, Sunflex, Valiant CL Plus						>	★	★	★	★	<								
Coota, Coolah, DS Faraday, EG Titanium, EGA_Gregory, Flanker, Gazelle, Intrigue, Jumbuck, Leverage, Major, Rockstar, Scotch, Sheriff CL Plus, Sundancer							>	★	★	★	<								
Optimus								>	★	★	★	★	<						
Beckom, Boree, Impala, Ironbark, Oryx, Reliant, Scepter, Shotgun, Sunblade CL Plus, Sunmaster, Suntop, Tracer									>	★	★	★	★	<					
Calibre, Condo, Hellfire, Jillaroo, Mustang, RGT Healy, Spitfire, Suncentral, Sunchaser, Sunprime, Vixen											>	★	★	★	★	<	<		
Plains																			
Brighton ❶, EGA_Wedgetail ❶, Illabo ❶, Kittyhawk ❶, Longsword ❶, Naparoo❶, Sunlamb, Wallaroo ❶				>	★	★	★	★	<										
Sunmax						>	★	★	★	<									
Genie, Raider, Sunflex, Valiant CL Plus						>	>	★	★	★	★	<	<						
Coota, Coolah, DS Faraday, EG Titanium, EGA_Gregory, Flanker, Intrigue, Jumbuck, Lancer, Leverage, Major, Rockstar, Sheriff CL Plus, Stealth, Sundancer								>	★	★	★	<							
Beckom, Ironbark, Optimus									>	★	★	★	<						
Boree, Impala, Oryx, Reliant, Scepter, Shotgun, Sunblade CL Plus, Sunmaster, Suntop, Tracer									>	★	★	★	★	<	<				
Calibre, Condo, Hellfire, Jillaroo, Mustang, RGT Healy, Spitfire, Suncentral, Sunchaser, Sunprime, Vixen											>	★	★	★	★	<			

> Earlier than ideal, but acceptable.

★ Optimum sowing time.

< Later than ideal, but acceptable.

❶ Winter wheat sowing window can be extended earlier, provided crops are grazed to delay reproductive development.

Note: For durum suggested sowing times see Table 21. Suggested sowing times, Durum wheat varieties on page 40.

Southern NSW – Wheat variety performance

Yield performance experiments from 2020–2024

The yield results presented are NVT 'Production Value' multi-environment trial (MET) data shown on a yearly regional group mean and regional mean basis from 2020–2024. Further results can be found on the NVT website.

Table 13. Long season varieties (southern): compared with EGA_Wedgetail = 100%.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024 ❸		
% EGA_Wedgetail (t/ha)	**5.47**	**6.47**	**5.52**	**6.02**	**–**	**5.87**	
Anapurna ❶	130	133	158	107	–	131	16
BigRed ❶	–	131	160	103	–	130	12
Brighton ❶	–	–	–	114	–	108	4
DS Bennett ❶	108	113	115	101	–	109	16
EGA_Wedgetail ❶	**100**	**100**	**100**	**100**	**–**	**100**	**16**
Illabo ❶	116	117	118	108	–	115	16
Longford ❶	–	128	166	99	–	129	12
Longsword ❶	107	103	103	113	–	107	16
LRPB Kittyhawk ❶	104	104	112	98	–	104	16
LRPB Nighthawk	111	111	115	104	–	110	16
Manning ❶	113	107	137	94	–	112	16
Naparoo ❶	95	96	108	87	–	96	16
RGT Accroc ❶	126	133	154	99	–	127	16
RGT Cesario ❶	124	129	163	94	–	127	16
RGT Waugh ❶	125	123	167	93	–	126	16
Severn ❶	–	107	117	105	–	109	12
Stockade	–	–	136	108	–	125	8

❶ Winter wheat.
❸ All long season wheat trials in the south east NVT region were damaged by frost in 2024.

Table 14. Early season variety trial results (sown before 15 May): compared with EGA_Gregory = 100%.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	**5.25**	**5.79**	**5.20**	**4.87**	**5.17**	**5.29**	
Brighton ❶	–	–	119	112	112	122	12
Catapult	116	111	100	118	115	111	24
Coolah	116	112	111	106	106	111	24
Coota	114	108	99	118	110	110	24
DS Faraday	97	99	101	100	–	99	22
DS Pascal	125	117	120	107	101	117	24
EG Titanium	103	100	97	103	102	101	24
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**24**
EGA_Wedgetail ❶	114	108	112	94	99	107	24
Genie	–	–	–	116	108	121	7
Illabo ❶	126	118	125	103	98	117	24
Intrigue	–	–	–	107	–	105	5
Jumbuck	–	–	–	–	105	118	2
Leverage	–	–	123	118	108	122	12
Longsword ❶	123	113	110	115	103	114	24
LRPB Flanker	103	106	107	100	102	104	24
LRPB Kittyhawk ❶	114	108	111	94	99	107	24
LRPB Lancer	111	104	107	102	96	105	24
LRPB Major	–	–	116	117	110	120	12
LRPB Nighthawk	123	115	119	100	99	114	24
LRPB Optimus	–	–	121	118	100	120	12
LRPB Raider	116	113	112	107	106	112	24
LRPB Stealth	114	109	111	105	99	109	24
LRPB Trojan	111	106	99	116	–	108	22
Packer	–	–	–	120	120	120	7
Rockstar	125	121	115	120	113	120	24
Scotch ❷	–	121	125	110	100	121	18
Severn ❶	–	119	125	103	101	117	18
Sheriff CL Plus	112	107	99	117	109	109	24
Sundancer	–	–	125	113	104	121	12
Sunflex	127	–	115	109	108	117	18
Valiant CL Plus	125	119	116	111	110	118	24
Wallaroo ❶	–	–	–	112	106	129	7
Feed wheats							
BigRed ❶	–	139	158	92	101	131	18
RGT Zanzibar	142	132	139	114	100	130	24
Triple 2 ❶	–	–	–	–	119	135	2

❶ Winter wheat.
❷ Soft/biscuit wheat variety.

Table 15. Early season variety trial results (sown before 15 May): compared with EGA_Gregory = 100%.

South west ❶							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	5.20	5.52	4.83	5.08	4.77	5.10	
Brighton ❶	–	–	114	110	120	116	18
Catapult	113	116	102	115	114	112	32
Coolah	108	111	109	106	110	109	32
Coota	112	114	102	114	113	111	32
DS Pascal	112	114	117	107	114	113	32
EG Titanium	101	102	98	102	102	101	32
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**32**
EGA_Wedgetail ❶	101	102	106	95	104	102	32
Genie	–	–	–	114	118	118	11
Illabo ❶	111	112	119	103	113	112	32
Intrigue	–	–	–	106	–	106	6
Jumbuck	–	–	–	–	115	114	5
Leverage	–	–	122	117	119	120	18
Longsword ❶	114	115	109	112	116	113	32
LRPB Flanker	103	103	107	101	102	103	32
LRPB Kittyhawk ❶	100	102	106	94	104	101	32
LRPB Lancer	104	103	104	101	106	103	32
LRPB Major	–	–	116	115	118	117	18
LRPB Nighthawk	107	109	113	100	111	108	32
LRPB Optimus	–	–	–	–	120	119	5
LRPB Raider	109	111	110	107	110	109	32
LRPB Stealth	107	108	109	104	108	107	32
LRPB Trojan	111	112	102	113	–	110	27
Packer	–	–	–	117	120	117	11
Rockstar	119	122	116	118	119	119	32
Scotch ❷	–	117	121	110	118	116	25
Sheriff CL Plus	111	113	102	113	112	110	32
Sundancer	–	–	123	113	117	118	18
Sunflex	112	–	111	107	116	112	25
Valiant CL Plus	114	117	114	110	115	114	32
Wallaroo ❶	–	–	–	112	123	122	11
Feed wheats							
BigRed ❶	–	118	146	–	–	120	14
RGT Zanzibar	124	125	134	115	124	125	32

❶ Winter wheat.
❷ Soft/biscuit wheat variety.

GRDC NATIONAL VARIETY TRIALS™

Table 16. Main season variety trial results – southern (sown after 14 May): compared with EGA_Gregory = 100%.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	5.43	5.82	5.63	4.40	5.27	5.30	
Beckom	116	114	112	114	109	114	25
Boree	117	107	100	117	107	110	25
Brumby	–	115	109	121	109	115	19
Calibre	113	111	105	123	113	113	25
Condo	110	110	112	107	97	109	25
Coolah	110	107	105	102	100	106	25
Coota	113	103	93	112	103	105	25
DS Faraday	102	103	99	102	–	102	23
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**25**
Hammer CL Plus	100	103	98	112	105	103	25
Ironbark	–	–	–	117	108	117	8
Kingston	–	–	108	115	103	113	13
Leverage	–	–	–	109	108	115	8
LRPB Flanker	104	104	105	101	102	103	25
LRPB Hellfire	100	101	98	103	100	101	25
LRPB Impala ❷	104	–	–	–	–	106	6
LRPB Matador	–	–	–	–	109	113	2
LRPB Mustang	106	103	99	109	101	104	25
LRPB Optimus	–	–	116	104	99	112	13
LRPB Oryx ❷	108	110	111	106	98	108	25
LRPB Parakeet	95	101	101	97	97	98	25
LRPB Raider	109	108	105	101	100	106	25
LRPB Reliant	94	99	99	102	102	99	25
LRPB Spitfire	96	101	97	99	91	98	25
LRPB Tracer	–	–	–	113	102	108	8
Razor CL Plus	109	109	100	114	96	107	25
Reilly	–	–	109	108	101	109	13
RGT Healy	–	114	121	107	–	115	17
RGT Ponsford	–	–	–	117	107	116	8
Rockstar	122	113	106	116	107	114	25
Scepter	118	113	107	120	106	114	25
Shotgun	–	–	–	124	112	117	8
Sunblade CL Plus	119	116	113	112	106	115	25
Suncentral	118	113	113	110	105	113	25
Sunchaser	104	102	106	102	100	103	25
Sundancer	–	–	–	105	104	111	8
Sunmaster	123	120	120	113	107	118	25
Sunprime	101	102	98	108	102	102	25
Suntop	–	109	108	106	102	108	19
Tomahawk CL Plus	–	–	107	126	111	117	13
Vixen	120	108	98	120	104	111	25

❷ Soft/biscuit wheat variety.

Table 17. Main season variety trial results – southern (sown after 14 May): compared with EGA_Gregory = 100%.

South west ❹							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% EGA_Gregory (t/ha)	4.51	5.38	5.20	4.48	4.61	4.86	
Ballista	111	115	112	112	118	114	41
Beckom	112	112	110	112	117	112	41
Boa	–	–	–	–	123	116	6
Boree	113	114	104	114	118	112	41
Brumby	–	115	109	115	120	114	32
Calibre	112	116	106	116	119	113	41
Condo	105	104	112	104	105	106	41
Coolah	106	105	105	104	109	106	41
Coota	109	108	93	107	116	106	41
EGA_Gregory	**100**	**100**	**100**	**100**	**100**	**100**	**41**
Hammer CL Plus	102	105	96	105	107	102	41
Ironbark	–	–	–	114	120	115	14
Kingston	–	–	107	110	118	111	23
Leverage	–	–	–	113	118	114	14
LRPB Cobra	109	109	104	–	–	108	20
LRPB Flanker	103	103	105	103	103	103	41
LRPB Hellfire	100	101	96	100	104	100	41
LRPB Impala ❷	100	–	–	–	–	103	9
LRPB Matador	–	–	103	114	123	113	23
LRPB Mustang	104	103	98	103	107	103	41
LRPB Optimus	–	–	–	104	111	108	14
LRPB Oryx ❷	104	104	109	103	106	105	20
LRPB Parakeet	96	98	99	96	98	98	41
LRPB Raider	105	104	103	102	109	105	41
LRPB Reliant	98	98	97	99	97	98	41
LRPB Spitfire	95	99	95	94	100	96	41
LRPB Tracer	–	–	–	107	115	106	14
Razor CL Plus	105	107	98	104	112	105	41
Reilly	–	–	107	106	112	108	23
RGT Healy	–	105	119	110	–	111	26
RGT Ponsford	–	–	–	115	121	116	14
Rockstar	115	116	108	114	122	114	41
Scepter	113	114	107	114	119	113	41
Shotgun	–	–	–	118	125	117	14
Sunblade CL Plus	113	112	110	111	120	112	41
Suncentral	112	110	113	110	114	112	41
Sunchaser	102	97	105	100	98	101	41
Sundancer	–	–	–	108	114	110	14
Sunmaster	115	112	116	112	120	115	41
Sunprime	102	103	98	103	104	102	41
Suntop	–	104	105	104	110	106	32
Tomahawk CL Plus	–	–	108	119	125	117	23
Vixen	114	116	103	114	120	113	41
Feed wheats							
RGT Zanzibar	124	125	133	99	101	119	25

❷ Soft/biscuit wheat variety.
❹ Includes irrigated trials.

CEREAL, OILSEEDS, PULSES

"It all begins with seed"

WARATAH Seed Co. Ltd

- Insist on **Hart Bros** quality assured seed
- Growing, cleaning, sales, distribution and research of all broadacre seed varieties

ADVANTA · BARENBRUG · BAYER · CSIRO · INTERGRAIN · nuSEED · pbseeds · S&W · Seednet · AGT · BASF · Cargill · NSW Department of Primary Industries · LongReach · PACIFIC SEEDS · PIONEER · RAGT · syngenta

HART BROS SEEDS
It all begins with Seed



office@hbseeds.com.au www.hartbrosseeds.com.au
Phone: 02 6924 7206 Fax: 02 6924 7271
263 Coffin Rock Road, via Goldfields Way, Erin Vale NSW 2663

Hart Bros Seeds Spring Field Day, always the 2nd Wednesday in October.

Suggested sowing times – Southern NSW

Aim to sow grain-only crops in the earlier part of the optimum period. The actual date is influenced by location, soil fertility and the likelihood of frost at flowering in a particular paddock. Sowing windows for specific varieties vary across the regions and the tables are provided as a guide. Sowing decisions should be made according to the relative maturity of each variety.

Table 18. Suggested sowing times southern NSW – wheat.

Variety	March				April				May				June				July		
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Slopes																			
Anapurna ❶, BigRed ❶, Longford ❶, Mackellar ❶, Manning ❶, RGT Accroc ❶, RGT Cesario ❶, RGT Waugh ❶	>	★	★	★	★	★	★	★	<										
DS Bennett ❶, Severn ❶		>	★	★	★	★	★	★	★	<									
Brighton ❶, EGA_Wedgetail ❶, Illabo ❶, Kittyhawk ❶, Naparoo ❶, Triple 2 ❶, Wallaroo ❶		>	>	★	★	★	★	★	★	<									
Nighthawk, Stockade, Sunlamb				>	★	★	★	★	<										
Longsword ❶				>	★	★	★	★	★	<									
Sunmax					>	★	★	★	<										
DS Pascal, RGT Zanzibar, Sunflex, Valiant CL Plus						>	★	★	★	★	<								
Catapult, Coolah, Coota, DS Faraday, EG Titanium, EGA_Gregory, Flanker, Genie, Intrigue, Jumbuck, Lancer, Leverage, Major, Packer, Raider, Rockstar, Scotch, Sheriff CL Plus, Stealth, Sundancer							>	★	★	★	★	<							
Beckom, Brumby, Ironbark, Kingston, Optimus, RGT Ponsford, Sunblade CL Plus, Sunmaster, Suntop, Tracer, Trojan								>	★	★	★	<							
Boree, Calibre, Impala, Matador, Oryx, Parakeet, Reilly, Reliant, Scepter, Shotgun, Sunchaser, Tomahawk CL Plus									>	★	★	★	★	<					
Condo, Hammer CL Plus, Hellfire, Mustang, Razor CL Plus, Spitfire, Suncentral, Sunprime, Vixen										>	★	★	★	★	<				
Plains																			
DS Bennett ❶			>	★	★	★	★	<	<										
Brighton ❶, EGA_Wedgetail ❶, Illabo ❶, Kittyhawk ❶, Nighthawk, Stockade, Sunlamb				>	★	★	★	★	<	<									
Longsword ❶, Wallaroo ❶				>	★	★	★	★	★	<									
Sunmax					>	★	★	★	<										
DS Pascal, Raider, Sunflex, Valiant CL Plus							★	★	★	★	<								
Catapult, Coolah, Coota, DS Faraday, EG Titanium, EGA_Gregory, Flanker, Genie, Intrigue, Jumbuck, Lancer, Leverage, Major, Packer, Rockstar, Scotch, Sheriff CL Plus, Stealth, Sundancer							>	★	★	★	★	<							
Beckom, Brumby, Boree, Ironbark, Kingston, Matador, Optimus, Reliant, RGT Ponsford, Scepter, Shotgun, Sunblade CL Plus, Sunmaster, Suntop, Tomahawk CL Plus, Tracer, Trojan								>	★	★	★	<							
Ballista, Boa, Calibre, Cobra, Corack, Hammer CL Plus, Impala, Oryx, Parakeet, Reilly, Sunchaser									>	★	★	★	<	<					
Condo, Hellfire, Mustang, Razor CL Plus, Spitfire, Suncentral, Sunprime, Vixen									>	>	★	★	★	★	<				

> Earlier than ideal, but acceptable.

★ Optimum sowing time.

< Later than ideal, but acceptable.

❶ Winter wheat sowing window can be extended earlier, provided crops are grazed to delay reproductive development.

Note: For durum suggested sowing times see Table 21, Suggested sowing times, Durum wheat varieties on page 40.

Table 19. Wheat varietal characteristics and reaction to diseases. (Page 1 of 3.)

Variety	Maximum quality classification		Resistances and tolerances																	Origin	Year of release
	North zone	South-east zone	Crown rot	Common root rot ❶	Leaf rust ❹	Stem rust	Stripe rust ❷❸	Powdery mildew ❺	Septoria tritici blotch ❹	Yellow leaf spot	RLN *P. thornei* resistance	RLN *P. thornei* tolerance	RLN *P. neglectus* resistance	RLN *P. neglectus* tolerance	CCN resistance	Blackpoint	Sprouting	Lodging	Acid soils tolerance		
Bread wheat																					
Ballista	AH	AH	S	MS	S	MR	MS–S	S–VS	S–VS	MS	MR–MS	MI	S	MT–MI	MR–MS	MS	MS–S (P)	MR (P)	–	AGT	2020
Beckom	AH	AH	S	MS–S	MS–S	MR–MS	MR–MS	S	S	MS–S	MS–S	T–MT	S	MT–MI	R	MR–MS	MS–S	MR–MS	T–MT	AGT	2015
Boa	FEED	AH	MS–S (P)	–	MR	MS	MR–MS	S	S	MR–MS	VS	MI (P)	S	MT (P)	R (P)	–	–	MR (P)	MT (P)	LongReach	2024
Boree	APH	APH	S	–	S	MR	S–VS	S–VS	S–VS	MR–MS	MS–S	MI–I	S	I	MS–S	S	–	–	–	AGT	2021
Borlaug 100	AH	FEED	MS–S	–	MR	MR	S–VS	–	MS–S	MR–MS	MS	T–MT	S	T	MS	MS–S	–	–	–	Rebel Seeds	2018
Brighton	APH	APH	S	–	S	MR–MS	MR–MS	S–VS	S	MR–MS	MS	MT–MI	S	VI (P)	R	MR–MS (P)	–	–	–	AGT	2024
Brumby	FEED	APW	S	–	S–VS	MR	MS	MS–S	S	MR–MS	MS	MI	MR–MS	T–MT	MR–MS	MS–S	–	–	–	InterGrain	2022
Calibre	APH	APH	S	–	S	MR	S	MS–S	S	MR–MS	MS–S	MI–I	S	MT	MR–MS	MS–S	–	–	–	AGT	2021
Catapult	AH	AH	MS–S	MS	S	MR	S	S	MS–S	MR–MS	MS	MT	S	MI–I	R	S	MS–S	MR–MS	MT	AGT	2019
Condo	AH	AH	S	MS–S	S	MR	MR–MS & MS	S	S	MS	MS	T–MT	S	MT	MR	MS	S	MR–MS	MT	AGT	2014
Coolah	APH	APH	MS–S	S	R–MR	MR	MS–S	MS–S	MS–S	MS–S	MS	MT	S	MT	S	S	S	MR–MS	MT	AGT	2016
Coota	APH	APH	MS–S	MS	MR	R–MR	S	S	S	MS–S	MS	MT–MI	MR	MI	MR	MS	MS–S (P)	MR (P)	–	AGT	2020
DS Bennett	FEED	ASW	VS	S	S–VS	MS	S	R	MS–S	MR–MS	S	–	S	–	S	MS–S	–	–	–	Trigall Australia.	2018
DS Pascal	AH	APW	S	MS	MR–MS	MS–S	MR–MS	R–MR	MS–S	MS	S	I–VI	S	MT–MI	S	MS	–	–	–	Trigall Australia	2015
EG Titanium	APW	FEED	MS–S	–	MS	MS	MR	S	MS–S	MS–S	MS–S	MT–MI	MS–S	MT–MI	R	MS–S	–	–	–	EPG Seeds	2020
EGA_Gregory	APH	APH	S	MS–S	MR	MR	MS	MS–S	MS–S	S	MS–S	MT	S	MT	S	MS–S	S	MS–S	MT	EGA	2004
EGA_Wedgetail	AH	APH	S	–	MS–S	MR–MS	MS	MS–S (P)	MS–S	MS–S	VS	MI–I	S	MI–I	S	MS	S	MR	T–MT	EGA	2002
Genie	FEED	AH	MS (P)	–	S	MR–MS	MS–S	S–VS	S	MR–MS (P)	MR–MS	I–VI (P)	MS (P)	I–VI (P)	MS–S (P)	–	–	–	–	InterGrain	2023
Hammer CL Plus	FEED	AH	MS–S	MS–S	S	MR	MS	S	MS–S	MR–MS	S	I	MS–S	MT–MI	MR–MS	MR–MS	MS–S (P)	MR–MS (P)	–	AGT	2020
Illabo	AH	APH	S	MS–S	S	MR	MR–MS	R–MR	MS–S	MS	MS–S	MI–I	MS–S	VI	MR–MS	MR–MS	MS (P)	MR (P)	MT (P)	AGT	2018
Intrigue	APH	APH	MS–S	–	MR	MR	MR	S	MS–S	MS	MR–MS	T–MT	S	MT (P)	MS	S (P)	–	–	–	AGT	2023
Ironbark	NYC	AH	MS–S (P)	–	MR–MS	MS	MR	S	S	MS–S	MR (P)	MT–MI (P)	S	I–VI (P)	MS (P)	–	–	–	–	AGT	2024
Jillaroo	AH	AH	S	–	S	MS	S	S	S	MS	MS (P)	MI–I	S	I	MS	MS	–	–	–	InterGrain	2022
Jumbuck	AWW	AWW	MS–S (P)	–	R–MR	MR–MS	MR–MS	MS–S	MS–S	MS	MS–S	T–MT (P)	–	T (P)	R (P)	–	–	–	–	InterGrain	2023
Kingston	FEED	AH	S	–	S	S	MS–S	S	S	MS–S	MR	MT–MI	S	MT–MI	R	MS–S	–	MR (P)	–	RAGT	2022
Leverage	APH	APH	S	–	R–MR	MR	MR–MS	S–VS	S	MR–MS	MS	T–MT	S	T–MT (P)	MS	MS–S (P)	–	–	–	AGT	2023
Longsword	AWW	AWW	MS–S	MS	MS–S	MR	MR–MS & MS	S	MS	MR–MS	MR–MS	MI	MR–MS	VI	MR–MS	MS	–	MR–MS (P)	MT–T	AGT	2018
LRPB Flanker	APH	APH	MS–S	MS–S	R–MR	MR	MS	S	S	MS–S	MS–S	MT	S	MT	S	MS	S	S	–	LongReach	2015
LRPB Hellfire	APH	APH	MS–S	MS–S	MS–S	MR	MR–MS	S–VS	S	MS–S	MS–S	MI	MS–S	MT–MI	MS	S	MS–S (P)	MR (P)	MT–MI (P)	LongReach	2019
LRPB Kittyhawk	APH	APH	S–VS	S	MR	MR–MS	MR	MS	MR–MS	MR–MS	S	I	S	MI	S	MR–MS	S	MR	MT–MI	LongReach	2016
LRPB Lancer	APH	APH	MS–S	S	R–MR	R	R–MR	MR	MS–S	MS	MS	T–MT	S	MT–MI	S	MR–MS	MS–S (P)	MR	MI–I	LongReach	2013
LRPB Major	AH	AH	MS–S	–	MR	MR–MS	MR–MS	MS–S	MS–S	MS	MS–S	MT–MI	S	MI (P)	MR–MS	MR–MS (P)	MS-S (P)	R-MR	MT-MI	LongReach	2023
LRPB Matador	FEED	AH	S	–	MS–S	MS	MS	MS–S	S	MR–MS	MS	MT	S	–	MS (P)	MR–MS (P)	MS-S (P)	MR-MS (P)	T-MT (P)	LongReach	2023
LRPB Mustang	APH	APH	MS–S	MS	MS–S	MR–MS	MR–MS	MR–MS	S	MS–S	MS–S	MT–MI	S	MI	MR	MS	–	MR (P)	–	LongReach	2017
LRPB Nighthawk	FEED	AH	MS–S	MS–S	MS	R–MR	MR	S–VS	MS	MS	MS	MI	MS–S	I–VI	MS	MS	S (P)	R–MR (P)	MI (P)	LongReach	2019
LRPB Optimus	AH	AH	MS–S	–	R–MR	MR	MR–MS	MS–S	S	MS–S	MS	MT–MI	MS–S	I (P)	MS	MR–MS (P)	–	MR (P)	T–MT (P)	LongReach	2024
LRPB Raider	APH	APH	S	–	R–MR	R–MR	MR	S	S	MS–S	MS	T–MT	MS–S	MT–MI	S	MS–S	MS–S (P)	MR–MS (P)	MI (P)	LongReach	2021
LRPB Reliant	APH	AH	MS	MS–S	R–MR	R	MR	MS	S	S	MS–S	T–MT	S–VS	MT–MI	MS–S	MS	S	MS (P)	MI (P)	LongReach	2016
LRPB Spitfire	APH	APH	MS	MS–S	MS	MR	MR–MS	S–VS	S	S	MS	MT–MI	MS–S	MI	MS	MS–S	MS	MR–MS	MT–MI	LongReach	2010
LRPB Stealth	APH	APH	MS–S	MS–S	R–MR	R	R–MR	MR–MS	MS–S	MS	S	MT–MI	MS–S	MT–MI	S	MR–MS	MS–S (P)	MR–MS (P)	MI (P)	LongReach	2020
LRPB Tracer	APH	APH	S (P)	–	MR–MS	MS	MR–MS	MS–S	S	MS–S	MS–S	MT (P)	S	MT (P)	R (P)	–	MS-S (P)	MR (P)	MT (P)	LongReach	2023
Packer	NYC	NYC	MS (P)	–	MR	MR	MR–MS	MS–S	MS–S	MS	S	MI–I (P)	S	MI (P)	R (P)	–	–	MR (P)	MT (P)	LongReach	2024
Razor CL Plus	FEED	ASW	S	MS–S	S	MR–MS	MR–MS	MS–S	S–VS	MS–S	MS	MI	S	MT	MR	MS	MS (P)	MR	MT	AGT	2018
Reilly	FEED	AH	S	–	MS–S	MR–MS	MS	MS–S	S	S	MS–S	MT–MI	MS	MT–MI	R	MS–S	–	MR–MS (P)	–	RAGT	2023
RGT Healy	NYC	NYC	S	–	MR	MR–MS	MR–MS	S	MS–S	MS–S	MR	MT	MS–S	T–MT	MR	MR	–	–	–	RAGT	2024

Table 19. Wheat varietal characteristics and reaction to diseases. (Page 2 of 3.)

Variety	Maximum quality classification		Resistances and tolerances																	Origin	Year of release
	North zone	South-east zone	Crown rot	Common root rot ❶	Leaf rust ❹	Stem rust	Stripe rust ❷❸	Powdery mildew ❺	Septoria tritici blotch ❹	Yellow leaf spot	RLN *P. thornei* resistance	RLN *P. thornei* tolerance	RLN *P. neglectus* resistance	RLN *P. neglectus* tolerance	CCN resistance	Blackpoint	Sprouting	Lodging	Acid soils tolerance		
RGT Ponsford	NYC	NYC	MS–S	–	MR	R–MR	MS	MS–S	MS–S	MS	S	I–VI	MS–S	MT	MR–MS	S	–	–	–	RAGT	2024
Rockstar	APH	APH	S	MS–S	S	MR–MS	S	S–VS	S	MR–MS	MS	MI	MR–MS	I	MS–S	MS–S	–	MR (P)	–	InterGrain	2019
Scepter	AH	AH	MS–S	MS	MS–S	MR–MS	S	S–VS	S	MR–MS	MS–S	MT	S	MT–MI	MR–MS	MS	MS–S	MR	MT	AGT	2015
Severn	FEED	AWW	S	–	MR	MR–MS	MR	R–MR	MS–S	MR–MS	MR–MS	–	S	–	MS–S (P)	MR	–	–	–	Trigall Australia	2021
Sheriff CL Plus	APW	APW	S	MS	S–VS	MS	S–VS	S–VS	S	MR–MS	MS	I	MR–MS	MT–MI	MS	MS	–	MR (P)	–	InterGrain	2018
Shotgun	NYC	AH	MS (P)	–	MS–S	MR–MS	MS–S	S	S (P)	MR–MS	MR–MS	T–MT (P)	MS (P)	MI (P)	R (P)	–	–	–	–	AGT	2024
Stockade	APW	APW	S	–	MR	MS	MR	S–VS	MS	MR–MS	MS–S	MT–MI	S	MT	MR–MS	MR–MS	–	MR (P)	MT-MI (P)	LongReach	2023
Sunblade CL Plus	APH	APH	S	S	MS–S	MS	MR–MS	S	S	MS–S	MR–MS	MT	MS–S	MI	MS–S	MR–MS	S (P)	MR–MS (P)	–	AGT	2020
Sunchaser	APH	APH	MS–S	–	R	MR	R–MR	S–VS	S	MS	MS–S	MT	MS–S	MT–MI	MS–S	MR–MS	–	–	–	AGT	2019
Sundancer	APH	APH	MS–S	–	R–MR	MR	MR	S	MS–S	MS	MS	MT–MI	MS–S	MT–MI (P)	MS	MS–S (P)	–	–	–	AGT	2023
Sunflex	APH	AH	MS–S	S (P)	R–MR	MR	MR–MS	S	S–VS	MS	MS–S	MI	S	MI	MS	MS–S	MS–S (P)	MR (P)	–	AGT	2020
Sunmaster	APH	APH	MS–S	MS	R–MR	MS	MR–MS	S	S	MS–S	MS	T–MT	MR–MS	MT–MI	MS–S	MR	S (P)	MR–MS (P)	–	AGT	2020
Sunmax	APH	APH	MS–S	MS–S	MS	MR–MS	R–MR	S	MS–S	MS	MS	MI	S	MT	MR–MS	MR–MS	MS–S (P)	MR–MS	T–MT	AGT	2016
Sunprime	APH	APH	MS–S	MS–S	MR	MS	MS	–	S	MS–S	S	MT–MI	S	MT–MI	MS	MS–S	MS–S (P)	MR–MS	MT (P)	AGT	2018
Suntop	APH	APH	MS–S	MS	MR	MR–MS	MR–MS	S	S	MS–S	MR–MS	T–MT	S	MT	S	MS–S	S	MR–MS	MT	AGT	2012
Tomahawk CL Plus	FEED	APW	MS–S	–	S	MR	S	S–VS	S	MR–MS	MS	T–MT	S	MI (P)	MR–MS	S (P)	–	–	–	AGT	2023
Valiant CL Plus	FEED	AH	MS–S	–	S	MR–MS	S	VS	MS–S	MR–MS	S (P)	VI	S	MI–I	MS–S (P)	MS (P)	–	–	–	InterGrain	2020
Vixen	AH	APH	S	MS	S–VS	MR–MS	S–VS	S–VS	S	MR–MS	MS	I	MR–MS	I	MS–S	MS–S	–	MR (P)	–	InterGrain	2018
Wallaroo	NYC	NYC	MS–S	–	R–MR	R–MR	R–MR	S	MS–S	MR–MS	MR–MS	MI	MS	–	R	MS–S (P)	–	–	–	Trigall Australia	2024

– Insufficient data

(P) Data relating to these varieties is based on limited testing and should be considered provisional information.

NYC No grain quality classification in NSW currently.

❶ GRDC NVT have discontinued with screening for these diseases, ratings shown in the guide are 2020 ratings.

❷ Varieties with a second rating separated by a '&' show the reaction to different pathotypes if they are present in the region.

Stripe rust

❸ The stripe rust rating shown are the most susceptible reaction of the variety to the pathotypes currently present in NSW (198 E16 A+ J+ T+ 17+, 239 E237 A– 17+ 33+, 238 E191 A+ 17+ 33+ ,134E16A+17+, 134E16A+17+ 27+ and 64E0A-).

Leaf rust and septoria tritici blotch

❹ (Warning) May be more susceptible to other pathotypes.

Powdery mildew

❺ (Warning) Ratings are a consensus rating based on 2019 to 2024 ratings.

Resistances

R (Resistant) indicates a high level of resistance and grain yield is unlikely to be reduced.

R–MR (Resistant to moderately resistant) indicates a high level of resistance and grain yield is unlikely to be reduced.

MR (Moderately resistant) indicates disease can develop in favourable conditions, some yield loss could occur. Early disease control can be important in some varieties.

MR–MS (Moderately resistant to moderately susceptible) indicates disease can develop in favourable conditions, some yield loss could occur. Early disease control can be important in some varieties.

MS (Moderately susceptible) indicates disease might be conspicuous in favourable situations with moderate yield losses. Early disease control is important.

MS–S (Moderately susceptible to susceptible) indicates disease might be conspicuous in favourable situations with moderate yield losses. Early disease control is important.

S (Susceptible) indicates high levels of disease can occur with substantial yield losses. Early disease control is essential.

S–VS (Susceptible to very susceptible) indicates high levels of disease can occur with substantial yield losses. Early disease control is essential.

VS (Very susceptible) indicates high levels of disease can occur with substantial yield losses.

Tolerances

T (Tolerant) indicates a high level of tolerance and grain yield is unlikely to be reduced.

T–MT (Tolerant to moderately tolerant) high level of tolerance and grain yield is unlikely to be reduced.

MT (Moderately tolerant) indicates disease can develop in favourable conditions, some yield loss could occur.

MT–MI (Moderately tolerant to moderately intolerant) indicates disease can develop in favourable conditions, some yield loss could occur.

MI (Moderately intolerant) indicates disease might be conspicuous in favourable situations with moderate yield losses.

MI–I (Moderately intolerant to intolerant) indicates disease might be conspicuous in favourable situations with moderate yield losses.

I (Intolerant) indicates high levels of disease can occur with substantial yield losses.

VI (Very intolerant) indicates very high levels of disease can occur with substantial yield losses.

Note: Root lesion nematode (RLN) or cereal cyst nematodes (CCN) tolerance indicates the ability of the variety to grow and yield in the presence of nematodes. Resistance refers to the ability of the variety to reduce nematode carryover.

Table 19. Wheat varietal characteristics and reaction to diseases. (Page 3 of 3.)

Variety	Maximum quality classification		Resistances and tolerances																	Origin	Year of release
	North zone	South-east zone	Crown rot	Common root rot ❶	Leaf rust ❹	Stem rust	Stripe rust ❷❸	Powdery mildew ❺	Septoria tritici blotch ❹	Yellow leaf spot	RLN *P. thornei* resistance	RLN *P. thornei* tolerance	RLN *P. neglectus* resistance	RLN *P. neglectus* tolerance	CCN resistance	Blackpoint	Sprouting	Lodging	Acid soils tolerance		
Feed wheat																					
Anapurna	FEED	FEED	S–VS	MS–S	MS	MS–S	R–MR	R–MR	MR–MS	MR–MS	S (P)	–	MS	–	MR–MS	MS–S	MR (P)	R–MR (P)	–	AGT	2020
BigRed	FEED	FEED	MS–S	–	MR–MS	S	R–MR	R–MR	MR	MR	MS	–	MR–MS	–	S	MR	–	–	–	AGF Seeds	2021
Longford	FEED	FEED	MS–S	–	R–MR	R–MR	R–MR	R–MR	MR–MS & S	MR–MS	S	–	S	–	MS	MR–MS	–	–	–	AGF Seeds	2023
Manning	FEED	FEED	VS	S–VS	MS–S	MR	MR	MR–MS	MR–MS & S	MR–MS	S	–	MS–S	–	S	S	–	–	–	CSIRO	2013
RGT Accroc	FEED	FEED	S–VS	–	S	MR–MS	MR–MS	MR–MS	MS	MR–MS	MS–S	–	MS	–	S	MR–MS	–	R–MR	–	RAGT	2016
RGT Cesario	FEED	FEED	VS	–	R–MR	R–MR	MR–MS	R–MR	MR–MS	MR	MS–S	–	MR–MS	–	MS–S (P)	–	–	–	–	RAGT	2021
RGT Waugh	FEED	FEED	S	–	S	MS	MR	R–MR	MR–MS ❹	MR–MS	MS–S	–	MS–S	–	MS	MR–MS	–	–	–	RAGT	2022
RGT Zanzibar	FEED	FEED	S	S	S–VS	VS	R–MR	R–MR	MS–S	MS	MS (P)	MI	S	I–VI	MS–S	MR–MS	–	–	–	RAGT	2017
SEA Condamine	FEED	FEED	MS–S	–	R–MR	MR–MS	MS–S	MS–S	VS	MS–S	MS	MT	S	MT	S	MR–MS	–	–	–	SEA and UQ	2018
SEA Stockman	FEED	FEED	S	–	MR	MS	MR–MS (P)	–	S (P)	MS–S (P)	S	MT–MI	MR–MS	–	S	MS–S (P)	–	–	–	SEA and UQ	2023
Triple 2	FEED	FEED	MR–MS (P)	–	MR–MS	MR (P)	R–MR (P)	MR–MS	MR	MR (P)	MR	–	R (P)	–	MS (P)	–	–	–	–	AGF Seeds	2024
Durum																					
Caparoi	ADR	ADR	VS	–	R–MR	MR	MR–MS	S	MR–MS & S	MR–MS	MR	MT	MS	MI	MR–MS (P)	MS–S	MR	MR–MS	VI	NSW DPI	2008
DBA Bindaroi	ADR	FEED	S–VS	MS–S	R–MR	MR	MR–MS	S	MS	MS	MR	MT–MI	MR–MS	MI	MS	MR–MS	–	–	–	DBA	2017
DBA Lillaroi	ADR	ADR	S–VS	MS–S	R–MR	R–MR	MR–MS	S	S	MR–MS	R–MR	MT	MR–MS	MI	S	MS	–	–	–	DBA	2014
DBA Mataroi	ADR	ADR	S–VS	–	MR	MR–MS	MR–MS	S	MS–S	MR–MS	R–MR	MI	MS	MT	MR–MS	MS	–	–	–	DBA	2021
DBA Vittaroi	ADR	ADR	S–VS	MS–S	R–MR	MR	MR–MS	MS–S	MS–S	MR–MS	MR	MI	MS	I	S	MS–S	–	MR	–	DBA	2017
Patron	ADR	FEED	S–VS	–	R–MR	R–MR	MR–MS	S	MR–MS	MR–MS	MR	MT	MR–MS	T	S	MS–S	–	–	–	AGT	2023
Westcourt	ADR	ADR	VS	MR–MS	R–MR	R–MR	MR	MS–S	S	MR–MS	MR	MT–MI	MS	MI	MS–S	MS–S	–	MS	–	AGT	2019
Noodle wheat																					
LRPB Parakeet	FEED	ANW	MS–S	MR–MS	R–MR	MR	MR	S–VS	S–VS	MS–S	S	MI–I	MR–MS	MT	MS	MS	S (P)	MR–MS (P)	MT–MI	LongReach	2019
Soft domestic																					
LRPB Impala	ASFT	ASFT	MS–S	MS–S	S–VS	MR	MR–MS	MR	S–VS	MS–S	S	MI–I	S–VS	MT–MI	MS–S	MS	MS–S	MR–MS	MT–MI	LongReach	2011
LRPB Oryx	ASFT	ASFT	MS–S	MS–S	R–MR ❹	MR	MR–MS	MR	S–VS	MS–S	MS–S	I–VI	MS–S	MI–I	S	MS	–	–	–	LongReach	2018
Scotch	ASFT	ASFT	S	–	MR ❹	MS–S	MR–MS	MR	S	MR–MS	S	MI	MS	MT–MI	MS	MS	–	–	–	LongReach	2022

– Insufficient data

(P) Data relating to these varieties is based on limited testing and should be considered provisional information.

NYC No grain quality classification in NSW currently.

❶ GRDC NVT have discontinued with screening for these diseases, ratings shown in the guide are 2020 ratings.

❷ Varieties with a second rating separated by a '&' show the reaction to different pathotypes if they are present in the region.

Stripe rust

❸ The stripe rust rating shown are the most susceptible reaction of the variety to the pathotypes currently present in NSW (198 E16 A+ J+ T+ 17+, 239 E237 A– 17+ 33+, 238 E191 A+ 17+ 33+ ,134E16A+17+, 134E16A+17+ 27+ and 64E0A-).

Leaf rust and septoria tritici blotch

❹ (Warning) May be more susceptible to other pathotypes.

Powdery mildew

❺ (Warning) Ratings are a consensus rating based on 2019 to 2024 ratings.

Resistances

R (Resistant) indicates a high level of resistance and grain yield is unlikely to be reduced.

R–MR (Resistant to moderately resistant) indicates a high level of resistance and grain yield is unlikely to be reduced.

MR (Moderately resistant) indicates disease can develop in favourable conditions, some yield loss could occur. Early disease control can be important in some varieties.

MR–MS (Moderately resistant to moderately susceptible) indicates disease can develop in favourable conditions, some yield loss could occur. Early disease control can be important in some varieties.

MS (Moderately susceptible) indicates disease might be conspicuous in favourable situations with moderate yield losses. Early disease control is important.

MS–S (Moderately susceptible to susceptible) indicates disease might be conspicuous in favourable situations with moderate yield losses. Early disease control is important.

S (Susceptible) indicates high levels of disease can occur with substantial yield losses. Early disease control is essential.

S–VS (Susceptible to very susceptible) indicates high levels of disease can occur with substantial yield losses. Early disease control is essential.

VS (Very susceptible) indicates high levels of disease can occur with substantial yield losses.

Tolerances

T (Tolerant) indicates a high level of tolerance and grain yield is unlikely to be reduced.

T–MT (Tolerant to moderately tolerant) high level of tolerance and grain yield is unlikely to be reduced.

MT (Moderately tolerant) indicates disease can develop in favourable conditions, some yield loss could occur.

MT–MI (Moderately tolerant to moderately intolerant) indicates disease can develop in favourable conditions, some yield loss could occur.

MI (Moderately intolerant) indicates disease might be conspicuous in favourable situations with moderate yield losses.

MI–I (Moderately intolerant to intolerant) indicates disease might be conspicuous in favourable situations with moderate yield losses.

I (Intolerant) indicates high levels of disease can occur with substantial yield losses.

VI (Very intolerant) indicates very high levels of disease can occur with substantial yield losses.

Note: Root lesion nematode (RLN) or cereal cyst nematodes (CCN) tolerance indicates the ability of the variety to grow and yield in the presence of nematodes. Resistance refers to the ability of the variety to reduce nematode carryover.

Stripe rust ratings – what do they mean?

The pictures below show the varying levels of adult plant reaction to stripe rust.

Figure 5. Stripe rust ratings.

Adult plant resistance – what does it mean?

Response to stripe rust is determined by the interaction of genes for resistance in a variety and genes for virulence in the pathogen population. The reaction of a wheat variety to stripe rust depends on 2 forms of resistance:

1. **Seedling [All stage resistance (ASR)] genes**, effective from seedling emergence through to maturity, provided the matching virulence gene in the pathogen population is absent.
2. **Adult plant resistance (APR) genes**, which become effective at various growth stages, ranging from the fourth leaf stage through to full head emergence. APR will also be effective provided that matching virulence is not present in the pathogen.

Both seedling ASR and APR genes, and combinations of both, provide varying levels of crop protection, which can be influenced by environment (temperature, crop nutrition, management) and disease pressure.

Growers need to be aware that varieties predominantly relying on APR for stripe rust protection might be more susceptible to stripe rust infection earlier in the season until the APR provides protection. Wheat varieties with APR can benefit from early stripe rust control by fertiliser, seed or foliar fungicides. If unsure speak to your local agronomist.

Varietal characteristics

Note: Quality classifications are preliminary and subject to final review.

Aim to spread the overall risk by planning to sow at least one variety at each sowing opportunity. This depends upon suitable sowing rains. Varieties are grouped into their maturity types in the sowing time tables on pages 17 and 23 where suggested sowing windows are shown for northern and southern NSW.

Caution: These varietal descriptions should be read in conjunction with the current disease ratings in Table 19 on page 24.

Refer to the chapter on Durum on page 38 for notes on durum varieties.

Milling wheat varieties

BallistaΦ. Australian Hard (AH) quality in NSW. Ballista^{Φ} is suited to the low rainfall and Mallee regions of NSW, showing yield improvements over Scepter^{Φ}. Quick mid maturity variety, slightly quicker than Mace^{Φ}. AGT.

Beckom^{Φ}. Australian Hard quality in NSW. High-yielding mid maturity variety suited to sowing in early May. Broadly adapted variety throughout NSW. Short in height, Beckom^{Φ} produces plants with moderate early vigour and straw strength, with good threshability. Moderate grain size; aluminium and boron tolerant. AGT.

Boree^{Φ}. Australian Prime Hard (APH) quality in NSW. A mid season spring wheat with maturity between Beckom^{Φ} and Scepter^{Φ}. Broadly adapted and suits a range of pH, soil types and environments. High yield potential, medium plant height with good straw strength. AGT.

Borlaug 100^{Φ}. Australian Hard quality in northern NSW. A mid season variety released for its high yield potential in northern NSW and Qld, where there were strong domestic livestock feed grain markets. Performs well under dry conditions. Strong straw strength and low screenings. Rebel Seeds.

Brumby^{Φ}. Australian Premium White (APW) quality in southern NSW. It is a mid maturing variety suited to sowing in early May. Suited to the medium–high rainfall zones of NSW. The variety has shown extremely low powdery mildew infection levels in high pressure disease environments in recent seasons. Good pre-harvest sprouting tolerance. InterGrain.

Calibre^{Φ}. Australian Prime Hard quality in NSW. High yielding, quick mid maturity spring wheat, slightly quicker than Scepter^{Φ}. Calibre^{Φ} is derived from Scepter^{Φ} and has shown similar adaptation to growing regions of southern NSW. Good sprouting tolerance, similar to Scepter^{Φ} and with a longer coleoptile length than many commonly grown varieties. AGT.

Catapult^{Φ}. Australian Hard quality in NSW. Catapult^{Φ} is a mid late-maturing variety. Yield potential is highest when sown from late April to early May, but has shown good flexibility maintaining a similar yield potential to Scepter^{Φ} when sown or emerging later in May. Catapult^{Φ} has tolerance to acid soils, produces a large and consistent grain size, resulting in low screenings and high test weight. AGT.

Condo^{Φ}. Australian Hard quality in NSW. Early maturity, adapted to low–medium rainfall areas of NSW. Maturity similar to Livingston^{Φ}. Condo^{Φ} has a tall plant type with medium straw strength. Moderately tolerant to acid soils. AGT.

Coolah^{Φ}. Australian Prime Hard quality in NSW. It is a high yielding variety adapted to a range of environments across NSW. Suited to an end of April through to mid May sowing. It has good tolerance to acid soils, with improved lodging over EGA_Gregory^{Φ}. Coolah^{Φ} produces a large and consistent grain size, resulting in low screenings loss and high test weight. AGT.

Coota^{Φ}. Australian Prime Hard quality in NSW. Coota^{Φ} is a high yielding mid slow-maturing variety suited to the end of April to the beginning of May sowing window. It exhibits very low screenings, high test weights and good blackpoint resistance. Short plant height, it has shown good resistance to lodging. AGT.

DS Bennett^{Φ}. Winter wheat. Australian Standard White (ASW) quality in southern NSW. It is a high yielding winter wheat, with photoperiod sensitivity, which generally flowers 7–10 days later than EGA_Wedgetail^{Φ}. The sowing window for DS Bennett^{Φ} is from mid March until early May. Suited to both grazing and grain production, or straight grain production. DS Bennett^{Φ} is a tall, awnless wheat suited to the high and medium rainfall zones of NSW. Trigall Australia.

DS Faraday^{Φ}. Australian Prime Hard quality in NSW. This is a main season variety with a maturity similar to EGA_Gregory^{Φ}. DS Faraday^{Φ} has shown a yield improvement over EGA_Gregory^{Φ} in northern NSW environments. It has improved tolerance over EGA_Gregory^{Φ} to pre-harvest sprouting to manage the risk in a wet harvest. Trigall Australia.

DS Pascal^{Φ}. Australian Premium White quality in southern NSW and Australian Hard quality in northern NSW. It is an early season line, being 1–2 days quicker than Bolac^{Φ}, making it suitable for mid April through to early May sowing. Medium plant height, with good standability and high yield potential under irrigation. Exhibits pre-harvest sprouting tolerance. Trigall Australia.

Note – Winter wheats

Winter wheats have the major advantage of adaptability to a wide range of sowing times. Winter habit delays maturity in early sowings, thus reducing the risk of frost damage. Maturity varies once cold requirement has been met. Winter wheats can be sown from February into April for grazing, depending on vernalisation (cold) requirement.

EG TitaniumΦ. Australian Premium White quality in northern NSW. An early to mid season variety that is targeted for early sowing, but also has a flexible sowing time in the medium–higher rainfall areas. Good early plant vigour and harvestability. EPG Seeds.

EGA_GregoryΦ. Australian Prime Hard quality in NSW. Similar maturity, straw strength and height to Batavia and Strzelecki[Φ]. Pacific Seeds.

EGA_WedgetailΦ. Winter wheat. Australian Prime Hard quality in southern NSW and Australian Hard quality in northern NSW. Acid-soils-tolerant, early sowing variety suited to grazing and grain production systems. Adapted to higher rainfall regions in southern and central NSW and the eastern part of the northern wheat belt. Large grain size. Seednet.

GenieΦ. Australian Hard quality in southern NSW. Mid slow-maturity wheat suited to late April to early May sowings, slightly longer in maturity than Rockstar[Φ]. Suited to the medium–high rainfall environments in NSW. Higher yielding replacement for Rockstar[Φ], with improved disease resistance to stripe rust over Rockstar[Φ]. Improved coleoptile length, allowing deeper sowing. Genie[Φ] has also shown good sprouting tolerance in breeding company evaluations. InterGrain.

Hammer CL PlusΦ. Australian Hard quality in southern NSW. A high-yielding, quick, mid maturing variety tolerant to Clearfield® Intervix® herbicide. Closely related to widely adapted variety Mace[Φ] with similar adaptation. Good physical grain package, with low screenings and high test weight. Check current herbicide registrations for registered product rates and adhere to recommended plant growth stages for application timing. AGT.

IllaboΦ. Winter wheat. Australian Prime Hard quality in southern NSW and Australian Hard quality in northern NSW. An EGA_Wedgetail[Φ] alternative suited to grazing and grain production, with higher grain yield potential. Mid fast winter maturity, Illabo[Φ] is 2–3 days quicker to maturity than EGA_Wedgetail[Φ]. Improved blackpoint resistance over EGA_Wedgetail[Φ]. Tolerant to acid soils. AGT.

IntrigueΦ. Australian Prime Hard quality in NSW. Mid slow spring maturing variety, 1–2 days quicker to head emergence than LRPB Lancer[Φ]. Intrigue[Φ] maintained a high yield in AGT fusarium crown rot (FCR) yield evaluation trials compared to other early sown varieties. Intrigue[Φ] is well adapted to moisture-stressed environments and paddocks with a risk of crown rot infection. Strong rust resistance, good tolerance combined with a moderately resistant–moderately susceptible resistance rating to RLN (*P. Thornei*). AGT.

JillarooΦ. Australian Hard classification in NSW. A high yielding, quick, mid maturing spring wheat suited to northern NSW and southern Queensland (Qld). It features a moderate plant height with semi-erect growth habit. InterGrain.

JumbuckΦ. Australian White Wheat (AWW) quality in NSW. Mid slow-maturity wheat suited to late April to early May sowings, slightly quicker in maturity than LRPB Lancer[Φ]. Jumbuck exhibits excellent yield stability. Jumbuck[Φ] has a medium plant height with good lodging tolerance. InterGrain.

KingstonΦ. Australian Hard quality in southern NSW. It has a short plant height and good straw strength with a compact head resulting in outstanding lodging resistance and lower stubble residues to manage the following year. Similar maturity/days to heading as Scepter[Φ], followed by a slower finish, which has shown to result in a minimal yield penalty from an earlier sowing window. Bred by RAGT and marketed by Seednet.

LeverageΦ. Australian Prime Hard quality in NSW. Mid slow-maturity variety suited to late April to early May sowings. Closely related to Coolah[Φ], Leverage[Φ] offers higher yield with a shorter plant type, improved resistance to stripe rust and yellow leaf spot. Leverage[Φ] has very good physical grain characteristics. AGT.

LongReach CobraΦ. Australian Hard quality in southern NSW. High yielding, early mid season variety suited to both acid and alkaline soil types. Compact plant height, moderately resistant to lodging and has performed particularly well on irrigation and in high-production areas. Pacific Seeds.

LongReach FlankerΦ. Australian Prime Hard quality in NSW. Higher yielding EGA_Gregory[Φ] type adapted to NSW where EGA_Gregory[Φ] is grown. Can be prone to crop lodging in high rainfall environments or under irrigation. Mid–late in maturity and has demonstrated a similar plasticity in maturity to EGA_Gregory[Φ]. Reliable grain package with good test weights and sound for screenings. Pacific Seeds.

LongReach HellfireΦ. Australian Prime Hard quality in NSW. Mid quick maturing higher yielding main season variety with yield and protein accumulation similar to LRPB Spitfire[Φ]. Good grain package with large grain, high protein and low screenings. Medium plant height with good standability. Good early vigour. Pacific Seeds.

LongReach KittyhawkΦ. Winter wheat. Australian Prime Hard quality in NSW. Similar maturity and sowing window to EGA_Wedgetail[Φ]. Dual-purpose variety, suitable for grazing and grain recovery. Has improved stripe rust resistance and grain quality over EGA_Wedgetail[Φ]. Pacific Seeds.

LongReach LancerΦ. Australian Prime Hard quality in NSW. A mid–late maturing variety, which is responsive to temperature, suited to early to mid season sowing. Shorter canopy height than EGA_Gregory^{Φ}, with good resistance to lodging. Medium coleoptile length and has a medium plant height at maturity; improved lodging resistance over EGA_Gregory^{Φ}. Stripe rust resistance is based on adult plant resistance. Pacific Seeds.

LongReach Major^{Φ}. Australian Hard quality in NSW. Mid slow-maturing spring wheat (similar to Beckom^{Φ} and Rockstar^{Φ}) suitable for early to mid May seeding opportunities throughout NSW. Good disease package for NSW production systems with improved *Septoria* resistance over its Beckom^{Φ} parent. Strong yield performance in both acidic and sodic soil yield trials. Marketed by Pacific Seeds.

LongReach Matador^{Φ}. Australian Hard quality in southern NSW. A mid maturing variety with high and stable yields in southern NSW. A medium plant type that is more compact with an improved canopy over the Scepter^{Φ} parent with good lodging resistance. Sound physical grain quality package with medium grain size. Moderately tolerant–moderately intolerant to acid soils with an aluminium and boron tolerance gene. Good pre-harvest sprouting tolerance. Marketed by Pacific Seeds.

LongReach Mustang^{Φ}. Australian Prime Hard quality in NSW. A high-yielding variety suited to NSW and Qld, with a reliable grain package similar to other prime hard main season varieties. Maturity similar to LRPB Spitfire^{Φ}. Compact canopy with good straw strength maximises harvest efficiency and ease of stubble management. Pacific Seeds.

LongReach Nighthawk^{Φ}. Australian Hard quality in southern NSW. Slow-maturing spring wheat with a unique set of maturity holds that allows it to be planted earlier in areas that don't suit the traditional winter wheat types. Demonstrated high yields throughout the late March to late April sowing window while maintaining yield in later sowings. Medium tall plant height with good standability. Pacific Seeds.

LongReach Parakeet^{Φ}. Australian Noodle classification in southern NSW. Mid quick-maturing noodle wheat to suit main season sowing windows with a similar maturity to LRPB Lincoln^{Φ}. Well suited to dryland and supplementary irrigation wheat production systems in NSW. Pacific Seeds.

LongReach Raider^{Φ}. Australian Prime Hard quality in NSW. A shorter, higher tillering capacity Longreach Reliant^{Φ} plant type, which is showing high and stable yield performance across both early and main season sowing dates. Slow spring maturity, best suited to mid April to early May sowing times across NSW. Bred by LongReach Plant Breeders and marketed by Pacific Seeds.

LongReach Reliant^{Φ}. Australian Prime Hard quality in northern NSW and Australian Hard quality in southern NSW. High yield potential, mid season variety suited to the low–medium yielding environments in NSW. Developed from a cross between EGA_Gregory^{Φ} and LRPB Crusader^{Φ}. Tillering ability similar to EGA_Gregory^{Φ} and tightly packed heads like LRPB Crusader^{Φ}. Reliable grain package with good grain size and test weight like EGA_Gregory^{Φ}. Pacific Seeds.

LongReach Spitfire^{Φ}. Australian Prime Hard quality in NSW. Early to mid season maturity, similar to Livingston^{Φ}.Good grain package with low screenings, high test weights and excellent protein accumulation. Long coleoptile and medium plant height. Performs well in acid soils. Pacific Seeds.

LongReach Stealth^{Φ}. Australian Prime Hard quality in NSW. Mid slow-spring-maturing variety similar to LRPB Lancer^{Φ}, adapted to the low–medium rainfall regions of NSW and Qld. The result of a dedicated cross to improve crown rot resistance in APH germplasm, LRPB Stealth^{Φ} shows improved crown rot tolerance and demonstrated yield stability in tough conditions. Medium plant height with similar growth and yield accumulation pattern as LRPB Lancer^{Φ}. Good blackpoint resistance with a long coleoptile. Pacific Seeds.

LongReach Tracer^{Φ}. Australian Prime Hard quality in NSW. Mid spring-maturing variety (similar to LongReach Reliant^{Φ} and Suntop^{Φ}) suitable for main season seeding opportunities across NSW and Qld. Strong performance in sodic soil yield trials combined with a good disease package for northern production systems with excellent RLN (*P.thornei*) tolerance. Compact canopy (similar plant height to LongReach Lancer^{Φ}), which can aid in stubble management in zero till farming systems. Marketed by Pacific Seeds.

Longsword^{Φ}. Winter wheat. Australian White Wheat quality in NSW. Longsword^{Φ} is a winter type and requires vernalisation as with other winter wheats. It has Mace^{Φ} as a parent and is relatively quick to mature once vernalisation requirements have been met. The quicker maturity makes it suitable for low–medium rainfall environments in which traditional longer season winter wheats would not normally be grown. Most suited to April sowings and can be grazed, given its winter growth habit. Good physical grain package with low screenings and high test weights. AGT.

Note – Winter wheats

Winter wheats have the major advantage of adaptability to a wide range of sowing times. Winter habit delays maturity in early sowings, thus reducing the risk of frost damage. Maturity varies once cold requirement has been met. Winter wheats can be sown from February into April for grazing, depending on vernalisation (cold) requirement.

Razor CL PlusΦ. Australian Standard White quality in southern NSW. High yielding early maturity variety tolerant to Clearfield® Intervix® herbicide. Slightly quicker than its parent MaceΦ, similar in maturity to CorackΦ. Check current herbicide registrations for registered product rates and adhere to recommended plant growth stages for application timing. Good physical grain package, with low screenings and high test weight. AGT.

ReillyΦ. Australian Hard quality in southern NSW. The variety is bred from new genetics to Australia and has a synthetic parent. Medium height plant type bred with a capacity to thrive in low–medium rainfall environments. Similar maturity/days to heading as ScepterΦ followed by a faster finish, which has been shown to result in yield stability in tough conditions. Bred by RAGT and marketed by Seednet.

RockstarΦ. Australian Prime Hard quality in NSW. RockstarΦ is a high yielding mid–late flowering variety, with a similar flowering time to LRPB TrojanΦ. It has excellent yield stability across its sowing window, and very good lodging tolerance. RockstarΦ has good grain size, good test weight and has a moderate plant height, reducing stubble loads in high yielding environments. InterGrain.

ScepterΦ. Australian Hard quality in NSW. A mid maturing variety with high and stable yields across NSW. Medium plant type with good lodging resistance and a robust physical grain quality package. Moderately tolerant to acid soils with good pre-harvest sprouting tolerance. AGT.

SevernΦ. Winter wheat. Australian White Wheat quality in southern NSW. SevernΦ is an awnless quick winter wheat ideal for grain, grazing, silage and/or hay production. It is best suited to early sowing in eastern and southern areas and exhibits prolific tillering. SevernΦ is tall with good standability and has tolerance to pre-harvest sprouting Trigall Australia.

Sheriff CL PlusΦ. Australian Premium White quality in NSW. A high yielding mid late-flowering wheat suited to late April to early May sowing, with moderate plant height and good physical grain characteristics, including good grain size and test weight. Sheriff CL PlusΦ incorporates the Clearfield® Plus technology, which provides tolerance to label rates of Intervix® herbicide. InterGrain.

StockadeΦ. Australian Premium White quality in NSW. StockadeΦ is a very slow spring wheat, longer season than LRPB BeaufortΦ by 5–10 days, with a heading time similar to LRPB NighthawkΦ. Suited to high rainfall environments. Similar plant height to LRPB TrojanΦ, which was one of its parents and good lodging tolerance. Tolerance to boron and acid soils. Bred by LongReach Plant Breeders and marketed by AGF Seeds.

Sunblade CL PlusΦ. Australian Prime Hard quality in NSW. APH-quality Clearfield® variety released for NSW, tolerant to Clearfield® Intervix® herbicide. Higher yielding alternative to Elmore CL PlusΦ with improved disease resistance. Derived from SuntopΦ with a similar maturity. Sunblade CL PlusΦ has a slightly shorter plant height compared with SuntopΦ with similar lodging resistance. Displays a similar or slightly smaller grain size than SuntopΦ. Check current herbicide registrations for registered product rates and adhere to recommended plant growth stages for application timing. AGT.

SuncentralΦ. Australian Prime Hard quality in NSW. SuncentralΦ is a quick, mid maturity variety comparable to LRPB SpitfireΦ and 4 days quicker than SuntopΦ. Higher yielding variety suited to later sowing opportunities in northern NSW. Good ability to maintain yield in the presence of crown rot and RLN (*P. Thornei*) tolerance. AGT.

SunchaserΦ. Australian Prime Hard quality in NSW. SunchaserΦ is a high yielding alternative in the main season sowing window. SunchaserΦ has an improved grain package compared with SuntopΦ producing significantly lower screenings losses while maintaining high test weight. SunchaserΦ has improved disease resistance profile over SuntopΦ and features a moderately long coleoptile. AGT.

SundancerΦ. Australian Prime Hard quality in NSW. Mid slow-spring-maturing variety similar to LRPB LancerΦ. A high yielding variety with excellent yield stability. SundancerΦ has an excellent rust resistance package and a longer coleoptile than LRPB LancerΦ and other similar maturing varieties. SundancerΦ is slightly taller than LRPB LancerΦ. AGT.

SunflexΦ. Australian Prime Hard quality in northern NSW and Australian Hard quality in southern NSW. SunflexΦ is a slow maturity variety best planted in the mid to late April window in NSW, up to one week earlier than CoolahΦ and LRPB LancerΦ. SunflexΦ exhibits a moderately long coleoptile and is adapted to the medium–high rainfall zones of NSW. SunflexΦ has a moderately short plant height and good lodging resistance, consistently producing large grain with low screening losses. AGT.

SunlambΦ. Australian Standard White quality in NSW. An awnless, long-season spring wheat suited to early April sowings. Suited to grazing and grain recovery across NSW. Similar flowering time to EGA_Wedgetail[Φ], and a few days earlier than Naparoo[Φ]. Moderately intolerant to acid soils. AGT.

SunprimeΦ. Australian Prime Hard quality in NSW. Early maturing variety, similar to LRPB Spitfire[Φ], Sunmate[Φ] and LRPB Mustang[Φ]. High yielding variety across NSW. Derived from a cross with EGA_Gregory[Φ] with similar adaptation across NSW, but with a quicker maturity and shorter plant height. Good physical grain package, including moderate to low screenings and high test weight. Good tolerance to RLN (*P. Thornei*). Moderately tolerant to acid soils. AGT.

SunmasterΦ. Australian Prime Hard quality in NSW. Sunmaster[Φ] is a replacement variety for Suntop[Φ], with similar maturity and sowing window. Sunmaster[Φ] has a shorter plant type than Suntop[Φ], with good lodging tolerance. It has demonstrated a consistently higher yield potential than Suntop[Φ], with slightly lower screenings and similar test weight. Sunmaster[Φ] has shown improved yield over Suntop[Φ] in AGT crown rot trials. AGT.

SunmaxΦ. Australian Prime Hard quality in NSW. It is a slow-maturing spring wheat, slower in maturity than Sunzell[Φ], but quicker than the older variety Sunbrook. Best suited to a mid April sowing. It has proven to be a reliable early sown option for the northern region for grain-only crops. Avoid sowing later than its preferred sowing window to limit the risk of excessive screenings. It has acid soils tolerance and improved lodging tolerance over EGA_Gregory[Φ]. AGT.

SuntopΦ. Australian Prime Hard quality in NSW. A main season line that is well adapted to NSW, showing high and stable yields from low to high-yield-potential environments. It is quicker maturing than EGA_Gregory[Φ], similar in maturity to Janz. AGT.

Tomahawk CL PlusΦ. Australian Premium White quality in southern NSW. A high yielding Scepter[Φ] type with tolerance to Clearfield® Intervix® herbicide. Agronomically very similar to Scepter[Φ] for maturity, physical grain quality and disease resistance. Good sprouting tolerance, similar to Scepter[Φ]. AGT.

Valiant CL PlusΦ. Australian Hard quality in southern NSW. A high-yielding slow-maturity, Clearfield® tolerant, spring wheat with a similar maturity to Cutlass[Φ]. Valiant CL Plus[Φ] performs best when sown early. It has good grain size, test weight, a moderate plant height, and a longer coleoptile. InterGrain.

VixenΦ. Australian Hard quality in northern NSW and Australian Prime Hard quality in southern NSW. An early to mid maturity variety, similar in maturity to LRPB Spitfire[Φ]. Suited to sowing from mid May onwards in southern NSW. High yield potential, with very good lodging resistance and strong physical grain characteristics. It has good grain size and produces low screenings. Vixen[Φ] has a short–moderate plant height, providing reduced stubble loads in high-yielding environments. InterGrain.

Note – Winter wheats

Winter wheats have the major advantage of adaptability to a wide range of sowing times. Winter habit delays maturity in early sowings, thus reducing the risk of frost damage. Maturity varies once cold requirement has been met. Winter wheats can be sown from February into April for grazing, depending on vernalisation (cold) requirement.

The following are more recently released bread wheat varieties with limited data available in NSW.

BoaΦ. Australian Hard quality in southern NSW. Quick–mid maturity wheat that stands out for top end yield in high production scenarios and irrigated systems. Combines the best attributes of the Scepter^{Φ} × Cobra^{Φ} parentage to deliver a shorter canopy wheat with an erect growth habit and large 'Cobra' heads. Boa^{Φ} has both acid and boron tolerance traits. Bred by LongReach Plant Breeders. Marketed by Baker Seed Co.

BrightonΦ. Winter wheat. Australian Prime Hard quality in NSW. A quick–mid maturing winter wheat slightly quicker than Illabo^{Φ}. Suitable for graze and grain production. A higher yielding alternative to Illabo^{Φ}, EGA_Wedgetail^{Φ} and LRPB Kittyhawk^{Φ}. Excellent grain package with improved test weight over Illabo^{Φ} and EGA_Wedgetail^{Φ}. Derived from Beckom^{Φ}, with similar height and plant structure. AGT.

IronbarkΦ. Australian Hard quality in southern NSW. Mid season spring wheat. Released as a high yielding Beckom^{Φ} replacement with similar maturity, plant height and aluminium (acid) soil tolerance genes. Improvements in stripe rust (MR). Good physical grain package with increased grain size and lower screenings compared to Beckom^{Φ}. AGT.

LongReach OptimusΦ. Australian Hard quality in NSW. Mid maturity variety with a similar plant type, yield, build and grain receivals package similar to its parent LRPB Lancer^{Φ}. Consistent yield performance across a range of sowing times in NSW, showing optimal yield performance when sown in the first half of May. A well-rounded disease package suitable for all regions of NSW. Breeding company trials show it has the ability to yield under high crown rot pressure combined with strong acid and sodic soil tolerance. Bred by LongReach Plant Breeders. Marketed by Pacific Seeds.

PackerΦ. Classification pending in NSW. Mid–slow spring maturing Scepter^{Φ}-derived variety with good Septoria and stripe rust resistance. Strong yield performance across early season trials, showing its highest yields in trials sown from late April to early May, while maintaining competitive yields in later-sown trials. Strong soil abiotics package with aluminium and boron tolerance traits. LongReach Plant Breeders.

RGT HealyΦ. Classification pending in NSW. Quick–mid maturity spring wheat suited to sowing in mid–late May. RGT Healy^{Φ} has a medium stature and moderate straw strength and performs well across all rainfall zones in northern NSW. Bred and marketed by RAGT.

RGT PonsfordΦ. Classification pending in NSW. Mid maturity spring wheat suited to sowing in early May. RGT Ponsford^{Φ} has a medium stature and moderate straw strength and has performed well across medium–high rainfall zones in southern NSW. Bred and marketed by RAGT.

ShotgunΦ. Australian Hard quality in southern NSW. A mid maturing spring wheat, released as a higher yielding Scepter^{Φ} replacement. Agronomically very similar to Scepter^{Φ} for physical grain quality and disease resistance. AGT.

WallarooΦ. Winter wheat. Classification pending in NSW. A quick-maturing white-grained awned winter wheat offering the opportunity to take advantage of an early break reducing the risk of frost damage. The ideal planting window is from mid March through to the end of April. Excellent level of resistance to leaf, stem and stripe rust. Mid plant height with good standability and grain size. Trigall Australia.

Soft wheat varieties

LongReach GazelleΦ. Biscuit wheat. Australian Soft quality in NSW. Mid–late season maturity, similar to QAL2000^{Φ} and slightly quicker than Yenda^{Φ}. Fully awned. Medium length coleoptile with good early seedling vigour, medium plant height at maturity and suited to high rainfall production areas and irrigation. Very susceptible to powdery mildew. Good soft wheat grain package with low screenings, low protein accumulation and good test weight. Pacific Seeds.

LongReach ImpalaΦ. Biscuit wheat. Australian Soft quality in NSW. Quick to mid season maturity, similar to Lincoln^{Φ} and Ventura^{Φ}. Fully awned. Medium length coleoptile with good early seedling vigour, medium plant height at maturity. Good soft wheat grain package with low screenings, low protein accumulation and good test weight. Pacific Seeds.

LongReach OryxΦ. Biscuit wheat. Australian Soft quality in NSW. Early mid maturing variety, marginally quicker to mature than LRPB Impala^{Φ}, suited to main season sowing in dryland and supplementary irrigation soft wheat systems. LRPB Oryx^{Φ} has demonstrated reduced canopy heights over its parent LRPB Impala^{Φ}, improving harvest efficiencies and stubble management for growers. Good soft wheat grain package with low screenings, low protein accumulation and good test weight. Pacific Seeds.

ScotchΦ. Mid slow spring maturing soft wheat (ASFT) well suited for high yielding soft wheat production systems. Medium–short plant height with good straw strength and a well-rounded disease package, suited to irrigated production systems. Bred by LongReach Plant Breeders. Marketed by Waratah Seeds.

Feed wheats

Anapurna[Φ]. Winter wheat. Awned, red-grained winter feed wheat. Suitable for very early sowing and graze-and-grain production. Anapurna[Φ] is a high-yielding wheat suited to the high rainfall zones of NSW and is similar in maturity to RGT Accroc[Φ]. Excellent standability. AGT.

BigRed[Φ]. An awned, high-yielding red-grained feed winter wheat. Mid slow maturity for the medium–high rainfall zones and irrigation. Suitable for dual-purpose (grazing) applications when sown early. AGF seeds.

Longford[Φ]. An awned, high yielding red-grained feed winter wheat. Mid slow winter maturity for the high rainfall long season environments and irrigation. Suitable for dual-purpose (grazing) applications when sown early. AGF seeds.

Naparoo[Φ]. Winter wheat. Feed quality. An awnless variety with maturity similar to Marombi[Φ], slower than Whistler and EGA_Wedgetail[Φ]. Medium height with good straw strength. Consistently produces higher levels of dry matter than Marombi[Φ], but lower grain recovery. AGT.

RGT Accroc[Φ]. Red winter wheat, feed grain quality, suited to the high rainfall zone of NSW. Suitable for sowing late February to early April for early grazing. Good standability. Maturity is 3–5 days earlier than SF Adagio. RAGT.

RGT Cesario[Φ]. Awnless red-grained winter wheat. Multipurpose feed grain quality wheat suited to grazing, silage and grain production. Suited to the high rainfall zone of NSW. Suitable for sowing late February to early April for early grazing. Excellent standability. Similar maturity to RGT Accroc[Φ]. RAGT.

RGT Waugh[Φ]. Slow, white-grained winter wheat suited to the medium–high rainfall zone of NSW. Suitable for sowing late February to early April for early grazing. Very high yield potential. Excellent standability. RAGT.

RGT Zanzibar. Red wheat, feed grain quality, suited to the medium–high rainfall zone of NSW. Suitable for sowing late April to early May. Maturity is similar to Suntop[Φ] and EGA_Gregory[Φ]. Good standability. RAGT.

SEA Condamine. Feed quality in NSW. It is a tall, robust, quick-maturing variety with a relatively short grain filling period, which combines high yield potential, large grain size, good straw strength and standability. Its high yield potential is demonstrated particularly in north-western NSW, south-western and central Qld, particularly in late-sowing applications where its quick maturity and short grain filling period are an advantage. SEA Condamine expresses late-maturity alpha-amylase (LMA), and so cannot receive an Australian milling classification, and was released as a feed variety. Seed is available through Shepherd Grain. Seed Exchange Pty Ltd.

SEA Stockman[Φ]. Feed quality in NSW. Quick mid maturity awnless specialist hay wheat, suitable for grazing, fodder and feed grain production. Seed is available through Shepherd Grain. Seed Excellence Pty Ltd.

The following is a more recently released feed variety with limited data available in NSW.

Triple 2[Φ]. An awned, high yield potential red-grained feed winter wheat. Mid winter maturity that is slightly slower than LRPB Beaufort[Φ] for high rainfall environments and irrigation. Suitable for dual-purpose (grazing) applications when sown early. AGF seeds.

Note – Winter wheats

Winter wheats have the major advantage of adaptability to a wide range of sowing times. Winter habit delays maturity in early sowings, thus reducing the risk of frost damage. Maturity varies once cold requirement has been met. Winter wheats can be sown from February into April for grazing, depending on vernalisation (cold) requirement.

Table 20. Diseases and crop injury guide – wheat. (Page 1 of 3.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Foliar diseases				
Yellow spot *Pyrenophora tritici repentis*	Tan coloured leaf lesions with a yellow border. Lesions eventually join (coalesce), resulting in leaf death. Lesions are usually randomly distributed along individual leaves; early in the season they are more concentrated on lower leaves in the canopy.	More severe in northern and central NSW, associated with retained wheat stubble. Can develop in all crops late in season after above-average rainfall. Quite common early in the growing season. Infection can be worse in nitrogen-deficient crops.	Primary infection from ascospores from wheat stubble, which are airborne for a short distance. Secondary infection from conidia produced on infected leaves during season, which are airborne for longer distances.	Wheat stubble removal, crop rotation (avoid wheat-on-wheat). Sow varieties with improved levels of resistance. Apply foliar fungicides as a preventative before rain as they have poor curative activity.
Septoria tritici blotch *Zymoseptoria tritici*	Angular leaf lesions with minute black spots (pycnidia) contained within lesion margin; leaf death.	Common in the south and occurs in medium–high rainfall regions in most seasons. Increased prevalence in lower rainfall cropping regions of NSW with the wetter seasonal conditions where its distribution has crept north into central NSW.	Initially airborne spores (ascospores) from infected stubble, then rain-splashed spores (conidia) within crop from infected leaves. Has a long latent period (approximately 28 days) and longer leaf wetness requirement (24-48 hr) compared with other wheat leaf diseases.	Wheat stubble removal, crop rotation (avoid wheat-on-wheat). Sow varieties with improved levels of resistance. Apply seed and foliar fungicides. Pathotypes with reduced fungicide sensitivity have developed in NSW, Victoria and Tasmania to some Group 3 (DMI, triazole) fungicides making them less effective. The mutation that confers the highest reduced sensitivity to Group 3 fungicides was widespread in NSW during 2022 to 2024. Fungicide resistance confirmed in South Australia to Group 11 (QoI) fungicides in 2021, Tasmania in 2022 but testing revealed it was not present in NSW in 2023and 2024. Rotate mode of action (MOA) of fungicides, don't apply the same MOA more than twice in one season. Use fungicides that contain 2 MOA.
Septoria nodorum blotch *Phaeosphaeria nodorum*	Leaf blotches with minute grey–brown spots; leaf death. Glumes darken to brown to grey. Easily mistaken for septoria tritici blotch or yellow leaf spot.	Develops late in the season with above average mid–late spring rainfall and warm temperatures.	Initially airborne spores, rain-splashed spores within the crop from infected leaves.	None required at present. Increasingly detected in NSW crop surveys conducted in 2021 and 2024, which had above-average rainfall. Detection has decreased with drier seasonal conditions in 2023 and 2024. Importance presently unclear.
Ring spot *Drechslera campanulata*	Small (1–4 mm) spots with light centres and dark brown rims.	Southern and central areas; favoured by prolonged wet periods in late winter – early spring.	Spores spread from previously infected barley grass seed.	Reduce barley grass in previous season. Minor disease. Control not warranted.
Physiological black chaff (melanism or false black chaff) genetic disorder	Glumes, and sometimes stems just below the head, discoloured to brown–purple–black. Browning can also appear on stems in some varieties, which always extends downwards from a node.	Throughout the state. Develops in wet, humid springs.	This is a physiological expression of an over production of a melanoid associated with the stem rust resistance gene Sr2, which is present in some wheat varieties.	None. Is not a disease.
Stripe (yellow) rust *Puccinia striiformis* f.sp. *tritici*	Scattered yellow powdery pustules appear on leaves in the seedling plant stage and often in stripes on leaves in the adult plant stage.	Can develop from mid-autumn onwards; favoured by cool (8–15 °C) moist weather. Plant infection can occur when night-time temperatures are 5–20 °C. High nitrogen levels within a crop can favour development.	Survives on wheat volunteers and spreads as airborne spores.	Sow varieties with improved levels of resistance (can vary for different pathotypes); seed fungicide or in-furrow fungicides on starter fertiliser at sowing and/or foliar fungicides applied in-crop; control volunteer wheat and barley grass over summer–autumn period to reduce 'green-bridge'.
Leaf rust *Puccinia triticina*	Small, scattered orange–brown powdery pustules on upper side of leaf.	Can develop from early spring; favoured by mild (15–22 °C) moist weather.	Survives on living wheat volunteers and spreads as airborne spores.	Sow varieties with improved levels of resistance (can vary for different pathotypes); use foliar fungicides; control volunteer wheat over summer–autumn period. Group 3 (triazole, DMI) resistance detected in pathogen population; this resistance is pathotype-specific.
Stem rust *Puccinia graminis* f.sp. *tritici*	Red–brown, powdery, oblong pustules with tattered edges on leaf (both sides) and stem.	Can develop from mid spring to end of season, more severe in the north; favoured by warm (15–30 °C), humid weather.	Survives on living wheat volunteers and spreads as airborne spores.	Sow varieties with improved levels of resistance; apply foliar fungicides; control volunteer wheat and barley over summer–autumn period.
Wheat powdery mildew *Blumeria graminis* f.sp. *tritici*	White–grey cottony fungal growth on leaf and leaf sheath; black resting bodies developing during the season.	Generally, more prevalent in irrigated crops and usually more evident in winter and early spring. High nitrogen levels within a crop can favour development.	Spores blown from infected trash and infected plants.	Sow varieties with improved levels of resistance, apply seed or in-furrow fungicides at sowing or foliar fungicides in-crop. **Note**: fungicide resistance/reduced sensitivity to triazoles (Group 3, DMIs) and strobilurin (Group 11, QoI) actives has been detected in NSW.

Table 20. Diseases and crop injury guide – wheat. (Page 2 of 3.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Virus diseases				
Barley yellow dwarf virus (BYDV) and *Cereal yellow dwarf virus* (CYDV)	Yellowing, infected plants have reduced height and reduced seed set. Purple and/or red leaf margins.	Most common near perennial grass pastures and in early sown crops.	Transmitted by aphids (oat, corn and rose grain) from infected grasses and cereals. Not seed-borne.	Resistant/tolerant varieties. Apply seed treatments to control early aphids in crop. In-crop aphid control.
Wheat streak mosaic virus (WSMV)	Light green streaks and blotches on leaves, stunted plants, twisted leaves and trapped heads in the boot, reduced seed set.	Has occurred in wheat in southern irrigation areas, and in early sown grazing wheat on the tablelands and slopes. Earlier infections have a more severe effect on crops. Increased prevalence in southern NSW in 2021.	Transmitted by the wheat curl mite (WCM). Low level of seed transmission.	Generally, no control required. Spray out grasses in paddock and adjoining paddocks 4 weeks before sowing wheat. No in-crop treatment available, insecticides do not control WCM as they are protected within the curled leaf. Do not retain seed from infected crops for planting.
Root and crown diseases				
Take-all *Gaeumannomyces graminis* var. *tritici*	Blackened roots, stem bases and crown; stunting; 'white heads' and pinched grain.	More common in central and southern NSW, favoured by a wet winter and early spring, followed by heat and or moisture stress at anthesis and flowering. Prevalence has increased in southern and central NSW in recent seasons.	Soil and stubble-borne on grass and cereal residues, mostly roots and crowns.	Crop rotation for one year free of hosts; some seed and in-furrow fungicides provide a level of suppression.
Fusarium crown rot (FCR) *Fusarium pseudograminearum*	Brown stem bases, crown and sometimes roots go brown; pink hyphae around leaf sheath under high moisture conditions; 'white heads'; pinched grain. White mycelium inside stem after harvest.	Common across NSW farming systems, particularly in stubble retention systems. Generally high levels across the state during 2024.	Stubble-borne on grass and cereal residues.	Crop rotation, preferably for 18 months to 2 years; grow more resistant or tolerant varieties; grass weed control; balance inputs to available soil water. Inter-row sowing and avoid delayed sowing to minimise losses. Only grow susceptible varieties (e.g. durum) in low risk paddocks based on PreDicta®B or stubble testing. New seed fungicide treatments have shown economic activity against fusarium crown rot, growers should check for the latest product registrations.
Common root rot *Bipolaris sorokiniana*	The root between the crown and seed (sub-crown internode) is always dark (brown–black); roots and sometimes the stem base are brown; plants have reduced tillering and biomass ('ill thrift').	Widespread throughout the grain belt, often found in association with crown rot; scattered through the crop. Exacerbated by deep sowing. Infection favoured by warmer soil temperatures (20–30 °C).	As spores in soil, and on grass and cereal residues in soil. Sorghum and maize are also hosts.	Resistant varieties; crop rotation; optimise nutrition (especially phosphorus), be careful with sowing depth, as deeper sowing into warmer soils favours infection.
Rhizoctonia root rot *Rhizoctonia solani*	Patches of spindly, stunted plants with yellow erect leaves; 'spear point' root rot; plant death. Later infection of crown roots just seen as wavy appearance across crop.	Associated with minimum or reduced tillage; often aggravated by Group 2 herbicides and agricultural hardpans.	As fungal threads in soil; soil-borne on residues of many grass, cereal and broadleaf plants.	Crop rotation, soil disturbance to 5–10 cm below sowing depth at or within 2–4 weeks before sowing; avoid Group 2 herbicides building up, which can cause root pruning. Some seed treatments provide suppression only. Liquid banding of some fungicides is also registered.
Eyespot *Tapesia yallundae*	Lodging, distinctive 'eyespot' with sharp bend in stem 3–5 cm above ground.	Southern and central west slopes, eastern Riverina; favoured by prolonged wet periods in late winter to mid spring. Rarely detected in recent crop surveys across NSW.	Rain-splashed spores from crop or grass residue during winter.	Crop rotation (2-year break from cereals); fungicide at first node stage (Zadok GS31).
Root lesion nematode (RLN) *Pratylenchus thornei* *Pratylenchus neglectus*	Lower leaves yellow, reduced tillering, general ill thrift, restricted root system.	*P. thornei* more common in north. Crops differentially host each species, e.g. canola hosts *P. neglectus* but not *P. thornei*. Lower soil fertility and delayed sowing can exacerbate effects.	Survives within old roots or as dormant nematodes in the soil. Nematodes can be spread between paddocks and regions through the movement of soil on machinery or in flood water.	Crop rotation, but note different crops differentially host the 2 nematode species; tolerant or resistant varieties, which again can differ for the 2 nematode species.

Table 20. Diseases and crop injury guide – wheat. (Page 3 of 3.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Smuts				
Flag smut *Urocystis agropyri*	Stunted plants with black, powdery streaks in leaves.	Most likely in early sown crops (sown in warm soil).	Soil and seed-borne spores.	Resistant varieties, seed-applied fungicide.
Loose smut *Ustilago tritici*	Black powdery heads on diseased plants.	Statewide.	Airborne spores infect developing seeds at flowering.	Seed-applied fungicide.
Bunt *Tilletia laevis; T. tritici*	Seed contains a black, foul-smelling mass of spores – affected grain is not accepted by buyers.	Now very rare, but present at low levels in many crops.	Spores on seed coat infect seedling before it emerges.	Seed-applied fungicide.
Grain conditions				
Fusarium head blight (FHB) *Fusarium pseudograminearum* and *Fusarium graminearum*; other *Fusarium* spp.	Dying portions of head; white or pink, pinched grain; orange spore masses on head. Browning of stem in head (rachis) with bleached spikelets attached.	In wet springs with high humidity during flowering; more common in the north. Durum wheat very susceptible. Overhead irrigation during flowering can provide conditions favourable for infection.	Stubble-borne on wheat, maize, sorghum, other grasses; wind-borne and rain-splashed spores. Note: basal infections from crown rot (*F. pseudograminearum*) can also cause fusarium head blight (FHB) in very wet seasons such as in 2022.	Crop rotation (maize is the highest inoculum risk); avoid highly susceptible varieties especially durum; fungicide at flowering applied correctly (angled nozzles and 100 L/ha water rate) to provide good coverage of heads. High levels of FCR in base of plants increases FHB risk in very wet seasons. When FHB occurs test seed retained for sowing in the following season to determine fusarium grain infection levels to guide appropriate management. In overseas studies, applying strobilurin (Group 11, QoI) fungicides after GS45 is not recommended where FHB risk is high.
Black point genetic disorder	Dark coloured areas on grain, particularly at embryo end, reducing appearance of grain products.	Favours moist weather during late stages of grain filling and ripening.	This is a physiological condition affecting some varieties of bread wheat and durum.	Resistant varieties.
Frost injury				
–	Dark or split nodes, kinked stem. Whole or partial head death. Absence of seeds.	After severe frost at stem elongation. After frost during booting and from heading to flowering.	–	Target the correct sowing window for the varieties being used. Avoid sowing short season varieties early. Avoid varieties with a short sowing window to spread risk.

Acknowledgements

Variety characteristics and reaction to diseases table

Disease scores courtesy of the various NVT national pathology screening projects throughout Australia funded by GRDC. Lodging scores are combined ratings from the Southern Irrigated Wheat project, breeding company ratings and from Allan Peake, CSIRO (Northern Irrigated Wheat project).

Contributing authors

Andrew Milgate, Steven Simpfendorfer and Brad Baxter NSW DPIRD;
Felicity Harris and Peter Martin (formerly NSW DPIRD).

Durum

Key considerations for 2025

- High fusarium crown rot (FCR) levels were detected in 2023 and 2024 cereal paddocks and will be an issue for growing durum wheat in 2025.
- All paddocks should be tested for FCR levels before sowing and durum considered only in low-risk paddocks.
- The best commercially available seed fungicide should also be applied to reduce plant infection at the seedling stage.

Milled durum wheat is ideal for making semolina, which is used to make pasta, couscous and many other products.

Durum wheat produces high yields and often attracts a price premium over bread wheat, giving growers in Prime Hard wheat or similar areas a useful alternative. Durum varieties should only be grown in high fertility soils where 13% grain protein or above is consistently produced, and preferably following a weed-free long fallow or broadleaf crop to minimise FCR risk.

Crop management

Seed

Use sound, true-to-type seed that is free of weed seeds, cracked grain, bread wheat and barley. Durum seed is significantly larger than bread wheat seed. Thousand grain weight should be determined and used to calculate a sowing rate based on target plant population. Target plant populations are similar to bread wheats. Germination percentage should exceed 90%.

Sowing time

Best yields are obtained from sowing in mid May to the end of June, depending on variety and region. Frost can damage earlier sowings at flowering.

Sowing

Adjustments might be necessary for the larger seed size; increase the sowing rate if using seed with a reduced germination percentage, sowing later into cold conditions, or higher yield potential situations. Short coleoptile length should be considered when moisture seeking. Ensure seeders are clean of bread wheat, and barley in particular, before starting sowing.

GO TO PAGE
Calculating sowing rates on page 7.

Nutrition

A balance of nutrients is essential for profitable yields. Fertiliser is commonly needed to add the essential nutrients and phosphorus. A lack of other essential plant nutrients – e.g. sulfur and zinc (Zn) – can also limit production in some situations. Soil test and consider paddock history to determine nutritional requirements. Complete a nitrogen (N) budget and consider variety selection to ensure that protein levels above 13% are achieved.

Crops usually tolerate low Zn levels when grown on heavy, self-mulching black earths (pH_{Ca} 8.0–8.5). When grown in very wet, high phosphate soils for several weeks, Zn-deficiency symptoms can appear.

If the soil is known to be low in Zn (soil and plant tissue tests are available), a 1% aqueous solution of zinc sulfate heptahydrate applied as a foliar spray 2–4 weeks after emergence ameliorates the deficiency. A range of Zn-fortified starter fertilisers are also available.

Diseases

Rust

With the change in stripe rust pathotypes across NSW since 2020, growers should ensure they are using the latest resistance ratings. Depending on the variety, consider using a seed, fertiliser or foliar fungicide management program for stripe rust.

Fusarium crown rot and fusarium head blight

Durum varieties are very susceptible to FCR and are also susceptible to fusarium head blight (FHB). Fusarium head blight is common in very wet seasons and in areas where durum is grown in close proximity to maize or sorghum stubble, which hosts *Fusarium graminearum*. In very wet seasons basal infections from FCR can result in spores (conidia) produced around lower nodes being splashed by rain into heads during flowering, creating FHB infection.

Rotations and paddock selection are therefore important to minimise both FCR and FHB risk. Avoid wheat-on-wheat/barley situations due to the high FCR risk and low nutrition. Preferred paddocks for durum are tested paddocks (PreDicta B® or NSW DPIRD cereal stubble testing) and known to have a very low level of FCR risk. In some paddocks where inoculum levels are high, this might require a double-break (e.g. pulse–canola) to reduce the FCR risk to a safe level for durum production.

Ensure good grass weed control as many grass species also host the fusarium crown rot pathogen.

NSW DPIRD, under bilateral funding with GRDC, is offering free FCR testing based on laboratory stubble culturing. This test is only for levels of infection by FCR and common root rot (*Bipolaris* spp.).

Free FCR stubble testing

Want more info? Contact:
e: steven.simpfendorfer@dpi.nsw.gov.au
m: 0439 581 672.

Send dry stubble samples to:

Steven Simpfendorfer
NSW DPIRD
4 Marsden Park Rd
Tamworth, NSW 2340

Varieties

BitalliΦ. Australian Premium Durum (ADR) quality in southern NSW. A quick-mid maturing variety, 1–2 days slower than DBA_Lillaroi Φ. Bitalli Φ exhibits high yield potential and has shown adaptation to tougher environments. It has very good physical grain characteristic with low screenings and high test weights. Marketed by AGT.

CaparoiΦ. ADR quality in NSW. A mid season maturity durum, with a maturity between EGA_Bellaroi Φ and Jandaroi Φ. It is a semi-dwarf durum variety with good yield potential in all regions. The grain quality is better than EGA_Bellaroi Φ and generally achieves a lower grain protein content. Caparoi Φ has improved dough strength compared with EGA_Bellaroi Φ, but is inferior to Jandaroi Φ for this trait. Caparoi Φ is superior to Jandaroi Φ for semolina yellowness, adequate resistance to common root rot. Marketed by Seednet.

DBA_AuroraΦ. ADR quality in NSW. A mid season maturity durum variety, released for the southern grains region. High yield potential, with yield levels similar to, or better than, Hyperno Φ in most NSW regions. Nitrogen management is important to obtain acceptable grain protein levels for delivery into durum quality grades, especially DR1. Higher levels of screenings can occur in some circumstances when compared with varieties such as DBA_Lillaroi Φ, Jandaroi Φ and Caparoi Φ. Avoid sowing DBA_Aurora Φ later than the suggested sowing window for your region as grain quality and yield potential can be affected. It can lodge under irrigation or high yielding conditions. Bred by the Southern Program of Durum Breeding Australia (University of Adelaide). Marketed by SA Durum Growers Association.

DBA_BindaroiΦ. ADR quality for northern NSW only. Early to mid maturing durum wheat variety that is adapted to dryland production areas in NSW, with a higher yield potential than Caparoi Φ. DBA Bindaroi Φ has erect plant growth and is shorter in stature than Caparoi Φ with better straw strength. Grain, semolina and pasta-making quality are superior to Caparoi Φ with improved colour and brightness. Low screening variety, similar to Jandaroi Φ. Bred by the Northern Program of Durum Breeding Australia (NSW Department of Primary Industries and Regional Development (NSW DPIRD)). Marketed by Seednet.

DBA_LillaroiΦ. ADR quality in NSW. An early–medium maturity variety, 3 days later to head emergence than Jandaroi Φ, with a higher grain yield. Excellent durum quality with large grain size, low screenings, high test milling yield, and improved semolina colour compared with older varieties. Adapted to the rain-fed durum production regions of NSW and is also suited to sowing later in the season. DBA_Lillaroi Φ is not recommended for high-input irrigation systems without the appropriate agronomic management. Bred by the Northern Program of Durum Breeding Australia (NSW DPIRD). Marketed by Seednet.

DBA_MataroiΦ. ADR quality in NSW. An early to mid maturing durum variety, with a similar heading date to Jandaroi Φ. DBA Mataroi Φ is adapted to dryland durum production areas of NSW and Queensland. Currently not recommended for high-input irrigation cropping systems. Erect plant type, with medium stature and straw strength similar to Caparoi Φ. Grain, semolina and pasta-making quality comparable to Caparoi Φ, low screenings, similar to Caparoi Φ with excellent yellow colour and good milling yield. Bred by the Northern Program of Durum Breeding Australia (NSW DPIRD). Marketed by Seednet.

DBA_VittaroiΦ. ADR quality in NSW. An early to mid maturing durum variety that is suitable for high-input irrigation durum production systems and replaces EGA_Bellaroi Φ. DBA_ Vittaroi Φ is shorter in stature than all other released varieties, with superior straw strength. It is approximately 7 days earlier to heading than EGA_Bellaroi Φ. Grain, semolina and pasta-making quality are superior to EGA_Bellaroi Φ. Low screenings, similar to Jandaroi Φ and superior to EGA_Bellaroi Φ. Bred by the Northern Program of Durum Breeding Australia (NSW DPIRD). Marketed by Seednet.

JandaroiΦ. ADR quality for northern NSW only. A quick maturity variety adapted to most durum producing regions and is suited to sowing later in the season. It has improved weather tolerance at harvest compared with other varieties. Grain quality is superior to Caparoi$^{\Phi}$ and EGA_Bellaroi$^{\Phi}$, with much stronger dough properties, but lower yellow pigment. An erect, semi-dwarf plant type. It is very prone to lodging under high yield conditions in southern NSW. Marketed by Seednet.

PatronΦ. ADR quality for northern NSW only. Released as a high yielding variety for the southern durum production regions in South Australia and Victoria. Patron$^{\Phi}$ is an alternative to DBA_Aurora$^{\Phi}$, sharing similar maturity and adaptation patterns. Patron$^{\Phi}$ is well suited to the medium-high yield potential environments. Good physical quality characteristics. Marketed by AGT.

WestcourtΦ. ADR quality in NSW. A main season variety similar in maturity to Caparoi$^{\Phi}$. Westcourt$^{\Phi}$ exhibits high yield potential in the northern region across diverse environments, with particular adaptation to dryland production systems. Westcourt$^{\Phi}$ has very good physical grain quality attributes including large seed size and a low percentage of screenings losses, high test weight and excellent semolina colour. Westcourt$^{\Phi}$ has maintained a Moderately resistant (MR) rating to stripe rust. Marketed by AGT.

Table 21. Suggested sowing times, durum wheat varieties.

Variety	April				May				June				July		
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Northern Slopes															
DBA_Aurora, Patron					>	★	★	<							
Caparoi, DBA_Bindaroi, Westcourt						>	★	★	★	★	★	<			
DBA_Lillaroi, DBA_Vittaroi							>	★	★	★	★	★	<	<	<
DBA_Mataroi							>	★	★	★	★	★	<	<	<
Jandaroi							>	★	★	★	★	★	<	<	<
Northern Plains (Moree, Narrabri)															
Caparoi							>	★	★	★	★	<			
DBA_Aurora, Patron					>	★	★	<							
DBA_Bindaroi, Westcourt						>	★	★	★	★	★	<			
DBA_Lillaroi, DBA_Vittaroi								>	★	★	★	★	<	<	<
DBA_Mataroi								>	★	★	★	★	<	<	<
Jandaroi								>	★	★	★	★	<	<	<
Liverpool Plains															
Caparoi								>	★	★	★	<			
DBA_Aurora, Patron					>	★	★	★	<						
DBA_Bindaroi, Westcourt						>	★	★	★	★	★	★	<		
DBA_Lillaroi, DBA_Vittaroi								>	★	★	★	★	★	<	<
DBA_Mataroi									>	★	★	★	★	<	<
Jandaroi									>	★	★	★	★	<	<
South Western Plains (Griffith, Hillston)															
Caparoi						>	★	★	<						
DBA_Aurora, Patron					>	★	★	★	<						
Bitalli, DBA_Bindaroi, Westcourt						>	★	★	★	★	<				
DBA_Lillaroi, DBA_Mataroi, DBA_Vittaroi							>	★	★	★	<				

Suggested sowing times

Aim to sow crops in the earlier part of the optimum period. The actual date is influenced by location, soil fertility and the likelihood of frost at flowering in a particular paddock.

> Earlier than ideal, but acceptable, some frost damage could occur.

★ Optimum sowing time.

< Later than ideal, but acceptable, yield might be reduced. DBA_Lillaroi$^{\Phi}$, DBA_Mataroi$^{\Phi}$ and Jandaroi$^{\Phi}$ given their quicker maturities, are suitable for double cropping following cotton.

Yield performance experiments from 2020–2024

The regional mean yields shown in the guide are average varietal performances across trial locations within each year or region. This averaging can mask the variety-by-environment interaction, that is, the ability of a variety to yield differently at each location across seasons (years).

New varieties can have less trial data supporting the five-year-across-sites analysis and should be viewed with caution, especially where there are only 2 trial results, or they have only been tested for 2 years in a region.

Table 22. Durum – north east region – compared with Caparoi = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Caparoi (t/ha)	4.05	4.96	3.87	2.21	4.83	4.11	
Caparoi	**100**	**100**	**100**	**100**	**100**	**100**	**13**
DBA_Aurora	103	97	110	100	94	100	13
DBA_Bindaroi	101	103	101	101	102	102	13
DBA_Lillaroi	91	89	96	100	97	94	13
DBA_Mataroi	104	105	116	109	106	108	13
DBA_Vittaroi	104	108	101	103	106	105	13
Jandaroi	87	85	90	99	97	91	13
Patron	–	98	–	108	97	106	8
Westcourt	105	106	114	108	106	108	13

Table 23. Durum – north west region – compared with Caparoi = 100%.

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Caparoi (t/ha)	2.92	5.34	4.43	2.08	5.23	4.22	
Caparoi	**100**	**100**	**100**	**100**	**100**	**100**	**16**
DBA_Aurora	106	108	106	107	99	104	16
DBA_Bindaroi	101	102	100	100	101	101	16
DBA_Lillaroi	94	84	104	95	98	95	16
DBA_Mataroi	111	104	118	101	106	109	16
DBA_Vittaroi	103	105	100	99	104	103	16
Jandaroi	89	76	101	91	96	92	16
Patron	–	111	–	110	104	113	9
Westcourt	110	105	115	101	106	108	16

Table 24. Durum – south west region – compared with Caparoi = 100%.

South west ❷							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Caparoi (t/ha)	5.49	6.14	3.70	4.68	5.62	5.21	
Bitalli	103	104	137	108	105	109	17
Caparoi	**100**	**100**	**100**	**100**	**100**	**100**	**17**
DBA_Aurora	105	101	122	103	102	105	17
DBA_Bindaroi ❶	101	102	98	100	101	101	17
DBA_Lillaroi	93	91	106	100	92	95	17
DBA_Mataroi	102	104	130	107	105	107	17
DBA_Vittaroi	101	105	95	100	104	102	16
Jandaroi ❶	90	87	98	99	88	91	17
Patron ❶	–	104	–	111	106	113	10
Westcourt	102	105	125	106	105	107	17

❶ No classification currently for this growing region, feed quality only.
❷ Includes irrigated and dryland variety trials.
Yield results are a combined across sites analysis of NVT yield trials from 2020–2024.
The tables present NVT 'Production Value' MET (multi-environment trials) data on a yearly region mean grouping and a regional mean basis.

Contributing author

Dr Mike Sissons, Cereal Chemist, NSW DPIRD, Tamworth.

Barley

Key considerations for 2025

» Loose smut in more susceptible barley varieties was widespread in 2024 following poor crop hygiene in 2023, and not using a seed fungicide or poor application of a fungicide seed dressing.

» It is recommended to treat all barley seed with a registered fungicide seed dressing for loose smut and use a properly calibrated application system.

Crop management

Sowing time

Sowing time determines when a crop matures; ideally flowering and grain fill should be in the cooler part of spring.

Sowing on time maximises the chances of achieving high yields and a malting grade. Sowing after the middle of June usually limits yield potential and results in smaller grain and higher protein, rendering the grain less likely to be accepted as malting.

Nutrition

Soil fertility and fertiliser management, with attention to nitrogen (N) and phosphorus (P), are essential to optimise yield.

Grain protein below 10.5% in combination with low yields usually indicates N deficiency. Where the level of protein is consistently less than 10%, at least 50 kg/ha of N can normally be applied at sowing or up to the 5-leaf stage to increase yields while maintaining malting quality. High fertility paddocks usually produce grain too high in protein for malting grade. High N rates can optimise feed grain yields.

Sowing depth

Pay close attention to sowing depth, particularly when direct drilled and for varieties with a short coleoptile. The ideal depth is 3–6 cm, but seed should always be sown into moist soil. If considering dry sowing, target a sowing depth of 3–4 cm, particularly on a hard-setting or slumping soil to avoid problems with crop emergence.

Irrigation

Barley does not tolerate waterlogging, so good paddock drainage and management are essential for high grain yields.

Sowing rates

GO TO PAGE
Calculating sowing rates on page 7.

Select seed carefully for large size and high germination percentage; a germination test can be conducted if in doubt. A suggested guide per hectare is:

- plains: 35–50 kg
- slopes: 45–60 kg
- tablelands and partial irrigation: 60–90 kg
- full irrigation: 70–110 kg
- grazing and grain: increase the above rates by 10–20 kg
- cover crops for pastures: 10–20 kg.

The lower rates should be used when there is limited subsoil moisture at sowing, and in drier areas. High sowing rates tend to decrease grain size and increase screenings.

Acid soils tolerance

No new acid-tolerant barleys have been released in recent years specifically for NSW. The acid-soil-tolerant barley, Buff$^{\Phi}$, was released in 2018 for Western Australia, and has shown adaption to NSW conditions. Limited yield data is available on Buff$^{\Phi}$ under acid soil conditions in NSW. The older varieties Yambla and Tulla can tolerate high soil aluminium up to 10–15%. Most varieties tolerate high manganese levels very well.

Variety choice

When selecting a variety consider:

- **crop use**: for grazing and grain recovery, feed grain, or malt grain production.
- **grazing value**: when is feed most important? Dual-purpose varieties are most suitable.
- **grain for**:
  - retention on farm
  - sale as feed grain
  - sale as human food
  - sale as a malting or food grade – for general delivery to malt segregations or under contract? Use only accredited malting or food grade varieties.

Management to achieve malting barley

Paddock selection

- Nitrogen status appropriate for expected yield
- Soil pH_{Ca} not less than 5.0 or soil aluminium not more than 5%
- Avoid soils prone to waterlogging
- Rotation; ideally sow after a root-disease break crop
- Avoid barley-on-barley. Barley can be sown after wheat if disease or seed contamination is not a problem
- Avoid varietal contamination

Variety choice

- Appropriate for the environment
- To suit the sowing time
- Availability of segregation

Sowing time

- Too early increases the risk of frost damage
- Too late will increase protein and screenings

Sowing rate

- Too high can reduce grain size and increase lodging, especially under irrigation
- Too low will reduce yield potential

Seed treatment

- Use appropriate seed dressings to control smuts and foliar diseases
- Note the effect of seed treatments on short–medium coleoptile length varieties, particularly in deep-sown situations

Phosphorus

- Too low will limit yield and increase protein

Nitrogen

- Too low will reduce yield and quality
- Excessive N fertiliser can increase screenings and protein levels

Timely weed control

- Weeds compete for nutrients and moisture
- Reduce contamination

Care with harvest

- Avoid skinning: partial loss of the husk from harvest damage
- Try to minimise weather damage effects
- Avoid varietal contamination
- Only use grain protectants registered for malting barley

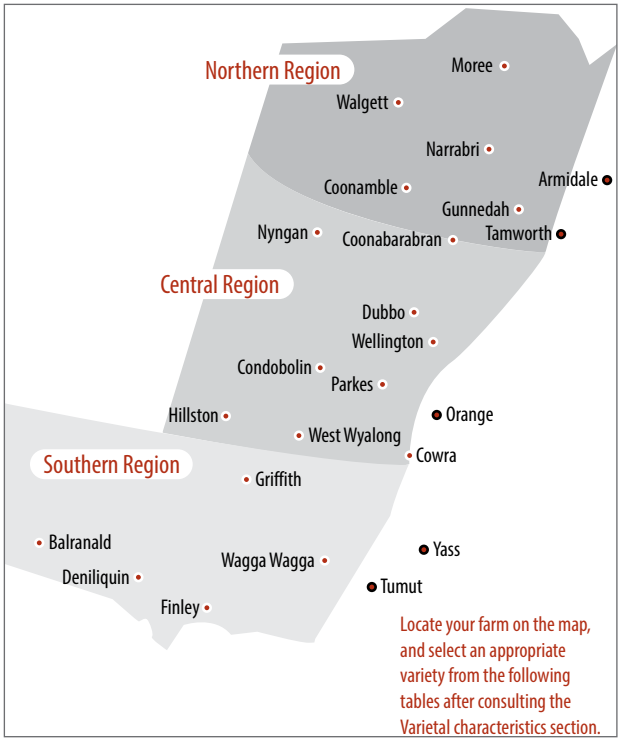


Figure 6. Map of NSW showing barley-growing zones.

Variety selection

Varietal characteristics

The following is a list of barley varieties, including new releases for 2025. The variety descriptions should be read in conjunction with Table 28. Variety characteristics and reaction to diseases on page 53.

There are specialist malt barley varieties available on the Australian market, which are grown under contract to specific companies. Limited information is available on the performance of some of these varieties, with limited testing in NVT (National Variety Trial) barley trials. Growers should seek as much information from the respective company on a variety's yield performance and disease resistance ratings and ensure grain contracts reflect any differences in yield or disease management for other, more locally adapted, barley varieties.

Information has been collated from breeding companies. Refer to Table 25. Suggested sowing times – barley on page 47 for suggested sowing times.

AlestarΦ. Malt. A medium–long season barley, 3 days earlier than Commander[Φ] and 5 days earlier than Gairdner[Φ] and Oxford[Φ]. Good yield potential in medium to high-yielding environments. Test weight, screenings and plumpness (retention) is similar to Hindmarsh[Φ]; high grain colour (brightness). Good straw quality with high resistance to lodging and straw breakage; excellent head retention. Bred by Limagrain UK, developed by Edstar Genetics/ Elders in Australia. EPG Seeds.

BeastΦ. Feed. A quick maturing, high yielding barley suited to low–medium rainfall environments. Beast[Φ] is 1–2 days quicker to reach awn peep than Spartacus CL[Φ]. A similar plant type to Compass[Φ] with excellent early vigour and a competitive physical grain package make it well adapted to terminal stress conditions and shorter season environments. AGT.

BottlerΦ. Malt. A mid season maturity variety (5 days earlier than Gairdner[Φ]), with high yield potential. Suits medium and high rainfall zones, with the potential for irrigation use. Barrett Burston Malting is supporting malt grain production in selected regions. Commercialised by Seednet.

CombatΦ. Feed. A highly competitive yielding barley that has performed well across a range of growing environments in NSW. It is a mid maturing variety, longer than Rosalind[Φ] and similar to Scope CL[Φ] in maturity. Combat[Φ] has a semi-prostrate growth habit providing a higher level of early vigour, improving ground cover and weed competition compared with Rosalind[Φ]. InterGrain.

CommanderΦ. Malt. Mid season variety, with a maturity between Schooner and Gairdner[Φ]. Plump grain size compared with other malting varieties. Higher yield and lower grain protein than Schooner or Gairdner[Φ] when grown under the same conditions. Can lodge when sown early. Developed by the University of Adelaide. Commercialised by Seednet.

Commodus CL[Φ]. Malt. Quick-maturity imidazolinone (IMI) tolerant barley variety suited to lighter soils and medium–low rainfall environments. Agronomically similar to Compass[Φ]. Similar lodging tolerance and head loss risk to Compass[Φ], which could require in-season agronomic management. Excellent grain size with high retention levels and low screening. Moderate hectolitre weight. InterGrain.

CompassΦ. Malt. An early to mid season maturing variety option. It has a similar growth habit to Commander[Φ], but higher yield potential. In high-yielding situations it has shown to be prone to crop lodging. Compass[Φ] is earlier flowering than Commander[Φ] and similar to Hindmarsh[Φ]. Compass[Φ] has shown good physical grain quality, with plump grain, high retention and low screenings. Commercialised by Seednet.

CyclopsΦ. Malt. A quick-mid maturing barley, slightly slower than Spartacus CL[Φ]. Very high and stable yield potential with a short plant type similar to La Trobe[Φ], reducing lodging susceptibility compared with taller varieties. Widely adapted to a range of environmental conditions across NSW and has a competitive physical grain package. AGT.

FandagaΦ. A mid slow maturity, high-yielding barley, suited to medium–high rainfall zones and irrigation production. Approved overseas as a malt variety, yet to be classified in Australia; currently a feed barley only. Marketed by AGF Seeds.

FathomΦ. Feed. Developed using wild barley to improve stress tolerance and water use efficiency. Fathom[Φ] has a long coleoptile and shows particularly good early vigour and weed competitiveness. Early maturity is similar to Hindmarsh[Φ]; best suited to lower and medium rainfall environments. Fathom[Φ] is a moderately tall variety, but shows good straw strength and has excellent grain plumpness with screenings levels lower than Hindmarsh[Φ]. Developed by the University of Adelaide. Commercialised by Seednet.

LaperouseΦ. Released through SECOBRA Recherches as a competitive-yielding feed type and is under evaluation for malt accreditation with Grains Australia. Competitive growth habit with medium plant height. Laperouse^{Φ} is a spring type barley – when sown in a main season sowing time maturity is typically between Compass^{Φ} and RGT Planet^{Φ}. Laperouse^{Φ} has shown a low incidence of head-loss and good physical grain quality. Commercialised by Seednet.

La Trobe^{Φ}. Malt. An early-maturing semi-dwarf variety with good yield potential in low–medium production environments. It has a very similar growth habit and plant architecture to Hindmarsh^{Φ}. It has excellent head retention, lodging resistance and good physical grain characteristics. Similar disease profile to Hindmarsh^{Φ}. La Trobe^{Φ} also possesses good pre-harvest sprouting tolerance. InterGrain.

Leabrook^{Φ}. Malt. Mid tall plant type, with mid–early maturity similar to Compass^{Φ}. Generally higher grain yield, higher grain plumpness percentage and low screenings percentage compared with Compass^{Φ}. Bred by the University of Adelaide, commercialised by Seednet.

Maximus CL^{Φ}. Malt. A quick-mid maturing IMI-tolerant high yielding barley. Maximus CL^{Φ} is similar to Spartacus CL^{Φ} with an erect plant type, strong lodging tolerance and low–medium head loss risk. Maximus CL^{Φ} has a short coleoptile so adjust sowing depth accordingly. The variety also has a good physical grain package, slightly improved over Spartacus CL^{Φ}. InterGrain.

Minotaur^{Φ}. Malt. A mid slow maturity barley, slightly later than RGT Planet^{Φ}. Suited to medium–high rainfall environments. Shorter plant type compared to the Compass^{Φ} types, with moderate resistance to crop lodging. Minotaur^{Φ} has a good physical grain package with improved test weight, screenings and retention compared with RGT Planet^{Φ}. AGT.

Neo CL^{Φ}. Malt. A mid-maturing IMI-tolerant high yielding barley, suited to medium–high rainfall environments, slightly quicker than RGT Planet^{Φ}. Medium plant height and good tolerance to lodging, good grain retention and tolerance to head loss. Improved grain plumpness compared to RGT Planet^{Φ} and Zena CL^{Φ}. InterGrain.

Newton^{Φ}. Feed. Released through SECOBRA Recherches as a mid maturing winter barley. Dual-purpose barley variety with slow early development enabling grazing and a longer growing season. Requires exposure to cold temperatures (vernalisation) to initiate reproductive development. Highly competitive plant type, with high tillering ability, tall plant type at maturity. Unlike Urambie^{Φ}, it has a mid maturity which is between the winter wheats EGA_Wedgetail^{Φ} and DS Bennett^{Φ}, so is suited to the medium to high rainfall environments. Commercialised by Seednet.

Nitro. A mid season maturity, spring feed barley with mid straw height. Good early vigour and strong tillering variety, which appears to tolerate sodic soils – performing well under these conditions in northern NSW. High yield potential in favourable environments and suited to early to mid May sowing. Nitro can only be grown under licence from GrainSearch. Commercial seed is available through AMPS (Tamworth NSW) or their affiliates.

RGT Planet^{Φ}. Malt. Mid season flowering, but maturity is flexible with a multi-environmental fit that has shown a high yield potential in NSW. Similar maturity to Commander^{Φ}. Excellent standability. RAGT.

Rosalind^{Φ}. Feed. A broadly-adapted, high-yielding mid season barley that has performed well across NSW. Maturity is later than La Trobe^{Φ} and earlier than Buloke^{Φ}. It has a short coleoptile length, moderate plant height and an erect growth habit. Good straw strength and head retention. High level of pre-harvest sprouting tolerance, with good physical grain package; grain plumpness is similar to La Trobe^{Φ}. InterGrain.

ShepherdΦ. Feed. Slightly later maturing than GroutΦ, but has a similar growth habit with erect, vigorous early growth. Suited to the medium rainfall areas of northern NSW and Queensland. Commercialised by Seednet.

Spartacus CLΦ. Malt. A high-yielding IMI-tolerant barley suited to NSW. It is an early-maturing semi-dwarf barley with a maturity similar to La TrobeΦ. Short coleoptile length. Moderately good straw strength and head retention with good physical grain quality. High level of pre-harvest sprouting tolerance. InterGrain.

SakuraStarΦ. A boutique malting barley developed by Sapporo Breweries and the University of Adelaide. Targeted to replace SouthernStarΦ as it has improved pre-harvest sprouting tolerance. Superior grain size compared with SouthernStarΦ and is similar to BulokeΦ. Grown only under production contracts; contact local malt buyers before growing.

SpinnakerΦ. Released through SECOBRA Recherches, as a high yielding early to mid maturing barley variety targeted for medium rainfall environments. Prostrate early growth habit and its mature plant height is between LaperouseΦ and RGT PlanetΦ. Has improved physical grain quality compared to RGT PlanetΦ. Low risk for both lodging and head loss. Released as a feed quality barley, Grains Australia is currently evaluating SpinnakerΦ for malt accreditation. Commercialised by Seednet.

Titan AXΦ. A CoAXium® barley variety that is tolerant to Sipcam Aggressor® (Group 1, quizalofop-P-ethyl) herbicide offering an alternative to Clearfield® technology. A mid season maturing, high-yielding barley derived from CompassΦ suited to low–medium rainfall environments. Titan AXΦ reaches awn peep slightly later than CompassΦ and similar to RGT PlanetΦ. Agronomically similar to CompassΦ with similar height and lodging tolerance that might require in-season agronomic management in some environments. Good grain package with low screenings and good retention, moderate test weight, similar to CompassΦ. Released as a feed quality barley, Grains Australia is currently evaluating Titan AXΦ for malt accreditation. AGT.

Urambie. Feed. It is best suited to grain and grazing situations. Two-row barley, adapted to early sowing, having early maturity combined with a cold requirement to initiate heading. Sowing window is early May to mid June; earlier if grazed. Consistent yields across seasons, but low grain quality. Waratah Seeds.

YetiΦ. Feed. A high-yielding barley variety released for northern NSW. YetiΦ is closely related to CompassΦ and has a robust physical grain package with low screenings and high retention. Shorter in plant height than CompassΦ, YetiΦ offers improved lodging resistance. AGT.

Zena CLΦ. Malt. An IMI-tolerant barley closely related to RGT PlanetΦ with similar maturity and agronomic management, with the added benefit of herbicide tolerance. Suited to medium–high rainfall environments, the variety has good levels of resistance to powdery mildew and leaf rust. The net form and spot form of net blotch will require monitoring. InterGrain.

The following are more recently named or released varieties. Some lines might only have limited seed available in NSW for 2025.

Bigfoot CLΦ. A quick-mid Clearfield® Intervix® herbicide tolerant, high yielding feed only barley. Bigfoot CLΦ is broadly adapted but particularly suited to low–medium rainfall regions. Bigfoot CLΦ is related to the CompassΦ family, has good early vigour for early weed competition, but has reduced plant height and a lower risk of lodging. Similar plant height and maturity to YetiΦ and Maximus CLΦ. Bigfoot CLΦ has a solid grain package with low screenings and good test weights. AGT.

Granite CLΦ. A quick-mid maturing, Clearfield feed barley suited to low-medium rainfall areas. Erect plant habit and medium plant height similar to RosalindΦ and Maximus CLΦ. Good lodging tolerance and low head loss risk. The variety has shown excellent yield potential. Good physical grain quality, including good seed size and test weight. Limited seed for 2025 in NSW, seed widely available for 2026. InterGrain.

PegasusAXΦ. A CoAXium® barley variety that is tolerant to Sipcam Aggressor® (Group 1, quizalofop-P-ethyl) herbicide offering an alternative to Clearfield® technology for managing susceptible grass weeds in the barley rotation. A quick-mid maturing, feed only barley variety. PegasusAXΦ is a RosalindΦ derivative and agronomically similar, offering a shorter plant height and lower lodging risk than Titan AXΦ. Similar grain size as other high-yielding feed varieties including RosalindΦ. AGT.

RGT AtlantisΦ. A world first waterlogging tolerant quick maturing barley. It is suited to medium to high-rainfall regions where transient waterlogging occurs. It is agronomically identical to RGT PlanetΦ, quick to establish and produces high early biomass for excellent weed competition. Good straw strength. Under evaluation for malt accreditation with Grains Australia. Bred By UTAS and RAGT, marketed by RAGT.

Suggested sowing times

Aim to sow in the earlier part of the indicated optimum time to achieve maximum potential yield, particularly in western parts of the region. Actual sowing date selection should allow for soil fertility and frost damage risk in particular paddocks.

Table 25. Suggested sowing times – barley.

Variety	March				April				May				June				July		
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Northern region																			
Newton ❶ ❷, Urambie ❶		>	★	★	★	★	★	★	★	★	<								
GrangeR							>	★	★	★	★	<							
Alestar, Bottler, Combat, Commander, Laperouse, Minotaur, Neo CL ❷, Nitro, RGT Atlantis ❷, RGT Planet, Spinnaker ❷, Titan AX, Zena CL									>	★	★	★	★	★	<				
Bigfoot CL ❷, Commodus CL, Compass, Cyclops, Granite CL ❷, La Trobe, Leabrook, Maximus CL, PegasusAX ❷, Rosalind,									>	>	★	★	★	★	<				
Beast, Fathom, Shepherd, Spartacus CL, Yeti										>	★	★	★	★	★	<			
Central region																			
Newton ❶ ❷, Urambie ❶		>	★	★	★	★	★	★	★	★	★	<							
GrangeR, Nitro								>	★	★	★	★	<	<					
Bottler, Combat ❷, Commander, Laperouse, Minotaur, Neo CL ❷, RGT Atlantis ❷, RGT Planet, Spinnaker ❷, Titan AX, Zena CL									>	★	★	★	★	<	<				
Commodus CL, Compass, Cyclops, Leabrook, PegasusAX ❷, Rosalind										>	★	★	★	<	<				
Beast, Bigfoot CL ❷, Fathom, La Trobe, Granite CL ❷, Maximus CL, Shepherd, Spartacus CL, Yeti										>	★	★	★	★	<	<			
Southern region																			
Newton ❶ ❷, Urambie ❶		>	★	★	★	★	★	★	★	★	<								
GrangeR							>	>	★	★	★	★	★	★	<	<			
Bottler, Combat ❷, Commander, Laperouse, Minotaur, Neo CL ❷, Nitro, RGT Atlantis ❷, RGT Planet, Spinnaker ❷, Titan AX, Zena CL										>	★	★	★	★	★	★	<		
Beast, Bigfoot CL ❷, Commodus CL, Compass, Cyclops, Fathom, Granite CL ❷, La Trobe, Leabrook, Maximus CL, PegasusAX ❷, Rosalind, Shepherd, Spartacus CL, Yeti										>	>	★	★	★	★	★	★	<	

> Earlier than ideal, but acceptable.
★ Optimum sowing time.
< Later than ideal but acceptable.

❶ Dual-purpose varieties that can be grazed. Newton and Urambie can be sown from mid–late March, if grazed.
❷ Limited information available on performance in NSW.

Northern NSW barley variety performance

Yield performance experiments from 2020–2024

The yield results presented are NVT 'Production Value' multi-environment trial (MET) data shown on a yearly regional group mean and regional mean basis from 2020–2024. Further results are on the NVT website.

Table 26. Northern NSW main season compared with La Trobe = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% La Trobe (t/ha)	4.21	3.94	4.12	3.56	5.34	4.15	
Alestar ❶	96	99	118	103	97	102	16
Beast	103	97	104	105	105	102	16
Bigfoot CL	–	–	–	111	124	116	5
Bottler ❶	98	101	117	105	100	104	16
Combat	–	106	119	112	115	112	12
Commander ❶	93	95	106	102	95	98	16
Commodus CL ❶	96	92	103	104	99	98	16
Compass ❶	99	93	102	104	102	99	16
Cyclops ❶	109	111	108	102	107	108	16
Fathom	103	98	97	103	104	101	16
Granite CL	–	–	–	–	121	116	2
La Trobe ❶	**100**	**100**	**100**	**100**	**100**	**100**	**16**
Laperouse	116	106	110	107	119	112	16
Leabrook ❶	106	100	114	109	109	107	16
Maximus CL ❷	120	108	113	108	123	114	16
Minotaur ❶	–	110	108	105	110	109	12
Neo CL ❶	–	–	–	113	118	117	5
Nitro	106	–	–	–	–	110	4
PegasusAX	–	–	–	–	109	110	2
RGT Atlantis	–	–	–	104	–	106	3
RGT Planet ❶	106	108	133	111	108	113	16
Rosalind	111	106	119	108	112	111	16
Spartacus CL ❶	106	105	100	99	106	103	16
Spinnaker	–	115	132	111	117	118	12
Titan AX	–	–	109	109	104	102	8
Yeti	121	105	113	112	125	115	16
Zena CL ❶	–	108	131	109	107	111	12

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% La Trobe (t/ha)	4.14	5.02	5.50	2.54	5.04	4.61	
Alestar ❶	96	111	103	91	91	100	21
Beast	105	102	104	103	102	103	21
Bigfoot CL	–	–	–	–	107	109	4
Bottler ❶	101	113	108	93	97	105	21
Combat	–	117	116	104	108	113	17
Commander ❶	100	104	102	94	95	100	21
Commodus CL ❶	101	99	99	98	95	98	21
Compass ❶	101	98	99	100	97	98	21
Cyclops ❶	105	112	109	100	108	108	21
Fathom	105	100	102	102	104	102	21
La Trobe ❶	**100**	**100**	**100**	**100**	**100**	**100**	**21**
Laperouse	106	111	105	100	106	107	21
Leabrook ❶	106	110	108	100	101	106	21
Maximus CL ❶	104	111	103	102	105	106	21
Minotaur ❶	111	117	114	97	110	112	20
Neo CL ❶	–	–	–	100	109	116	7
Nitro	102	–	–	–	–	109	4
PegasusAX	–	–	–	–	102	108	4
RGT Planet ❶	105	126	118	95	100	112	21
Rosalind	104	115	110	101	103	108	21
Spartacus CL ❶	100	102	100	100	103	101	21
Spinnaker	–	–	119	98	106	115	12
Titan AX	–	–	105	98	98	103	12
Yeti	109	112	107	104	108	109	21
Zena CL ❶	–	124	115	95	99	110	17

❶ Accredited malt varieties.

GO TO PAGE
NVT website
(https://nvt.grdc.com.au/)

Southern NSW barley variety performance

Yield performance experiments from 2020–2024

The yield results presented are NVT 'Production Value' multi-environment trial (MET) data shown on a yearly regional group mean and regional mean basis from 2020–2024. Further results are on the NVT website:

Table 27. Southern NSW main season compared with La Trobe = 100%

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% La Trobe (t/ha)	**5.03**	**4.47**	**4.84**	**3.57**	**6.33**	**4.85**	
Alestar ❶	99	100	105	89	103	100	5
Beast	93	87	106	97	100	97	5
Bigfoot CL	–	–	–	–	110	106	1
Bottler ❶	104	98	113	90	110	104	5
Buff ❶	89	94	105	93	101	97	5
Combat	–	108	120	99	115	112	4
Commander ❶	89	84	105	97	–	96	4
Commodus CL ❶	83	79	105	93	97	92	5
Compass ❶	81	78	107	91	97	91	5
Cyclops ❶	116	98	111	108	113	110	5
Fandaga	–	110	120	87	113	108	4
Fathom	94	94	104	96	100	98	5
Granite CL	–	–	–	–	109	108	1
La Trobe ❶	**100**	**100**	**100**	**100**	**100**	**100**	**5**
Laperouse	109	85	105	107	107	103	5
Leabrook ❶	90	82	112	94	104	97	5
Maximus CL ❶	112	94	100	108	102	103	5
Minotaur ❶	119	100	116	104	116	112	5
Neo CL ❶	–	–	–	99	129	122	2
Nitro	107	–	–	–	–	106	1
PegasusAX	–	–	–	–	108	107	1
RGT Atlantis	–	–	–	88	112	107	2
RGT Planet ❶	115	112	121	89	116	112	5
Rosalind	115	106	113	99	110	109	5
SakuraStar	77	–	95	95	–	89	3
Spartacus CL ❶	105	96	98	103	100	100	5
Spinnaker	–	109	122	91	116	112	4
Titan AX	–	–	109	97	104	97	3
Yeti	108	88	107	103	105	102	5
Zena CL ❶	–	110	119	89	114	110	4

GO TO PAGE
NVT website
(https://nvt.grdc.com.au/)

❶ Accredited malt varieties.

Table 27. Southern NSW main season compared with La Trobe = 100%. (Continued).

South west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% La Trobe (t/ha)	4.82	5.50	5.41	4.81	4.41	5.06	
Alestar ❶	99	95	105	95	89	98	26
Beast	100	101	103	100	103	101	26
Bigfoot CL	–	–	–	–	108	107	3
Buff ❶	96	99	101	98	95	98	26
Combat	–	113	115	108	113	112	20
Commander ❶	97	96	100	96	–	97	23
Commodus CL ❶	95	97	101	96	96	97	26
Compass ❶	94	97	101	97	96	97	26
Cyclops ❶	111	107	110	105	112	109	26
Fathom	99	100	102	99	100	100	26
La Trobe ❶	**100**	**100**	**100**	**100**	**100**	**100**	**26**
Laperouse	106	99	105	101	105	103	26
Leabrook ❶	100	101	106	100	102	102	26
Maximus CL ❶	106	100	103	102	106	103	26
Minotaur ❶	112	107	115	105	110	110	26
Neo CL ❶	–	–	–	108	116	119	8
PegasusAX	–	–	–	–	103	105	3
RGT Planet ❶	110	106	119	102	101	109	26
Rosalind	109	106	113	104	107	108	26
SakuraStar	89	–	91	93	–	91	17
Spartacus CL ❶	102	98	100	100	101	100	26
Spinnaker	–	–	119	103	104	110	14
Titan AX	–	–	104	99	101	101	14
Yeti	106	101	107	102	106	104	26
Zena CL ❶	–	104	117	101	99	107	20

GRDC NATIONAL VARIETY TRIALS

❶ Accredited malt varieties.

Diseases

Integrated disease management is the key to minimising crop losses, rather than relying on seed or foliar fungicide for control alone. Avoid sowing barley into barley stubble and carefully consider whether to sow barley into wheat stubble. Improved levels of resistance to specific leaf diseases are available in some newer barley varieties; this is the preferred management option if these varieties are suitable for your region.

Paddock management and crop rotation are preferred controls for root diseases and fusarium crown rot (FCR). Seed dressings control smuts and delay leaf scald and powdery mildew from building up early in the season, with some providing useful net blotch control.

Varying pathotypes of the main fungal pathogens causing diseases – leaf rust, leaf scald and net blotches – occur in different regions across NSW and other barley-growing regions.

Growers should be aware that a variety's disease rating will depend on which pathotype(s) of a pathogen are present in their region. This can vary within and between seasons.

For some varieties, there are 2 distinct ratings or a range that relate to differences in susceptibility to different pathotypes. Growers are advised to show caution and monitor their crops carefully and be prepared, where feasible, to apply foliar fungicides to manage leaf disease should the variety begin to show susceptibility and seasonal conditions are favourable for disease development.

Leaf diseases

Rusts

Four rusts: barley leaf rust, barley grass stripe rust, stem rust and wheat stripe rust, can affect barley in NSW, with barley leaf rust the major concern.

Barley leaf rust

Barley leaf rust is present in all growing regions, with increased importance in central and northern NSW. Varieties that are rated very susceptible to leaf rust should be monitored carefully as they can build up leaf rust in local areas and spread it to other susceptible varieties causing leaf damage and the need for fungicide control. Fungicide groups should be rotated and selected carefully as resistance to Group 3 (triazoles, DMI) has been detected within the pathogen population. However, the fungicide resistance is pathotype-specific and not carried by every pathotype. Care should be taken to destroy volunteers of any susceptible or very susceptible barley variety over summer to limit leaf rust build-up early in the season.

Barley grass stripe rust, wheat stripe rust and barley stripe rust

Barley grass stripe rust and wheat stripe rust can develop to a small extent on some barley varieties, particularly if the diseases are severe on nearby barley grass or wheat. A new pathotype of barley grass stripe rust has been detected across NSW, which has increased virulence on some barley varieties such as RGT Planet$^{\Phi}$. However, it is still questionable whether the severity of infection warrants fungicide application.

Barley stripe rust poses a significant threat to the Australian barley industry; it is a major disease of barley in some countries but is not currently present in Australia. Report any unusually severe infections of stripe rust on barley to your agronomist or a NSW DPIRD plant pathologist and send samples to the Australian cereal rust survey; contact details can be found in Industry information on page 77.

Stem rust
This is not usually a problem on main season sowings. Stem rust infection occurs at higher temperatures and can develop on very late-sown susceptible varieties in some seasons.

Net blotch

There are 2 forms: the spot form and the net form. Both forms survive on infected barley stubble, but the net form can also be seed-borne. It can be difficult to distinguish between the 2 forms and mixed infections are possible.

Spot form
The spot form produces small, dark brown spots or blotches up to 10 mm long. Blotches are round–oval when small, becoming more straight-sided as they enlarge. Larger blotches are often surrounded by a yellow margin, particularly towards the leaf tip. Lesions will often join into each other. The spot form of net blotch is widespread as most varieties are susceptible.

Net form
This also produces small, round–oval dark brown spots at first, but these elongate into dark brown streaks along the leaf, often giving a netted appearance. Severely affected leaves wither. Only the net form can infect grain, which can result in seed-borne infections if this seed is retained for sowing next season. The net form has been less common in the southern region but increasing in importance as more susceptible varieties are being grown. It can, however, be a major disease in northern NSW if susceptible varieties are grown.

It is advisable to use a seed treatment that will control the seed-borne stage of the net form of net blotch. Growers should be aware that the fungicide flutriafol, commonly applied as a fertiliser treatment, is not an effective control for either the net or spot form of net blotch. Planting seed retained from crops infected with the net form should be treated with an appropriate dressing. See Table 91 on page 171 for details. Note that this only controls the seed-borne infection and will not provide protection against infection from spores from infected barley stubble.

The fungicide seed treatment Systiva® provides useful levels of early control against stubble-borne infections of both the net and spot forms of net blotch. The product is based on a Group 7 fungicide from the succinate dehydrogenase inhibitor (SDHI) class and growers should be aware that this class of fungicide is vulnerable to resistance development and should not be repeatedly used. Field resistance to Systiva® has been detected in areas of South Australia and Western Australia where barley has been grown at high intensity in-crop rotations. The mutation conferring SDHI (Systiva®) resistance was detected in 17 of 41 net blotch samples collected in 2024 with 35 of 41 having the mutation for reduced sensitivity to Group 3 (triazole, DMI) fungicides. Whether this will result in field failure is unclear at the moment, but testing by the Centre for Crop Disease Management indicates that NSW net blotch samples are likely to be more resistant to propiconazole than either epoxiconazole or prothioconazole.

Ramularia leaf spot

Ramularia leaf spot (RLS) is present throughout NSW, being particularly widespread in southern and central regions. Crops can be infected without disease symptoms appearing before turning pathogenic and causing lesions around full head emergence or early grain fill. Grain yield loss is possible when symptoms are present, although currently little is known about the effects of this disease in NSW. Overseas research indicates yield loss from RLS can be as severe as losses from net blotches and barley scald under ideal environmental conditions.

Overseas research has also shown that preventative fungicide application is best, i.e. before symptoms appear. There are foliar fungicides registered for RLS control in Australia, but do not undertake more than 2 applications of the same product in one season. There are currently confirmed instances of fungicide resistance in Europe and New Zealand.

RLS is commonly misdiagnosed as other barley diseases and/or environmental stresses such as physiological spotting. Correct identification can be obtained by contacting a NSW DPIRD plant pathologist.

Barley scald

This is the major leaf disease in the higher rainfall areas of central and southern NSW. In susceptible varieties it can reduce grain yield by more than 50%. Scald has high levels of genetic diversity, which enables it to rapidly overcome host resistance. Most current varieties are rated susceptible and should be closely monitored. To reduce the risk of scald developing, avoid sowing barley onto barley stubble.

Fungicides applied to fertiliser or as a seed treatment provide useful early control. Fungicide sprays at growth stages Z31 and Z39 can provide an economical response, in susceptible varieties with high-yield potential, in seasons conducive to scald development.

Table 28. Variety characteristics and reaction to diseases.

Variety	Leaf scald	Net blotch net form	Net blotch spot form	Powdery mildew	Leaf rust	BGYR (stripe) rust	Crown rot	Common root rot ❹	Cereal cyst nematode resistance	RLN *P. thornei* Resistance ❷	RLN *P. thornei* Tolerance ❸	RLN *P. neglectus* Resistance ❷	RLN *P. neglectus* Tolerance ❸	Issued by	Year registered
Alestar ❶	S–VS	S	S	MR–MS	MR–MS	R	S	MS–S	R (P)	MR	MT–MI	MR	I	Limagrain/EPG Seeds	2017
Beast	S–VS	MS–S	MS	S	S	R	S	S	MR	MR–MS	T–MT	MR–MS	MI	AGT	2020
Bigfoot CL	S–VS (P)	MR–MS (P)	MR–MS	S	S–VS	R–MR	MS–S (P)	–	R	R–MR (P)	T–MT	MR	–	AGT	2024
Bottler ❶	S–VS	MR–MS	MS–S	R–MR	MR–MS	R	S–VS	MS	–	R–MR	MI	MS	MT	DLF Seeds	2017
Combat	S	MS–S	MR	MS–S	MS	R	MS–S	–	MR	MS	T–MT	MR–MS	–	InterGrain	2022
Commander ❶	S–VS	S	MS–S	MS–S	S–VS	R	S	MS–S	R	MR–MS	MT	MR–MS	MT–MI	University of Adelaide	2008
Commodus CL ❶	S	MS	MS–S	MS–S	S–VS	R	S	S	R	MR–MS	MT–MI	MR–MS	T–MT	InterGrain	2021
Compass ❶	S–VS	MS–S	MS	S	S–VS	R–MR	MS–S	MS	R	MR	T–MT	MR–MS	T–MT	University of Adelaide	2013
Cyclops ❶	S	MS	MS–S	S–VS	S	R	MS–S	–	S	MR–MS	MI	MR–MS	MI	AGT	2021
Fandaga	S	MS	S	R	MR–MS	MS	MS	–	R	MR	T–MT	MR	–	AGF Seeds	2022
Fathom	S	S	MR	MR–MS	MS	MR	S–VS	MS–S	R	MR	MT	MR–MS	T	University of Adelaide	2012
Granite CL	S–VS (P)	MR–MS (P)	MS (P)	S–VS (P)	MS–S (P)	R	S–VS (P)	–	–	–	–	–	–	InterGrain	2024
La Trobe ❶	S–VS	MR–MS	S	S	MS	R	S	S	R	MR–MS	MT	MR–MS	MT	InterGrain	2013
Laperouse	S–VS	MS	MR–MS	MS–S	S–VS	MR	S	MS–S	S	MR	MT–MI	MR–MS	MI	SECOBRA Recherches/Seednet	2020
Leabrook ❶	S	MS	MS	S	S–VS	R–MR	S	MS	R–MR	R–MR	T–MT	MR–MS	MT	University of Adelaide	2019
Maximus CL ❶	S	MR–MS	MS	S	MS	R–MR	S	S	R	MR–MS	MI	MR–MS	MT	InterGrain	2020
Minotaur ❶	VS	MR–MS	S	S	S–VS	R	MS–S	–	R	MR–MS	T–MT	MR–MS	MI	AGT	2021
Neo CL ❶	S	MS–S	MR	R–MR	S–VS	MR–MS	VS (P)	–	R	MR–MS	MI–I	MR	–	InterGrain	2023
Newton	MS	MR (P)	MS	R–MR	R–MR	R	MS–S (P)	–	MS–S	MR–MS	T	MR–MS	–	SECOBRA Recherches/Seednet	2023
Nitro	S	MS–S	S	R–MR	MR–MS	MS	S	MS–S	R	MR	MT–MI	MR	MI	DLF Seeds	2020
PegasusAX	MS–S (P)	MR–MS (P)	MS–S	S	MR	R	MS–S (P)	–	R	MR–MS	I–VI	MR	–	AGT	2024
RGT Atlantis	S	S–VS (P)	S	R	MR	MR	S–VS (P)	–	R	R–MR	MI–I	MR	–	RAGT	2024
RGT Planet ❶	MS–S	S–VS	S–VS	R–MR	MR	MR	MS–S	MS–S	R	MR	MI	MR–MS	MT	RAGT	2017
Rosalind	MS–S	MR	MS–S	S	MR	R–MR	S	S	R	MR–MS	T–MT	MR–MS	MT	InterGrain	2015
Spartacus CL ❶	S–VS	MS–S	S	S	MS–S	R–MR	S	MS–S	R	MR–MS	MI	MR–MS	MI–I	InterGrain	2016
Spinnaker	S	S (P)	S–VS	R–MR	MS	MS	MS–S	–	S	MS	MT	MR	–	SECOBRA Recherches/Seednet	2023
Titan AX	S–VS	MS	MS–S	MS–S	S–VS	MR	MS–S	–	MR (P)	MR	T–MT	MR	–	AGT	2022
Yeti	VS	MS	MR–MS	S	S–VS	MR	S	–	R–MR	MR	MT	MR	T–MT	AGT	2021
Zena CL ❶	MS–S	S	S	R–MR	MR–MS	MR	S	–	R	MR	T–MT	MR–MS	–	InterGrain	2022

Where ratings are separated by '&' the first is correct for the majority of situations, but different pathotypes are known to exist and the latter rating reflects the most severe response observed to these pathotypes.

– insufficient data or no data available.

(P) Provisional rating.

❶ May be accepted as malting. Accredited by Grains Australia.

❷ **RLN Resistance ratings.**

The root-lesion nematode (*Pratylenchus. thornei* and *P. neglectus*) resistance ratings that appear in this sowing guide are national consensus ratings based on glasshouse and field data collected from all Australian grain regions.

❸ **RLN Tolerance ratings.**

The root-lesion nematode (*P. thornei* and *P. neglectus*) tolerance ratings that appear in this sowing guide are national consensus ratings based on glasshouse and field data collected from all Australian grain regions.

❹ Common root rot screening was discontinued; ratings are from 2020.

Resistances

R (Resistant) indicates a high level of resistance; disease should not be seen and grain yield should not be affected.

R–MR (Resistant to moderately resistant) indicates a high level of resistance; very low levels of disease can be seen and grain yield should not be reduced.

MR (Moderately resistant) indicates low levels of disease can develop in favourable conditions, some yield loss could occur, but fungicide control is unlikely to be economic.

MR–MS (Moderately resistant to moderately susceptible) indicates low to moderate levels of disease could develop in favourable conditions, some yield loss can occur. Fungicides might be economic.

MS (Moderately susceptible) indicates moderate levels of disease can develop in favourable situations with moderate yield losses. Fungicide applications are likely to be economic.

MS–S (Moderately susceptible to susceptible) indicates significant disease can develop in favourable situations with moderate yield losses. Fungicide applications are likely to be economic.

S (Susceptible) indicates high levels of disease can occur with substantial yield losses. Fungicide applications should be budgeted.

S–VS (Susceptible to very susceptible) indicates high levels of disease can occur with substantial yield losses. Disease might require close monitoring and proactive fungicide control.

VS (Very susceptible) indicates very high levels of disease can occur in favourable seasons with serious yield losses. Will require close monitoring and proactive fungicide control. It is likely to develop some disease even when conditions are less favourable.

Tolerances

VT (Very tolerant) indicates a high level of tolerance and grain yield is unlikely to be reduced.

T (Tolerant) indicates a high level of tolerance and grain yield is unlikely to be reduced.

T–MT (Tolerant to moderately tolerant) indicates disease could develop in favourable conditions, some yield loss can occur.

MT (Moderately tolerant) indicates disease could develop in favourable conditions, some yield loss can occur.

MT–MI (Moderately tolerant to moderately intolerant) indicates disease can be conspicuous in favourable situations with moderate yield losses.

MI (Moderately intolerant) indicates disease can be conspicuous in favourable situations with moderate yield losses.

MI–I (Moderately intolerant to intolerant) indicates high levels of disease can occur with substantial yield losses.

I (Intolerant) indicates high levels of disease can occur with substantial yield losses.

VI (Very intolerant) indicates high levels of disease can occur with substantial yield losses.

Powdery mildew

This can occasionally be severe on seedlings and tillering barley in northern and central NSW, favoured by high humidity, but reduced with rainfall. High N levels in crops can also favour development. Foliar fungicides are often applied, but in many cases too late after powdery mildew infection has already damaged the crop. Growing resistant varieties is the best management strategy as the powdery mildew pathogen of barley has been found to have developed a level of reduced sensitivity and resistance to some triazole fungicides. Some seed treatments provide effective and economical control of powdery mildew at the seedling stage in areas where the disease frequently develops. See Table 91 on page 171 for details.

Physiological leaf spotting

Under some circumstances, barley plants might develop various forms of leaf spots that are not caused by a pathogen. Spots can vary from tiny white/yellow flecks to dark brown or black blotches. These physiological leaf spots (PLS) can be easily mistaken for diseases but, not being related to pathogens, applying fungicides is not warranted. Some varieties (e.g. RGT Planet$^{\Phi}$ and Spartacus CL$^{\Phi}$) are more prone to developing PLS than others, and growers are advised to consult their agronomist/adviser or NSW DPIRD plant pathologist if uncertain about what is causing the leaf spotting.

Managing diseases with foliar fungicides

Foliar fungicides are often used as one component of an integrated disease management plan and can provide economical returns when applied correctly at the appropriate growth stage. Applying foliar fungicides should be an economic decision based on:

- accurate disease diagnosis
- yield potential
- potential loss (varietal susceptibility, growth stage, effect on yield and quality)
- appropriate application time
- cost of fungicide and application
- duration of control
- amount of disease present
- future disease development (weather)
- stock/harvest withholding periods.

With most diseases, application should aim to protect the flag-1 and flag-2 leaves in barley, which are the main contributors to yield. Losses from diseases in the vegetative stage are relatively small compared with infection of the adult plant. Consequently, in most cases, spraying at early growth stages is not economically viable. In areas where there is frequent severe powdery mildew infection on seedlings, an appropriate seed dressing generally provides better and more economical control than in-crop foliar fungicide application.

Control duration varies with the fungicide product and application rate. Therefore, early sprays before stem elongation might require repeat applications to protect key leaves that had not emerged when the fungicide was applied.

Fungicide resistance has been documented in several barley foliar pathogens in Australia, such as powdery mildew and net blotch – net form (*Pyrenophora teres* f. *teres*), net blotch – spot form (*Pyrenophora teres* f. *maculata*) and barley leaf rust (*Puccinia hordei*). This means that repeated applications of the same fungicide group should be avoided. Rotate fungicide groups, use mixtures of different groups where possible and adhere to label instructions.

Root and crown diseases

Barley is susceptible to the same root diseases (*Pythium*, rhizoctonia, take-all, fusarium crown rot and common root rot) as wheat. With fusarium crown rot (FCR), yield losses are usually not as severe in barley as for wheat because of barley's earlier maturity, which provides an escape from late season stress that exacerbates disease expression. However, barley is very susceptible to FCR infection and builds up inoculum levels within the rotation. Barley can still suffer significant yield loss from FCR if there is moisture stress during crop development. Barley varieties also differ in their susceptibility and yield loss from infection. As with wheat, FCR control relies on adopting integrated management strategies, which include effective rotations, stubble management, fallow moisture storage, grass weed control, sowing time, inter-row sowing and variety choice.

Smuts

Growers should be aware that varieties with a Hindmarsh background (e.g. La Trobe$^{\Phi}$ and Spartacus CL$^{\Phi}$) are more susceptible to loose smut in barley. Over past seasons, loose smut has built up in the more susceptible varieties where a seed fungicide has either not been used or poorly applied. Both malting and feed barley receival standards have a zero tolerance for smuts. Control is readily achieved by using seed dressings at sowing. See Table 91 on page 171 for details.

Treat all barley seed for sowing each year and ensure good coverage during the application process.

Using a seed dressing that will also control scald and powdery mildew is advisable.

Do not sow untreated seed retained from a crop where any smut was visible in heads during the season. Even low levels of infection within a paddock can result in significant carry-over of spores on (covered smut) or in grain (loose smut) that will infect the next barley crop.

Black point

The grain coat can darken at the embryo (shoot) end during wet periods from flowering to harvest. All varieties can be affected, depending on seasonal conditions. There are no known control measures as this is a physiological condition and not a disease.

Badly discoloured grain is unacceptable for malting, although affected seed is usually satisfactory for sowing.

Marketing

Barley can be freely traded on both the domestic and export markets. Before adopting new barley varieties, look at what marketing options are available in your region. Not all new varieties will be accepted by the larger grain receival sites, so alternative arrangements might be needed, or grain stored on farm, before delivery to an end user.

Take care not to over-thresh barley at harvest, which damages the grain. Ideally, markets seek malting barley with 10.5% protein.

Feed barley is traded through major traders and private merchants, or direct to domestic end-users such as stockfeed manufacturers, feedlots and other farmers. Prices tend to be lower around harvest time and are usually higher during winter.

Barley is more difficult than most other cereals to store for more than 3 months because of its susceptibility to grain insect attack.

Grain insect treatment WARNING: malting barley may only be treated with a limited number of grain protectants for insect control. Check with the end user before treatment to ensure a particular pesticide is acceptable. Refer to Grain insects – options for control on page 168 for more details.

Current barley delivery standards are available from your local grain trader or from Grain Trade Australia (GTA).

Malting varieties

Malting barley varieties in Australia are accredited by Grains Australia and undergo rigorous testing to ensure they meet malting standards both for domestic and international markets. The Grains Australia website has a list of currently accredited varieties. Malting variety delivery will depend on segregations in your region and must meet the GTA quality standards/specifications for malt barley.

Food grade varieties

This classification was introduced by Barley Australia in 2010 to meet a growing market for food-grade barley. Barley varieties need to meet all the physical quality parameters that apply to accredited malting barleys, such as protein, test weight, screenings and retention, before they can be accepted into food barley segregations.

Feed varieties

Barley1™ and Barley2™: two-row varieties with white aleurone layer only.

Further reading

Grains Australia (https://grainsaustralia.com.au/)

GTA – Barley Trading Standards (https://www.graintrade.org.au/)

GRDC – *Wheat & barley leaf symptoms: The back pocket guide* (https://grdc.com.au/resources-and-publications/all-publications/publications/2011/03/wheat-barley-leaf-symptoms-the-back-pocket-guide)

Contributing authors

NSW DPIRD: Andrew Milgate, Cereal Pathologist, Wagga Wagga; Steven Simpfendorfer, Cereal Pathologist, Tamworth; Brad Baxter, Cereal Pathologist, Wagga Wagga.

GO TO PAGES

Grain Trade Australia (https://www.graintrade.org.au/)

Grains Australia (https://grainsaustralia.com.au/)

Table 29. Disease and crop injury guide – barley. (Page 1 of 2.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Foliar diseases				
Barley scald *Rhynchosporium commune*	Initially 'scalded' patches that can spread to entire crop. Leaf lesions first appear water-soaked and then elongate into bleached blotches with dark brown margins. Can also affect the heads.	More common and severe in the south, favoured by wet weather.	Rain-splashed spores from infected barley stubble and barley grass residues. Secondary infection from infected leaves during the season. Can be seed-borne.	Sow varieties with improved levels of genetic resistance; rotate with non-host crops. Fertiliser, seed and foliar fungicides; stubble removal: avoid sowing into barley and barley grass residues. To limit the chance of seed-borne infection, retain seed for sowing from crops that had low levels of scald in the previous season.
Net blotch – net form *Pyrenophora teres* f. *teres*	First, as small elliptical dark brown spots that elongate into fine, dark brown streaks on the leaf blades giving a netted appearance. Severely affected leaves wither. It also infects heads.	Widespread, favoured by warm, wet weather and early sowing.	Airborne spores from infected plants and stubble. Carried on seed.	Sow varieties with improved levels of genetic resistance; rotate with non-host crops. Stubble removal. Clean seed. Fungicide seed treatments and foliar fungicides but be aware of potential fungicide resistance issues.
Net blotch – spot form *Pyrenophora teres* f. *maculata*	Small, dark brown, round to oval spots or blotches up to 10 mm long becoming more straight-sided as they enlarge. Larger blotches are often surrounded by a yellow margin, particularly towards the leaf tip.	Widespread, favoured by wet weather and early sowing.	Airborne spores from infected plants and stubble.	Sow varieties with improved levels of genetic resistance; rotation with non-host crops. Stubble removal. Fungicide seed treatments. Use appropriate foliar fungicides but be aware of potential fungicide resistance issues.
Powdery mildew *Blumeria graminis* f.sp. *hordei*	White to grey cottony fungal growth on leaf and leaf sheath.	More common in north and south-western regions and under irrigation. More prevalent in winter and early spring.	Airborne spores from infected trash and infected plants.	Sow varieties with improved levels of genetic resistance; seed and foliar fungicides. Control volunteer barley plants.
Barley leaf rust *Puccinia hordei*	Very small pustules of orange–brown powdery spores on leaves and leaf sheaths.	Favoured by moist conditions and temperatures around 15–22 °C.	Survives on barley volunteers and spreads via airborne spores from living plants.	Sow varieties with improved levels of genetic resistance; clean fallows; foliar fungicides to protect flag-1 to flag-2 leaves. Monitor very susceptible varieties regularly. Group 3 (triazole, DMI) resistance detected in pathogen population.
Ramularia leaf spot *Ramularia collo-cygni*	Reddish-brown rectangular lesions ringed with yellow margin. Lesions restricted by leaf veins and through both sides of leaf. Often confused with net blotches.	Identified in NSW barley crops; widespread in southern and central regions.	Stubble, seed and wind-borne. Is an endophytic fungus that lives within the plant for part of its life cycle without causing symptoms, before becoming pathogenic and causing disease.	To limit the chance of seed-borne infection, retain seed for sowing from a crop that had low levels of ramularia leaf spot the previous season; in-crop fungicide applications and rotate with non-host crops.
Barley grass stripe rust *Puccinia striiformis* f.sp. *pseudo-hordei*	Pustules and stripes of yellow powdery spores on leaves.	Barley stripe rust is not present in Australia. However, some varieties can develop small amounts of barley grass stripe rust and wheat stripe rust. Cool nights (8–15 °C) with dews promote the disease.	Survives on barley volunteers and barley grass, spreads via airborne spores from living plants.	Rarely required. Resistant varieties, foliar fungicides not likely to be required or economically viable. Control volunteer barley and barley grass.
Stem rust *Puccinia graminis* f.sp. *tritici*	Elongated pustules of dark brown spores on stems, leaves and awns.	Favoured by warm (15–30 °C) moist conditions. Only likely to be a problem in very late crops or where crops are in close proximity to other infected wheat and barley crops.	Survives on barley volunteers and spreads via airborne spores from living plants.	Clean fallows. Resistant barley varieties; control stem rust in other cereals (wheat, rye, triticale); foliar fungicides.
Physiological leaf spotting (PLS)	Ranges from tiny white or yellow flecks to conspicuous dark brown to black spots and blotches on leaves.	Most prevalent under mild, moist growing conditions, yet can occur after frosts with spots concentrated towards leaf tips. Some genotypes are more susceptible. Spartacus CL and RGT Planet are prone to brown blotching.	Not a pathogen. Note that some brown flecking might be a resistant reaction to other diseases and, in some regions, a reaction to adverse soil nutrient levels.	Avoid susceptible varieties. Confirm cause before considering fungicide application as it will provide no control because PLS is not a disease.
Sunblotch (physiological reaction to nutrient stress and sunlight)	Orange to dark brown spots more common on upper surface of leaf; leaf death.	Occurs sporadically. Conditions causing it are yet to be defined.	Not a pathogen.	No practical control option.

Table 29. Disease and crop injury guide – barley. (Page 2 of 2.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Virus diseases				
Barley yellow dwarf virus (BYDV) or *Cereal yellow dwarf virus* (CYDV)	Yellowing, reduced plant height, reduced seed set.	Most common near perennial grass pastures and in early sown crops.	Transmitted by aphids (oat, corn and rose grain) from infected grasses and cereals. Not seed-borne.	Sow varieties with better resistance. Consider using an insecticide seed treatment (e.g. imidacloprid) to limit early infections from aphid vectors. Consider insecticide application in-crop to control aphids at early growth stages if required.
Wheat streak mosaic virus (WSMV)	Light green leaf streaks and blotches, stunted plants, reduced seed set.	Not yet observed in barley. Has occurred in wheat in southern irrigation areas and early sown grazing wheat crops on the tablelands and slopes.	Transmitted by the wheat curl mite.	Generally, no control required. Spray out grasses in paddock and adjoining paddocks 4 weeks before sowing. No in-crop treatment available, insecticides do not control wheat curl mite as they are protected within the curled leaf. Do not retain seed from infected crops for planting.
Root and crown diseases				
Take all *Gaeumannomyces graminis* var. *tritici*	Blackened roots and crown, stunting, white heads, pinched grain.	More common in the south, favoured by wet winter and early spring, followed by heat or moisture stress at anthesis and grain fill. Less severe on barley than on wheat.	Soil and stubble-borne on grass and cereal residues.	Crop rotation to provide one year free of grass hosts. Some seed treatments provide a level of suppression.
Rhizoctonia root rot *Rhizoctonia solani*	Patches of spindly, stunted plants with erect leaves; spear point root rot; plant death. Later infection of crown roots seen as a wavy appearance across the crop.	Associated with minimum or reduced tillage; often aggravated by Group 2 herbicides and agricultural hardpans.	As fungal threads in soil; soil-borne on residues of many grass, cereal and broadleaf plants.	Crop rotation, soil disturbance to 5–10 cm below sowing depth at or within 2–4 weeks before sowing; avoid Group 2 herbicide build-up, which can cause root pruning. Some seed and fertiliser treatments provide suppression only. Liquid banding of some fungicides is also registered.
Fusarium crown rot *Fusarium pseudograminearum*	Browned stem bases, stunted or plant death if severe early infection, white heads not common in barley; pinched grain.	More common in northern and western areas, becoming common in the south, favoured by moisture/heat stress during grain filling. Generally high levels across the state during 2023.	Stubble-borne on grass and cereal residues.	Crop rotation. More resistant varieties. Grass weed control. Balance fertiliser inputs to available soil water. Inter-row sowing and avoid delayed sowing to minimise losses. Fungicide seed dressings: growers should check for the latest product registrations.
Common root rot *Bipolaris sorokiniana*	The root between the crown and seed (sub-crown internode) is always dark; roots and sometimes the stem base are brown; white heads; pinched grain	Scattered through the crop. Plants can have reduced tillering and appear to have ill-thrift. Exacerbated by deep sowing. Infection favoured by warmer soil temperatures (20–30 °C).	Stubble-borne on grass and cereal residues; also survives as spores in the soil.	Resistant varieties; crop rotation; optimise nutrition; be careful with sowing depth.
Eyespot *Tapesia yallundae*	Lodging, eyespot with sharp bend in stem 3–5 cm above ground.	South and central west slopes, eastern Riverina. Less severe on barley than on wheat.	Rain-splashed spores from crop or grass residue during winter.	Crop rotation.
Smuts				
Loose smut *Ustilago tritici*	Black powdery heads on diseased plants; black lumps in harvested grain.	Statewide: presence can make grain unacceptable to maltsters. Certain varieties (La Trobe, Spartacus CL and Rosalind) appear more susceptible.	Airborne spores infect developing seeds at flowering.	Avoid retaining seed from heavily infected crops (>1% seed infection). Seed-applied fungicides. Treat seed every season with a registered product ensuring good coverage.
Covered smut *Ustilago segetum* var. *hordei*	Ball of black powder replaces the seed.	Statewide: presence can make grain unacceptable to maltsters.	Spores on seed coat infect seedling before emergence.	Seed-applied fungicides, resistant varieties. Source clean seed.

Oats

Key considerations for 2025

» For milling oat crops, make sure you manage foliar diseases such as leaf and stem rust; late stage crop infection will reduce seed size and lower grain test weights.

Crop management

This widely adapted and reliable cereal is the major winter cereal grazing crop. It also offers rotational benefits where conditions are not suitable for broadleaf break crops. Oats can tolerate some cereal diseases such as take-all, crown rot and common root rot. Other benefits include its easy establishment and comparatively low cost compared with other grazing crops. Oats are a versatile crop in farming systems. They can adapt to acidic soils, are used for hay, silage, pasture renovation and grazing-out, and are suitable for broadleaf weed control using in-crop herbicides.

Sowing

Except for very high tablelands areas, January and February sowings should be avoided. Hot conditions, soil temperatures consistently above 25 °C, and rapidly drying soils can cause patchy establishment.

GO TO PAGE
Calculating sowing rates on page 7.

Optimum sowing times are shown for each variety in the respective zones, see Table 31. Sowing later than recommended increases the risk of lower yields. In wet, acid soil conditions sow grain-only varieties at the earliest recommended time.

A 5 cm sowing depth is ideal, but oats can be sown as deep as 7 cm if moisture seeking.

Nutrition

Apply fertiliser at above the normally recommended rates to crops used for grazing and grain production, as they have a longer vegetative period than grain-only crops. For grazing crops, be aware of nitrate poisoning issues if high rates of nitrogen are applied before grazing.

To achieve 10% grain protein and above in high yielding varieties such as Bilby$^{\Phi}$, Goldie$^{\Phi}$, Koala$^{\Phi}$, Kowari$^{\Phi}$, Minnie$^{\Phi}$ and Mitika$^{\Phi}$, avoid sowing into low fertility paddocks.

Sowing rates

High sowing rates give rapid growth rates and high forage yields. Use high rates:

- where dense weed populations are expected
- when conditions are likely to be wet during winter
- in low pH soils, and/or in paddocks with low soil fertility
- if seed quality is substandard.

Seed size varies significantly between oat varieties and season, so it is important to know the 1,000 seed weight of the selected variety to calculate the required sowing rate. The sowing rates shown should be used as a guide only and growers should calculate their own sowing rates based on the 1,000 seed weight, target plant population and seed establishment percentage.

Higher tablelands/tablelands/slopes

- 80–120 kg/ha, grazing and grain
- 60–80 kg/ha, grain-only

Slopes/plains

- 60–80 kg/ha, grazing and grain
- 40–60 kg/ha, grain-only

Early-sown – grazing only

- 100–130 kg/ha

Irrigated

- 100–150 kg/ha, grazing and grain
- 80–120 kg/ha, grain-only

Hay production

Sowing rates are 30–50% higher than grain crops in the same region

- 60–100 kg/ha dryland
- 80–140 kg/ha irrigated

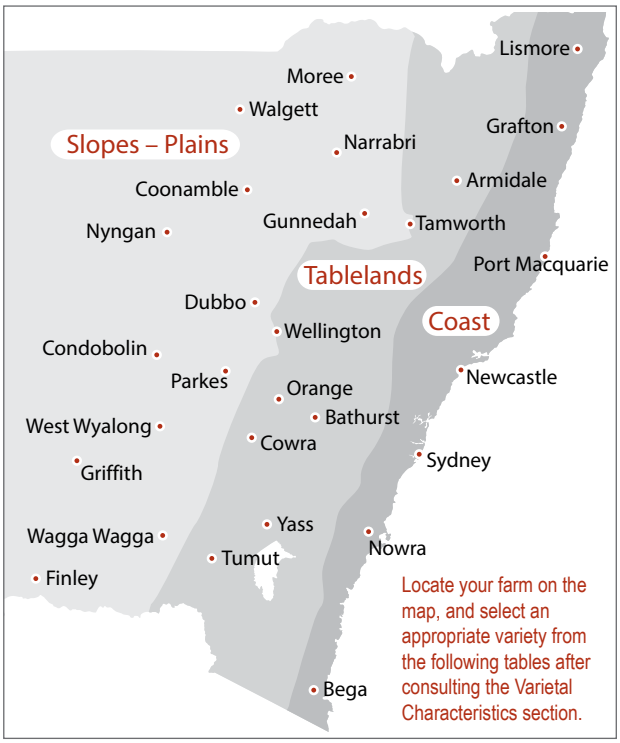


Figure 7. Oat-growing zones in NSW.

Grazing

The ideal stage to start grazing is when plants are well-anchored and the canopy has closed. Continuous grazing might be better for fattening stock than rotational grazing. Maintain adequate plant material to give continuous and quick regrowth, e.g. a minimum of 1,000–1,500 kg/ha of dry matter.

For the best recovery after grazing, do not graze below 5 cm for prostrate varieties, or below 10 cm for more erect types. The higher grazing height is particularly important with erect growing varieties; over-grazing greatly reduces the plant's ability to recover.

Financial returns from grazing can be based on:

- changes in body weight throughout the grazing period; weight gains of 1.2 kg/head/day for steers, and 200 g/head/day for lambs are common
- stock value before and after grazing
- current agistment rates for stock
- hand feeding costs for the same period.

On the tablelands and slopes, grazing oats significantly reduces the grazing pressure on pastures and can often reduce the necessity for hand feeding during winter.

On the slopes and plains, grazing oats means clover and lucerne pastures can be spelled in autumn.

Weeds

Planning in the previous season to prevent annual weeds, especially grass weeds, from setting seed by pasture cleaning, spray topping or early fallow, helps to reduce in-crop weeds and improves crop production.

Some post-sowing pre-emergent herbicides and early post-emergent herbicides will control annual ryegrass, but timing is critical. Broadleaf weeds can be effectively controlled with either early or late post-emergent herbicides, but again, timing is most important.

Higher sowing rates and narrow row spacings improve competition against weeds. Maintain crop canopy (bulk) to discourage weed recovery.

Diseases

Barley yellow dwarf virus

Aphids transmit *Barley yellow dwarf virus* (BYDV); early sown crops are more at risk. Sow tolerant varieties or be prepared to control aphids to prevent virus transmission. There are several insecticide seed dressings registered for use on cereal crops to manage aphids and BYDV spread in cereal crops. See Table 92 on page 174 for available products.

Stem and leaf rust

Significant production losses can result from these rusts. There are no remaining genetic resistances available for stem rust in commercially grown varieties to fully protect crops since new pathotypes developed in some regions. Leaf rust resistance levels in some varieties provide useful genetic control of this disease.

Monitor crops for rusts, they can be managed by:

- selecting appropriate varieties
- avoiding sowing later-maturing varieties
- applying late irrigations
- adjusting grazing management
- applying foliar fungicides at key growth stages for control.

See Table 93 on page 175 for available products.

Fusarium crown rot

Oats serve as a host for fusarium crown rot (FCR) but, compared with wheat and barley, appear to suffer limited yield loss from this disease. Oats can therefore be a lower risk option in paddocks with medium to high levels of FCR inoculum in terms of yield loss in that season. However, be aware that oats further elevate the inoculum risk for following winter cereal crops.

Insects

Earth mites, aphids and armyworms commonly affect crops.

Earth mites

These can affect young crops, so monitor and control as necessary. They should be suppressed in the previous spring by applying an insect spray with the fallow weed-control program.

Aphids

Aphids are a major concern and in high numbers can cause feeding damage to establishing oat crops. The main issue with aphids is BYDV spread. Growers should treat their seed with an appropriate insecticidal seed dressing to reduce early aphid feeding and BYDV transmission.

Armyworms

Armyworms can cause severe damage to the ripening crop and should be monitored. Chewed leaf margins and/or oat spikelets on the ground are sure signs of armyworm presence. Always inspect the denser areas of the crop.

Producing quality grain

There are strong domestic and export markets with premium payments for oats with a high test weight (kg/hL) – see Table 32. Oat varieties and disease ratings on page 64.

Producers aiming at milling markets should consider Bannister$^{\Phi}$, Bilby$^{\Phi}$, Durack$^{\Phi}$, Goldie$^{\Phi}$, Koala$^{\Phi}$, Kowari$^{\Phi}$, Minnie$^{\Phi}$, Mitika$^{\Phi}$, Williams$^{\Phi}$ or Yallara$^{\Phi}$. In NSW growers should talk to local milling oat accumulators before choosing a variety as not all varieties are accepted into local milling oat segregations.

For high-quality feed grain oats for livestock, consider low husk lignin varieties Kowari$^{\Phi}$, Mannus$^{\Phi}$, Mitika$^{\Phi}$, Yarran or Yiddah$^{\Phi}$. Avoid over-grazing dual-purpose crops or grazing too late into early spring as this will affect grain quality and yield. Crops maturing under hot, dry conditions result in low grain quality.

Choose paddocks with good soil moisture retention characteristics. Use moderate sowing rates and sow at the suggested time. Pay attention to weeds and provide adequate nutrition, but be careful not to apply excessive fertiliser rates (especially nitrogen), which can delay maturity.

Marketing

Before harvest, careful weed and insect control will ensure the best quality product to take to market. In crops used for hay, ensure even curing after cutting.

Prevent weed seeds and insects from contaminating grain. If the grain is to be stored for longer than 3 months, protect against insects. Store in the best possible facility to ensure a quality product.

Grain size, plumpness, variety, husk lignin content, protein and hectolitre (hL) weight are some of the buyers' criteria for feed grain sales. To aid marketing, samples should be protein and energy tested and premiums sought. Varieties and samples vary considerably.

As a marketing aid, collect a representative running sample at harvest from each truckload.

Bannister$^{\Phi}$, Bilby$^{\Phi}$, Durack$^{\Phi}$, Goldie$^{\Phi}$, Koala$^{\Phi}$, Kowari$^{\Phi}$, Minnie$^{\Phi}$, Mitika$^{\Phi}$, Williams$^{\Phi}$ or Yallara$^{\Phi}$ are accepted milling varieties. The newer varieties, Goldie$^{\Phi}$, Koala$^{\Phi}$ and Minnie$^{\Phi}$ while acceptable as milling oats, could have limited opportunities for segregation in NSW storage systems. Growers should contact prospective buyers before growing these varieties. Echidna and Yarran might also be accepted.

Variety selection

When selecting a variety, consider:

- **region**
- **crop use** – for grazing only, for dual-purpose grazing and grain, for hay, for silage or for grain-only
- **grazing value** – when is feed most important – in early or late winter
- **hay** – freedom from leaf and stem diseases, resistance to lodging, and maturity to cutting time
- **grain**:
  - to keep on-farm or sell
  - to keep – high yield and low husk lignin content
  - for sale – market requirements – white or cream colour 'attractive'
  - for feed – high test weight, protein and low husk lignin content
  - for milling – as specified by milling companies
- **forage only varieties** – the suggested sowing time for forage-only varieties is mid February to early April. As many of these varieties are late/very late for grain maturity, they might not be suitable for grain production in many regions. Grazing management for the more erect types needs to be different from the usual heavy grazing in dual-purpose grazing and grain varieties. Avoid heavy grazing to below 10 cm if plant recovery is expected. More upright varieties are best suited to grazing with cattle. For coastal and northern regions, consider varieties with the best rust resistance ratings.

Varietal characteristics

Most varieties are suitable for grazing. Variety selection depends on the crop use; sowing date; likely diseases and tolerance to acid soil; grain quality; and possible market outlet. Check Table 32. Oat varieties and disease ratings on page 64 and choose varieties with the best resistance for diseases important in your farming system.

Milling and potential milling varieties

Bannister[Φ]. Released in Western Australia in 2012 as a milling oat for the western region. It has high grain yield potential and has performed well in trials in southern NSW. It is taller than Mitika[Φ] and heads about 3–4 days later than Mitika[Φ]. Bannister[Φ] has a slightly lower hectolitre weight and slightly higher screenings compared with Mitika[Φ]. Seednet.

Bilby[Φ]. Released in 2019 from the National Oat Breeding Program, Bilby[Φ] is a dwarf, early to mid season milling oat. Plant height is similar to Mitika[Φ] and is 3 days later to head emergence. Grain yield is similar to Bannister[Φ] in NSW, but with improved grain quality. Bilby[Φ] has low screenings and high groat percentage compared with Williams[Φ] and Bannister[Φ]. It has a lower hectolitre weight and slightly higher screenings compared with Mitika[Φ] and Kowari[Φ]. Protein is similar to Mitika[Φ] and Kowari[Φ] and grain size is similar to Mitika[Φ], but bigger than Kowari[Φ], Bannister[Φ] or Williams[Φ]. Bilby[Φ] has high β-glucan and lower oil than other dwarf varieties with bright grain. High hull lignin oat. Barenbrug Australia.

Durack[Φ]. Released in 2016 from the National Oat Breeding Program. Durack[Φ] is a moderately tall variety, similar in height to Yallara[Φ]. Durack[Φ] is the earliest maturing oat of any of the current milling varieties available, approximately 7–10 days earlier than Mitika[Φ]. Durack[Φ] has performed well in the shorter season environments of southern and central NSW yielding similarly to Yallara[Φ]. Grain quality for Durack[Φ] is good, with improved hectolitre weight compared to all current grain varieties. Screenings are low and similar to Yallara[Φ]. Protein is similar to Mitika[Φ] and higher than Bannister[Φ], Williams[Φ] and Yallara[Φ]. Groat per cent is similar to Mitika[Φ] and an improvement compared with Williams[Φ] and Bannister[Φ]. Barenbrug Australia.

Koala[Φ]. Released in 2022 from the National Oat Breeding Program (SARDI – South Australian Research and Development Institute). Koala[Φ] has a high grain yield potential and has performed well in trials throughout the NSW medium–high rainfall zone. Koala[Φ] is a tall dwarf variety with similar height to Bannister[Φ], and taller than Mitika[Φ], Bilby[Φ] or Kowari[Φ]. Koala[Φ] has a mid–late season maturity that can be 7 days later to head compared with Bannister[Φ] and Williams[Φ]. Early vigour is similar to Bannister[Φ] and slightly slower than Bilby[Φ] and Yallara[Φ]. Classified by Grains Australia as a milling oat. Commercialised by Seednet.

Kowari[Φ]. Released in 2017 from the National Oat Breeding Program, it is a milling oat with dwarf stature, slightly taller than Mitika[Φ]. It has a maturity similar to Mitika[Φ]. The grain quality is excellent. Kowari[Φ] has a slightly lower hectolitre weight than Mitika[Φ]and similar 1000 grain weight. It combines high β-glucan with low screenings. Kowari[Φ] has high grain protein and a slightly higher groat percentage than Mitika[Φ]. Like Mitika[Φ], it has low hull lignin. Barenbrug Australia.

Mitika[Φ]. A dwarf milling oat released in 2005. It is earlier maturing than Possum[Φ] and Echidna, favouring Mitika[Φ] in a dry finish. Mitika[Φ] has high hectolitre weight, low screenings and high groat percentage compared with Echidna. Mitika[Φ] also has improved feed quality with low hull lignin and high grain digestibility. Barenbrug Australia.

Williams[Φ]. Released in 2013 by the National Oat Breeding Program, it has a high grain yield potential and has performed well in trials throughout the NSW medium–high rainfall zone. Williams[Φ] is an early to mid season variety similar to Yallara[Φ], but 3–7 days later than Mitika[Φ]. It is taller than Mitika[Φ] by 15 cm, 5 cm taller than Bannister[Φ], and 15 cm shorter than Yallara[Φ]. Williams[Φ] has a lower hectolitre weight and higher screenings than Mitika[Φ]. Williams[Φ] is not recommended for low rainfall areas due to the potential for high screenings. Barenbrug Australia.

Yallara[Φ]. A medium–tall, early to mid season variety similar to Euro for flowering and maturity. Yallara[Φ] was released in 2009. It is a Euro lookalike milling line with slightly better grain quality. Yallara[Φ] has excellent grain quality. It has a high hectolitre weight, low screenings and a high groat per cent. Yallara[Φ] has bright, plump grain suitable for the milling industry and specialised feed end uses such as the horse racing industry as well as human consumption. Yallara[Φ] was evaluated for hay production and although the hay yield might be lower than popular hay varieties, it has excellent hay quality. Seednet.

The following are more recently named or released varieties. Some lines might only have limited seed available in NSW for 2025.

GoldieΦ. Released in 2024 by InterGrain. Goldie Φ is a high yielding milling oat for southern and central NSW. With a mid spring maturity, it is 4–7 days earlier to flower than BannisterΦ, 3–5 days later than BilbyΦ. GoldieΦ has excellent early vigour and a tall plant type, 5 cm taller than BannisterΦ and 15 cm taller than BilbyΦ. GoldieΦ has reduced screenings and high test weight grain. Preliminary interstate testing indicates that GoldieΦ has high hay yields, producing good quality hay suitable for the export oaten hay market. Seed is available in NSW for the 2025 season. InterGrain.

MinnieΦ. Released in 2024 by InterGrain. MinnieΦ has a short plant height (~5cm shorter than MitikaΦ) and a mid–slow maturity (similar to BannisterΦ) Suited to grain production only due to its shorter height, improving lodging tolerance and harvestability compared to taller varieties in high yielding situations. MinnieΦ has been classified as a milling oat by Grains Australia. Seed availability for NSW is limited for the 2025 season, contact InterGrain if interested in growing MinnieΦ. InterGrain.

Table 30. Grain only varieties compared with Kowari (2020–2024).

GRDC NATIONAL VARIETY TRIALS™

North east

Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Kowari (t/ha)	**4.48**	**5.28**	**6.46**	**1.70**	**4.90**	**4.60**	
Bannister	109	116	117	98	100	108	7
Bilby	106	104	106	104	105	105	7
Durack	94	95	87	100	92	93	7
Goldie	108	114	116	113	108	111	4
Koala	110	119	120	86	95	108	7
Kowari	**100**	**100**	**100**	**100**	**100**	**100**	**7**
Minnie	101	104	108	107	107	105	4
Mitika	98	98	96	97	96	97	7
Williams	110	114	114	89	95	106	7
Yallara	96	105	90	106	88	94	7

South east

Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Kowari (t/ha)	**4.87**	**5.03**	**4.97**	**3.44**	**4.67**	**4.66**	
Bannister	110	111	114	103	104	109	19
Bilby	103	106	106	104	106	105	19
Durack	85	83	85	92	90	87	19
Goldie	108	114	112	110	112	111	11
Koala	115	112	119	99	100	110	19
Kowari	**100**	**100**	**100**	**100**	**100**	**100**	**19**
Minnie	109	112	107	108	109	109	11
Mitika	96	94	96	96	95	95	19
Williams	107	106	113	97	98	105	19
Yallara	80	79	82	92	87	83	19

South west

Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Kowari (t/ha)	**3.76**	**4.62**	**5.64**	**2.61**	**3.23**	**4.12**	
Bannister	105	107	111	93	104	106	9
Bilby	107	103	105	107	102	105	9
Durack	88	91	87	95	94	90	9
Goldie	110	107	109	105	109	109	5
Koala	103	109	114	85	101	107	9
Kowari	**100**	**100**	**100**	**100**	**100**	**100**	**9**
Minnie	107	106	107	103	107	106	5
Mitika	95	97	96	96	97	96	9
Williams	103	105	110	92	99	104	9
Yallara	82	89	83	87	94	87	9

The table presents NVT 'Production value' multi-environment trial (MET) data on a yearly regional group mean and regional mean basis from 2020–2024.
Preferred milling varieties locally are BilbyΦ, KowariΦ, MitikaΦ and YallaraΦ.
Preferred varieties for feeding grain to livestock are MitikaΦ and KowariΦ.

Table 31. Sowing times for oats in NSW.

Variety	January		February				March				April				May				June		
Weeks	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Higher tablelands/tablelands: dual-purpose – grazing and/or grain recovery																					
Bass, Blackbutt, Nile	>	★	★	★	★	★	★	★	★	★	<	<									
Eurabbie			>	>	★	★	★	★	★	★	★	★	★	★	<	<					
Bimbil, Mannus					>	>	★	★	★	★	★	★	★	★	<	<					
Tablelands/slopes: dual-purpose – grazing and/or grain recovery																					
Blackbutt					>	★	★	★	★	<	<	<	<								
Eurabbie					>	★	★	★	★	★	★	<	<								
Cooba ❶						>	★	★	★	★	<	<	<	<	<						
Bimbil, Mannus, Yiddah								>	★	★	★	★	<	<	<						
Coolabah ❶, Yarran ❶									>	★	★	★	★	<	<						
Slopes/plains: dual-purpose – grazing and/or grain recovery																					
Cooba ❶, Eurabbie						>	★	★	★	★	★	<	<	<	<						
Bimbil, Mannus, Yiddah								>	★	★	★	★	★	★	<	<	<				
Coolabah ❶, Kingbale ❷, Yarran ❶									>	★	★	★	★	★	<	<	<				
Tablelands/slopes grain only																					
Koala														>	★	★	<	<			
Bannister, Minnie, Williams														>	★	★	★	<	<		
Goldie, Possum															>	★	★	★	<	<	
Bilby, Kowari, Mitika, Yarran ❶															>	>	★	★	★	<	
Slopes/plains grain only																					
Koala														>	★	★	<	<			
Bannister, Minnie, Williams														>	★	★	★	<	<		
Goldie, Possum, Yallara															>	★	★	★	★	<	
Bilby, Kowari, Mitika, Yarran ❶															>	★	★	★	★	★	<
Durack																>	★	★	★	★	★

> Earlier than ideal, but acceptable.
★ Optimum sowing time.
< Later than ideal, but acceptable.

❶ Outclassed varieties.
❷ **Note**: Limited information on the time of sowing response of this variety for NSW.
Warning: High soil temperatures (>25 °C) with early sowings can reduce germination and establishment.

Table 32. Oat varieties and disease ratings.

Variety	Grazing		Straw strength after grazing	Grain maturity	Test weight (kg/hL)	Husk lignin content ❺	Diseases						Acid soils sensitivity to aluminium
	Early dry matter production	Grazing recovery					Stem rust ❶	Leaf (crown) rust ❶	BYDV ❻	Red leather leaf	Bacterial blight	Septoria blotch	
Dual-purpose varieties													
Bass	medium	excellent	good	late	medium	low	–	–	Tol	–	–	–	Tol
Bimbil	medium	excellent	good	early–mid	high	low	–	–	MS	–	–	–	–
Blackbutt	slow	excellent	good	late	low–med	medium ❷	–	–	MT	–	–	–	Tol
Cooba ❸	medium	excellent	fair	early–mid	high	low	–	–	MT	–	–	–	Int
Coolabah ❸	quick	moderate	fair	early	medium	high	–	–	MT	–	–	–	Sens
Eurabbie	quick	excellent	very good	late	low–med	low	–	–	VS	–	–	–	Tol
Mannus	medium	excellent	good	mid	high	low	–	–	MS	–	–	–	–
Nile	quick	excellent	good	very late	medium	low	–	–	Tol	–	–	–	Tol
Yarran ❸	medium	moderate	good	early	high	low	–	–	VS	–	–	–	Int
Yiddah	slow	excellent	good	early	high	low	–	–	MT	–	–	–	–
Grain only varieties ❹													
Bannister	quick	poor	–	mid	med–high	high	S	S	MS–S	MS–S & S–VS	S	MS–S	–
Bilby	quick	poor	–	early–mid	med	high	S	S	S	MS–S	S–VS	S	–
Durack	quick	poor	–	very early	high	high	S	S	S	S	S	S	–
Goldie	quick	poor	–	early–mid	high	high	S	S	MS	S–VS	MS–S	MS–S	–
Koala	quick	moderate–poor	–	mid–late	–	medium	MS	MS–S	MS–S	S	S	MS–S	–
Kowari	quick	poor	–	early	med–high	low	S	S–VS	S	S	S	S	–
Minnie	quick	poor	–	mid	–	high	S–VS	VS	S	VS	S	S	–
Mitika	quick	poor	very good	early	high	low	MS–S	S	S–VS	S	S	S–VS	–
Williams	quick	poor	–	mid	med-high	high	–	–	MS–S	MS	MS–S	MS–S	–
Yallara	quick	poor	good	early–mid	high	high	S	S–VS	MS–S	S–VS	S	MS–S	–

Resistances

– Insufficient data
R Resistant
R–MR Resistant to Moderately resistant
MR Moderately resistant
MR–MS Moderately resistant to Moderately susceptible
MS Moderately susceptible
MS–S Moderately susceptible to Susceptible
S Susceptible
S–VS Susceptible to Very susceptible
VS Very susceptible.

Where ratings are separated by '&' the first is correct for the majority of situations, but pathotypes are known to exist in some regions and the later rating reflects the response to these pathotypes.

Sensitivity

Sen Sensitive
Int Intermediate
MT Moderately tolerant
Tol Tolerant.

❶ Field resistance to the rusts on crops differ depending on season, maturity and strains present.
❷ Lignin content of Blackbutt can be variable.
❸ Outclassed, Yarran (BYDV), Cooba and Coolabah (grain yield).
❹ Ratings for the grain only varieties are from the NVT pathology program.
❺ Refer to Table 37.
❻ BYDV ratings for dual-purpose oat varieties based on old NSW ratings from local BYDV strains, new strains might be present in NSW and could affect variety performance.

Specialist oaten hay varieties

For information on quality and marketing of oaten hay, including export options, contact the Australian Fodder Industry Association (AFIA) (see Industry information on page 77 for details).

Archer$^{\Phi}$. A mid maturing hay oat with single-gene imidazolinone (IMI) tolerance. Medium plant height with good early vigour and hay colour retention. Hay yield data is currently limited in NSW. Improved tolerance to soil-residual IMI herbicides, ideal for use where there are IMI residue concerns. Registered for use with incorporated by sowing (IBS) application of IBS Sentry® herbicide for hay, seed production and grain (domestic stockfeed markets) only. Archer$^{\Phi}$ grain cannot be delivered into bulk grain handling systems. Released in 2022, bred by Grains Innovation Australia (GIA) and commercialised by InterGrain.

Brusher$^{\Phi}$. A tall, early to mid season hay variety with improved hay digestibility. Resistant and moderately intolerant to cereal cyst nematode. Intolerant to stem nematode. Low husk lignin. Released by SARDI in 2003. AEXCO.

Forester$^{\Phi}$. A very late hay variety adapted to high rainfall and irrigated cropping regions. It is 3 days later than Riel and 3 weeks later than Wintaroo$^{\Phi}$ to head emergence. Forester$^{\Phi}$ has excellent early vigour and lodging, and shattering resistance. It is moderately resistant to cereal cyst nematode. Good hay colour, but like all late hay varieties might not resist hot dry winds as well as earlier maturing varieties. Forester$^{\Phi}$ has excellent hay quality. Released by SARDI in 2012. Forester$^{\Phi}$ seed is available from AGF Seeds, Smeaton, Victoria.

Kingbale$^{\Phi}$. A mid maturing hay oat with single gene tolerance to IMI chemistry. Improved tolerance to soil-residual IMI herbicides. Registered for use with incorporated by sowing (IBS) application of Sentry® herbicide for hay, seed production and grain (domestic stockfeed markets) only. Kingbale$^{\Phi}$ grain cannot be delivered into bulk grain handling systems. Hay yield data is currently limited in NSW, similar agronomic profile to Wintaroo$^{\Phi}$. Bred by GIA and commercialised by InterGrain.

KoorabupΦ. Released in 2019 from the National Oat Breeding Program, it is a hay oat with improved grain yield over other hay varieties. Koorabup[Φ] is a medium-tall hay variety with early to mid to mid season maturity developed for the WA market. It is similar in height, 2–4 days later in maturity and has similar grain yield and stem diameter compared with Yallara[Φ]. Hay yield is slightly higher than Carrolup[Φ], but lower than Yallara[Φ] and Brusher[Φ]. It has improved disease and grain quality compared with other current hay varieties. It has excellent hay colour, and hay quality is similar to Wintaroo[Φ] for all traits except water soluble carbohydrates, which averages slightly lower in Victoria and WA. Grain quality is similar to Yallara[Φ], but with a lower groat per cent. It has low oil and bright grain. Commercialised by AEXCO.

KultarrΦ. A quick–mid maturing hay oat with tall plant height. Slightly later to flower than Brusher[Φ], similar to Mulgara[Φ]. Preliminary hay quality data indicated a suitable quality profile for export oaten hay. Hay yield data is currently limited in NSW. Released in 2022, bred by SARDI, commercialised by InterGrain.

MulgaraΦ. A tall, mid season hay oat slightly earlier in heading time than, and similar in height to, Wintaroo[Φ] with cereal cyst nematode and stem nematode resistance and tolerance. Mulgara[Φ□] compared with Wintaroo[Φ], has improved resistance to bacterial blight, lodging and shattering resistance and has early vigour. Hay yield is higher than Brusher[Φ], but slightly lower than Wintaroo[Φ], but with better hay quality. Mulgara[Φ] also maintains good hay colour and resists brown leaf at hay cutting. Grain yield is similar to Wintaroo[Φ], but with slightly better grain quality. Mulgara[Φ] has high husk lignin. Released by SARDI in 2009. AEXCO.

WallabyΦ. A mid slow-maturing hay oat with similar yields to Mulgara[Φ] and Brusher[Φ]. Good digestibility, high water-soluble carbohydrate levels and low NDF. Moderately tall plant height and likely to be suited to medium–high rainfall zones. Hay yield data is currently limited in NSW. Released in 2022, bred by SARDI and commercialised by InterGrain.

WintarooΦ. A tall, mid season hay variety, well suited to NSW. Low husk lignin. Released by SARDI in 2002. AEXCO.

Table 33. Hay oat varieties.

Variety	Grazing		Straw strength after grazing	Maturity	Diseases					Acid soils – sensitivity to aluminium
	Early dry matter production	Grazing recovery			Stem rust ❶	Leaf (crown) rust ❶	BYDV ❸	Red leather leaf	Bacterial blight	
Bass	medium	excellent	good	late	–	–	Tol	–	–	Tol
Bimbil	medium	excellent	good	early–mid	–	–	MS	–	–	–
Blackbutt	slow	excellent	good	late	–	–	MT	–	–	Tol
Cooba ❷	medium	excellent	fair	early–mid	–	–	MT	–	–	Int
Coolabah ❷	quick	moderate	fair	early	–	–	MT	–	–	Sen
Nile	quick	excellent	good	very late	–	–	Tol	–	–	Tol
Yarran ❷	medium	moderate	fair	early	–	–	VS	–	–	Int
Yiddah	medium	excellent	good	early	–	–	MT	–	–	–
Specialist hay varieties										
Archer	–	–	–	mid	MS	MR & S	MS–S	S–VS	MS–S	–
Brusher	medium	–	good	early–mid	–	–	S	MS	S–VS	–
Kingbale	–	–	–	mid–slow	S	MS–S	MS	S–VS	MS–S	–
Kultarr	–	–	–	early-mid	S–VS	MS–S	MS–S	S–VS	MS–S	–
Mulgara	medium	–	–	early–mid	–	–	MS–S	S–VS	MS–S	–
Wallaby	–	–	–	mid–slow	S–VS	MR	MS–S	S–VS	MS–S	–
Wintaroo	medium	–	fair–good	mid–slow	–	–	MS	S	MS–S	–

Select more than one variety, with at least one from the early maturing group and another from mid or late maturing group.

– Insufficient data

Resistances

R Resistant
R–MR Resistant to moderately resistant
MR Moderately resistant
MR–MS Moderately resistant to moderately susceptible
MS Moderately susceptible
MS–S Moderately susceptible to susceptible
S Susceptible
S–VS Susceptible to very susceptible
VS Very susceptible.

Where ratings are separated by '&' the first is correct for the majority of situations, but pathotypes are known to exist in some regions and the later rating reflects the response to these pathotypes.

Sensitivity

Sen Sensitive
Int Intermediate
MT Moderately tolerant
Tol Tolerant.

❶ Field resistance to the rusts on crops differ depending on season, maturity and strains present.
❷ Outclassed, Yarran (BYDV), Cooba and Coolabah (grain yield).
❸ BYDV ratings for dual purpose oat varieties based on old NSW ratings from local BYDV strains, new strains may be present in NSW and can affect variety performance.

Dual purpose varieties (grain and grazing)

Bass. Suitable for early sowing on the higher tablelands. Provides extended grazing with good grain recovery. Strong straw. Good BYDV tolerance. Released by the Tasmanian Institute of Agricultural Research and the Department of Primary Industries, Water and the Environment in 1998.

Bimbil. A dual-purpose type suitable for early to mid season sowing, grazing and grain recovery. Early and total dry matter production are similar to Cooba. Grain yield and grain recovery after grazing are better than Cooba. Straw is shorter and stronger than Cooba, but it can still lodge. High groat percentage. Bred by NSW DPIRD at Temora. Released in 1993.

Blackbutt. Popular on the higher tablelands and tablelands/slopes, especially for early sowing. Late maturing provides extended grazing with excellent grain recovery. Straw is strong and of medium height. Good resistance to frost damage after grazing. Tends to have small grain and a low test weight. Bred by NSW DPIRD at Glen Innes. Released in 1975.

Cooba. Suitable for early sowing, extended grazing and good grain recovery in most areas. Early growth is slow. It is mid season maturing. Medium straw height and strength, average grain size, low husk percentage, high test weight and high groat percentage. Bred by NSW DPIRD at Glen Innes, selected at Temora. Released in 1961.

Coolabah. Suitable for lenient grazing and good recovery for grain in most areas. Quick early growth. Early maturing. Straw is of medium height and strength. Fairly long grain, satisfactory test weight, high husk percentage. Bred by NSW DPIRD at Temora. Released in 1967.

Eurabbie. Eurabbie has a winter habit. It is semi-dwarf with similar maturity to Blackbutt and later than Cooba by about 10 days. Can be very short after heavy, late grazing, possibly resulting in harvesting difficulties. Grazing management is crucial for high grain recovery yields at sufficient height. Despite its susceptibility to BYDV, it can have excellent grain recovery yields. Grain quality is generally inferior and very similar to Blackbutt on the tablelands/slopes. Generally lower quality than Cooba from slopes/plains samples. Bred by NSW DPIRD at Temora. Released in 1998.

Mannus$^{\phi}$. A tall, strong-strawed, mid maturing variety for feed grain. Grain yield after grazing is similar to Eurabbie on the tablelands/slopes but lower on the slopes/plains. Physical grain quality is better than Eurabbie. Large uniform grain size with high test weight, high groat percentage, medium protein and fat content. Low lignin husk. Moderately susceptible to BYDV, more resistant than Eurabbie and Yarran. The variety might exhibit physiological yellowing in winter. Bred by NSW DPIRD at Temora. Released in 2006. Waratah Seeds.

Nile. A medium height, late maturing variety producing good winter grazing in tablelands districts. Grain recovery yields depend heavily on good, late spring finishing conditions. It has shown good BYDV tolerance. Released by Tasmanian Department of Agriculture in 1982.

Yarran. A medium height, early to mid season maturing variety for feed grain. Performs better than Coolabah for grain recovery, or grain-only on the slopes/plains, but is slightly inferior to Coolabah for grazing production. In very dry years it out yields Echidna in grain-only trials. Large grain with a high test weight, protein percentage and medium to low husk content. Very susceptible to BYDV. Bred by NSW DPIRD at Temora. Released in 1988.

Yiddah$^{\phi}$. A tall, strong-strawed, early maturing variety for feed grain. It can be sown earlier than Yarran and has quicker early feed production. Grain yield after grazing is similar to Yarran. Physical grain quality is better than Yarran. Very large grain with high test weight and protein percentage and low husk content. Low lignin husk. Moderate tolerance to BYDV. Bred by NSW DPIRD at Temora. Released in 2001. Waratah Seeds.

Oat grazing and grain yield performance

Table 34. Higher tablelands dual-purpose compared with Eurabbie = 100% (2004–2009).

Variety	1st grazing DM Eurabbie = 2.37 t/ha	2nd grazing DM Eurabbie = 2.51 t/ha	Grain recovery Eurabbie = 2.94 t/ha	Ungrazed Eurabbie = 4.57 t/ha
Bass	94	95	85	92
Bimbil	88	93	87	84
Blackbutt	89	91	84	89
Eurabbie	**100**	**100**	**100**	**100**
Mannus	87	91	87	72
Nile	99	97	85	93

Consider Nile, Bass and Blackbutt for very early sowing. Eurabbie is outstanding for grain recovery after grazing. Mannus is outstanding for grain quality.

Table 35. Tablelands/slopes dual-purpose compared with Bimbil = 100% (2004–2009).

Variety	1st grazing DM Bimbil = 2.90 t/ha	2nd grazing DM Bimbil = 2.34 t/ha	Grain recovery Bimbil = 2.07 t/ha	Ungrazed Bimbil = 2.50 t/ha
Bimbil	**100**	**100**	**100**	**100**
Blackbutt	102	97	86	86
Cooba ❶	106	106	87	87
Eurabbie	114	107	119	118
Mannus	99	97	98	101
Yarran ❶	103	95	105	105
Yiddah	109	111	86	85

Consider Eurabbie or Blackbutt for the tablelands, or areas with later maturity. Eurabbie is outstanding for grain recovery after grazing. Preferred varieties for feeding grain to livestock are Mannus, Yiddah and Yarran.

Table 36. Slopes/plains dual-purpose compared with Bimbil = 100% (2004–2009).

Variety	1st grazing Bimbil = 2.09 t/ha	2nd grazing Bimbil = 2.34 t/ha	Grain recovery Bimbil = 2.26 t/ha	Ungrazed Bimbil = 2.59 t/ha
Bimbil	**100**	**100**	**100**	**100**
Cooba ❶	106	106	97	86
Eurabbie	107	107	112	120
Mannus	99	97	101	94
Yarran ❶	106	95	120	103
Yiddah	111	111	103	87

❶ Outclassed varieties.

For the slopes, consider Eurabbie, Mannus, Bimbil and Yiddah for grazing and especially Eurabbie and Mannus for grain recovery.

For the plains consider Yarran, Yiddah and Coolabah for grazing and especially Yiddah for grain recovery.

Preferred varieties for feeding grain to livestock are Mannus, Yiddah and Yarran.

Forage and grazing varieties

Forage and grazing oat seed might be limited depending on ongoing seed production by the commercial companies or their business partners. Check seed supplies early in the season when looking for a replacement variety.

Aladdin[Φ]. A late maturity grazing variety with good semi-erect early growth and quick recovery from grazing. A leaf rust pathotype affecting Aladdin[Φ] was identified in 2015. Selected for Queensland (Qld) and northern NSW. Released by the Department of Agriculture and Fisheries Queensland (DAF Qld) and Barenbrug Australia in 2012, and available through Barenbrug Australia.

Austin[Φ]. An erect, medium maturity forage oat with very strong initial growth. Good tillering ability, with good recovery after cutting or grazing. High total season dry matter production. High levels of resistance to current races of leaf (crown) rust. Released in 2018, commercialised by DLF Seeds.

Bond[Φ]. A semi-erect medium–late maturing forage oat with high dry matter yields in both initial growth and regrowth. Dry matter production is equal to or better than Taipan[Φ]. Maturity is 7–10 days earlier than Taipan[Φ]. Good germination and establishment with early sowing into warm soil. Suited to central and northern NSW and south-eastern Qld growing environments. DLF Seeds.

Boss[Φ]. A semi-erect medium–late maturing forage oat with high dry matter yields in both initial growth and regrowth. Marketed by EPG Seeds.

Brigalow[Φ]. A semi-erect, high tillering, medium–late maturity forage oat. Flowers slightly later than Drover[Φ]. Selected Seeds.

Bronco[Φ]. A mid–late flowering forage oat with a semi-erect growth habit and good resistance to leaf rust. Suitable for grazing and hay production. Marketed by AlfaGen Seeds.

Colossus. A late-flowering forage oat suitable for grazing and producing hay. Medium seed size compared with mainline oat varieties reducing overall seed rates (kg/ha).

Comet[Φ]. A medium–late maturity grazing variety, it has semi-erect early growth, with early growth similar to Aladdin[Φ]. High level of resistance to most leaf rust pathotypes. Available through Pacific Seeds.

Cooee. A forage oat that has good early growth and dry matter production for multiple grazings. Erect habit with good regrowth, with fine stems. Late maturing. Released in 2010. Marketed by DLF Seeds.

Drover[Φ]. A medium maturity forage oat with intermediate growth habit. Suitable for grazing and hay. Released by Pacific Seeds in 2006.

Empire. A late-flowering forage oat, suitable for grazing and hay production.

Express[Φ]. An erect forage type suitable for grazing, hay or silage. Quick early growth; late maturing variety. Marketed by Barenbrug Australia.

Flinders[Φ]. An erect forage variety with quick early forage growth. Late maturing, flowering a few days earlier than Taipan[Φ]. High total season dry matter production. Resistance to current field strains of leaf (crown) rust. Released in 2018, commercialised by DLF Seeds.

Galileo[Φ]. A forage oat that has good emergence, vigour and early growth. Good dry matter production for early grazing. Late maturing, similar to Enterprise. Released by Barenbrug Australia in 2006.

Genie[Φ]. A late maturity erect grazing variety with quick early growth and very high dry matter yields. Susceptible to leaf and stem rust in the northern region. Selected for Qld and northern NSW. Released by DAF Qld and Barenbrug Australia in 2008 and available through Barenbrug Australia.

Graza 53[Φ]. A medium maturity forage oat line, with a semi-erect growth habit. Seed available through EPG Seeds.

Graza 85[Φ]. A grazing forage oat released by Elders. Medium to medium-quick maturity, with good early vigour, quicker to first grazing than Graza 80[Φ]. A high tillering oat with soft, broad leaves and a low growing point. Very limited information available on its performance in NSW. Seed available through EPG Seeds.

Graza 88[Φ]. A late maturity grazing forage and hay oat. Its high tillering with fine leaves and stems makes it suitable for hay production. Seed available through EPG Seeds.

Ignite[Φ]. Released in 2022. A semi-erect, late maturing forage oat with excellent early growth. Ideal for early plantings with good tillering ability. High total season dry matter production. Will remain vegetative into late spring. Showing resistance to all current pathotypes of leaf (crown) rust. Commercialised by DLF Seeds.

LavishΦ. A semi-erect, high tillering, late maturity forage oat. Maturity similar to Taipan Φ. Marketed by Upper Murray Seeds.

MammothΦ. A long season forage oat. Marketed by Barenbrug Australia.

MarleighΦ. A mid-late maturity forage oatwith good early vigour, fast biomass production and recovery post grazing. Marketed by AGF Seeds.

Massive®. A very late maturing forage oat. Marketed by Upper Murray Seeds.

MoolaΦ. A grazing variety with rapid early growth developed by Agriculture Canada and released in 1998 by DAF Qld. Susceptible to leaf and stem rust in the northern region.

OliverΦ. A dual-purpose grazing and hay oat and mid maturity forage oat that has good early vigour. Low growing point compared with many forage oats, with narrow leaves and a high tillering capability. Marketed by EPG Seeds.

Overland. A forage oat that has quick, early growth and dry matter production, an erect habit and is mid–late maturing with improved tiller production. Marketed by AlfaGen Seeds.

RaptorΦ. An earlier maturing forage oat that has a semi-erect growth habit. Suited to all livestock types, with quick early growth. Currently has a good level of resistance to all leaf rust pathotypes. Marketed by Pacific Seeds.

RegencyΦ. A new mid season forage oat with more prostrate growth habit then traditional forage oats. Slower early dry matter production than other forage varieties, but excellent recovery after grazing, with higher dry matter production. Marketed by RAGT.

SabreΦ. A late maturity forage oat, with an intermediate growth habit. Currently resistant to all leaf rust pathotypes. Due to its late maturity, it will remain vegetative into late spring for an extended grazing period. Marketed by Pacific Seeds.

Saia. A grazing only type, it has a much smaller seed than most other varieties, so use lower sowing rates. Produces early feed and extended grazing. Recovery from grazing is sometimes poor. It has tall, fine, weak straw; highly tolerant to aluminium and manganese toxicity. Its blackish grain can be regarded as a contaminant if mixed with white grained varieties. Introduced from Brazil.

SorcererΦ. Semi-erect plant growth with quick early growth, suited to northern NSW and Qld growing environments. It has a medium–late plant maturity, which is later than Genie Φ, but earlier than Warlock Φ. Medium plant height, high tillering ability, medium thickness leaves and stems. Released with resistance to all the current field strains of leaf rust, reducing the need for foliar fungicide use. Released by DAF Qld and Barenbrug Australia and available through Barenbrug Australia.

TaipanΦ. An erect plant with quick, early growth and high dry matter yields. Released by Pacific Seeds in 2001.

Tucana. A late flowering forage oat suitable for grazing and hay production. Flowers 7 days later than Colossus. Marketed by RAGT.

Victory®. A late maturing forage oat, maturing slightly earlier than Massive®. Semi-erect growth habit. Marketed by Upper Murray Seeds.

WarlockΦ. A medium–late maturity grazing oat. Erect early growth habit, tall plant height, high tillering and medium thick leaves and stems. Similar appearance to Genie Φ but slightly taller, higher forage yield, higher tillering and later maturity. Known to be susceptible to at least one known leaf rust pathotype. If leaf rust is present, manage with an appropriate foliar fungicide. Selected for Qld and northern NSW. Released by DAF Qld and Barenbrug Australia in 2018, and available through Barenbrug Australia.

WizardΦ. A medium maturity grazing variety with semi-erect early growth and quick recovery from grazing. Early growth similar to Genie Φ and better than Aladdin Φ. Selected for Qld and northern NSW. Released by DAF Qld and Barenbrug Australia in 2017, and available through Barenbrug Australia.

Feeding value of oat grain

The GRDC-supported 'Premium grains for livestock production' project demonstrated significant differences between varieties in whole grain digestibility. Cattle feeding trials have subsequently demonstrated that this translates into major changes in grain digestibility and animal growth rates. Grain testing from the 2014 harvest showed that, on average, Mitika$^{\phi}$ oats had a 17% increase in digestibility over other grain oat varieties grown at sites in central and southern NSW.

The varietal differences in the lignin content of the oat husk causes most of the difference in whole grain digestibility. Where varieties have a high husk lignin content, digestion of both the husk and the underlying grain is poor. Husk lignin content is assessed using a simple staining test (phloroglucinol stain test). Table 37 shows a list of lignin ratings for a range of oat varieties.

While other seasonal factors affect whole grain digestibility, varieties with a high husk lignin rating will inherently have low whole grain digestibility. Near infra-red tests have been developed to measure the feeding value of grains.

Feed quality tests can accurately measure whole grain digestibility, protein levels and metabolisable energy. For livestock feeding, grain protein is an important attribute. Oats can vary widely in protein levels due to varietal factors, paddock variability, fertiliser inputs and yield levels. Oats with low protein levels (<12%) can limit growth rates in young animals.

Table 37. Husk lignin rating of a range of oat varieties – low is better for ruminant feed value.

Low	Medium	Medium–high	High
Bass, Bimbil, Brusher, Carbeen, Cooba, Eurabbie, Graza 68, Kowari, Mannus, Mitika, Mulgara, Nile, Tungoo, Wintaroo, Yarran, Yiddah	Blackbutt (variable), Graza 80, Koala, Quoll	Euro, Potoroo, Wandering	Bannister, Bilby, Carrolup, Coolabah, Dawson, Drover, Dunnart, Durack, Echidna, Forester, Genie, Graza 50, Kangaroo, , Koorabup, Mortlock, Nugene, Possum, Taipan, Williams, Yallara

Contributing authors

Allan Rattey, Oat Breeder, InterGrain; Glenn Roberts, former Oat Breeder, NSW DPI, Temora; Pamela Zwer and Sue Hoppo, former Oat Breeders, SARDI, Adelaide.

Table 38. Disease guide – oats.

Disease/Cause	Symptoms	Occurrence	Spread	Control
Foliar diseases				
Bacterial stripe blight *Pseudomonas striafaciens* pv. *striafaciens*	Water-soaked stripes on leaves, drying to tan/red stripes, leaf death.	More severe in early maturing crops in wetter seasons.	Rain splash, insects, seed-borne.	Nil
Barley yellow dwarf virus (BYDV)	Yellowing, dwarfing of infected plants, floret blasting, leaf reddening in some varieties.	Most common near perennial grass pastures and in early sown crops.	Transmitted by aphids from infected grasses and cereals.	Resistant and tolerant varieties; controlling aphids, insecticidal seed treatments.
Septoria blotch *Phaeosphaeria avenaria* f.sp. *avenaria*	Small dark coloured spots on leaf, oval to elongated in shape. Chlorotic margin surrounds lesions as they mature. Often lesions coalesce. Leaf death.	More severe in in oat-on-oat rotation. Becoming more common in southern NSW.	Oat stubble inoculum and rain splash in crop.	Sow varieties with improved levels of resistance. Crop rotation. Avoid sowing oats back into infected stubbles. In-crop fungicides when economically viable (under high disease pressure).
Leaf (crown) rust *Puccinia coronata* f.sp. *avenae*	Orange powdery pustules on upper leaf surface.	In wet seasons; more important on the coast.	Airborne spores from living plants.	Uniformly graze infected crops in autumn, with crash grazing more effective than set stocking rates. Sow varieties with improved levels of resistance. Apply foliar fungicides.
Leaf spots: several fungi	Leaf spots, leaf death.	Usually minor.	Depends on disease.	None.
Red leather leaf *Spermospora avenae*	Long lesions with reddish borders and light centres. Leaves might look and feel leathery.	Higher rainfall, cool wet weather.	Oat stubble. Stubble and rain splash.	Avoid susceptible oat varieties and rotate crops. Apply foliar fungicides.
Stem rust *Puccinia graminis* f.sp. *avenae*	Reddish-brown, powdery, oblong pustules with tattered edges on leaf (both sides) and stem; progressive plant death.	More important inland, from spring to summer in warm, wet weather.	Airborne spores from living plants.	Early maturing varieties to avoid rust. Apply foliar fungicides.
Smuts				
Smuts *Ustilago avenae*, *U. segetum* var. *hordei*	Replacement of florets by black sooty mass.	Statewide.	Spores on or in the seed infect the seedling after sowing.	Thorough treatment of seed with appropriate fungicide.

Triticale

Key considerations for 2025

» No independent grain yield testing has been undertaken since 2015

» No current information on the performance of newer triticale varieties in NSW is available.

Crop management

This high-yielding feed grain crop is suited to all soil types, but has yield advantages on light, acid soils high in exchangeable aluminium. In these soils, triticale significantly out-yields wheat, barley and sometimes oats in all seasonal conditions, wet or dry.

In low soil fertility, triticale responds well to high inputs of seed and fertiliser. Adequate fertiliser needs to be applied to achieve optimum yields.

On the better wheat soils, and in average to above average rainfall seasons, triticale yields are equal to or exceed those of wheat. However, in dry springs, triticale yields can be 10–15% below wheat, due to its longer grain-filling period.

Triticale often suffers more from frost damage than wheat, hence it should generally be sown later. It flowers earlier than most wheats, but matures at about the same time.

Triticale usually receives a lower price per tonne at the farm gate compared with milling wheat. An exception to this can be where there is strong local demand for feed grain when a better cash return from lower transport costs could be expected.

Phosphorus (P). Consider using 15–25 kg P/ha, depending on expected yield, paddock history, soil test results and soil type.

Nitrogen (N). Give particular attention to N supply. Triticale used for grazing and grain could use up to 100 kg/ha of N. Consider applying 60–100 kg/ha of N as a topdressing if soil N levels are low. As grain-only crops tend to be grown later in the crop rotation, ensure adequate N levels are supplied to support crop yields and maintain grain quality as soil N levels will be low.

GO TO PAGES

How to calculate sowing rates: on page 7.

Read in conjunction with Table 43 on page 74.

Cover crop for pasture establishment

The low tillering growth of some varieties and triticale's good shattering tolerance has proven useful as a cover crop for undersowing pastures on the slopes and tablelands.

Sowing rates

Aim to achieve the same plant populations as for wheat by setting the seeder at 25–40% above the setting recommended for district wheat sowings. The higher setting is needed because the:

- grain is larger than wheat, and flows more slowly
- plants tiller less than wheat.

Table 39. Sowing rates for triticale.

Purpose/growing conditions	Sowing rate (kg/ha)
Grain only	60–100
Grazing and grain	100–120
Irrigation and favourable environments	100–120
Undersowing pasture	15–30

Check germination and seed size to calculate sowing rate.

Grazing

The ideal stage to start grazing dual-purpose varieties is when plants are well anchored and the canopy has closed. For fattening stock, continuous grazing is better than rotational grazing. Maintain adequate plant material to give the crop continuous and quick regrowth (1,000–1,500 kg DM/ha).

For the best recovery after grazing do not graze below 5 cm for prostrate varieties, or below 10 cm for more erect types. Over-grazing greatly reduces the plant's ability to recover.

Disease

Table 40. Disease susceptibility and management.

Disease	Susceptibility	Notes
Loose smut	Susceptible	Treat with a fungicidal seed dressing
Take all	Less susceptible than wheat	–
Septoria tritici blotch	Superior tolerance than wheat	–
Yellow spot	Will harbour disease	Does not usually show severe symptoms
Fusarium crown rot	Susceptible	–
Stripe rust	Susceptible	Ensure variety has adequate field resistance; consider using a foliar fungicide if needed. Consider seed or fertiliser–fungicide treatment for controlling seedling stripe rust in susceptible varieties, especially those sown early for grazing

Variety selection

Grazing and grain recovery: Endeavour$^{\Phi}$, Cartwheel$^{\Phi}$, Kokoda$^{\Phi}$ and Normandy$^{\Phi}$.

Grazing and grain recovery – outclassed: Crackerjack 2 (stripe rust), Tuckerbox (yield) and Wonambi (stripe rust).

Grain only: Astute$^{\Phi}$ or Bison$^{\Phi}$ – for main season sowings (mid May–June).

Grain only – outclassed: Fusion$^{\Phi}$ (stripe rust) and KM10 (yield).

Note: varieties outclassed due to stripe rust have had a variable response to the disease depending on the pathotype present in that season, e.g. Fusion$^{\Phi}$ 2022 rating: Susceptible; 2023 rating: Resistant to Moderately resistant. Monitor varieties regularly if you choose to grow them.

Variety characteristics

Dual-purpose grazing varieties

Cartwheel$^{\Phi}$. A long-season dual-purpose triticale that is suitable for an early March to early April sowing. Good early forage production when sown in March and recovers from grazing to give excellent forage in winter. Straw strength is good and has shorter stature than Tobruk$^{\Phi}$. Grain yield after grazing is equivalent to Tobruk$^{\Phi}$. Released by the University of Sydney. Seed is available from Waratah Seeds.

Crackerjack 2$^{\Phi}$. A mid–late season replacement for the original Crackerjack. Earlier sowing option than the original Crackerjack; sowing from early April. Excellent establishment and early vigour. Suited to rotational grazing and silage, or hay production. Shown to be susceptible to the newer stripe rust pathotypes, a fungicide management program might need to be implemented. Released by Barenbrug Australia.

Endeavour$^{\Phi}$. A semi-awnless dual-purpose variety. Excellent dry matter production and grain recovery after grazing. Released by the University of Sydney. Seed is available from Waratah Seeds.

Kokoda$^{\Phi}$. A dual-purpose semi-awnless triticale that can be sown from mid March to the end of April, though could be sown earlier if grazed judiciously. Shown to have higher early dry matter production than Endeavour$^{\Phi}$ in NSW performance trials, with excellent forage recovery and dry matter production in winter. It can be grazed until the end of July. High grain yield after grazing; better than Endeavour$^{\Phi}$ and Cartwheel$^{\Phi}$ in NSW dual-purpose cereal evaluation trials. Limited trials have shown improved metabolisable energy in the grain for pigs and chickens, and higher starch and lower fibre compared with Endeavour$^{\Phi}$. Released by the University of Sydney. Seed available through Waratah Seeds.

Normandy$^{\Phi}$. A dual-purpose triticale that can be sown from mid March to the end of April. Good recovery from grazing, suitable growth habit for early sowing. Released by the University of Sydney. Seed available through Waratah Seeds.

Tuckerbox. A reduced-awn, medium season, tall, dual-purpose variety suitable for grain, hay or silage production. Tuckerbox is most suited to production areas with 450 mm annual rainfall or greater, but will grow to maturity in lower rainfall areas or in tough seasons. About one week later than Rufus to heading, slightly earlier than Yukuri. Selected at Sherlock, South Australia, by Kath Cooper. Cooper & Elleway seed growers and Yankalilla Seeds. Non PBR.

Wonambi. A late maturing spring-type triticale suitable for grazing, forage conservation and grain production. Tip-awned, dense grained triticale. Bred at Sherlock, South Australia, by Kath Cooper. Marketed by Naracoorte seeds. Non PBR.

Suggested sowing times

Aim to sow grain-only crops in the earlier part of the optimum period. The actual date is influenced by location, soil fertility and the likelihood of frost at flowering in a particular paddock. Sowing windows for specific varieties vary across the regions and the tables are provided as a guide only. Sowing decisions should be made according to the relative maturity of each variety.

Table 41. Suggested sowing times for triticale.

Variety	February		March				April				May				June				July	
Weeks	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Endeavour	>	★	★	★	★	★	★	★	<	<										
Cartwheel, Kokoda		>	>	★	★	★	★	★	<	<										
Normandy ❶				>	★	★	★	★	★	<										
Crackerjack 2						>	★	★	★	★	★	<	<							
Wonambi ❶							>	★	★	★	★	★	<							
Tuckerbox									>	★	★	★	★	★	★	<				
Astute, Bison, Fusion											>	★	★	★	★	★	<			
KM10												>	>	★	★	★	★	★	<	<

Aim to sow in the earlier part of the optimum time indicated to achieve maximum potential yield, particularly in western areas. Soil moisture, soil fertility and the likelihood of frost in a particular paddock at flowering influence the actual sowing date.

❶ Note: Limited information available on the response to sowing time for this variety.

> Earlier than ideal, but acceptable.

★ Optimum sowing time.

< Later than ideal, but acceptable.

Table 42. Dual-purpose triticale performance compared with Endeavour (2011–2017).

Variety	1st grazing DM	2nd grazing DM	Grain recovery
% of Endeavour (t/ha)	**2.30**	**2.83**	**4.10**
Cartwheel	91	102	107
Endeavour	**100**	**100**	**100**
Kokoda	103	107	109
Normandy	99	102	103
Wonambi ❸	97	87	91
Tobruk	92	102	108

❸ Outclassed.

Table 43. Triticale variety performance – NSW (compared with Fusion = 100%).

North east						
Variety	Yearly group mean				Regional mean (2008–2015)	Number of trials
	2012	2013	2014	2015		
% Fusion (t/ha)	**3.38**	**3.00**	**2.87**	**3.15**	**4.14**	
Astute	–	98	96	99	104	6
Bison	–	100	100	107	101	6
Fusion ❸	**100**	**100**	**100**	**100**	**100**	**11**
KM10 ❸	–	–	92	94	87	4

South east						
Variety	Yearly group mean				Regional mean (2008–2015)	Number of trials
	2012	2013	2014	2015		
% Fusion (t/ha)	**5.90**	**4.34**	**4.44**	**4.40**	**4.57**	
Astute	–	101	103	105	105	10
Bison	–	100	102	106	101	10
Fusion ❸	**100**	**100**	**100**	**100**	**100**	**22**
KM10 ❸	–	–	88	91	89	7

South west irrigated						
Variety	Yearly group mean				Regional mean (2008–2015)	Number of trials
	2012	2013	2014	2015		
% Fusion (t/ha)	**6.46**	**–**	**8.07**	**6.49**	**6.08**	
Astute	–	–	104	111	112	2
Bison	–	–	100	110	103	2
Fusion ❸	**100**	**–**	**100**	**100**	**100**	**5**
KM10 ❸	–	–	90	100	91	2

❸ Outclassed – Fusion (stripe rust) and KM10 (yield).
The tables present NVT 'Production Value' MET (multi-environment trials) data on a regional mean basis from 2008–2015.
Yearly group means shown for 2012, 2013, 2014 and 2015.
No new data is available for triticale variety performance in NSW, with NVT testing stopping in 2015.

Grain only varieties

Astute[Φ]. Mid maturity variety suited to the medium–high rainfall areas of NSW, with high yield potential. Astute[Φ] is a suitable replacement for Hawkeye[Φ], with a similar flowering time. It is a fully awned variety, with good lodging resistance. Seed is available through AGT Affiliates. AGT.

Bison[Φ]. An early to mid maturity variety, suited to low–medium yield potential environments, performing well across NSW. Reduced-awned variety; possible replacement for Rufus. Seed is available through AGT Affiliates. AGT.

Fusion[Φ]. Mid maturity triticale, a unique line bred from a cross between triticale parents and bread wheat parent Stylet. Fusion[Φ] maintains exceptionally high yields under tough conditions such as drought or tight finishes. It is best suited to medium-yield-potential environments and has performed well across all regions of NSW. Available through AGT Affiliates. AGT.

KM10. A quick-maturing line, suited to late sowing or short-season environments. Reduced-awned variety with quick early growth. Could be suitable for fodder production systems as it has good early growth. It could be used as part of an annual ryegrass management program where sowing is delayed and/or the option for cutting as silage is used. Selected at Sherlock, South Australia, by Kath Cooper. Non PBR.

The following are more recently released varieties from South Australia with no yield performance data available for NSW.

Joey. Mid maturity, tall, reduced-awn triticale, suitable for forage conservation and grain for feed and milling. Rated susceptible for stem rust and is not recommended for northern NSW where stem rust is an increased risk. Selected at Sherlock, South Australia, by Kath Cooper. Non PBR.

Razoo. Mid maturity, medium height, reduced-awn triticale, suitable for forage conservation and grain for feed and milling. Selected at Sherlock, South Australia, by Kath Cooper. Seed available through Cooper & Elleway seed growers and Yankalilla Seeds. Non PBR

Woomera. Later maturing, medium-tall spring triticale with reduced-awn head type. Suited for forage and grain production, preferring higher rainfall and longer season environments. Selected at Sherlock, South Australia, by Kath Cooper. Non PBR.

Table 44. Variety characteristics and reaction to diseases ❶.

Variety	Grazing production	Straw strength	Maturity	Resistance					Acid soils – sensitivity to aluminium
				Stem rust	Leaf rust	Stripe rust ❷ 2022	Stripe rust ❷ 2023	Cereal cyst nematode	
Dual-purpose									
Cartwheel	quick–early	very good	mid–late	R	R	R–MR	R–MR	R Ⓟ	–
Crackerjack 2	quick–early	moderate	mid–late	–	–	–	–	–	–
Endeavour	quick–early	very good	late	–	–	–	–	–	V. tol
Kokoda	quick–early	very good	mid–late	R	R–MR	R–MR	R–MR	MR	–
Tuckerbox	quick–early	–	mid	–	–	–	–	–	V. tol
Wonambi ❸	quick–early	good	mid–late	R	R	S	MR–MS	MS	–
Woomera	quick–early	good	mid–late	MS	R–MR	MS–S	MR	MS	–
Grain only									
Astute	NR	very good	early–mid	MR	R–MR	MS–S	–	R	V. tol
Bison	NR	good	early–mid	–	–	–	–	R	V. tol
Fusion ❸	NR	medium-good	mid	R	R	S	R–MR	R	V. tol
Joey	NR	–	mid	S	R–MR	MS–S	MR	MS	–
KM10 ❸	NR	good	very early	R	MR & S	S	MR	S	–
Razoo	NR	–	mid	MR–MS Ⓟ	R–MR	MS–S	MR	–	–

Ⓟ Provisional rating.
❶ Disease ratings come from the NVT pathology project, funded by GRDC. Testing for triticale disease responses ceased in 2023, view table ratings with caution and actively monitor and manage crops for disease presence.
❷ Stripe rust ratings shown is a combined rating for all pathotypes.
❸ Outclassed.
Where ratings are separated by '&' the first is correct for the majority of situations, but different pathotypes are known to exist and the latter rating reflects the response to these pathotypes.

NR	Not recommended
R	Resistant
R–MR	Resistant to moderately resistant
MR	Moderately resistant
MR–MS	Moderately resistant to moderately susceptible
MS	Moderately susceptible
MS–S	Moderately susceptible to susceptible
S	Susceptible
S–VS	Susceptible to very susceptible
VS	Very susceptible
V. tol	Very tolerant
–	Unknown or no data

Marketing

Triticale is predominantly used as a stockfeed and often processed into prepared ration mixes or pellets. As with other cereal grains, care is needed when introducing stock to triticale due to grain poisoning issues.

The market is small compared with other feed grains such as barley. Grain is traded domestically through merchants or directly to end users in the dairy, feedlot, pig and poultry industries.

Prices offered are often relative to Australian Standard White wheat and are influenced by the:
- supply and price of other grains such as barley, wheat, sorghum and possibly oats
- quality and quantity of grain
- location of grain and transport costs
- seasonal effects on the grazing industries.

Prices tend to be lowest at, or soon after, harvest and rise during winter.

Aim for a maximum 12% moisture, test weight of 65 kg/hL with a minimum of admixture. Grain protein and metabolisable energy (ME) levels should be known before negotiating sales. ME levels in triticale grain are are similar to wheat.

Since triticale is often grown in acid soils and later in the rotation, low protein grain can result, affecting marketability and price. Apply adequate N fertiliser to alleviate this problem.

Storage

Triticale grain is very prone to weevil attack; more so than barley. Be careful of high grain moisture contents. When storing triticale, refer to Table 89 on page 169 and Table 90 on page 170 for grain protection options.

Key grain characteristics

Table 45. Typical values for grain characteristics.

Grain	Typical values for key grain characteristics				
	Seeds/kg	Volumetric grain weight (kg/hL)	Bulk densities		Angle of repose
			kg/m^3	t/m^3	
Barley	53,200	62	620	0.62	28
Canary seed	143,000	70	700	0.70	–
Canola	250,000	70	700	0.70	22
Cereal rye	40,000	71	710	0.71	26
Chickpea – desi	4,500	75	750	0.75	–
Chickpea – kabuli	2,100	75	750	0.75	–
Cowpea	5,000	76	760	0.76	–
Faba bean	2,000	75	750	0.75	–
Field pea	5,000	75	750	0.75	–
Grain sorghum	45,000	72	720	0.72	28
Linseed	150,000	73	730	0.73	20
Lupin – narrow-leaf	6,000	75	750	0.75	–
Lupin – albus	3,000	75	750	0.75	–
Maize	3,000	72	720	0.72	28
Millet	250,000	62	620	0.62	–
Mungbean	15,000	75	750	0.75	–
Navy bean	5,000	75	750	0.75	–
Oats	34,400	45	450	0.45	28
Pigeon pea	6,600	75	750	0.75	–
Rice – medium grain	35,700	56	560	0.56	31
Rice – long grain	40,000	56	560	0.56	31
Safflower	24,000	53	530	0.53	28
Soybean	5,500	75	750	0.75	27
Sunflower	17,300	40	400	0.40	30
Triticale	23,000	65	650	0.65	–
Vetch	14,000	75	750	0.75	–
Wheat	34,800	75	750	0.75	27

Note: The number of seeds/kg will vary according to variety and growing conditions. The bulk density and angle of repose varies according to variety, moisture content, quality and trash content of the grain.
To check grain bulk density, weigh 1 L of grain. This weight in kilograms is its density in tonnes per cubic metre.

Figure 8. Wheat being loaded into bulk freight wagons at Nevertire, NSW.

Industry information

Seed testing laboratories

The key to getting a reliable seed testing result is making sure you collect a representative sample of your seed lot and using an accredited laboratory. Several commercial seed testing services are available to growers. The following list is not exhaustive, and others are available.

AgEtal Agricultural Testing Laboratory
(www.agetal.com.au)
9/24 Carroll Street, Wilsonton,
Queensland, 4350
t: 07 4633 3223
e: lab@agetal.com.au

Australian Seed Labs
(www.australianseedlabs.com.au)
71 Croft Crescent, Toowoomba,
Queensland, 4352
t: 07 4613 9052
e: seedlab@australianseedlabs.com.au

EM Pascoe Seed Testing services
12 Ridge Road, Greensborough, Victoria 3088
t: 03 9434 5072
e: elizabethpascoe@gmail.com

Futari Grain Technology Services
(www.futari.com.au)
34 Francis Street [PO Box 95], Narrabri NSW 2390
t: 02 6792 4588
e: futari@futari.com.au

Seed Services Australia
(https://pir.sa.gov.au/research/services/seed_services/seed_testing)
Primary Industries and Regions South Australia
GPO Box 1671, Adelaide, SA 5001
t: 1300 928 170
e: PIRSA.seeds@sa.gov.au

Industry organisations

Australian Fodder Industry Association Inc.
(www.afia.org.au)
The Grange, Fullers Road, Tocumwal NSW 2714
Contact: Vanessa Curtis
m: 0412 870 452
e: info@afia.org.au

Grains Australia
(www.grainsaustralia.com.au)
C/- Ground floor, 465 Victoria Avenue,
Chatswood, NSW 2067
t: 02 9994 8000
e: grainsaus@grainsaustralia.com.au

Grain Growers Association
(www.graingrowers.com.au)
Level 19, 1 Market Street, Sydney NSW 2000
PO Box Q1355, Queen Victoria Building, NSW 1230
t: 1800 620 519 or 02 9286 2000
e: enquiry@graingrowers.com.au

Grain Trade Australia **(GTA)**
(www.graintrade.org.au)
Level 7, 12 O'Connell Street, Sydney NSW 2000
PO Box R1829, Royal Exchange NSW 1225
t: 02 9235 2155
e: admin@graintrade.org.au

NSW Durum Growers Association
Chairman: Ross Durham
Nombi, Mullaley NSW 2379
m: 0427 437 841
e: ross@nombi.com.au

SA Durum Growers Association
(www.durumgrowerssa.org.au)
Secretary: Deb Baum
m: 0481 322 821
e: sadgasecretary@gmail.com

The University of Sydney
Plant Breeding Unit – Cereal Rust
107 Cobbitty Road, Cobbitty NSW 2570
t: 02 9351 8800

Variety Central
(www.varietycentral.com.au)
Contact: Narelle Moore
m: 0428 286 414
e: enquiries@australiancropbreeders.com.au

National Cereal Rust Survey

Cereal rust samples can be collected and mailed to the address below. Rusted plant samples can be mailed in paper envelopes; do not use plastic wrapping or plastic lined packages.

Send to:

University of Sydney
Australian Cereal Rust Survey
Reply Paid 88076
Narellan NSW 2567

For more information, go to the University of Sydney's Australian Cereal Rust Survey page (https://www.sydney.edu.au/science/our-research/research-areas/life-and-environmental-sciences/cereal-rust-research/rust-reports.html).

Canola

Key considerations for 2025

- Target high fertility paddocks to increase crop yield potential and minimise the need for high nitrogen (N) inputs.
- Ensure fallow weeds are controlled and soil cover is maintained to maximise sowing opportunities.
- While the 2024 season varied across NSW, the legacy effects of sclerotinia stem rot (SSR) outbreaks in 2022 across NSW should still be considered in 2025.
- Plan crop protection inputs ahead of potentially conducive seasonal conditions for disease.
- Test farmer-retained seed for germination and vigour 4–6 weeks before sowing, particularly if the seed-crop was exposed to extreme moisture stress during spring.

Crop management

Canola offers a range of rotational benefits in farming systems and is profitable in its own right. It has the potential to widen sowing windows and manage disease. Its broad range of herbicide options provides the opportunity to control a range of both broadleaf and grass weeds. It competes strongly with weeds, which complements herbicide control and reduces reliance on herbicides.

Canola is best suited to paddocks with a high N level as it has a greater N demand than other commonly grown crops. Growing a pulse crop the year before sowing canola as a 'double-break' can be useful for fixing and conserving N, controlling weeds and providing a longer break for cereal diseases. In central and northern NSW, canola is effective in reducing *Pratylenchus thornei* nematode populations.

Pulses, especially field pea, leave more water than cereals deeper in the soil profile for the following crop. A pulse crop leaves low levels of stubble residue following harvest. This can improve canola establishment, but could increase the risk of diseases such as sclerotinia stem rot (SSR). In northern and western areas, canola can be an 'opportunity' crop. Target paddocks and seasons where stored soil water is above average, for example >150 mm.

Canola will grow in a range of soils, but is best suited to fertile paddocks free of hard pans, crusting, waterlogging potential, or subsoil constraints. Avoid acidic soils, especially those high in aluminium and manganese. Severely acidic layers (pH_{Ca} <4.5) are common at depths of 5–10 cm and 10–15 cm in the main cropping soils of central and southern NSW. Check for acidic layers by sampling soils at 5 cm intervals to 20 cm deep, 2 years before sowing canola.

Where acidity is detected below the surface soil, the most rapid method to increase pH is to incorporate fine-grade lime to 10–15 cm deep, at least 12 months before sowing canola. If deep incorporation is not an option, liming soil above the acid layers to target pH_{Ca} 5.8 is needed to help move the effect from the lime down to the depth of acidity.

Maintain an adequate break between canola crops to minimise the risk of yield losses from blackleg. Select a paddock as far from last year's canola stubble as possible to minimise the blackleg spore load reaching the new crop. A minimum distance of 500 m is recommended. Avoid paddocks with major weed problems and/or choose an appropriate herbicide-tolerant variety.

Canola is very sensitive to herbicide residues. Plantback periods shown on herbicide labels should be strictly adhered to. Spray equipment previously used to apply Group 2 herbicides should be thoroughly decontaminated before being used on canola.

Sowing

Seedbed preparation

Canola is best sown using no-till systems, which minimises seedbed moisture loss. Stubble retention and timely fallow weed control will greatly increase the chance of germinating canola on time.

When sowing into cereal stubble, ensure that straw and header residue are pushed away from the seeding row. Stubble that is 'hair-pinned' in the furrow or covering the row can reduce canola emergence, early plant growth and yield. Burning stubble residue from the previous crop can be a useful strategy to improve canola emergence where stubble loads are very high and suitable machinery is not available. Burning should be done as close as possible to sowing to minimise soil moisture loss from the surface.

TruFlex®
CANOLA

BAYER

READY WHEN YOU ARE

You only get one shot. So go with your best option: TruFlex® Canola

- IMPROVED WEED CONTROL
- FLEXIBLE SPRAY RATES AND TIMING
- HIGHER YIELD POTENTIAL

truflex.com.au

TruFlex® canola is Bayer's second-generation herbicide tolerant trait. New advances in trait technology will help enable better weed control and crop safety compared to Roundup Ready® canola. It's a combination that could result in higher yield potential at harvest time.

To learn more about TruFlex scan this QR code

TruFlex seed varieties are available from the following seed companies:

nuSEED · BASF We create chemistry InVigor · Cargill · Pacific Seeds Growing possibilities · DYNAGRO SEED

Sowing depth

Where conditions allow, aim to sow seed through the main seed box. Soil texture will influence thresholds for sowing depth. Canola is more likely to emerge from deeper sowing (3–5 cm) on sandy soil than clay soil and up to 5 cm in self-mulching clays. Where there is moisture below 1.5–3 cm, a reduced but viable establishment can still be achieved by sowing deeper, provided high-vigour seed is sown. This strategy can be used to sow some crops on time in seasons where good summer rainfall is followed by drying surface seedbeds in autumn. A crop sown on time with a reduced establishment has generally higher yield potential than a late-sown crop. Success with this strategy is very dependent on soil type, soil structure and the amount and timing of follow-up rainfall.

Dry sowing

Canola can be successfully dry sown in reliable rainfall zones, allowing emergence following the first rain after sowing. Seed should be placed at around 1.5–2 cm deep and pressure on closing devices (e.g. press wheels) should be minimised. When sowing dry, select a variety with flexible phenology (i.e. one with a stable flowering date across a wide range of germination dates) as the germination date will be uncertain unless sowing in front of assured rain.

Seed quality and establishment

Research has shown that retaining and replanting seed from hybrid crops (F2 seed) can reduce yield by 7–17% compared with the F1 hybrid crop. In addition, other traits such as flowering and maturity evenness, blackleg resistance and oil content will be affected. Retaining and replanting open-pollinated (OP) varieties is now widely practised. Where OP varieties are to be retained, aim to grade seed to ≥1.8 mm diameter and pay particular attention to seed storage, ensuring it is in a cool, dry place and evenly treated with the appropriate seed dressings.

Aim to establish 30–50 plants/m^2 (20–30 plants/m^2 in northern and western NSW). This can normally be achieved with 2–4 kg/ha of seed. Plant densities as low as 15 plants/m^2, if consistent across a paddock, can still be profitable when crops are sown on time and plants have time to compensate. Seed size varies between and within OP and hybrid varieties. Check seed size to calculate the correct number of seeds per square metre to be sown.

In the following situations, use the higher sowing rate, consider sowing the seed at a shallower depth, or select a variety with high vigour. Sowing:

- too deep
- too fast
- into marginal moisture
- late into cold, wet soils

or no-till sowing into dense stubble can reduce establishment.

Hybrids are generally more vigorous than OP varieties, primarily because of their larger seed size.

Farmer-retained seed for sowing

Seed retention blocks need to be managed differently from commercial crops to ensure high-vigour seed is produced with superior establishment characteristics. Retaining large-sized seed alone will not guarantee successful establishment if the seed crop has been poorly managed.

The key principles of seed crop production include:

- favourable conditions during seed fill
- low seed chlorophyll levels
- adequate seed phosphorus concentration
- allowing the crop to reach harvest maturity (not physiological maturity)
- retaining large sized seed.

The *Five tips for growing high-vigour canola seed* are:

1. **Paddock selection and matching phenology with sowing time**. Ensure the seed crop flowers within the critical flowering period for the environment (see Table 46 on page 83). The aim is to reduce heat and frost stress and provide favourable conditions for seed fill.
2. **Target high plant density (>40 plants m^2)**. Ensure a high proportion of seed yield is derived from the main stem and not the lower branches. Seeds produced from the main stem have a longer seed fill duration (slower and preferential accumulation of assimilates and nutrients) and less seed chlorophyll compared with lower branches.
3. **Apply adequate phosphorus (P) fertiliser**. Phosphorus-deficient seed crops can produce up to 50% abnormal seedlings; ensure the seed-crop is not P deficient (see Phosphorus on page 81) while maintaining high plant density.

GO TO PAGE

Five tips for growing high-vigour canola seed (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/canola-and-safflower/five-tips-for-growing-high-vigour-canola-seed)

4. **Allow seed-crop to naturally mature so enzymes can clear seed chlorophyll**. Seeds develop germination capacity before seed vigour. The gap between germination percentage and vigour is reduced when the seed-crop is allowed to reach harvest maturity. Therefore, direct heading is the preferred option, but if not possible, windrow late (80% seed colour change) in the cool of the evening. Do not apply glyphosate as a harvest aid or for late weed control.
5. **Grade and retain large sized seed**. Target ≥1.8 mm seed size or above (the bigger the better). At a minimum ensure <1.6 mm seed size is graded out. Larger seed size is required when sowing depth increases, for example 1 cm depth ≥1.6 mm; 3 cm depth ≥1.8 mm; 5 cm depth ≥2 mm. Larger seed size will always produce quicker ground cover, no matter the seeding depth.

Nutrition

Nitrogen

High yielding canola crops have a high N requirement, which can be provided by:

- 2–4 years of legume-dominant pasture
- pulse crops that supply some of the N requirement
- applying adequate N throughout the rotation
- applying N before, at, or after sowing.

Split application of N at, or just before sowing, followed by topdressing in the vegetative stage, is a very effective strategy. This allows N requirements to be adjusted as seasonal conditions dictate. There is usually no penalty from applying all N at sowing. Crops can be topdressed until the stem elongation stage. Topdressing at early flowering can still be economical in seasons where the crop has a high yield potential and rain falls soon after. However, the total amount of N is more important than the application timing.

Deep soil testing for N before sowing or during the seedling stage will help determine appropriate N rates and timing. As a rule of thumb, canola requires 72 kg N/ha per tonne of grain (assuming 50% efficiency), so a 2.5 t/ha crop requires 180 kg N/ha. This can be supplied by existing soil mineral N at sowing, applied N fertiliser and soil N mineralisation during the growing season.

High N application rates can reduce oil content. Excess N does not cause canola to 'hay off' as it does in cereals.

Warmer and drier soils are typical of low rainfall zones. Canola is sensitive to high rates of N in close proximity to the seed, especially in the lighter textured soils. Nitrogen should therefore be separated from the seed at sowing.

Eastern zones of central and southern NSW: no more than 10 kg N/ha should be sown in direct contact with the seed on the common row spacing of 20–25 cm.

Northern region, and for early sowings in western zones of the centre and south: limit N rates to a maximum of 5 kg N/ha with the seed, especially on a row spacing of 30 cm and wider.

Avoid placing high rates of N (above 25 kg N/ha) under canola seed as this can also affect emergence.

Sulfur

Canola has a high sulfur (S) requirement – more than double that of wheat. Apply 25 kg S/ha as sulfate S (not elemental S), unless local experience or a deep soil test clearly indicates that your soil is not deficient, or that a lower rate is adequate. Sulfur is often found deep in the soil profile, so soil sampling should include the whole root zone. Even where there is high S down deep, roots might not be able to access it in dry or waterlogged years. Apply S fertiliser test strips at sowing to confirm that S is not lacking. Sulfur deficiency can be quickly corrected in-crop by applying sulfate of ammonia.

The main sources of S are sulfate of ammonia, gypsum and single super.

Phosphorus

Ensure that adequate P is applied at sowing. Unless the crop is sown into a high P soil, apply at least 8 kg P/ha for every tonne of canola expected to be harvested, e.g. apply 20 kg P/ha if the target yield is 2.5 t/ha. Low or deficient soil P levels can limit the crop's potential response to N. As with N, canola seed is sensitive to phosphate fertilisers.

Avoid drilling high rates of P in direct contact with canola seed. Rates as low as 10 kg P/ha applied in direct contact with seed can reduce establishment with the low soil disturbance of narrow sowing points and disc seeders.

Micronutrients

Several micronutrients, including boron, molybdenum and zinc, are known to be essential for healthy, high yielding canola crops. In soils with a long cropping history or where deficiencies are suspected, a supplemented fertiliser at sowing should be considered. Some micronutrients can be applied with pre-emergent herbicides, but check to ensure compatibility.

Variety phenology

Research has shown that there are major differences in canola variety phenology, especially when sown early. Varieties are classed into 4 groups based on the phenological rate of development to flowering:

1. fast developing spring types, which are preferred in low rainfall zones
2. fast to mid developing spring types suited to low to medium rainfall zones
3. mid to slow spring types for medium to high rainfall zones
4. slow spring to winter types for high rainfall zones.

Sowing fast varieties early can lead to flowering starting in early winter, exposing the crop to increased frost and disease risk, and often lowering yield potential. Where early sowing is a viable option, choose a slow developing variety that still flowers at the optimum time for the environment (see Canola first, *Twenty tips for profitable canola – northern NSW* and *Twenty tips for profitable canola - central & southern NSW*.

Research is ongoing with the goal of predicting flowering times based on a variety's genetics. Table 47, Canola variety characteristics and disease reactions are also highlighted on page 91. It is more important to consider a variety's phenology than its maturity.

Slower developing varieties generally have a wider optimum sowing window –large variations in sowing date only result in small changes in flowering date. In contrast, fast varieties have a shorter sowing window –small variations in sowing date can lead to large changes in flowering date, especially when sowing date is moved earlier. Table 46 summarises the optimum sowing times for key canola growing environments . For locations not included in the table, take the middle point of 2 nearby locations. Adjustments can be made based on local knowledge, for example sowing early in the sowing window is feasible in paddocks with a low frost risk, while sowing later in the window is recommended in high disease-risk environments.

Consider the chances of sowing early when selecting a variety. In western and northern regions there is generally less opportunity to sow canola in the first 2 weeks of April, so fast and mid season varieties are more suitable. For eastern regions, especially in the eastern Riverina, South West Slopes and central western slopes, early sowing opportunities are more likely. Sowing slower developing varieties early should be considered to increase water use efficiency and profitability.

Phenology ratings (especially in response to early sowing) for most varieties are now available so growers and agronomists can match the sowing date recommendations in Table 46 with recent variety phenology ratings in Table 47 on page 91. Another useful resource is the CSIRO Prototype Flowering Calculator.

GO TO PAGES

Canola first (https://grdc.com.au/news-and-media/audio/podcast/2019/canola-first)

Twenty tips for profitable canola – northern NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/20-tips-for-profitable-canola-northern-nsw)

Twenty tips for profitable canola - central & southern NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/20-tips-for-profitable-canola-central-and-southern-nsw)

Prototype Flowering Calculator (https://cropflowering.com.au)

Table 46. Suggested sowing times for canola variety types with slow, mid and fast phenology (speed to flowering).

Region/locations	Phenology	March				April				May			
		1	2	3	4	1	2	3	4	1	2	3	4
North-east/Liverpool Plains Gunnedah, Bellata, North Star	Slow					>	★	★	<				
	Mid						>	★	★	★	<		
	Fast								>	★	★	<	
North-west Coonamble, Burren Junction, Garah	Slow						>	★	★	<			
	Mid							>	★	★	<		
	Fast								>	★	★	<	
Central-east Wellington, Parkes, Canowindra	Slow			>	★	★	★	<					
	Mid					>	★	★	★	<			
	Fast							>	★	★	<		
Central-west (north) Gilgandra, Trangie, Nyngan	Slow			>	★	★	★	<					
	Mid				>	★	★	★	<				
	Fast						>	★	★	<			
Central-west (south) Condobolin, West Wyalong, Rankins Springs	Slow				>	★	★	<					
	Mid					>	★	★	<				
	Fast						>	★	★	<			
South West Slopes Young, Cootamundra, Culcairn	Slow			>	★	★	★	★	<	<			
	Mid					>	★	★	★	<	<		
	Fast							>	★	★	★	<	
Riverina Coolamon, Lockhart, Corowa	Slow			>	★	★	★	<					
	Mid					>	★	★	★	<			
	Fast						>	>	★	★	<		

> Earlier than optimal; potential yield reduction.
★ Optimal sowing time.
< Later than optimal; potential yield reduction.

Figure 9. NSW canola growing zones.

Pests

Many pests can affect canola crops during the emergence, early seedling and flowering/podding growth stages. Pests are best managed using an integrated pest management (IPM) approach. All canola pests have a range of natural predators that can help keep the pest populations below economic damage levels. Before sowing, check the paddock history for previous pests, stubble load and 'green bridge' weeds from the summer fallow. To help identify potential problem pests refer to the publication *Insect pests of establishing canola in NSW* on the GRDC website.

Regularly monitoring crops after sowing will ensure problems are identified and, if necessary, treated early. Decisions to use chemical controls should consider the effects on the beneficial populations, especially early in the season when using broad-spectrum insecticides could destroy many of the natural predators that might keep later season pests in check. More recent information on insecticides and miticides effects on beneficial organisms is available at The impact of insecticides and miticides on beneficial arthropods in Australian grains.

Be aware of nearby beehives when insecticides are being applied to ensure that hives are not damaged. Many beneficial insects including European and native bees are attracted to canola flowers, so care needs to be taken when spraying to preserve these. Early morning or evening spraying will help when these insects are less active. Ensure you adhere to the harvest withholding period (WHP) of the insecticide.

Earth mite

These are the major pests of seedling canola, especially in central and southern NSW. Damage can be caused by redlegged earth mites (RLEM) and blue oat mites (BOM), which often occur in mixed populations. Bryobia and balaustium mites are an increasing problem in some areas. An effective mite control program starts with a population reduction treatment the previous spring. Learn to identify these 4 species of mites to ensure that the correct insecticide and rate is applied to the relevant species; Cesar Australia and search for 'mites' for further information on identification. The trend towards earlier sowing for some canola varieties can avoid the cool, wet conditions that trigger mite hatching and gives seedling canola a competitive growth advantage.

Treatments

- **bare earth**: protect germinating and establishing crops by:
  - boom spraying the soil surface of previous pasture or high-risk paddocks with a residual insecticide immediately after sowing
  - perimeter spraying bare ground in low-risk paddocks, not forgetting to spray around trees, rocky outcrops and dams, and along water flow lines.

There are 2 registered bare earth sprays that will give several weeks of residual protection:

1. Bifenthrin is registered for RLEM, BOM and bryobia mites. The application rate varies according to the targeted mite species.
2. Alpha-cypermethrin is registered for RLEM.

Apply a bare earth border spray where untreated pastures border the canola crop. Rotate chemical groups across successive spray windows. Consider RLEM resistance to synthetic pyrethroids and organophosphates.

- **seed treatments**
  - Imidacloprid (see Table 94. Canola and pulse seed dressings – 2025 on page 179) and Poncho® Plus (clothianidin + imidacloprid) are registered for use on canola seed to protect against RLEM, BOM and aphids. Poncho® Plus is also registered to control lucerne flea, wireworm and cutworm. Cruiser® Opti (thiamethoxam + lambdacyhalothrin) is registered for suppressing RLEM and lucerne flea. These seed dressings will protect emerging seedlings for 3–5 weeks after sowing. Use treated seed following a pasture phase if a well-timed spring spray of insecticide has been applied.
  - Cosmos® (fipronil) is also registered for controlling RLEM in canola.
  - Seed companies supply seed pre-treated with imidacloprid, Poncho® Plus and Cruiser® Opti. Where a seed dressing or bare earth treatment has been used it is advisable to regularly check seedling canola for earth mite damage.

Lucerne flea

An occasional pest found in establishing canola crops. The pest is identified by its jumping and hopping action between plants rather than flying. It is mainly a problem in heavier clay and loam soils in southern NSW. Early sown crops are more at risk. Frequent crop inspection from the time of emergence and early control measures are important because of the effects on seedling vigour and crop performance. Ensure sufficient monitoring to detect localised patches or hot spots. Lucerne flea will move in from the paddock edge. A border spray is often all that is needed for control. Seek advice on management and spray strategies.

GO TO PAGES

Insect pests of establishing canola in NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/insect-pests-of-establishing-canola-in-nsw)

The impact of insecticides and miticides on beneficial arthropods in Australian grains (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2022/02/the-impact-of-insecticides-and-miticides-on-beneficial-arthropods-in-australian-grains)

Cesar Australia (https://cesaraustralia.com/)

Slugs

Slugs are a potential problem along the northern, central and southern slopes, and occasionally adjacent to rivers on the western plains. Slugs kill plants at the seedling and rosette stages and can leave large, bare soil areas. Using long-lasting bait that is resistant to rainfall, attractive and palatable, and capable of being spread uniformly is effective. Baiting is part of an integrated approach; rolling and/or prickle harrowing after sowing and before the first bait application improves control.

Long-term monitoring of slugs in spring is vital to provide information on population dynamics. Wet springs and summers favour slug reproduction. The abundant growth and damp conditions provide an ideal habitat, which allows slugs to breed and survive into autumn and winter when they attack newly sown crops. Canola sown into dense stubble or next to grassy fence lines, creek banks or damp areas is at the greatest risk as these areas provide an ideal habitat for slugs to survive over summer. Heavy, cracking soils provide additional hiding places for slugs. Closely monitor crops at risk for 6–8 weeks after sowing so that any infestation can be treated with slug pellets containing metaldehyde.

Diamondback moth

Diamondback moth (DBM) has been observed in canola crops for many years in NSW. Moisture-stressed crops will attract DBM, so early monitoring along tree lines can give an indication that populations are about to increase. DBM caterpillars do most damage when large numbers are present in seedling crops, or when they move from leaves to graze on developing pods during crop ripening. Winter canola crops that are sown in late summer to early autumn, and those maturing in early summer, are more likely to require DBM control. The pest has developed resistance to a range of insecticides, so future management will involve regular monitoring and carefully selecting control methods.

Aphids

Aphid flights can occur in autumn and winter and can infest young canola crops, especially following a wet summer that provides a green bridge of alternative host plants on which aphids can survive and breed. Seed treated with imidacloprid, thiamethoxam, Poncho® Plus and Cruiser® Opti will protect seedling canola for up to 5 weeks. This is especially important in seasons and at sites with early aphid infestations.

Aphids can also infest crops in the spring, especially in years of moisture stress. High aphid populations are more evident and potentially damaging in dry seasons. Aphids have a wide range of natural predators that will keep moderate populations in check in most seasons. Lady beetles, hover flies, lacewings and parasitic wasps are the main natural predators providing a level of aphid control. Using the 'softer' insecticide pirimicarb (e.g. Pirimor®) will help maintain populations of natural predators, but might affect aphid parasitoids.

Green peach aphid – Transform™ (sulfoxaflor), MainMan® (flonicamid) and Versys® (afidopyropen) are selective insecticides that control early-season infestations of the green peach aphid. The green peach aphid is the major vector of *Turnip yellows virus* (TuYV) – formerly known as *Beet western yellows virus* – which caused some crop damage in southern and central NSW in 2014. Green peach aphid has developed resistance to the synthetic pyrethroid, carbamate, organophosphate and neonicotinoid groups of insecticides. Aphids are also showing signs of developing resistance to newer insecticides such as sulfoxaflor. IPM is the key to managing green peach aphid and minimising resistance development.

Helicoverpa spp. caterpillars

These are an occasional pest of canola in southern NSW and might require control measures if present in high numbers. They are more frequent in central and northern NSW. It is a pest that requires careful monitoring and management to minimise its impact on yield and profitability. Seasonal variation in incidence and infestation timing relative to the crop growth stage mean that growers should seek advice and check the harvest WHP of the chosen insecticide before deciding to spray.

Other caterpillars

Cabbage centre grub (*Hellula* spp.)

This is a sporadic pest in early sown canola. It is a warm season pest of forage brassica in spring, summer and autumn and can transfer to early sown canola. In most cases they will not persist in cool, wet conditions and most early sown canola is intended for grazing, which is often an effective control measure. If insecticides are used, be aware of the grazing WHP).

Brown pasture looper (*Ciampa arietaria*)

This is another occasional caterpillar pest that occurs later in winter and into spring, coming off weedy pasture paddocks. Economic damage is not likely in vigorously growing canola, but any late sown or poorly growing canola could be targeted. Spot spraying or border sprays might be needed.

Soil pests

As with slugs, there are increasing reports of European earwigs causing significant damage to emerging crops, particularly in the South West Slopes region. Retained stubble, combined with wet springs and summers and an early autumn break appear to favour their build-up. The damage earwigs cause can be difficult to identify and, as control can also be difficult, growers should seek advice if they either suspect or see earwigs.

Other soil-dwelling insect pests such as Portuguese millipede, cutworm, wireworm, bronzed field beetle, cockchafer and false wireworm have damaged emerging canola seedlings in recent years. Their occurrence is difficult to predict and is therefore best managed by thorough paddock sampling. In severe cases, plant stands can be thinned to such an extent that the paddock requires re-sowing. The most severe damage tends to occur in crops following pasture, or where stubble has been retained.

Diseases

Blackleg

Blackleg is the most important disease of canola, capable of causing yield losses up to 100%. To reduce its severity, include growing varieties with an adequate level of resistance, separating this year's crop from last year's canola stubble with a buffer zone of at least 500 m (up to 1 km), and using a fungicide seed dressing or fungicide-amended fertiliser. Use the BlacklegCM app before sowing to identify high risk paddocks and explore management strategies to reduce potential yield loss.

Typically, around 90% of air-borne spores that infect new-season crops originate from the previous year's stubble. However, significant numbers of spores from two-year-old stubble can be produced if seasonal conditions have been dry or the stubble is still largely intact. Spores can travel 1–2 km on the wind, but most of them originate more locally. Using fungicide seed dressings containing pydiflumetofen, fluopyram or fluquinconazole, or fertiliser treated with flutriafol, will also help to protect seedlings from early infection, which later can cause crown/stem canker. Various foliar fungicides are registered for managing blackleg at the seedling to early vegetative stage, see Table 95 on page 182. Rotating fungicide actives will reduce the risk of developing resistance in the pathogen population. The Australian Fungicide Resistance Network has online resources available for rotating fungicides in canola.

Upper canopy infection (UCI) has become more common in NSW in recent years. It is driven by early sowing and early flowering. Canola crops that flower later tend to develop fewer UCI symptoms. Early infection has the greatest potential for significant yield losses (up to 30%). Lesions develop after blackleg fungus spores are released, infecting stems, branches, flowers and pods. One or more branches can die prematurely without a crown canker developing at the stem base. Yield loss is due to reduced flower set, reduced seeds per pod, reduced seed size and pod shatter before harvest. Various foliar fungicides are registered for managing UCI (see Canopy infection by Blackleg – a new evolution and Table 95 on page 182).

Crops should be scouted regularly and monitored for UCI during the growing season. Leaf lesions developing up the crop canopy during stem elongation and early flowering are a warning sign and have the potential to develop into a UCI. Yield loss from UCI can be significant when conditions for infection are favourable. Under these conditions, foliar fungicide applications have been shown to give significant improvements in yield and economic returns. The UCI BlacklegCM app is a useful resource to support management decisions. Fungicides reduce UCI levels and also manage sclerotinia stem rot (SSR), especially when applied at 30% bloom (15–20 open flowers on the main stem). Choosing varieties with effective major gene resistance to UCI (Table 47 on page 91) and delayed flowering are effective UCI management strategies.

- **Blackleg resistance groups**: all current canola varieties are assessed for resistance genes and classified into resistance groups. If the same variety has been grown for 2 or more seasons, consider changing to a variety with a different resistance group. Consult the *Blackleg management guide* on the GRDC website to determine the resistance group for your current canola varieties and select future varieties that belong to a different group.
- **Blackleg rating**: all varieties are rated according to the independent Australian National Blackleg Resistance rating system; all canola breeding companies participate. Varieties with a rating of R in high blackleg-risk areas and at least MR in lower blackleg-risk areas will normally give sufficient disease protection.

Table 47. Varietal characteristics and disease reactions on page 91 lists the blackleg resistance rating for each variety. Please note they are the ratings released in February 2025. Blackleg resistance ratings can change from year to year and are updated in autumn and spring.

GO TO PAGES

BlacklegCM app (https://www.agric.wa.gov.au/apps/blacklegcm-blackleg-management-app)

Australian Fungicide Resistance Network (https://afren.com.au/)

Canopy infection by Blackleg – a new evolution (https://grdc.com.au/news-and-media/audio/podcast/canopy-infection-by-blackleg-a-new-evolution)

UCI BlacklegCM app (https://www.agric.wa.gov.au/apps/uci-blacklegcm-blackleg-upper-canopy-infection-management-app)

Blackleg management guide (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2025/blackleg-management-guide)

Sclerotinia stem rot

Sclerotinia stem rot (SSR), a fungal disease, can infect a wide range of broadleaf plants including canola. Prolonged wet conditions in late winter followed by prolonged canopy wetness (at least 48 hours) during flowering favour disease development. Yield losses can be up to 20% in some years, but have been as high as 35%.

Districts with reliable spring rainfall and long flowering periods for canola appear to develop the disease more frequently. Intensive wheat–canola rotations are very effective at building up levels of soil-borne sclerotia and quickly increasing disease pressure. Canola grown in a double-break rotation (canola following a pulse crop, especially lupin and chickpea) is more prone to developing SSR. The appearance of SSR within canola crops across NSW is increasing with changes in crop rotations and seasonal conditions.

Burning canola stubble will not effectively control SSR as sclerotia survive mainly on or in the soil. The most effective means of reducing disease levels are:

- increasing the length of time between broadleaf crops in the same paddock (especially canola and lupin)
- grading the seed of OP varieties retained for sowing to remove sclerotia
- avoiding early crop flowering
- applying foliar fungicides, which are best applied at 20–30% bloom (15–20 open flowers on the main stem), targeting protection of the main stem, lower leaves and early flowers.

Dry conditions across southern NSW in 2024 did not favour SSR development. In contrast, above average winter rainfall across central and northern NSW did allow the disease to develop in districts where SSR has not previously been damaging. This will have implications for broadleaf crops in the next few seasons, as sclerotia populations in paddocks can persist, presenting a disease risk. Lupin and chickpea in particular are highly susceptible to SSR.

The environmental conditions for SSR to develop are very specific and will not occur every year, so even when the fungus is present the disease can fail to develop in dry conditions. Consult your farm adviser and refer to the fact sheet *Sclerotinia stem rot in canola* (on the GRDC website). Use the SclerotiniaCM app to assess disease risk.

There are no commercial canola varieties in Australia with resistance to SSR. A number of foliar fungicides are registered for managing SSR, see Table 95 on page 182 for details.

GO TO PAGES

Sclerotinia stem rot in canola (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2014/03/grdc-fs-sclerotinia)

SclerotiniaCM app (https://www.agric.wa.gov.au/apps/sclerotiniacm-sclerotinia-management-app)

Virus diseases

Three virus species have been recorded in canola in Australia:

1. *Turnip yellows virus* (TuYV, formerly known as *Beet western yellows virus*)
2. *Turnip mosaic virus* (TuMV)
3. *Cauliflower mosaic virus* (CaMV).

Of these, TuYV is the more common with the potential to cause yield losses in canola. Recently, virulent strains of TuMV have been found in the Liverpool Plains and in dual-purpose canola in southern NSW. Crop infection levels to date have been low. TuMV can severely affect mustard (*Brassica juncea*). The importance of CaMV in canola and *B. juncea* is not known. Crop surveys have revealed only a very low incidence.

All 3 viruses are spread by aphids from weeds, which act as hosts. TuYV can come from a range of weed, pasture and crop species. Turnip weed, wild radish and other *Brassica* weeds are important TuMV hosts.

Viruses, particularly TuYV, can cause substantial yield losses, particularly if infection occurs during early plant development. Seed treated with either imidacloprid or Poncho® Plus is recommended to partially protect crops from early infestation with aphids.

Windrowing and harvesting

Although all varieties have improved shattering tolerance, windrowing is still favoured in most areas as it greatly reduces seed loss during heavy winds. It also allows harvest to start 7–10 days earlier as there is no waiting for green plants to dry down. Cutting the crop as high as possible reduces the risk of windrows being blown across the paddock in windy and stormy conditions. When windrowing, ensure the crop is cut at the recommended stage of maturity, i.e. when 60–80% of the ripening seeds averaged across the whole plant (main stem and branches) have started to change colour and most seeds are firm when rolled between the forefinger and thumb.

This stage is later than previous recommendations where only the main stem was used to assess seed colour change.

A decision-support tool released in 2020 helps growers determine the correct windrow timing that maximises yield and profit; see the GRDC website for Windrow on time, reap the rewards.

Recent research has shown that the main stem is only contributing 25–35% of the yield, with the branches contributing 65–75%. Windrowing too early increases the risk of harvesting smaller, immature green seed reducing yield and oil content. As the crop is at the correct stage for windrowing for only 3–4 days, the ripening crop needs careful and regular monitoring to ensure it is done on time. The delivery standard for grain moisture is a maximum 8%.

Direct harvesting is increasingly seen as a viable option. Direct harvesting is a cost-effective option for crops that have a yield potential of around 1 t/ha or lower, have a short plant height, or the plant stand is low and stems cannot hold the windrow above the ground. Using glyphosate for crop desiccation might be required to stop the crop from growing, especially when late rain falls on droughted, frosted crops. In practise, there could be justification to use both windrowing and direct harvesting on portions of the overall farm crop to ensure the crop is harvested at its optimum stage for highest yield and oil content. Direct harvesting could also be required when a paddock is too wet to windrow. See *Stewardship for pre-harvest application of herbicides in winter crops*.

GO TO PAGES

Windrow on time, reap the rewards (https://grdc.com.au/resources-and-publications/all-publications/publications/2020/canola-windrow-on-time,-reap-the-rewards)

Stewardship for pre-harvest application of herbicides in winter crops (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/preharvest-herbicide-use-fact-sheet)

New varieties

New releases – there are 9 for NSW

- **BASF**: InVigor® LR3540P, InVigor® LR5040P
- **Cargill:** VICTORY® V75-05CL
- **Nuseed**: Griffon TTI
- **Nutrien Ag Solutions**: DG Buller G
- **Pioneer Seeds**: PN526C, PY429T, PY327C, PY428R

Withdrawn

ATR-Stingray, ATR-Bonito, Bandit TT, Hyola® Continuum CL, InVigor® R 4022P, Monola® H524TT, Pioneer 44Y30 (RR), Pioneer 45Y93.

Varietal characteristics

The amount of information on the following varieties varies as some of them are new and have minimal independent data. Some statements about the newer varieties are based on seed company information. Blackleg resistance ratings and resistance groups published for each variety are for autumn 2025 and based on blackleg nursery data. Updated resistance ratings and resistance groups are available in the *Blackleg management guide*.

Yield

Table 48 to Table 54 presents comparative performance data for early and mid-maturing NVT trial groups for 2020–2024.

Oil content

Oil data is also presented from Table 48 to Table 54. Comparative performance in NVT Trials – early maturing and mid maturing – is the average oil content across sites for each chemistry group and region in 2025. Some varieties have oil data from only one site; view with caution as seasonal factors might have affected the oil content at that site. Check the NVT website for individual site quality data.

GO TO PAGES

NVT Individual site quality data (https://nvt.grdc.com.au/)

Blackleg management guide (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2025/blackleg-management-guide)

UCI BlacklegCM app (https://www.agric.wa.gov.au/apps/uci-blacklegcm-blackleg-upper-canopy-infection-management-app)

Varieties

Canola varieties are either hybrid or open-pollinated (OP). Within these breeding groups there are 11 herbicide tolerance groups:

1. Conventional
2. Triazine tolerant
3. Imidazolinone tolerant
4. Roundup Ready® technology
5. TruFlex® with Roundup Ready® technology
6. TruFlex® with Roundup Ready® technology + imidazolinone tolerant
7. TruFlex® plus LibertyLink® technology
8. Optimum GLY® technology
9. Optimum GLY® technology plus imidazolinone tolerant
10. Imidazolinone tolerant plus triazine tolerant
11. LibertyLink® technology plus triazine tolerant.

PIONEER®
BRAND · SEEDS

Pioneer has the right canola hybrid for your farm.

Here's 4

Y SERIES® CANOLA

Optimum GLY® HERBICIDE TOLERANCE

Optimum GLY® is a breakthrough, advanced glyphosate-tolerant canola trait technology designed to deliver excellent yield potential, improved crop safety, enhanced weed control and a wider window of application.

Optimum GLY® HERBICIDE TOLERANCE & Clearfield® Production System for Canola

Pioneer® brand canola hybrids with Optimum GLY® & Clearfield® traits combine the benefits of both systems to deliver the greatest versatility for sustainable weed management.

TRIAZINE TOLERANT & Clearfield® Production System for Canola

Pioneer's Triazine + Clearfield® combination canola hybrid adds greater flexibility to your weed management strategies. Exceptional early growth also drives excellent crop competition to help further reduce weed seed set.

Clearfield® Production System for Canola

Pioneer® brand canola with the Clearfield® trait delivers a holistic trait and herbicide solution to growers. Growers can depend on excellent standability, yield potential and enhanced weed control.

PP23004702

Pioneer® brand canola hybrids offer you a choice of standalone or combined herbicide tolerant systems such as Clearfield®, Triazine, Roundup Ready® and Optimum GLY® hybrid canola.

All of our canola hybrids contain Pioneer's trusted Y Series® genetics that provide growers with excellent standability, yield potential and weed control.

Contact Pioneer Seeds to choose the right seed for your program.

Scan here

Pioneer® brand seeds are produced and distributed in Australia by **GenTech Seeds**, a **Yates** Family Business

Canola Pioneer Seeds Australia

The following are 9 new releases for 2025. Information on characteristics and disease reactions of most current commercial varieties can be found in Table 47.

Triazine tolerant

PY429T. (Coded AA0902T) Early to mid maturing hybrid. Mid phenology. Medium plant height. Blackleg rating R. Blackleg upper canopy infection rating R. Blackleg resistance group ABH. Tested in NVT 2023 and 2024. Marketed by Pioneer Seeds.

Imidazolinone tolerant

PN526C. (Coded HH2990I). Nexera® Omega-9 Specialty (high oleic, low linoleic oil) hybrid. Mid maturing. Mid phenology. Suited to higher rainfall areas. Medium plant height. Blackleg rating R–MR. Blackleg upper canopy infection rating MR. Blackleg resistance group ABD. Tested in NVT trials 2023 and 2024. Marketed by Pioneer Seeds.

PY327C. (Coded AA0424I). Early maturing hybrid. Fast phenology. Suited to low–medium rainfall zones. Medium–tall plant height. Blackleg rating R and blackleg upper canopy infection rating is MR. Blackleg resistance group not available. Tested in NVT trials 2023 and 2024. Marketed by Pioneer Seeds.

VICTORY® V75-05CL hybrid. (Coded 19MH6024). Specialty (high oleic, low linoleic oil) hybrid. Mid–late maturing hybrid, suitable for earlier planting consideration in medium and higher rainfall zones. Medium plant height. Blackleg rating and blackleg upper canopy infection ratings not available. Blackleg resistance group not available. Tested in NVT trials 2023. Marketed by Cargill under contract.

Imidazolinone tolerance plus triazine tolerance

Griffon TTI. (Coded NCH22KT931). Early to mid maturing hybrid. Suited to medium rainfall areas. Medium plant height. Blackleg rating R–MR. Blackleg upper canopy infection rating MR. Blackleg resistance group AC. Tested in NVT trials 2022–2024. Bred and marketed by Nuseed Pty Ltd.

Optimum GLY® Technology

DG Buller G. (Coded DG8253G). Mid maturing hybrid. Blackleg rating R–MR and blackleg upper canopy infection rating R. Blackleg resistance group H. Tested in NVT trials in 2024 only. Bred and marketed by Nutrien Ag Solutions.

Roundup Ready® Technology

PY428R. (Coded D257-18). Early to mid maturing hybrid. Medium plant height. Blackleg rating R and blackleg upper canopy infection rating MR. Blackleg resistance group B. Tested in NVT trials 2023 and 2024. Marketed by Pioneer Seeds.

TruFlex® with LibertyLink® Technology

InVigor® LR 3540P. (Coded AN22LR007). Early maturing, compact hybrid. Suited to low–medium rainfall zones. Contains PodGuard® technology. Blackleg rating MR. Blackleg upper canopy infection rating MR. Blackleg group AB. Tested in NVT trials 2022–2024. Bred and marketed by BASF.

InVigor® LR 5040P. (Coded AN22LR010). Mid maturing hybrid. Medium height. Suited to medium–high rainfall zones. Contains PodGuard® technology. Blackleg rating R–MR. Blackleg upper canopy infection rating MR. Blackleg group AB. Tested in NVT trials 2022–2024. Bred and marketed by BASF.

Table 47. Variety characteristics and disease ratings. (Page 1 of 2.)

Herbicide group	Variety	Type	Phenology ❶ sown before15 April	Maturity	Plant height	Blackleg rating (bare) ❹	Blackleg rating (UCI) ❹	Blackleg group autumn 2025 ❹	NVT testing years (NSW)	Company	EPR ($/t)
Conventional	Nuseed Diamond	Hybrid	Fast ❸	Early	Medium	R–MR	MR	ABF	2012–2020	Nuseed	–
	Nuseed Quartz	Hybrid	Mid ❸	Mid to mid–early	Medium	R–MR	MR	ABD	2016–2020	Nuseed	–
	Outlaw	OP	Fast ❷	Early	Medium–tall	R–MR	MR	A	None	AGT	10.00
Triazine tolerant	ATR-Bluefin	OP	Fast ❸	Early	Medium	R–MR	MR	AB	2020–2024	Nuseed	5.00
	ATR-Swordfish	OP	Fast ❷	Early–mid	Medium	MR–MS	MR–MS	AB	2020–2024	Nuseed	5.00
	DG Avon TT	OP	Fast ❸	Early	Short	MR	MR	AC	2021–2024	Nutrien Ag Solutions	5.00
	DG Bidgee TT	OP	Mid–fast ❷	Early–mid	Medium	R	R	H	2019; 2021–2024	Nutrien Ag Solutions	5.00
	DG Torrens TT	OP	Mid ❷	Early–mid	Short–medium	R–MR	R	H	2020–2024	Nutrien Ag Solutions	5.00
	Hyola Blazer TT	Hybrid	Mid–fast ❸	Early–mid	Medium	R–MR	MR	ADF	2019–2024	Pacific Seeds	–
	HyTTec Trident	Hybrid	Mid–fast ❸	Early	Medium–tall	R	MR	AD	2017–2024	Nuseed	–
	HyTTec Trophy	Hybrid	Mid–fast ❸	Early to early–mid	Medium–tall	R	MR	AD	2017–2024	Nuseed	–
	HyTTec Trifecta	Hybrid	Mid ❷	Mid	Medium–tall	R	MR	ABD	2018–2024	Nuseed	–
	HyTTec Velocity	Hybrid	Fast ❷	Early	Medium	MR	MR	AB	2020–2024	Nuseed	–
	InVigor T 4511	Hybrid	Fast ❷	Early–mid	Medium	R–MR	MR	Unknown	2021–2024	BASF	–
	Monola H421TT	Hybrid; specialty	Fast ❸	Early	Medium	R–MR	MR	BC	2019–2023	Nuseed	–
	Monola 422TT	OP; specialty	Mid–fast ❸	Early–mid	Medium	MR–MS	MR–MS	BC	2020–2024	Nuseed	–
	Pioneer PY429T	Hybrid	Mid ❸	Early–mid	Medium	R	R	ABH	2023–2024	Pioneer	–
	Renegade TT	OP	Mid ❷	Early–mid	Short–medium	MR	MR	A	2021–2024	AGT	10.00
	RGT Baseline™ TT	Hybrid	Mid ❷	Early–mid	Medium	MR–MS	MR–MS	B	2021–2024	Seed Force RAGT	10.00
	RGT Capacity™ TT	Hybrid	Mid–fast ❷	Early–mid	Medium	MR–MS	MR–MS	B	2019–2024	Seed Force RAGT	10.00
	SF Dynatron™ TT	Hybrid	–	Mid	Medium–tall	MR–MS	MR–MS	BC	2019–2024	Seed Force RAGT	10.00
	SF Spark™ TT	Hybrid	Fast ❸	Early	Medium	MR	MR	ABDS	2018–2024	Seed Force RAGT	10.00
Imidazolinone tolerant	Captain CL	Hybrid	Slow (winter type) ❸	Late	Tall	R	R	AH	None	AGF seeds	5.00
	Hyola 970CL	Hybrid	Slow (winter type) ❸	Very late	Tall	R	R	H	None	Pacific Seeds	–
	Hyola Feast CL	Hybrid	Slow (winter type) ❸	Late	Tall	R	R	H	None	Pacific Seeds	–
	Hyola Solstice CL	Hybrid	Mid–fast ❸	Early–mid	Medium–tall	R	R	ADFH	2021–2024	Pacific Seeds	–
	Nuseed Ceres IMI	Hybrid	Fast ❷	Early	Medium–tall	R–MR	MR	AD	2021–2024	Nuseed	–
	Phoenix CL	Hybrid	Winter type ❸	Late	Tall	R	MR	B	None	AGF Seeds	–
	Pioneer 43Y92 (CL)	Hybrid	Mid	Early	Medium	R–MR	MR	B	2016–2024	Pioneer	–
	Pioneer PN526C	Hybrid; speciality	Early–mid ❸	Mid	Medium	R–MR	MR	ABD	2023–2024	Pioneer	–
	Pioneer PY327C	Hybrid	Fast	Early	Medium–tall	R	MR	AB	2023–2024	Pioneer	–
	Pioneer PY421C	Hybrid	Mid–fast ❷	Early–mid	Medium	R–MR	MR	A	2022–2024	Pioneer	–
	Pioneer 44Y94 (CL)	Hybrid	Mid ❷	Early–mid	Medium–tall	R–MR	MR	BC	2019–2024	Pioneer	–
	Pioneer 45Y95 (CL)	Hybrid	Mid–slow ❷	Mid	Medium	R–MR	MR	C	2018–2019; 2021–2024	Pioneer	–
	RGT CLAVIER™ CL	Hybrid	Slow (winter type) ❸	Late	Medium–tall	R	R	ACH	None	Seed Force RAGT	12.00
	RGT Nizza™ CL	Hybrid	Slow (winter type) ❸	Late	Medium–tall	R	MR	B	None	Seed Force RAGT	12.00
	Victory V75-03CL	Hybrid; speciality	Mid–slow ❷	Mid	Medium	R–MR	MR	AB	2017–2021; 2024	Cargill	–
	Victory V75-05CL	Hybrid; speciality	Mid–late ❸	Mid–late	Medium	–	–	–	2023	Cargill	–

Table 47. Variety characteristics and disease ratings. (Page 2 of 2.)

Herbicide group	Variety	Type	Phenology ❶ sown before15 April	Maturity	Plant height	Blackleg rating (bare) ❹	Blackleg rating (UCI) ❹	Blackleg group autumn 2025 ❹	NVT testing years (NSW)	Company	EPR ($/t)
Optimum GLY® technology	DG Buller G	Hybrid	Mid ❸	Mid	–	R–MR	R	H	2024	Nutrien Ag Solutions	–
	Pioneer PY323G	Hybrid	Mid–fast ❸	Early	Medium	MR	MR	BC	2023–2024	Pioneer	–
	Pioneer PY422G	Hybrid	Mid–fast ❸	Early–mid	Medium–tall	R–MR	MR	AB	2023	Pioneer	–
	Pioneer PY525G	Hybrid	Mid ❸	Mid	Medium–tall	MR	MR	AB	2023	Pioneer	–
Optimum GLY® technology + imidazolinone tolerant	Pioneer PY424GC	Hybrid	Mid–fast ❸	Early–mid	Medium	MR	MR	BC	2023–2024	Pioneer	–
Roundup Ready® technology	Pioneer 44Y27 (RR)	Hybrid	Mid–fast ❸	Early to early–mid	Medium	R–MR	MR	B	2016–2024	Pioneer	–
	Pioneer PY428R	Hybrid	Mid ❷	Early–mid	Medium	R	MR	B	2023–2024	Pioneer	–
	DG Hotham TF	Hybrid	Mid–fast❷	Mid	Medium–tall	R	R	ABH	2021–2024	Nutrien Ag Solutions	–
	DG Lofty TF	Hybrid	Mid–fast ❸	Early–mid	Medium	R	R	ABH	2021–2023	Nutrien Ag Solutions	–
	Nuseed Eagle TF	Hybrid	Mid ❷	Mid	Medium–tall	R	MR	ABD	2021–2024	Nuseed	–
	Nuseed Emu TF	Hybrid	Fast ❷	Early–mid	Medium	MR	MR	AB	2019–2024	Nuseed	–
	Nuseed Hunter TF	Hybrid	Fast ❷	Early–mid	Medium	R–MR	MR	AB	2021–2024	Nuseed	–
	Nuseed Raptor TF	Hybrid	Mid–fast ❸	Early–mid	Medium	R	MR	AD	2017–2024	Nuseed	–
	VICTORY V55-04TF	Hybrid; speciality	Mid ❷	Mid	Medium	R	MR	AB	2021; 2024	Cargill	–
	Hyola Regiment XC	Hybrid	Mid–fast ❸	Early–mid	Medium–tall	R	R	ADFH	2021–2024	Pacific Seeds	–
LibertyLink® technology + triazine tolerant	InVigor LT 4530P	Hybrid	Mid–fast ❷	Early–mid	Medium	R–MR	MR	BF	2020–2023	BASF	–
Imidazolinone + triazine tolerant	Griffon TTI	Hybrid	Fast ❷	Early–mid	Medium	R–MR	MR	AC	2022–2024	Nuseed	–
	Hyola Defender CT	Hybrid	Mid ❸	Mid–early	Medium	R	MR	ADF	2021–2024	Pacific Seeds	–
	PY520TC	Hybrid	Mid ❷	Mid	Medium	R–MR	MR	BC	2021–2024	Pioneer	–
TruFlex® + LibertyLink® technology	InVigor LR 3540P	Hybrid	Fast ❸	Early	Short–medium	MR	MR	AB	2022–2024	BASF	–
	InVigor LR 4540P	Hybrid	Mid–fast ❷	Early-mid	Medium	R–MR	MR	B	2022–2024	BASF	–
	InVigor LR 5040P	Hybrid	Mid❷	Mid	Medium	R–MR	MR	AB	2022–2024	BASF	–

Note The relative maturity of varieties can vary depending on location and sowing time. The maturity rankings are provided by seed companies. They are a guide only and relate to physiological maturity or windrow/harvest maturity.

– No data.

❶ Phenology – speed to flowering when sown before 15 April.

❷ Based on 2023–2024 phenology data at Wagga Wagga ONLY.

❸ Seed company estimate.

❹ Blackleg ratings are the published ratings for February 2025. UCI – Upper Canopy Infection

GO TO PAGES

Blackleg management guide https://grdc.com.au/resources-and-publications/all-publications/factsheets/2025/blackleg-management-guide)

UCI BlacklegCM app (https://www.agric.wa.gov.au/apps/uci-blacklegcm-blackleg-upper-canopy-infection-management-app)

Blackleg rating disclaimer

NSW DPIRD publishes this rating system on the basis of the best information available at the time of publication. However, nursery and grower experience has shown that disease severity can vary between locations and years depending on seasonal conditions and possible changes in the fungus for reasons that are not currently understood. Therefore, growers can sometimes experience significant variation from the averages shown in these ratings.

NUSEED GRIFFON TTI

HYB TT + HYB IMI

Introducing Nuseed's first dual herbicide resistant hybrid canola.
Versatile flexibility with Triazine and IMI tolerance.

- Herbicide tolerance to both Triazine and IMI herbicides for flexible, effective crop protection.
- IMI carryover tolerance ensures safe crop rotation.
- Early to mid-maturity and rapid pod development for higher yields and a shorter growing season.
- Enhanced standability over HyTTec® Trident, reducing lodging and ensuring a more consistent harvest.

DESCRIPTION

Maturity	Early-Mid	**Standability** 1 poor – 9 good	7
Blackleg rating*	RMR	**Pod Shatter tolerance**	S^^
Blackleg group*	AC	**Alternative to**	HyTTec® Trophy, Pioneer PY520TC, Hyola® Defender CT
Height	Medium-Tall		
Oil	Medium		
Seedling Vigour 1 poor – 9 very high	7	**Recommended Target Yield**	0.5 to 3 TNS

* 2025 Autumn Blackleg Rating bare.

^^ Rated Susceptible, Moderately Susceptible, Moderately Tolerant or Tolerant using Nuseed's shaking methodology.

VARIETY COMPARISON

Variety	Nuseed Griffon TTI	HyTTec® Trophy	Hyola® Defender CT	Pioneer® PY520TC
Type	Hybrid	Hybrid	Hybrid	Hybrid
Blackleg Rating*	RMR	R	R	RMR
Oil Average (%)#	42.2	42.1	42.0	41.9
Yield Average (MT/HA)	2.09	2.13	1.94	2.05
Yield % of Trial Mean	109%	111%	101%	107%

Long-term predicted yield from all SA, VIC, NSW and WA Low to Mid rainfall Triazine Tolerant NVTs in 2024.
Oil % results at 6% moisture from 16 MET sites 2024 except Pioneer PY520TC six sites only.

NUSEED HUNTER TF

HYB TF

Get an early head start with a quick growing TruFlex® hybrid.

- Suitable for medium – quick growing regions.
- Protects against grain loss with good pod shatter tolerance.
- With excellent early vigour and good biomass to give you a head start in growing.
- Better returns with an improved yield and oil content.
- Superior disease package.

DESCRIPTION

Maturity	Early – Mid	**Standability** 1 poor – 9 good	7
Blackleg rating*	RMR	**Pod Shatter tolerance^^**	MT
Blackleg group	AB	**Alternative to**	Pioneer® 44Y27RR, InVigor® R 4520P, Hyola® 410XX
Height	Medium		
Oil	Medium		
Seedling Vigour 1 poor – 9 very high	8	**Recommended Target Yield**	0.5 to 3.0 TNS

* 2025 Autumn Blackleg Rating bare.

^^ Rated Susceptible, Moderately Susceptible, Moderately Tolerant or Tolerant using Nuseed's shaking methodology.

VARIETY COMPARISON

Variety	Nuseed Hunter TF	Pioneer® 44Y27	InVigor® R 4520P
Type	Hybrid	Hybrid	Hybrid
Blackleg Rating	RMR	RMR	MRMS
Oil Average (%)#	43.7	42.9	42.0
Yield Average (MT/HA)	2.53	2.39	2.32
Yield % of Trial Mean	110%	104%	101%

Long-term predicted yield from all SA, VIC, NSW Low to Mid rainfall Glyphosate Tolerant NVTs in 2024.
Oil % results at 6% moisture from 13 MET sites 2024.

FOR MORE INFORMATION, CONTACT:

Sally Broadhead
Regional Sales Manager - East
M 0436 849 292

Genevieve Clarke
Regional Market Development Manager - East
M 0438 201 711

Ash Bryant
Area Sales Manager - Northern VIC & Southern NSW
M 0459 684 334

Brett Mawbey
Area Sales Manager Central & Southern NSW
M 0428 638 918

General Enquiries and Customer Service:
1800 687 333
Nuseed Pty Ltd.
5 Ballinger Street
PO Box 377 Horsham
VIC 3402

Comparative performance in NVT trials – early maturing

The more trials, the greater the reliability.

Table 48. Comparative performance of early maturing canola – north east NSW.

North east									
Early maturing TT – mean yield expressed as % of HyTTec Trident									
Variety	Yearly group mean 2020	2021	2022	2023	2024	Regional mean	Number of trials	Oil % 2024 ❶	Trials
HyTTec Trident	**1.23**	**–**	**1.63**	**1.08**	**2.14**	**1.52**			
DG Avon TT	–	–	–	65	89	78	2	44.6	1
DG BIDGEE TT	–	–	–	–	105	107	1	42.6	1
DG Torrens TT	–	–	–	–	99	96	1	43.7	1
Hyola Blazer TT	111	–	108	121	120	115	4	42.6	1
Hyola Defender CT	–	–	105	113	119	111	3	42.8	1
HyTTec Trident	**100**	**–**	**–**	**100**	**100**	**100**	**4**	**43.7**	**1**
HyTTec Trophy	101	–	102	115	111	107	4	43.0	1
HyTTec Velocity	–	–	–	–	83	97	1	43.3	1
InVigor T4510	92	–	96	96	–	98	3	–	–
InVigor T 4511	–	–	96	108	106	100	3	43.7	1
Nuseed Griffon TTI	–	–	–	–	103	99	1	42.7	1
PY520TC	–	–	–	99	112	101	2	41.7	1
Renegade TT	–	–	103	89	104	100	3	42.8	1
RGT Capacity TT	–	–	104	113	95	100	3	42.7	1
SF Dynatron TT	–	–	103	104	110	106	3	44.1	1
SF Spark TT	79	–	93	101	99	94	4	44.3	1
Early maturing IMI-tolerant trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 (CL)	**1.43**	**–**	**1.73**	**1.32**	**2.65**	**1.78**	**–**		
Hyola Solstice	–	–	–	111	51	84	2	43.3	1
Nuseed Ceres IMI	–	–	–	–	73	80	1	45.0	1
Pioneer 43Y92 (CL)	80	–	92	95	90	89	4	42.8	1
Pioneer 44Y94 (CL)	**–**	**–**	**100**	**100**	**100**	**100**	**3**	**43.3**	**1**
Pioneer 45Y95 (CL)	–	–	91	94	99	94	3	41.3	1
Pioneer PY327C	–	–	–	95	86	92	2	43.5	1
PY421C	–	–	111	112	110	108	3	41.9	1
PY520TC	–	–	–	77	–	85	1	–	1

– insufficient or no data.
❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Table 49. Comparative performance of early maturing canola – north west NSW.

North west									
Early maturing TT – mean yield expressed as % of HyTTec Trident									
Variety	Yearly group mean 2020	2021	2022	2023	2024	Regional mean	Number of trials	Oil % 2024 ❶	Trials
HyTTec Trident	**2.19**	**3.12**	**2.76**	**1.71**	**2.33**	**2.42**			
DG Avon TT	–	–	–	75	77	80	2	45.8	1
DG BIDGEE TT	–	–	90	84	84	93	23	43.5	1
DG Torrens TT	–	–	–	78	79	87	2	46.2	1
Hyola Blazer TT	117	–	108	103	104	106	4	44.8	1
Hyola Defender CT	–	–	103	94	95	101	3	44.7	1
HyTTec Trident	**100**	**100**	**100**	**100**	**100**	**100**	**5**	**45.1**	**1**
HyTTec Trophy	106	99	100	103	103	102	5	44.5	1
InVigor LT 4530P	113	95	108	81	85	97	5	44.2	1
InVigor T 4510	100	96	96	93	–	96	4	–	–
InVigor T 4511	–	95	89	97	98	95	4	45.4	1
Monola 422TT	86	84	72	75	78	79	5	45.4	1
Monola H421TT	73	85	60	82	–	76	4	–	–
Nuseed Griffon TTI	–	–	–	–	101	95	1	44.9	–
Pioneer PY429T	–	–	–	100	–	110	1	–	–
PY520TC	–	–	–	92	95	98	2	43.9	1
Renegade TT	–	95	98	81	82	94	4	45.0	1
SF Spark TT	91	92	81	93	94	90	5	46.8	1
Early maturing IMI-tolerant trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 (CL)	**2.66**	**3.72**	**3.06**	**1.68**	**2.69**	**2.75**			
Hyola Solstice CL	–	96	–	116	71	75	4	44.3	2
Nuseed Ceres IMI	–	93	–	100	84	83	4	45.2	2
Pioneer 43Y92 (CL)	85	93	80	94	93	90	6	43.3	2
Pioneer 44Y94 (CL)	**–**	**100**	**100**	**100**	**100**	**100**	**5**	**43.9**	**2**
Pioneer 45Y95 (CL)	–	–	96	97	101	98	4	42.0	2
Pioneer PY327C	–	–	–	97	88	91	3	43.5	2
PY421C	–	–	104	108	101	104	4	43.6	2
PY520TC	–	–	–	79	–	86	1	–	–

– insufficient or no data.
❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Table 50. Comparative performance of early maturing canola – south west NSW.

South west									
Early maturing TT – mean yield expressed as % of HyTTec Trident									
Variety	Yearly group mean					Regional mean	Number of trials	Oil % 2024 ❶	Trials
	2020	2021	2022	2023	2024				
HyTTec Trident	**2.94**	**3.47**	**2.76**	**2.14**	**1.69**	**2.52**			
ATR Bluefin	78	78	81	77	64	76	10	42.8	3
ATR Swordfish	–	80	–	75	64	78	7	42.9	3
DG Avon TT	–	–	84	84	74	82	7	42.7	3
DG BIDGEE TT	–	–	96	93	85	93	7	42.6	3
DG Torrens TT	–	–	–	–	78	88	3	44.6	3
Hyola Blazer TT	114	–	107	103	109	107	9	42.6	3
Hyola Defender CT	–	–	104	97	100	101	7	41.6	3
HyTTec Trident	**100**	**100**	**100**	**100**	**100**	**100**	**11**	**43.4**	**3**
HyTTec Trophy	107	99	102	102	108	103	11	43.5	3
HyTTec Velocity	96	–	93	104	102	98	8	44.3	3
InVigor LT 4530P	100	95	104	89	84	95	11	41.9	3
InVigor T 4510	98	96	98	96	–	97	8	–	–
InVigor T 4511	–	94	95	98	103	98	9	44.0	3
Monola 422TT	84	83	84	84	79	83	11	42.1	3
Monola H421TT	77	83	76	88	–	81	8	–	–
Nuseed Griffon TTI	–	–	–	99	106	98	5	43.0	3
Pioneer PY429T	–	–	–	101	–	107	3	–	–
Pioneer PY432T	–	–	–	–	126	103	3	43.5	3
PY520TC	–	–	–	95	97	99	5	42.4	3
Renegade TT	–	94	98	90	80	92	8	41.7	3
RGT Capacity TT	99	94	91	100	102	97	11	43.1	3
SF Dynatron TT	105	–	104	99	99	101	9	44.0	3
SF Spark TT	93	91	90	95	98	93	11	43.9	3
Early maturing IMI-tolerant trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 CL	**3.53**	**3.76**	**3.22**	**2.16**	**1.8**	**2.8**			
Hyola Solstice CL	–	92	–	107	103	89	7	44.1	3
Nuseed Ceres IMI	–	92	82	98	96	89	8	44.4	3
Pioneer 43Y92 (CL)	91	92	89	95	95	92	11	42.9	3
Pioneer 44Y94 CL	**100**	**100**	**100**	**100**	**100**	**100**	**9**	**43.8**	**3**
Pioneer PY327C	–	–	–	98	94	94	5	43.7	3
PY421C	–	–	–	106	106	105	5	42.8	3
PY520 TC	–	–	–	87	–	87	2	–	2
Early maturing glyphosate tolerant trials – mean yield expressed as % Pioneer 44Y27 (RR)									
Pioneer 44Y27 (RR)	**3.06**	**3.46**	**2.7**	**2.23**	**1.92**	**2.76**			
DG Buller G	–	–	–	–	96	98	1	42.4	1
DG Lofty TF	–	87	93	91	–	92	6	–	–
Hyola Regiment XC	–	98	–	106	111	102	5	42.7	1
InVigor LR 3540P	–	–	99	93	87	95	5	42.4	1
InVigor LR 4540P	–	–	108	103	106	106	5	42.3	1
InVigor LR 5040P	–	–	–	98	–	104	2	–	–
InVigor R 4520P	110	103	110	101	100	106	9	40.5	1
Nuseed Emu TF	89	95	86	101	102	93	9	41.7	1
Nuseed Hunter TF	–	104	105	106	111	106	6	42.0	1
Nuseed Raptor TF	107	95	103	96	96	106	6	41.2	1
Pioneer 44Y27 (RR)	**100**	**100**	**100**	**100**	**100**	**100**	**9**	**39.3**	**1**
Pioneer 44Y30 RR	–	98	103	101	–	103	6	–	–
PY323G	–	–	–	104	–	98	2	–	–
PY422G	–	–	–	98	98	96	3	41.6	1
PY424GC	–	–	–	99	99	100	3	42.4	1
Pioneer PY428R	–	–	–	–	113	103	1	41.0	1

– insufficient or no data.

❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Comparative performance in NVT trials – mid maturing

The more trials, the greater the reliability.

Table 51. Comparative performance of mid maturing canola – north east NSW.

North east									
Mid maturing TT trials – mean yield expressed as % of HyTTec Trophy									
Variety	Yearly group mean					Regional mean	Number of trials	Oil % 2024 ❶	Trials
	2020	2021	2022	2023	2024				
HyTTec Trophy	**2.61**	**3.42**	**2.62**	**1.42**	**2.01**	**2.35**			
DG BIDGEE TT	–	86	94	83	94	93	6	41.2	1
DG Torrens TT	101	–	–	–	96	91	2	43.1	1
Hyola Blazer TT	106	102	108	95	102	104	8	40.5	1
Hyola Defender CT	–	–	106	86	101	101	5	41.3	1
HyTTec Trifecta	–	101	106	102	102	104	6	42.8	1
HyTTec Trophy	**100**	**100**	**100**	**100**	**100**	**100**	**8**	**41.6**	**1**
InVigor T 4510	96	95	94	95	–	96	7	–	–
InVigor T 4511	–	95	96	100	100	98	6	41.9	1
Nuseed Griffon TTI	–	–	–	–	101	97	1	42.0	1
Pioneer PY429T	–	–	–	94	–	104	2	–	–
PY520TC	–	100	104	92	100	101	6	41.6	1
Renegade TT	–	88	98	89	106	97	6	41.6	1
RGT Baseline TT	–	94	108	92	104	104	6	43.4	1
RGT Capacity TT	–	93	102	97	105	101	6	41.2	1
SF Dynatron TT	–	100	102	93	101	100	6	42.2	1
SF Spark TT	93	87	85	94	94	90	8	44.0	1
Mid maturing IMI-tolerant – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 (CL)	**3.05**	**3.74**	**3.3**	**1.44**	**2.44**	**2.72**			
Hyola Solstice CL	–	86	84	108	92	91	6	43.5	1
Nuseed Ceres IMI	–	–	–	–	94	87	1	44.1	1
Pioneer 43Y92 (CL)	–	–	86	94	93	90	5	42.5	1
Pioneer 44Y94 (CL)	**100**	**–**	**100**	**100**	**100**	**100**	**7**	**42.8**	**1**
Pioneer 45Y93 (CL)	105	93	101	91	–	100	7	–	–
Pioneer 45Y95 (CL)	–	99	99	99	97	100	6	42.5	2
Pioneer PY327C	–	–	–	101	–	95	2	–	–
PY421C	–	–	106	108	105	105	5	41.1	2
PY520TC	–	–	–	83	–	87	2	–	–
VICTORY V75-03CL	84	77	–	80	83	78	6	41.2	2

– insufficient or no data.

❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Table 52. Comparative performance of mid maturing canola – north west NSW.

North west									
Mid maturing TT trials – mean yield expressed as % of HyTTec Trophy									
Variety	Yearly group mean					Regional mean	Number of trials	Oil % 2024 ❶	Trials
	2020	2021	2022	2023	2024				
HyTTec Trophy	**2.83**	**3.15**	**3.09**	**1.83**	**2.51**	**2.54**			
ATR Bluefin	79	81	85	81	74	79	7	44.7	2
DG Avon TT	–	–	–	85	80	84	4	45.4	2
DG BIDGEE TT	–	92	92	87	94	92	6	44.0	2
DG Torrens TT	–	–	92	87	91	90	5	46.1	2
Hyola Blazer TT	104	99	99	96	106	101	7	44.7	2
Hyola Defender CT	–	–	96	88	105	98	5	44.4	2
HyTTec Trident	92	100	97	103	91	96	7	45.2	2
HyTTec Trifecta	102	103	101	101	103	102	71	45.9	2
HyTTec Trophy	**–**	**100**	**100**	**100**	**100**	**100**	**7**	**44.8**	**2**
HyTTec Velocity	–	–	100	103	93	98	5	46.3	2
InVigor LT 4530P	96	–	97	93	93	94	6	44.1	2
InVigor T 4510	97	95	97	96	–	96	5	–	–
InVigor T 4511	–	98	99	98	96	98	6	45.6	2
Monola 422TT	80	84	86	84	76	81	7	44.7	2
Monola H421TT	73	87	86	92	–	81		–	–
Nuseed Griffon TTI	–	–	–	95	97	97	4	44.5	2
Pioneer PY429T	–	–	–	95	107	101	4	43.9	2
Pioneer PY432T	–	–	–	–	119	109	2	45.0	2
PY520TC	–	–	–	94	103	99	4	44.3	3
Renegade TT	–	88	94	85	97	93	6	44.9	2
RGT Capacity TT	–	95	98	93	100	97	6	45.5	2
SF Dynatron TT	–	96	98	94	102	98	6	45.8	2
SF Spark TT	90	94	95	96	88	92	7	46.8	2
Mid maturing IMI-tolerant trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 CL	**2.92**	**3.07**	**3.28**	**1.57**	**2.79**	**2.57**			
Hyola Solstice CL	–	103	100	110	85	95	6	47.0	2
Nuseed Ceres IMI	–	–	–	–	80	92	2	46.8	2
Pioneer 43Y92 (CL)	90	95	95	97	88	92	7	45.2	2
Pioneer 44Y94 CL	**100**	**100**	**100**	**100**	**100**	**100**	**7**	**44.9**	**2**
Pioneer 45Y95 (CL)	–	–	100	101	99	100	5	44.4	2
Pioneer PN526C	–	–	80	71	–	75	3	–	–
Pioneer PY327C	–	–	–	101	94	97	4	45.0	2
PY421C	–	–	104	105	104	104	5	45.0	2
PY520TC	–	–	89	83	–	86	3	–	–
VICTORY V75-03CL	–	–	–	87	77	83	4	44.0	2
Mid maturing glyphosate tolerant trials – mean yield expressed as % InVigor R 4520P									
InVigor R 4520P	**3.1**	**–**	**–**	**1.67**	**2.97**	**2.58**			
DG Buller G	–	–	–	–	92	93	1	45.6	1
DG Lofty TF	–	–	–	90	–	82	1	–	–
Hyola Regiment XC	–	–	–	108	89	93	2	46.5	1
InVigor LR 4540P	–	–	–	104	98	99	2	45.6	1
InVigor LR 5040P	–	–	–	97	103	102	2	44.7	1
InVigor R 4520P	**100**	**–**	**–**	**100**	**100**	**100**	**3**	**44.7**	**1**
Nuseed Hunter TF	–	–	–	106	95	98	2	45.3	1
Nuseed Raptor TF	89	–	–	101	90	92	3	44.9	1
Pioneer 44Y27 RR	89	–	–	100	89	91	3	44.7	1
PY424GC	–	–	–	94	91	92	2	44.9	1
PY428R	–	–	–	103	–	103	1	–	–
PY525G	–	–	–	92	–	95	1	–	–
VICTORY V55-04TF	–	–	–	–	88	88	1	43.9	1

– insufficient or no data.

❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Table 53. Comparative performance of mid maturing canola – south east NSW.

South east									
Mid maturing TT trials – mean yield expressed as % of HyTTec Trophy									
Variety	Yearly group mean					Regional mean	Number of trials	Oil % 2024 ❶	Trials
	2020	2021	2022	2023	2024				
HyTTec Trophy	**3.36**	**3.6**	**2.7**	**2.65**	**2.1**	**2.92**			
ATR Swordfish	–	–	71	77	68	73	16	41.6	5
DG BIDGEE TT	–	90	93	93	81	91	22	41.5	5
DG Torrens TT	90	–	87	91	83	88	22	42.7	5
Hyola Blazer TT	103	101	105	101	97	101	28	40.9	5
Hyola Defender CT	–	–	101	95	87	96	16	41.1	5
HyTTec Trifecta	105	104	105	105	104	104	28	42.6	5
HyTTec Trophy	**100**	**100**	**100**	**100**	**100**	**100**	**28**	**42.7**	**5**
InVigor LT 4530P	91	88	85	93	95	90	26	40.4	5
InVigor T 4510	94	94	93	94	–	94	23	–	–
InVigor T 4511	–	96	95	98	99	97	22	42.5	5
InVigor T 6010	98	91	94	98	–	95	23	–	–
Monola 422TT	75	75	72	78	68	74	25	41.2	5
Nuseed Griffon TTI	–	–	–	–	95	94	5	41.8	5
PY429T	–	–	–	99	96	100	11	41.6	5
PY520TC	–	99	102	98	93	99	19	41.7	5
PY432T	–	–	–	–	122	109	5	42.5	5
Renegade TT	–	84	84	90	88	87	20	40.8	5
RGT Baseline TT	–	96	100	100	94	98	21	43.4	5
RGT Capacity TT	97	93	94	98	97	96	28	42.7	5
SF Dynatron TT	98	96	99	96	93	97	28	42.9	5
Mid maturing IMI-tolerant trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 (CL)	**3.84**	**3.84**	**3.01**	**2.9**	**2.28**	**3.22**			
Hyola Solstice CL	–	–	89	100	103	97	15	43.8	6
Pioneer 44Y94 (CL)	**100**	**100**	**100**	**100**	**100**	**100**	**27**	**43.0**	**6**
Pioneer 45Y93 (CL)	98	95	98	98	–	96	20	–	–
Pioneer 45Y95 (CL)	–	102	101	102	99	101	21	42.3	6
Pioneer PN526C	–	–	72	75	–	70	10	–	–
PY421C	–	–	103	105	110	105	15	42.5	6
PY520TC	–	–	84	88	–	84	10	–	–
VICTORY V75-03CL	80	81	–	82	73	80	23	41.5	6
Mid maturing glyphosate tolerant trials – mean yield expressed as % InVigor R 4520P									
InVigor R 4520P	**3.69**	**3.71**	**2.42**	**3.05**	**2.97**	**3.22**			
DG Buller G	–	–	–	–	84	92	3	42.5	3
DG Drummond TF	–	92	98	93	–	92	14	–	–
DG Hotham TF	–	–	95	88	78	88	12	41.6	3
Hyola Regiment XC	–	101	98	99	97	98	17	45.0	3
InVigor LR 4540P	–	–	99	98	101	99	12	44.6	3
InVigor LR 5040	–	–	100	100	101	12	100	44	3
InVigor R4022P	90	92	90	91	–	91	19	–	–
InVigor R 4520P	**100**	**100**	**100**	**100**	**100**	**100**	**22**	**43.7**	**3**
Nuseed Eagle TF	–	98	104	96	86	96	16	44.1	3
Nuseed Hunter TF	–	–	101	97	98	99	12	42.9	3
Nuseed Raptor TF	92	97	98	94	88	94	20	43.8	3
Pioneer 44Y30 RR	94	97	100	94	–	95	17	–	–
Pioneer 45Y28 RR	97	99	105	98	–	98	17	–	–
PY323G	–	–	–	90	–	91	5	–	–
PY422G	–	–	–	93	81	91	8	44.3	3
PY424GC	–	–	–	90	87	90	8	43.4	3
PY428R	–	–	–	104	102	104	8	44.6	3
PY525G	–	–	–	99	77	96	8	44.5	3
VICTORY V55-04TF	–	88	–	–	81	88	8	42.2	3

– insufficient or no data.

❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Table 54. Comparative performance of mid maturing canola – south west NSW.

South west									
Mid maturing TT trials – mean yield expressed as % of HyTTec Trophy									
Variety	Yearly group mean					Regional mean	Number of trials	Oil % 2024 ❶	Trials
	2020	2021	2022	2023	2024				
HyTTec Trophy	**3.17**	**2.95**	**3.12**	**2.35**	**2.75**	**2.86**			
ATR Bluefin	80	81	68	80	80	78	11	44.3	3
ATR Swordfish	–	81	81	85	82	82	9	43.8	3
DG Avon	–	–	–	85	82	83	5	44.1	3
DG BIDGEE TT	–	92	106	94	91	96	9	43.2	3
DG Torrens TT	94	90	96	–	91	93	9	44.5	3
Hyola Blazer TT	104	99	114	103	101	104	11	42.6	3
Hyola Defender CT	–	–	116	101	96	102	7	42.7	3
HyTTec Trident	96	100	85	95	92	93	11	43.9	3
HyTTec Trifecta	104	102	108	102	103	104	11	44.4	3
HyTTec Trophy	**100**	**100**	**100**	**100**	**100**	**100**	**11**	**43.5**	**3**
HyTTec Velocity	–	–	82	96	100	94	7	45.0	3
nVigor LT 4530P	92	92	87	95	98	93	11	43.0	3
InVigor T 4510	95	96	94	97	–	96	8	–	–
InVigor T 4511	–	98	94	97	99	97	9	44.4	3
Monola 422TT	82	84	71	82	79	79	11	42.8	3
Monola H421TT	80	88	57	78	–	75	8	–	–
Nuseed Griffon TTI	–	–	–	98	97	96	5	43.0	3
PY429T	–	–	–	104	100	103	5	42.4	3
PY520TC	–	–	111	101	98	102	7	42.6	3
Renegade TT	–	88	97	96	96	94	8	43.3	3
RGT Baseline TT	–	96	116	101	100	103	8	44.3	3
RGT Capacity TT	98	95	102	99	101	99	11	43.7	3
SF Dynatron TT	99	97	106	100	98	100	11	43.7	3
SF Spark TT	92	94	84	92	93	91	11	44.9	3
Mid maturing IMI trials – mean yield expressed as % of Pioneer 44Y94 (CL)									
Pioneer 44Y94 (CL)	**3.47**	**3.21**	**3.91**	**2.53**	**2.91**	**3.18**			
Hyola Solstice CL	–	101	78	91	97	92	9	44.7	3
Nuseed Ceres IMI	–	97	67	88	96	87	8	44.4	3
Pioneer 43Y92 (CL)	93	95	86	92	92	91	11	43.0	3
Pioneer 44Y94 (CL)	**–**	**100**	**100**	**100**	**100**	**100**	**11**	**43.4**	**3**
Pioneer 45Y95 (CL)	–	101	102	99	99	101	8	42.9	3
PN526C	–	–	79	77	–	78	4	–	–
PY327C	–	–	–	96	98	95	5	44.0	3
PY421C	–	–	–	103	106	103	5	42.6	3
PY520TC	–	–	90	87	–	89	4	–	–
VICTORY V75-03CL	86	89	–	83	79	82	9	41.4	3
Mid maturing glyphosate tolerant trials – mean yield expressed as % InVigor R 4520P									
InVigor R 4520P	**3.29**	**3.15**	**3.41**	**2.6**	**3.25**	**3.14**			
DG Buller G	–	–	–	–	90	95	2	44.0	2
DG Hotham TF	–	–	96	90	86	92	6	43.8	2
DG Lofty TF	–	91	80	85	–	84	6	–	–
Hyola Battalion XC	92	95	79	88	–	88	8	–	–
Hyola Garrison XC	93	97	77	86	–	87	8	–	–
Hyola Regiment XC	–	102	88	93	90	94	8	46.1	2
InVigor LR 4540P	–	–	94	99	97	98	6	44.9	2
InVigor LR 5040P	–	–	103	102	103	101	6	43.9	2
InVigor R 4022P	93	95	89	93	–	92	8	–	–
InVigor R 4520P	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**44.1**	**2**
Nuseed Eagle TF	–	–	104	95	91	98	6	44.1	2
Nuseed Emu TF	87	95	72	88	82	85	10	44.4	2
Nuseed Hunter TF	–	102	93	97	94	97	7	44.9	2
Nuseed Raptor TF	97	99	93	92	88	94	10	44.2	2
Pioneer 44Y27 (RR)	94	97	89	92	87	92	10	44.2	2
Pioneer 44Y30 (RR)	–	98	98	97	–	97	6	–	–
PY323G	–	–	–	91	–	91	2	–	–
PY422G	–	–	–	93	91	96	4	44.1	3
PY424GC	–	–	–	94	–	93	2	–	–
PY428R	–	–	–	–	102	104	2	44.4	2
VICTORY V55-04TF	–	93	–	–	89	92	4	43.0	2

– insufficient or no data.

❶ Oil content, adjusted to 6.0% moisture content, is expressed as a region-wide average for each herbicide chemistry and maturity group in 2024 only.

Further information

NSW DPIRD

Five tips for growing high-vigour canola seed (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/canola-and-safflower/five-tips-for-growing-high-vigour-canola-seed)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Primefact 783, *Juncea canola in the low rainfall zone of south-western NSW* (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/canola-and-safflower/juncea-canola)

Primefact 786, *Brassica juncea in north-western NSW* (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/canola-and-safflower/brassica-juncea-in-north-west-nsw)

GRDC

Blackleg management guide (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2025/blackleg-management-guide)

Canola first (https://grdc.com.au/news-and-media/audio/podcast/2019/canola-first)

Canopy infection by Blackleg – a new evolution (https://grdc.com.au/news-and-media/audio/podcast/canopy-infection-by-blackleg-a-new-evolution)

Diseases of canola and their management – The back pocket guide (https://grdc.com.au/__data/assets/pdf_file/0028/52885/canoladiseasebpgpdf.pdf.pdf)

GRDC website (https://grdc.com.au)

Insect pests of establishing canola in NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/insect-pests-of-establishing-canola-in-nsw)

IPM checklist (https://grdc.com.au/__data/assets/pdf_file/0019/602650/GRDC_A4flyer_IPM_2406_v05.pdf)

NVT individual site quality data (https://nvt.grdc.com.au/)

Paddock Practices: Manage green bridge to reduce virus/aphid risk in canola (https://grdc.com.au/resources-and-publications/all-publications/paddock-practices/2024/southern/march/paddock-practices-manage-green-bridge-to-reduce-virusaphid-risk-in-canola)

Pressure building to find new control strategies for aphids (https://groundcover.grdc.com.au/weeds-pests-diseases/pests/pressure-building-to-find-new-control-strategies-for-aphids)

Prototype Flowering Calculator (https://cropflowering.com.au)

Sclerotinia stem rot in canola (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2014/03/grdc-fs-sclerotinia)

Stewardship for pre-harvest application of herbicides in winter crops (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/preharvest-herbicide-use-fact-sheet)

The impact of insecticides and miticides on beneficial arthropods in Australian grains (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2022/02/the-impact-of-insecticides-and-miticides-on-beneficial-arthropods-in-australian-grains)

Twenty tips for profitable canola – northern NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/20-tips-for-profitable-canola-northern-nsw)

Twenty tips for profitable canola - central & southern NSW (https://grdc.com.au/resources-and-publications/all-publications/publications/2019/20-tips-for-profitable-canola-central-and-southern-nsw)

Windrow on time, reap the rewards (https://grdc.com.au/resources-and-publications/all-publications/publications/2020/canola-windrow-on-time,-reap-the-rewards)

Grain Trade Australia

Trading standards (https://graintrade.org.au/commodity_standards)

Australian Oilseeds Federation

Sustainable Grain Australia (https://sustainablegrain.com.au/)

Apps

BlacklegCM app (https://www.agric.wa.gov.au/apps/blacklegcm-blackleg-management-app)

iLime (https://www.agric.wa.gov.au/apps/ilime)

SclerotiniaCM – Sclerotinia management app (https://www.agric.wa.gov.au/apps/sclerotiniacm-sclerotinia-management-app)

UCI BlacklegCM app (https://www.agric.wa.gov.au/apps/uci-blacklegcm-blackleg-upper-canopy-infection-management-app)

Other

Cesar Australia (https://cesaraustralia.com/)

Croplife Australia (https://www.croplife.org.au/resources/programs/resistance-management/canola-blackleg)

Helicoverpa insecticide resistance surveillance (https://thebeatsheet.com.au/key-pests/helicoverpa-insecticide-resistance-surveillance/)

Prototype Flowering Calculator (https://cropflowering.com.au)

The Australian Fungicide Resistance Extension Network (https://afren.com.au/)

Contributing authors

NSW DPIRD: Kurt Lindbeck, Plant Pathologist, Wagga Wagga; Mathew Dun, Research Officer, Wagga Wagga; Zorica Duric, Field Crop Entomologist, Tamworth; Colin McMaster, Research and Development Agronomist, Orange.

Rohan Brill, Brill Ag, Ganmain; Phil Bowden – Agronomist, Bowden Rural Services.

Chickpea

Key considerations for 2025

» Select an appropriate variety to suit sowing time, maturity windows and disease risk in your region.

» Sow within the recommended window for your region to maximise yield potential.

» Timely disease and insect control, based on systematic and regularly monitoring the crop, are critical management factors to produce high yields.

» An Indian tariff of 10% on Desi chickpea will be re-introduced from 1 April 2025, that will affect chickpea prices in Australia and change crop profitability.

Crop management

Many winter grain-growing areas in New South Wales (NSW) are suited to chickpea production. The crop contributes to farming system rotations by fixing nitrogen and providing a disease and weed break for cereal crops. However, chickpea crops require systematic monitoring for foliar and root diseases, and insect pests.

Chickpea is well adapted to warm spring environments and tolerates higher temperatures during and after flowering than other winter pulse crops such as faba bean, field pea, lentil and lupin. The crop is not suited to areas where there could be a risk of late frosts in spring.

There are 2 distinct types of chickpea grown in Australia: desi and kabuli. Both types are usually sold whole, so seed size and visual appearance are critically important.

Desi chickpea has relatively small, light-brown angular seeds that are commonly dehulled and split for use as split seed (dahl) or further ground to a flour (besan). Desi varieties are most widely grown under dryland production in Queensland (Qld) and northern NSW.

Kabuli chickpea seed is more rounded, coloured creamy–white, and is generally much larger than desi chickpea. Kabuli varieties flower at a similar time to the desi type, but have a longer grain-filling period, requiring more water and sunlight to ensure an adequate seed size. Kabuli variety yields can be lower (15–30%), and more variable than desi varieties, which are often offset by premiums for larger seeds (8–10 mm). Kabuli seeds are predominantly consumed as whole seed after cooking or canning. Hommus is another significant market for kabuli chickpea. Small kabuli seeds are mostly used for hommus or besan (chickpea flour).

Soil types

Chickpea is best suited to loams and self-mulching clay soils that have neutral–alkaline pH. Soils with high chloride levels (>600 mg/kg) in the subsoil (30–90 cm depth) are best avoided. Acidic soils (pH_{Ca} <5.2) with high aluminium levels, and sodic, saline or shallow soils are generally not suitable. In central and southern NSW, most cropping soils have acidic subsurface layers that can impact root growth, nodulation, crop vigour and yield potential. Severely acidic layers, with pH_{Ca} below 4.5, are commonly found at depths of 5–10 cm and 10–15 cm. Liming programs should be planned at least 2 years before sowing acid-sensitive pulses, using analyses from soil samples collected at 5 cm intervals to 20 cm deep. This data details the depth and severity of acidity in subsurface layers and guides the liming rate and the appropriate incorporation method needed for effective amelioration.

To manage acidity in layers below 10 cm, a medium-term to long-term approach is necessary. Initial lime applications should target a pH_{Ca} above 5.8 in the top 0–10 cm to facilitate the downward movement of alkali. Strategic incorporation that effectively mixes appropriate rates of fine-grade lime will accelerate pH increase in subsurface layers. Ongoing soil testing is recommended to guide subsequent liming treatments. To maintain alkali's movement into deeper acidic layers, pH_{Ca} in the 0–10 cm layer must be kept above 5.5.

Chickpea does not tolerate waterlogging and should not be grown in poorly drained paddocks or areas prone to flooding.

Sowing

Seed quality

Profitable crops start with quality planting seed (i.e. with high germination and vigour). Obtain seed from a commercial supplier or from a source known to have negligible levels of seed-borne pathogens. If using grower-retained seed from previous crops, be aware that seed could be infected with *Botrytis*, *Ascochyta* or *Sclerotinia*, even if the disease did not

cause economic damage or was not obvious in the crop. Desi seeds with noticeable tiger stripe or blotch markings on the seed coat should not be used for sowing, as there could be a risk of getting a higher percentage of affected seeds in next season's grain. Irrespective of the harvest year and source, all sowing seed must be thoroughly treated with a thiram-based fungicide to control seed-borne *Ascochyta* and *Botrytis* diseases, and a range of other opportunistic soil organisms. Chickpea seed quality deteriorates rapidly in storage after 12 months and should not be kept any longer than 18 months as sowing seed.

Sowing high quality, treated seed is the best way to achieve healthy seedlings, which will have a rapidly growing root system to obtain more nutrients and moisture, be more competitive with weeds and less susceptible to disease. Seed should first be tested for germination and if it meets a minimum standard of at least 70%, the seed should be treated and test planted into paddocks intended for chickpea in 2025. Count the number of seeds to emerge in the paddock as this is the best indicator of seed and seedling vigour. Paddock emergence tests are best done in March–April.

Paddock selection

Maintain a distance of at least 500 m (further is better) from the previous year's chickpea paddocks and a break of at least 3 years between chickpea crops in the same paddock. These practices aim to reduce the amount of disease inoculum available to initiate new season infection. Do not sow chickpea in paddocks with a history of lucerne, medics, phytophthora root rot, *Sclerotinia*, or waterlogging. When planning double-break crops for weed management with canola and chickpea, care needs to be taken to avoid *Sclerotinia* becoming a problem. Flooding can also carry disease inoculum long distances.

Stubble

In the northern grain zone, no-till crops sown into cereal stubble have been shown to yield 10% higher than those sown into conventionally prepared or reduced-tillage seedbeds. During the establishment and early vegetative stages, standing cereal stubble will also help to deter aphids from landing in the crop and transmitting virus disease.

Sowing depth

Sow chickpea seed 5–7 cm deep into moisture. If there is no moisture at this depth at the desired sowing time, chickpea can be sown deeper into stored moisture by sowing the seed 10–17 cm below the paddock soil surface, depending on moisture depth, and levelling the seedbed with a disc chain before the crop emerges.

Use high-quality seed if intending to sow deep. Levelling the seedbed after sowing to remove deep furrows will make harvesting easier, especially for later sown crops, which tend to be shorter in height. A level seedbed can also reduce the risk of herbicide damage to establishing seedlings. Ensure that seed is well covered with at least 7 cm of soil if using Balance® (isoxaflutole) or triazine herbicides.

Sowing rate

Aim to establish 20–30 plants/m^2 under most conditions in northern and central NSW. In southern NSW, the target plant density is 35–45 plants/m^2 for desi and 30–35 plants/m^2 for kabuli. Aim for the lower end of the range when yield potential is low (e.g. lower initial soil moisture). Target the higher end of the range when yield potential is high, such as when good subsoil moisture is available or under irrigation. Use Your calculation on page 104 to adjust sowing rates to take account of seed size, germination, vigour and establishment conditions. Avoid skimping on seed, which could lead to gaps in plant stands; a uniform plant establishment has been found to be highly effective in reducing aphid infestation.

Row spacing

In northern NSW, there is generally no yield difference between 25 cm and 75 cm row spacings.

In some situations, wide row spacing (up to 100 cm) offers several advantages, including:

- sowing into heavy stubble in zero-till situations
- applying pesticide in-crop with a ground rig
- the ability to band spray, reducing costs and chemical usage
- the option of inter-row cultivation or shielded spraying
- better airflow to reduce foliar diseases, particularly *Botrytis* in spring
- more moisture to finish the crop in low moisture situations.

The disadvantages of wide row spacing can include reduced crop competition with weeds and increased crop lodging, making harvesting more difficult. There can be yield penalties in above-average seasons. Wider row spacing (>50 cm) in southern NSW can result in lower grain yields.

Table 55. Sowing rate (kg/ha) guide based on 100% germination, 80% establishment and estimated seed weight for each variety.

Variety	100 seed weight (g)	Target plant density/m²			
		Northern and Central NSW		Southern NSW	
		20	30	35	45
Desi types					
CBA Captain	23	58	86	101	129
Kyabra	26	65	98	114	146
PBA Boundary	19	48	71	83	107
PBA HatTrick	20	50	75	88	113
PBA Maiden	24	60	90	105	135
PBA Seamer	23	58	86	101	129
PBA Slasher	18	45	68	79	101
PBA Striker	21	53	79	92	118
Kabuli types					
Genesis 090	30	75	113	131	169
Genesis Kalkee	45	113	169	197	253
PBA Magnus	48	120	180	210	270
PBA Monarch	42	105	158	184	236
PBA Royal	38	95	143	166	214

Your calculation

(100 seed weight ❶ (grams) ..... × target plant population ..... × 1000) ÷ (establishment percentage ❷ ..... × germination percentage .....) = your sowing rate ..... kg/ha

❶ To determine your seed weight, weigh 100 seeds in grams.
❷ Establishment percentage – 80% is a reasonable estimate, unless sowing into adverse conditions.

Sowing time

Aim to sow in the early to mid period of the recommended sowing window to maximise yield potential. However, early sowing can expose the crop to more rainfall events, which can increase the risk of ascochyta blight (AB), *Sclerotinia* and phytophthora root rot diseases. Early sowing can also result in greater crop biomass, which can increase the risk of botrytis grey mould later in the season and increase the risk of lodging. Very early sowing can lead to reduced pod set due to the effects of low temperatures on flowering and/or frost damage. There might also be a potential moisture shortage during the grain-fill period, which can reduce seed size and hence yield and marketing potential, particularly for kabuli types.

Later sown crops (outside the optimal sowing window) generally have lower yield potential. They can attract greater pest pressure from *Helicoverpa* spp. due to being later maturing than surrounding crops; and are often shorter in height, which can lead to harvesting difficulties. However, later sowing can reduce the risk of *Ascochyta* and *Phytophthora* infections and lessen the risk of botrytis grey mould and frosted grains.

Table 56. Suggested chickpea sowing times.

Region	April				May				June				July			
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Moree–Narrabri						>	★	★	★	★	<					
Walgett–Coonamble							>	★	★	★	<					
Liverpool Plains							>	★	★	★	★	<	<			
Central NSW (grey soil)						>	★	★	★	<						
Central NSW (red soil)					>	★	★	★	<							
Southern NSW				>	★	★	★	★	<							

> Earlier than recommended, yield reduction likely.
★ Preferred sowing time.
< Later than recommended, yield reduction likely.

Inoculation

Inoculating seed is essential, regardless of soil type or previous chickpea history. Use the commercially available Group N chickpea inoculant. Check for effective nodulation 6–10 weeks after sowing to ensure inoculation has been successful.

Effective nodulation requires forward planning and care to ensure it is done correctly. Treat seed with fungicide first, then apply inoculant separately just before sowing. An alternative method that gives better rhizobia survival is to use inoculum slurry sprayed directly into the furrow at sowing (liquid inject method), thus avoiding contact with the fungicide.

Avoid inoculating directly into air-seeder bins as the seed needs to dry before being sown. Newly inoculated seed is often sticky and does not flow properly causing uneven seed flow in the bin, leading to blocked hoses, patchy establishment and future weed and herbicide timing problems.

Several new inoculant products are available for chickpea, such as freeze-dried and dry granular products. Read and follow the instructions to avoid inoculation problems.

Nutrition

Select paddocks with a low level of residual nitrogen (N) to promote effective nodulation and N fixation.

Most growers in NSW use starter fertiliser (e.g. MAP or DAP) or other phosphorus-based fertilisers such as Granulock® with added zinc (Zn) (1–2%), due to its availability. A common starter fertiliser rate is 50–75 kg/ha. Responses to Zn are most likely in alkaline soils. These products can be drilled with the seed. If using more than 100 kg/ha of starter fertiliser, band it slightly away from the seed to avoid fertiliser toxicity, especially on wider (60–100 cm) row spacing. Extra care should also be taken if sowing into marginal moisture seedbed conditions with high rates of fertiliser.

A good method for determining the response from starter fertilisers is to put down test strips, leaving a control (nil) strip and a double rate strip for comparison.

Variety selection

When choosing a variety, several factors should be considered including:

- maturity to suit the environment
- disease resistance ratings
- paddock suitability
- seed availability and cost
- seed size and sowing rate (with reference to sowing machinery)
- harvesting ease
- marketing options.

A variety brochure is available from the GRDC website, or the relevant seed supply company for most current varieties. Refer to Table 56 for variety characteristics; Table 57 for disease ratings; and Table 58 and Table 59 for NVT variety yield results.

GO TO PAGES
GRDC website (https://grdc.com.au/)

There are no new chickpea variety releases for 2025. CBA Captain[Φ] was released in 2020 as a high yielding, medium sized desi type suited to all chickpea growing regions across Australia. It has rapidly become the most preferred and recommended desi variety in NSW. PBA Magnus[Φ] was also released in 2020 as a very large-seeded and high yielding kabuli type, suited to medium rainfall chickpea-growing regions in south-eastern Australia.

Ascochyta blight changes

A change in aggressiveness in the AB pathogen population has occurred in Victoria (Vic.), South Australia (SA), NSW and Qld. This has resulted in separate AB resistance ratings for southern and northern growing regions. The revised *Ascochyta* ratings published in this guide are for northern Australia (NSW) only and are based on NVT chickpea disease ratings trials with a limited number of pathogen isolates.

Table 57. Chickpea variety characteristics.

Variety	Year of release	100 seed weight (g)	Plant height	Lodging resistance	Maturity
Desi types					
CBA Captain	2020	23	MT	M	E–M
Kyabra	2006	26	T	VG	M
Neelam	2012	17	MT	VG	M
PBA Boundary	2011	19	T	M	M
PBA Drummond	2018	22	T	VG	E–M
PBA HatTrick	2009	20	T	M	M
PBA Maiden	2013	24	MS	M	M
PBA Seamer	2016	23	M	VG	M
PBA Slasher	2009	18	MS	M	M
PBA Striker	2012	21	MS	M	E
Kabuli types					
Almaz	2006	41	MT	G	L
Genesis™ 090	2005	30	M	G	M–L
Genesis™ Kalkee	2011	45	T	VG	L
PBA Magnus	2020	48	MT	F	E–M
PBA Monarch	2013	42	M	F	E
PBA Royal	2019	38	M	F	E–M

Plant height
T tall
MT medium tall
M medium
MS medium short
Lodging resistance
VG very good
G good
M moderate
F fair
Maturity
E early
M medium
L late

Table 58. Chickpea disease ratings for common varieties.

Variety	Ascochyta blight ❶	Phytophthora root rot ❷	Botrytis grey mould ❸	Virus ❹	Root lesion nematode *Pratylenchus thornei*		Root lesion nematode *Pratylenchus neglectus*	
					Resistance ❺	Tolerance ❺	Resistance ❺	Tolerance ❺
Desi types								
CBA Captain	MS	n.d.	S	n.d.	MS	MT	MR	MT
Kyabra	VS	VS	S	S	S	MT	MR–MS	MT
Neelam	S	n.d.	S	n.d.	MS	MT–MI	MR–MS	MI
PBA Boundary	S	VS	S	S	MR–MS	MT	R–MR	MT–MI
PBA Drummond	VS	n.d.	S	MS	MR–MS	T–MT	MR	T–MT
PBA HatTrick	S	S	S	S	MR–MS	MT–MI	MR–MS	MT
PBA Maiden	S	n.d.	S	S	MR–MS	MI–I	MR–MS	MI
PBA Seamer	MS	S	S	S	MR–MS	MT–MI	MR–MS	MT–MI
PBA Slasher	S	n.d.	S	S	MR–MS	MT	MR–MS	MI
PBA Striker	S	n.d.	S	S	MR–MS	T–MT	MR–MS	MI
Kabuli types								
Almaz	MS	n.d.	S	S	S	I	MR–MS	MI
Genesis™ 090	MS	n.d.	S	S	MS–S	MI–I	MR–MS	I–VI
Genesis™ Kalkee	S	n.d.	S	S	MS	MI	MR–MS	VI
PBA Magnus	MS	n.d.	S	S	MS–S	I–VI	MR	MI
PBA Monarch	MS	n.d.	S	S	MS	I	MR–MS	I–VI
PBA Royal	MS	n.d.	S	S	MS	MI	MR	MI–I

Source: NVT chickpea national disease ratings.

n.d. No data
R Resistant
MR Moderately resistant
MS Moderately susceptible
S Susceptible
VS Very susceptible
T Tolerant
MT Moderately tolerant
MI Moderately intolerant
I Intolerant
VI Very intolerant.

❶ Ascochyta blight ratings are from 2024 data for northern Australia only (NSW and Qld), not southern Australia (Vic and SA).
❷ Phytophthora root rot ratings are from 2024 data.
❸ Botrytis grey mould (BGM) ratings are from 2022 data. Note the risk of botrytis grey mould damage can be affected by the spray programs for AB; most fungicides used to control *Ascochyta* can also reduce *Botrytis*.
❹ Virus ratings are based on information supplied by breeders and could change with different virus species predominating in different regions and seasons.
❺ Root lesion nematode – *P. thornei* and *P. neglectus*: Resistance ratings are from 2023 data; Tolerance ratings are from 2024 data. Resistance measures the plant's ability to resist disease. Tolerance measures the plant's ability to yield at a given disease level. Tolerant varieties, while potentially yielding well, are unlikely to reduce nematode numbers for following crops.

Table 59. Comparative performance of desi chickpea in northern and southern NSW compared with CBA Captain(Φ) = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% CBA Captain (t/ha)	**2.31**	**2.87**	**n.d.**	**1.24**	**4.29**	**2.68**	
CBA Captain	**100**	**100**	**n.d.**	**100**	**100**	**100**	**4**
Kyabra	98	82	n.d.	108	91	92	4
PBA Boundary	95	88	n.d.	98	92	92	4
PBA Drummond	108	95	n.d.	117	106	105	4
PBA HatTrick	94	91	n.d.	95	91	92	4
PBA Seamer	96	98	n.d.	99	94	96	4

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% CBA Captain (t/ha)	**2.56**	**3.24**	**n.d.**	**0.90**	**2.28**	**2.30**	
CBA Captain	**100**	**100**	**n.d.**	**100**	**100**	**100**	**16**
Kyabra	98	94	n.d.	107	95	96	14
PBA Boundary	96	94	n.d.	95	94	94	16
PBA Drummond	107	106	n.d.	121	104	107	16
PBA HatTrick	95	92	n.d.	93	94	93	16
PBA Seamer	98	94	n.d.	98	98	96	16

South west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% CBA Captain (t/ha)	**2.22**	**2.31**	**2.53**	**1.29**	**2.07**	**2.08**	
CBA Captain	**100**	**100**	**100**	**100**	**100**	**100**	**5**
Neelam	97	n.d.	85	102	105	99	4
PBA Boundary	84	79	69	84	n.d.	82	4
PBA Maiden	94	100	79	96	104	94	5
PBA Seamer	88	76	75	87	94	83	5
PBA Slasher	97	107	69	98	103	94	5
PBA Striker	98	110	79	98	106	98	5

n.d. No data.

Table 60. Comparative performance of kabuli chickpea in northern NSW compared with Genesis™ 090 = 100%.

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% Genesis 090 (t/ha)	**2.71**	**3.56**	**n.d.**	**1.16**	**2.53**	**2.61**	
Almaz	96	93	n.d.	91	n.d.	94	7
Genesis 090	**100**	**100**	**n.d.**	**100**	**100**	**100**	**9**
Genesis Kalkee	96	95	n.d.	92	n.d.	95	6
PBA Magnus	91	92	n.d.	82	98	92	9
PBA Monarch	89	77	n.d.	74	86	81	9
PBA Royal	98	93	n.d.	94	96	95	9

n.d. No data

Desi types

CBA CaptainΦ. MS to *Ascochyta* (northern cropping region). Erect plant type with good height to lowest pod, moderate lodging resistance and excellent harvestability, with broad adaptation to all chickpea-growing regions across Australia. Early to mid flowering with early to mid season maturity. Medium-sized desi seed with a yellow–brown seed coat and suited to human consumption. Developed by Pulse Breeding Australia (PBA) Chickpea program and released by Chickpea Breeding Australia (CBA), seed available from CBA seed partners PB Agrifood, PB Seeds and Woods Seeds. End Point Royalty (EPR) $4.95/tonne incl. GST.

KyabraΦ. VS to *Ascochyta* therefore suited to areas where *Ascochyta* is not considered a major threat and experience shows that the disease can be managed in susceptible varieties. Larger seed size and superior grain quality for the whole seed market compared with other current varieties. Marketed by Barenbrug Australia. A seed royalty applies. No EPR.

PBA BoundaryΦ. Only suitable for paddocks with a low *Phytophthora* risk. High yielding across chickpea-growing regions of northern NSW and southern Qld. Mid season maturity. Medium-sized desi seed suited to human consumption. Developed by PBA. Marketed by Seednet. EPR $4.40/tonne incl. GST.

PBA DrummondΦ. Suited to north-western areas of NSW where Kyabra Φ has been grown, and in paddocks with a low *Phytophthora* risk. Not recommended for southern NSW. Tall, erect plant type with early to mid season maturity. Medium sized seed suited to human consumption. Developed by PBA. Marketed by Seednet. EPR $4.95/tonne incl. GST.

PBA HatTrickΦ. Now outclassed for yield and disease ratings. Tall, erect plant type with mid season maturity. Medium-sized desi seed suited to human consumption. Developed by PBA. Marketed by Seednet. EPR $4.40/tonne incl. GST.

PBA SeamerΦ. High yielding across growing regions of northern NSW, southern and central Qld; recommended for areas north of Dubbo. Semi-erect plant type with mid season maturity. Medium-sized desi seed suited to human consumption. Marketed by Seednet. EPR $4.40/tonne incl. GST.

Resistance abbreviations:
R – Resistant
MR – Moderately resistant
MS – Moderately susceptible
S – Susceptible
VS – Very susceptible.

Updated EPR rates for PBR varieties are available on the Variety Central website (https://varietycentral.com.au/varieties-rates/)

PBA SlasherΦ. S to *Phytophthora* (inferred from non-NVT data) so not recommended for northern NSW. High yielding across all southern and western Australian growing regions; recommended for areas south of Parkes. Semi-spreading plant type with mid season maturity. Medium-sized desi seed with a tan–brown seed coat suitable for whole and split seed. Marketed by Seednet. EPR $4.40/tonne incl. GST.

PBA StrikerΦ. VS to *Phytophthora* (inferred from non-NVT data) so not recommended for northern NSW. High yielding in short-season environments in southern and western Australian growing regions. Semi-spreading plant type with early flowering and maturity. Medium-sized desi seed with tan–brown seed coat suitable for whole and split seed. Marketed by Seednet. EPR $4.40/tonne incl. GST.

Kabuli types

AlmazΦ. VS to *Phytophthora* (inferred from non-NVT data). Medium seed size, 8–9 mm. Introduced from the International Centre for Agricultural Research in the Dry Areas (ICARDA) and selected by the Department of Primary Industries and Regional Development: Agriculture and Food, Western Australia (DAFWA). Marketed by Seednet in eastern Australia. EPR $6.60/tonne incl. GST.

Genesis™ 090. VS to *Phytophthora* (inferred from non-NVT data), suited only to areas with a low *Phytophthora* risk. Seed size is smaller than Almaz[Φ]. Predominantly 7–8 mm. Introduced from ICARDA, Syria and selected by Agriculture Victoria. Marketed by PB Seeds. EPR $5.50/tonne incl. GST.

Genesis™ Kalkee. VS to *Phytophthora* (inferred from non-NVT data). Larger seed size than Almaz[Φ], predominantly 9 mm. Yield is similar to Almaz[Φ] in northern and southern NSW. Excellent harvestability with an erect plant habit and good lodging resistance. Introduced from ICARDA, Syria and selected by Agriculture Victoria and NSW DPIRD. Marketed by PB Seeds. EPR $5.50/tonne incl. GST.

PBA MagnusΦ. VS to *Phytophthora* (inferred from non-NVT data). Early to mid flowering and maturity (earlier than Genesis™ Kalkee). Large seed size, predominantly 9 mm (larger than Genesis™ Kalkee). Highest yielding large-sized kabuli chickpea, suited to the medium rainfall environments of south-eastern Australia. Semi-spreading plant type that can be prone to lodging. Developed by PBA Chickpea program, seed available from commercial partner PB Seeds. EPR $7.15/tonne incl. GST.

PBA MonarchΦ. VS to *Phytophthora* (inferred from non-NVT data). Early flowering and early maturing. Medium seed size, 8–9 mm, similar to Almaz[Φ]. High yielding, medium sized kabuli chickpea. Semi-spreading plant type, which can be prone to lodging. Developed by PBA. Marketed by Seednet. EPR $7.15/tonne incl. GST.

PBA RoyalΦ. VS to *Phytophthora* (inferred from non-NVT data). Early to mid flowering; early to mid maturing. Medium seed size, 8 mm, larger than Genesis™ 090 but smaller than Almaz[Φ] and PBA Monarch[Φ]. High yielding, medium sized kabuli chickpea in potentially mid–high yielding environments. Semi-spreading plant type, which can be prone to lodging. Developed by PBA. Marketed by Seednet. EPR $7.15/tonne incl. GST.

Weed control

Chickpea does not compete well with weeds, and there are limited options for controlling certain broadleaf weeds using in-crop herbicides. However, there is now a wide range of herbicides that can be used either pre-sowing, incorporated by sowing (IBS), or post-sow-pre-emergence, which have made broadleaf weed control much more effective. Some of the newer chemistries include isoxaflutole (e.g. Balance®, Palmero®), terbuthylazine (e.g. Terbyne®), fomesafen (e.g. Reflex®) and flumioxazin (e.g. Terrain®), as well as combination chemistries terbuthylazine+isoxaflutole (e.g. Palmero® TX). Despite these newer options, it is still preferable to sow chickpea in paddocks with relatively low broadleaf weed seedbanks. Chickpea can be sensitive to herbicide wash from some products in sowing furrows and care needs to be taken, particularly when deep sowing, that seed is well covered with at least 7 cm of soil.

Plants weakened by herbicide injury are more susceptible to diseases. The most common problems arise when residual herbicides are applied to preceding cereal crops in the rotation. Examples include:

- **Sulfonylurea herbicides** (e.g. Logran® B-Power, Glean®, Ally®, Eclipse®) applied to preceding cereal crops. Take special note of label instructions concerning crop rotation, rainfall required for breakdown and plantback periods, particularly on high pH and/or compacted soils where rainfall has been limited. Residues could persist longer in both naturally occurring alkaline soils, and soils that have received surface-applied lime to raise soil pH.

GO TO PAGES

International Centre for Agricultural Research in the Dry Areas (https://icarda.org/)

Department of Primary Industries and Regional Development: Agriculture and Food (https://www.agric.wa.gov.au/)

Agriculture Victoria (https://agriculture.vic.gov.au/)

- **Triazine herbicides** (e.g. atrazine, simazine). Seek advice as to potential chickpea crop damage when using triazine herbicides in summer cereals (sorghum and maize) and also triazine tolerant (TT) canola, as application rates on different soil types influence the extent of residual herbicide breakdown. Follow label recommendations and avoid spray overlaps.
- **Clopyralid** (e.g. Lontrel®), 2,4-D amine and some other hormone herbicides which, under dry conditions, break down more slowly in the soil; and residues can also carry over in stubble and affect subsequent crops. Read labels carefully and observe plantback periods, including rainfall requirements.

Isoxaflutole products (e.g. Balance®, Palmero® and Palmero® TX), which are used in-crop can, under some conditions, damage some chickpea varieties. Damage can occur where rain follows soon after spray application and the full rate is used. However, the full rate will provide longer residual activity throughout the chickpea growing season. Ensure the trench above the seed is closed at sowing to reduce the risk of herbicide washing into the seed furrow.

To minimise the risk of spray-rig herbicide residues damaging the crop, decontaminate the main tank, mixing hopper and all spray lines, hoses and filters. If this cannot be done satisfactorily, fit end taps to booms so that they can be thoroughly flushed. Be aware herbicides can accumulate in filters and in the nozzle bodies. Herbicide injury from residual fallow spray mixtures has occurred in many chickpea crops via the main tank, despite decontamination.

Be aware of plantback periods for herbicides such as Broadstrike® (flumetsulam) if used later in the season, especially when considering double cropping.

For detailed information on registered herbicides, refer to the NSW DPIRD guide *Weed control in winter crops*. Consult herbicide labels for further information on specific weed control and plantback recommendations.

Insect control

The major insect pest of chickpea is *Helicoverpa* spp. (heliothis caterpillars). They can reduce yield and grain quality. Careful crop monitoring is required from flowering until seed maturity.

The Queensland Department of Primary Industries research recommends changes to control decisions for *Helicoverpa*. The change is from a fixed threshold of 1–2 larvae/m^2, to a threshold based on the relationship between damage potential (determined by size and number of larvae, and crop growth stage), chickpea grain price and control cost. Full details of the monitoring protocol to determine the cost/benefit of control are outlined in *Helicoverpa management in chickpea*.

Helicoverpa management must be considered in terms of area-wide management and the regional insecticide resistance management strategy. Where possible, growers should consider using products that do not increase the risk of *Helicoverpa* developing resistance to chemicals used in summer crops. This means growers are advised not to use certain chemicals such as synthetic pyrethroids or thiodicarb (e.g. Larvin®) without actively considering the benefits and disadvantages this will have to both their own crop and those of summer crop growers. Possible options are the 'softer', more selective products such as Vivus® or Gemstar® (*Nuclear Polyhedrosis Virus*), Steward®(indoxacarb), and Dipel®(*Bacillus thuringiensis* bacteria).

When deciding which product to use there are many factors to consider such as:
- *Helicoverpa* species and risk of resistance
- compatibility with fungicides
- cost
- harvest withholding period (WHP)
- CESAR IPM checklist.

Guidelines to support effective, sustainable integrated pest management are available at IPM Checklist: a step-by-step guide for a sustainable grains industry, available from the Cesar Australia website. For detailed information on insect threshold levels and registered pesticides for control, refer to the NSW DPIRD guide *Insect and mite control in field crops* and pesticide labels.

Disease management

Disease monitoring and management is an essential aspect of chickpea production. Growers are urged to seek advice on which diseases occur in their area. The most effective control measures include crop rotation, paddock selection, variety choice, seed selection and seed treatment, so it is best to start planning one season ahead of sowing.

GO TO PAGES

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Helicoverpa management in chickpea (https://thebeatsheet.com.au/wp-content/uploads/2019/08/HelicoverpaManagement-InChickpea.pdf)

CESAR IPM checklist (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

The major chickpea diseases in NSW are ascochyta blight (AB), phytophthora root rot (PRR), botrytis grey mould (BGM), botrytis seedling disease (BSD), viruses, and ill-thrift caused by root lesion nematodes. *Sclerotinia* can also cause problems in dense canopy crops and in paddocks with a history of canola or lupin production. Physiological disorders with disease-like symptoms are also significant, in particular injury from low temperature, frost, herbicides, waterlogging, sodicity and salinity.

This section describes strategies that will reduce the risk of major chickpea diseases for the coming season. Some of these strategies are based on local or national field experiments; others are based on observations of reduced disease in previous year's crops.

For more information on all chickpea diseases see *Managing diseases of chickpea 2025* on the NSW DPIRD website.

GO TO PAGE
Managing diseases of chickpea 2025 (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0011/1398188/Managing-diseases-of-chickpea-2025.pdf)

Ascochyta blight – fungus *Ascochyta rabiei*

Ascochyta blight (AB) is the most serious disease of chickpea in Australia and can cause 100% yield loss in susceptible varieties and years that favour the disease. Managing this disease is integral to producing chickpea in NSW.

The pathogen that causes AB survives and spreads in infected chickpea seed, stubble and on volunteers. Under ideal conditions, it can reproduce as fast as 5–7 days on very susceptible varieties such as Kyabra$^{\Phi}$. The disease can develop over a wide range of temperatures (5–30 °C) and needs 3–10 hours of leaf wetness for infection, so small showers can be just as effective in spreading disease as longer rainfall events. The disease develops quickest when temperatures are 15–25 °C and humidity is high. The longer the leaf is wet and subject to higher humidity, the more widespread and severe the infection. However, it is not a soil-borne pathogen and does not survive long when buried or in contact with the soil.

The chickpea industry has successfully adopted management strategies to control AB. They are updated as new information becomes available and new varieties are released. Strategies include:

- paddock selection and rotation
- growing the least susceptible varieties
- planting low risk seed
- treating seed with a thiram-based fungicide
- applying an early protectant fungicide
- routine crop monitoring
- the ability to apply additional fungicide sprays as required during the growing season if conditions favour further disease development.

Managing the disease is most effective when all strategies are implemented.

The following will reduce the occurrence and effects from AB in chickpea crops:

- **Paddock selection**: the fungus that causes AB survives on old chickpea trash; it does not survive in soil. In northern NSW, the high frequency of chickpea in cropping rotations makes separation of last year's stubble from this season's crop often difficult and significantly increases disease pressure. The same also applies to chickpea frequency in the rotation; once every 4 years is ideal.
- **Grow varieties with improved AB resistance**: varieties such as CBA Captain$^{\Phi}$ and PBA Seamer$^{\Phi}$ will have less disease and require fewer fungicide applications in northern NSW.
- **Remove volunteers**: volunteer chickpea plants infected with *Ascochyta* will provide inoculum even if the volunteer plants are killed with herbicide. Controlling volunteers early will restrict their size and limit the amount of inoculum they can produce.
- **Treat all sowing seed with a registered fungicide** to reduce both internally-borne *Ascochyta* and external contamination. See Table 61 on page 114 for information on seed treatment. *Ascochyta* transmission and spread is significantly reduced to very low levels (<1%) when chickpea seed is treated with a seed-applied fungicide, provided the application has been done effectively to ensure full coverage of the seed.
- **Plant on wider row spacing** (66 cm+) to improve airflow through the crop leading to more rapid drying after rain or dew. Canopy closure can also be delayed, which will improve fungicide penetration later in the season.

Rainfall across NSW in 2024 was highly variable, with excellent growing conditions in central and northern NSW, and dry spring conditions in southern NSW. The disease pressure in 2025 will be different across NSW depending on your district. Carefully consider if AB affected your chickpea crop in 2024 and plan to manage the disease in 2025.

Late rains in 2024 could have contributed to *Ascochyta* pod and seed infection. Consequently, seed treatment with a fungicide will be imperative when sowing chickpea crops in 2025. It is also recommended that selecting varieties with better *Ascochyta* resistance and using a preventative fungicide at the initial seedling stage of infection is critical in 2025. Throughout the season, fungicide should be applied before rain only if the disease is detected or if your crop is in a high risk *Ascochyta* situation.

High risk situations include planting into paddocks where active inoculum is known to be present, and planting seed of unknown pathogen status that has not been properly treated with fungicide seed dressings. In these situations, apply an *Ascochyta* fungicide before the first post emergence rain as recommended above, then monitor the crop from 10–14 days after rain.

If *Ascochyta* symptoms are detected, apply a registered fungicide before the next rain. This is especially important during the crop's reproductive stage, as *Ascochyta* on pods causes abortion, seed infection and seed defects. If a spray is missed, fungicides with limited curative activity are now available.

Recent research has shown the fungicides for *Ascochyta*, Aviator® Xpro™ (prothioconazole + bixafen) and Veritas® Opti (tebuconazole + azoxystrobin) are rainfast (up to 100 mm rain in 150 minutes). However, they have a limited timeframe for use and tight intervals for application after an infection occurs. Application might also be difficult in saturated or boggy paddocks and aerial application could be necessary, which is not as effective. Further information on salvage fungicide options is available on the GRDC website.

The NSW DPIRD website has more information on *Managing ascochyta blight in chickpeas 2021*.

Applying foliar fungicides for *Ascochyta*

Managing *Ascochyta* begins once the crop has emerged, with regular crop inspections key to applying foliar fungicides at the right time. Foliar fungicides provide cost-effective *Ascochyta* management in all varieties including those rated VS such as Kyabra$^{(\phi)}$. Timing is critical for a profitable outcome – labels for all registered fungicide products state they are most effective when applied before rain. Field experiments conducted in 2020 and 2021 at Trangie, Tamworth and Wagga Wagga, in which 3 varieties were inoculated with *Ascochyta* at different growth stages, showed least *Ascochyta* occurred when the disease was managed early and when the most resistant variety was grown.

Consider the logistics of multiple fungicide applications when selecting paddocks to be sown to chickpea. This also includes the possibility of using aircraft to apply fungicides if conditions are too wet for a ground rig. Applying fungicides by ground rig is preferred. Select a nozzle such as a DG TwinJet or Turbo TwinJet that will produce medium-size droplets and deliver the equivalent of 80–100 L/ha water at the desired speed. Where aerial application is the only option (e.g. wet weather delays) ensure the aircraft is set up properly and that contractors have had their spray patterns tested to ensure full canopy coverage.

There are multiple foliar fungicides registered to manage *Ascochyta* in NSW. Older products (such as those containing chlorothalonil and mancozeb) can be used throughout the growing season and have no restrictions on the number of applications. Newer foliar fungicides, such as Aviator® Xpro®, Veritas® Opti and Miravis® Star (fludioxonil + pydiflumetofen) are very effective, but have restrictions on the number of applications within a growing season. Be aware of the conditions that apply when using different foliar fungicide products.

The critical timings for foliar fungicide applications are:
Critical period 1: 4–6 weeks post emergence – apply a foliar fungicide to contain or eliminate any seed-borne infections.

Critical period 2: just before canopy closure – apply a foliar fungicide for adequate coverage of the lower canopy before the crop canopy closes. It is important to ensure coverage of the lower canopy and potential infection sites.

Critical period 3: at podding – continue to monitor the crop to protect pods from infection.

Continue to monitor the crop regularly throughout the growing season and time frequency of foliar fungicide applications with the residual length of fungicide protection depending on the product and rate of product used (e.g. mancozeb 14 days, chlorothalonil 21 days at standard label rate), and likelihood of repeated rainfall events within that timeframe.

Fungicide use should focus on preventing new infections and disease spread before rainfall, NOT curing old infections. Regularly monitoring your chickpea crop for *Ascochyta* symptoms is the most effective way to manage the disease. The appearance or spread of the disease will be most easily seen 7–10 days after rain.

Botrytis grey mould – fungus *Botrytis cinerea*

Botrytis grey mould (BGM) is an airborne foliar disease that develops rapidly when temperatures start increasing in spring (from 15 °C and higher). It is more prevalent in the warmer regions of the north at canopy closure where significant crop losses can occur in high biomass crops during wet or humid conditions such as in 2016, 2020, 2021 and 2022.

It is controlled with foliar fungicides; seed treatment is ineffective against airborne inoculum. *Botrytis cinerea* is ubiquitous, has a wide host range (over 138 genera in 70 families) and is an effective saprophyte, meaning it can survive, grow and sporulate on any dead plant tissue, including old senescent leaves, flowers and flower parts, which act as foci of infection. The fungus readily produces airborne spores and some isolates form

GO TO PAGES

GRDC website (https://grdc.com.au/)

Managing ascochyta blight in chickpeas 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0015/1220271/Managing-ascochyta-blight-in-chickpeas-in-2021.pdf)

sclerotia. This means that BGM inoculum is always present and, if conditions are favourable, it will occur irrespective of what has happened earlier in the chickpea season.

The following will reduce the risk of BGM in chickpea crops:

- **Paddock selection**: avoid sowing chickpea next to paddocks where BGM was an issue the previous season, this can include other pulse crop species. Chickpea should be grown as far away from any paddocks (including the neighbour's paddocks) in which BGM was a problem as is practically possible. However, under conducive conditions, this practice will not guarantee that crops will remain BGM-free, because of the pathogen's wide host range, ability to colonise dead plant tissue, and its airborne spores.
- **Sowing later in the sowing window**: if long-term weather forecasts suggest a wetter than normal season, consider sowing in the later part of the sowing window as this will reduce biomass. Early sown crops develop dense canopies, which favour high humidity and therefore BGM development.
- **Plant on wider rows (66 cm +)**: wide rows improve airflow through the crop leading to more rapid drying after rain, heavy dew, or after irrigation if applicable. Canopy closure can also be delayed, which will improve fungicide penetration.
- **Foliar fungicide**: in areas outside central Qld, spraying for BGM is not needed in most years. However, in seasons and situations that favour the disease, a preventative fungicide spray just before canopy closure, with another application 2 weeks later, will help minimise BGM development in most years. If BGM is detected in a district or in an individual crop, particularly during flowering or pod fill, a fungicide should be applied before the next rain. Select a foliar fungicide that has activity against BGM. None of the fungicides currently registered or under permit for chickpea BGM will eradicate established infections. Consequently, timely and thorough application is critical.

If *Botrytis* is present as infection on pods, it is important to treat any retained seed for the following season with a fungicide that will prevent botrytis seedling disease. Note, however, that seed treatments are ineffective against the airborne BGM fungus. If conditions such as warm humid weather and dense canopies favour BGM in 2025, the disease is still likely to appear.

The NSW DPIRD website has more information on *Managing* Botrytis *in chickpeas in 2021*.

Botrytis seedling disease – fungus *Botrytis cinerea*

Although botrytis seedling disease (BSD) is caused by the same fungus as BGM, BSD is a very different disease. Unlike BGM, BSD is seed-borne and will occur over a range of temperatures. Planting *Botrytis*-infected seed that has not been fungicide treated, or has been treated ineffectively, allows the fungus to grow out of the seed, attack the root and basal stem tissues and cause seedling disease and plant death. The fungus can also spread to, and kill, neighbouring healthy plants, thereby multiplying the BSD threat to crops. See Table 61 on page 114 for seed treatment information.

GO TO PAGE

Managing Botrytis *in chickpeas in 2021* (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/1299969/Managing-Botrytis-in-chickpeas-in-2021.pdf)

Late rains in spring will favour *Botrytis* development on seed and BSD development the following season. Seed testing at Tamworth has previously detected *Botrytis* infection as high as 34% in seed. Even if only 1% of seed is infected and the seed is not treated, this equates to 3,000 infected seedlings per hectare (assuming a target population of 300,000 plants/ha). Seed treatment using a registered fungicide seed dressing will provide complete BSD control.

Phytophthora root rot – oomycete *Phytophthora medicaginis*

Phytophthora root rot (PRR) is a soil- and water-borne disease with inoculum that can establish in some paddocks. Damage is greatest in seasons with above average rainfall, but only a single saturating rainfall event is needed for infection. Avoid high-risk paddocks such as those with a history of *Phytophthora* in chickpea, waterlogging, or pasture legumes. Alternative *Phytophthora* hosts such as pasture legumes, particularly medics and lucerne, must be managed to provide a clean break between chickpea crops.

Surveys in the 2020 and 2021 seasons identified 2 other *Phytophthora* species (*P. clandestina* and *P. megasperma*) on chickpea roots in the northern region. Current evidence suggests these pathogens are not causing severe root disease on chickpea, but further evaluations are required to confirm this. PRR only develops in northern NSW (Dubbo and north) and has not been detected in southern NSW despite extensive crop surveys over the last 4 seasons.

The PREDICTA® B soil test can be used to assess PRR risk. Detecting any level of *Phytophthora* in a paddock makes it at high risk of developing PRR if conditions become conducive. However, not detecting *Phytophthora* does not mean the PRR risk is low. If considerations other than *Phytophthora* warrant sowing in a high-risk paddock, choose CBA Captain$^{(\phi)}$ or PBA Seamer$^{(\phi)}$ and consider treating seed with metalaxyl, which can be applied in the

same operation as other fungicide seed treatments. Metalaxyl only provides protection for about 8 weeks; crops can still become infected and die later in the season. See Table 61 on page 114 for seed treatment information. Do not plant PBA Boundary(Φ) or PBA Drummond(Φ) in any paddock that has had a history of pasture legumes or chickpea with PRR.

The following will reduce the risk of PRR in chickpea crops:

- **Avoid PRR high-risk paddocks** where annual or perennial leguminous plants such as medics, sulla and sesbania have been a component of pastures and where PRR has occurred in the past in lucerne or chickpea; the oospores of *Phytophthora medicaginis* can survive for more than 10 years.
- **Avoid paddocks with areas prone to waterlogging** although the conditions that induce waterlogging might not happen every year. Previously flooded areas of paddocks could have also received water-borne *Phytophthora* inoculum.
- **Metalaxyl-based seed dressings are registered for PRR**, but they are relatively expensive and provide only 6–8 weeks protection after sowing.
- **Grow a variety with the highest level of resistance**, particularly in medium to high-risk situations, such as where medics, chickpea or lucerne have been grown in the past 5–6 years.

Phytophthora root rot disease is not considered to be a high risk in 2025. However, inoculum might be present in any areas of paddocks that have been previously flooded such as in 2022.

The NSW DPIRD website has more information on the *Phytophthora root rot management in chickpeas* and the Phytophthora root rot yield loss tool.

Sclerotinia white mould – fungi *Sclerotinia sclerotiorum*, *S. trifoliorum* and *S. minor*

Sclerotinia fungi (*S. sclerotiorum*, *S. trifoliorum* and *S. minor*) infect chickpea plants in 2 ways:

1. **Basal infection**: sclerotia (the soilborne survival structures of the fungus) germinate directly in or on soil and infect the plant through root or basal stem tissue, producing sclerotia on and within the basal stem tissues.
2. **Canopy infection**: sclerotia germinate indirectly, producing apothecia at ground level, which then release airborne ascospores (carpogenic germination) that infect plant parts higher in the canopy.

The type of infection pathway (basal or canopy) will be dictated by the season, and in particular, soil moisture levels. Paddocks with a high background level of sclerotia tend to develop basal infections. In the past, *Sclerotinia* canopy infection has led to issues with chickpea seed delivery and rejection at receival points. Canopy infection leads to sclerotes forming on and inside chickpea stems that can be captured during harvest. This can then cause problems at receival points because the cylindrical sclerotia formed inside the stems can resemble ryegrass ergots, and cause loads to be rejected or docked.

In southern NSW, outbreaks of sclerotinia white mould in chickpea are closely linked to paddocks with a history of canola or lupin production and thus are likely to have high populations of sclerotia. Chickpea crops that are sown early and reach canopy closure in winter tend to be predisposed to developing the disease. Infection via mycelium directly in the soil (basal) or through ascospores (canopy) appear to be equally prevalent.

The following will reduce the risk of *Sclerotinia* in chickpea crops:

- grade seed to remove sclerotia
- avoid paddocks with a history of *Sclerotinia* outbreak
- avoid paddocks with a recent history of canola or lupin
- avoid paddocks with a history of broadleaf weeds.

Development of *Sclerotinia* disease can affect broadleaf crops for several years following the outbreak. Sclerotia in soil can survive and cause future infections for at least the next 5 seasons; large sclerotia can survive for up to 10 years. Be aware of the legacy effect of the disease. In 2024, many outbreaks of *Sclerotinia* disease were due to sclerotia produced in the wet conditions in 2022.

Root lesion nematode – *Pratylenchus thornei*, *Pratylenchus neglectus*

Root lesion nematode (RLN) attacks cereals and pulses and is a threat to the whole farming system. Root lesion nematode causes poor plant growth in situations that otherwise appear favourable. Nematodes feed and multiply on and in the roots of chickpea plants and, in high numbers, will reduce growth and yield. Chickpea varieties differ in their resistance and tolerance to RLN, but are generally considered more susceptible (allowing nematodes to multiply) than field pea, faba bean and lupin. Reduce the risk of losses from RLN by not sowing chickpea in paddocks that had susceptible or intolerant cereal varieties in the previous season, and by following the recommendations in *Root lesion nematodes* on the GRDC website.

GO TO PAGES

Phytophthora root rot management in chickpeas (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0004/1452082/Phytophthora-root-rot-management-in-chickpeas-2023.pdf)

Phytophthora root rot yield loss tool (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/chickpeas/phytophthora-root-rot-yield-loss-tool)

GO TO PAGE

Root lesion nematodes https://grdc.com.au/___data/assets/pdf_file/0031/385627/GRDC_FS_RootLeNematodesNorth_1902_13.pdf

Virus diseases

Flying aphids spread viruses, which can cause major chickpea losses in some years. The Liverpool Plains, Gilgandra and Narrabri districts have a history of virus disease. In 2020, viruses caused widespread damage and losses in faba bean crops. Where chickpea crops adjoined or were close to an infected faba bean crop, the viruses also caused problems in the chickpea crops. Fortunately, most of this damage was confined to a narrow strip (10–20 m) beside the faba bean crop. Scattered instances of virus in chickpea were found in 2021 and 2023 on the edges of crops, however, no major yield effects were reported.

Prevention is the only option to limit losses because there is no in-crop management to control or cure virus disease. However, prevention measures are often not adequate due to limited effectiveness and practicality, and there are no virus-immune chickpea varieties. Follow best agronomic practices including retaining standing stubble, optimising sowing rate and sowing time, and controlling in-crop and fallow weeds. Stressed crops tend to be more prone to insect attack (particularly from aphids), hence the basic principles of paddock selection and plant health to avoid stressed crops should apply.

Other measures that can be beneficial in some cases include:

- using virus-free seed
- controlling host weeds
- distancing from lucerne crops
- using narrow row spacing
- using a higher sowing rate.

Monitoring and spraying for aphids in chickpea crops is generally not effective. Virus control is different for chickpea than for other pulses because spread is almost entirely by non-colonising aphids that visit crops only briefly. Management options are detailed in 2 0brochures: *Managing viruses in pulse crops in 2021* and *Aphid management in pulse crops* on the NSW DPIRD website.

GO TO PAGES

Managing viruses in pulse crops in 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Aphid management in pulse crops (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Fungicide seed dressings

Chickpea seed should always be treated to control seed-borne *Ascochyta* and *Botrytis* and some soil-borne diseases. Research has shown that P-Pickel T® (thiram + thiabendazole), and products containing thiram only (e.g. Thiram® 600) are equally effective against *Ascochyta* or *Botrytis*. Additionally, applying metalaxyl could be warranted if there is a risk of *Phytophthora* in a paddock, but seed treatment with metalaxyl only provides protection for 6–8 weeks from sowing.

Table 61. Chickpea seed treatments.

Active ingredient	Example product	Rate	Target disease
thiram 360 g/L + thiabendazole 200 g/L	P-Pickel T®	200 mL/100 kg seed	Seed-borne *Ascochyta* and *Botrytis*, damping off, *Fusarium*
thiram 600 g/L	Thiram® 600	200 mL/100 kg seed	Damping off, seed-borne *Ascochyta* and *Botrytis*
thiram 800 g/kg	Thiragranz®	150 g/100 kg seed	Seed-borne *Ascochyta* and *Botrytis*, damping off
metalaxyl 350 g/L	Apron® XL 350 ES	75 mL/100 kg seed	Phytophthora root rot

Injury from herbicide residues in soil

Herbicide residues can cause disease-like symptoms. Damage is greatest on alkaline soil with pH_{Ca} > 7.6, and compacted soil can aggravate the situation. Group 2 sulfonylurea herbicides (e.g. Ally®, Associate®, Glean®, Logran® B-power, Lynx®, Nugran® and Tackle®) on preceding cereal crops are especially risky, requiring growers to pay special attention to crop rotation recommendations on labels. The trend in northern NSW to double crop sorghum and include triazine tolerant (TT) canola in the rotation also increases the risk of Group 6 herbicide damage.

For detailed information on registered herbicides, refer to the NSW DPIRD guide *Weed control in winter crops*. Consult herbicide labels for specific information on plantback periods and rainfall requirements.

GO TO PAGE

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Desiccation and harvest

Chickpea plants often contain pods with various stages of maturity (i.e. first-set pods can be mature while young, green pods are still forming at the top of the plant). Chickpea seeds are physiologically mature when yellowing from the seed beak begins to extend through the remainder of the seed.

Chickpea crops can be desiccated using glyphosate (470/570/600 g/L) ± metsulfuron-methyl (600 g/kg) ± saflufenacil (700 g/kg), or diquat (200 g/L), to aid harvest efficiency once the majority (90–95%) of seeds have reached physiological maturity. Ensure that the harvest WHP is observed according to the label of the desiccation product used (e.g. 7 days for glyphosate products; 2 days for diquat products). If retaining seed on-farm for sowing, the

preferred product for desiccation is diquat, because glyphosate products can reduce seed viability, particularly if used before the correct timing stage for pod and seed maturity.

Desiccation allows earlier harvest, maximising both yield and grain quality. However, a crop ripening evenly under very hot conditions and/or with no weed problems might not require desiccation.

The receival standard for chickpea is 14% seed moisture content. Harvest should start as soon as the seed has dried down sufficiently to thresh. Harvesting chickpea at 14–15% moisture then drying or aerating will normally result in a higher yield, better quality seed, fewer harvest difficulties and reduced risk of late *Ascochyta* infection from rain during the harvest period.

Harvest losses and downgrading in quality (cracking) can be substantial if chickpea harvest is delayed until moisture is below 11–12%. A delayed harvest also increases the risk of lodging and late rain or hail damage leading to lower yields (reduced seed density and brittle seeds), and downgraded quality (observed as darkened, discoloured or sprouted seeds).

There can be significant yield losses if harvest operators are inexperienced. Make sure contractors are experienced in chickpea harvesting, that header settings are optimised for each crop and that harvesting machinery travels at appropriate speeds. Use appropriate harvest strategies to minimise header fires, such as dragging chains behind headers, and blowing dust and debris out of the header with compressed air as often as every 30 minutes if required.

Late rains can cause a second flush of growth and podding. When this occurs, timing the desiccation is a balance between minimising losses at the bottom of the plant (potential pod and seed loss when overripe and/or dry) and losses or defects from the top of the plant (killing the new growth resulting in immature and/or wrinkled seeds, green seeds and higher moisture seeds that can promote mould in storage). Harvesting should then start shortly after desiccation to avoid yield losses. A header that is well set up for the crop should be able to capture the good quality seed without retaining any smaller defective seed caused by this second flush of growth. Contact your header dealer or manufacturer for assistance in optimal header set up.

Marketing

The bulk of the Australian chickpea crop is exported. Most desi chickpea whole seed traditionally went to the subcontinent countries of India, Pakistan, Bangladesh and Sri Lanka for human consumption as whole seed, dahl (split seed) or besan. The Indian tariffs in recent years have changed export patterns, with Bangladesh being our main buyer (32%) in 2024, followed by Pakistan (18.9%), the United Arab Emirates (17.6%), India (16.7%) and Nepal (6%). A small proportion is sold whole, split or milled into flour within Australia and consumed locally, or sold to expatriate Indian communities in the UK, Canada and the rest of the world. There is an increasing interest in besan as an ingredient in food products, both domestically and internationally, and for plant-based foods. Markets assess chickpea visually (subjectively) so colour, size and shape are important for buyers. Check with local buyers for specific market requirements.

Prices in the subcontinent are lower in their post harvest period from April to June, and Turkish imports fill the period from August to December. The Australian crop meets the off-season demand from December to March, although prices for chickpea in Australia in October and November are often higher than in December and January. Indian tariffs since 2017 have meant that the main market has shifted to Pakistan and Bangladesh where consistent colour and size are important considerations for buyers, so careful harvesting and storage is imperative for achieving top prices.

Small seeded kabulis (up to 7 mm diameter) meet separate market requirements from large kabulis and are therefore priced accordingly. They are mainly exported to the Middle East and Europe.

Larger kabulis command a higher price, with premiums applying to each 1 mm increment in seed diameter. The size of these premiums varies from year to year, depending on supply from key competitors. Larger kabuli chickpea are exported to the subcontinent, Middle East and Europe. A small amount of both small and large seeded kabulis are retained in Australia for local processing and consumption.

The Grain Trade Australia has the current marketing specifications for the different grades of chickpea.

GO TO PAGE
Grain Trade Australia (https://www.graintrade.org.au/sites/default/files/Standards/Pulse%20Trading%20Standards%20202425%20Web%20Revised%2026Nov24.pdf)

Contributing authors

NSW DPIRD: Kristy Hobson, Chickpea Breeder, Tamworth; Kevin Moore, former Pulse Plant Pathologist, Tamworth; Sean Bithell, Pulse Pathology Research Officer, Tamworth; Kurt Lindbeck, Senior Plant Pathologist, Wagga Wagga; Mark Richards, Pulse Research Agronomist, Wagga Wagga; Jenny Wood, Pulse Quality Research Scientist, Tamworth; Leigh Jenkins, Research and Development Agronomist, Trangie.

Phil Bowden, Agronomist, Bowden Rural Services.

Further information

NSW DPIRD

Aphid management in pulse crops (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Managing ascochyta blight in chickpeas in 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0015/1220271/managing-ascochyta-blight-in-chickpeas-in-2021.pdf)

Managing Botrytis in chickpeas in 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/1299969/Managing-Botrytis-in-chickpeas-in-2021.pdf)

Managing diseases of chickpea 2025 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/1398188/Managing-diseases-of-chickpea-2025.pdf)

Managing viruses in pulse crops in 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Northern NSW research results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/ngrt-results)

Phytophthora root rot management in chickpeas (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/1452082/Phytophthora-root-rot-management-in-chickpeas-2023.pdf)

Phytophthora root rot yield loss tool (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/chickpeas/phytophthora-root-rot-yield-loss-tool)

Pulse Point 20, *Germination testing and seed rate calculation* (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

Southern NSW research results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results)

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

GRDC

GRDC website (https://grdc.com.au/)

Root lesion nematodes (https://grdc.com.au/__data/assets/pdf_file/0031/385627/GRDC_FS_RootLeNematodesNorth_1902_13.pdf)

What causes and how can we manage grain quality defects in chickpeas (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2019/03/what-causes-and-how-can-we-manage-grain-quality-defects-in-chickpeas)

Other

Agriculture Victoria (https://agriculture.vic.gov.au/)

Australian Pulse Trading Standards (Grain Trade Australia) (https://www.graintrade.org.au/sites/default/files/Standards/Pulse%20Trading%20Standards%20202425%20Web%20Revised%2026Nov24.pdf)

CESAR IPM checklist (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Department of Primary Industries and Regional Development: Agriculture and Food (https://www.agric.wa.gov.au/)

Grains Australia website (https://grainsaustralia.com.au/grains/pulses)

Helicoverpa management in chickpea (https://thebeatsheet.com.au/wp-content/uploads/2019/08/HelicoverpaManagement-InChickpea.pdf)

International Centre for Agricultural Research in the Dry Areas (https://icarda.org/)

The Beatsheet (Queensland Government) (https://thebeatsheet.com.au/)

Variety Central website (https://varietycentral.com.au/varieties-rates/)

Table 62. Disease and crop injury guide – chickpea.

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Fungal and oomycete diseases				
Pre-emergence diseases Many fungi	Seedlings fail to emerge.	Mainly kabuli cultivars (due to thinner seed coat).	Wet soils. Survives in soil.	Treat seed with a thiram-based fungicide.
Botrytis seedling disease *Botrytis cinerea* (fungus)	Seedlings wilt and die. Random distribution (not patches of plants).	Related to infected seed source.	Survives in seed after pods become infected.	Treat seed with a thiram-based fungicide (first grading out small or mouldy seed, if present).
Damping off *Pythium* (oomycete) and several fungi	Seedlings wilt and die. Patchy distribution.	Wet soils.	Survives in soil.	Treat seed with a thiram-based fungicide (might not give adequate control of *Pythium*).
Phytophthora root rot *Phytophthora medicaginis* (oomycete)	Rotted roots, plants easily pulled up. Patches of plants wilting; yellowing and defoliation starting from bottom leaves.	In patches with poor soil drainage, after heavy rainfall. Paddock history of medic, lucerne, or root rot in chickpea.	Survives in soil. Can persist for years. Spreads by water and soil movement.	Use desi varieties CBA Captain or PBA Seamer, which combine improved resistance to both *Phytophthora* and *Ascochyta*. Avoid kabuli varieties. Avoid paddocks with a history of PRR in chickpea. Rotate with cereals. In high-risk situations, treat seed with metalaxyl (effective against early, but not late, infection).
Ascochyta leaf, stem and pod blight *Phoma rabiei* (syn. *Ascochyta rabiei*) (fungus)	Lesions with concentric rings of tiny black specks. Leaves, stems, pods and, when severe, whole plants and patches of plants die. Can kill entire crops of susceptible varieties if not managed properly.	Endemic in NSW. Favoured by wet, humid weather.	Seed, chickpea trash, volunteer chickpea.	Prevent introduction of chickpea trash, especially on equipment. Maintain machinery hygiene. Control volunteers early in the fallow. Use varieties with improved resistance.
Botrytis grey mould *Botrytis cinerea* (fungus)	Initial infection appears as water-soaked tissue. Grey mycelial growth or dead patches on stem, collar, flowers or pods. Spore clusters evident as 'bunches of grapes' on dark brown stalks, best seen with hand lens.	Warm (>15 °C), humid, overcast conditions, dense canopies.	Many sources including any crop trash, sclerotes in soil, neighbouring crops, in-crop weeds, and infected seed. Inoculum usually not limiting.	Prevention is the same as for ascochyta blight. Current recommendations for *Ascochyta* management have also reduced botrytis grey mould. Pre-emptive spraying might be possible; check current recommendations.
Sclerotinia wilt *Sclerotinia sclerotiorum*, *S. trifoliorum*, *S. minor* (fungi)	Beige–tan lesions on stems at ground level or higher. White–grey mould in wet or humid weather. Sclerotes (1–5 mm black bodies) usually form on, or inside stems, or on tap roots.	Basal stem rot usually occurs in late winter/early spring. Canopy stem rot favoured by dense, luxuriant growth.	Sclerotes survive in soil for at least 8 years, germinate directly and infect roots and stem bases, or indirectly to release wind-blown spores. Very wide host range in broadleaf weeds and crops.	Rotate with cereals, maintain a 4-year break between broadleaf crops. Avoid sowing next to canola paddocks; control broadleaf weeds.
Virus diseases				
Turnip yellows virus (TYV ex BWYV), *Alfalfa mosaic virus* (AMV), *Subterranean clover redleaf virus* (SCRLV), *Cucumber mosaic virus* (CMV), *Mastrevirus* spp., *Bean leafroll virus* (BLRV), *Tomato spotted wilt virus* (TSWV), and at least 3 other species	First symptoms are bunching, reddening, yellowing, or shoot tip death. Later symptoms are reddening or yellowing and early death of whole plants. Diseased plants are scattered, i.e. solitary or in small groups of 2–4 plants.	Seasons or districts with major aphid flights. Most common in crops that have a low plant density and/or broadleaf weed infestation.	Survives in weeds and pasture legumes, especially lucerne. Spread by aphids and, to a minor extent, thrips and leafhoppers. AMV and CMV are transmitted through seed to seedlings at incidences up to 1% and 2% respectively.	Aim for optimal establishment, standing cereal stubble, and no weeds by following best agronomic practices. Controlling aphids on nearby legume pastures might help to prevent virus transmission in both autumn and spring.
Nematodes				
Ill-thrift *Pratylenchus thornei*, *P. neglectus*	Poor plant growth in situations where nodulation and other factors are favourable. Microscope shows nematodes with stylets.	Widespread in soils with high clay content.	Survives and spreads in soil.	Crop rotation with a nematode-resistant cereal variety could be beneficial. Some chickpea varieties are less susceptible than others (seek advice).
Herbicide injury				
Injury from soil residues of Group 6 herbicides (e.g. triazines) and sulfonylurea herbicides, and isoxaflutole (e.g. Balance®, Palmero®, Palmero® TX)	Discolouration, stunting, death, or leaf necrosis, especially in seedlings.	Related to pre-emergence herbicide use in current and previous seasons. Damage greatest in boom overlaps and compacted soil areas. Retained stubble can capture herbicide and slowly release after rain, potentially causing damage.	Most persistent in alkaline soils.	Observe label recommendations and avoid spray overlaps. Thoroughly decontaminate spray equipment, especially auto rigs. Be aware of Group 6 herbicide risk when following sorghum or maize (double crop) and triazine-tolerant (TT) canola. Be careful in flattened high cereal stubble loads.
Waterlogging				
Injury from saturated soil or standing water	Similar to phytophthora root rot, but roots remain intact. Initially plants do not pull easily out of ground. Onset is more rapid (1–2 days after rain) than for *Phytophthora*. Leaflets show bleaching, yellowing or reddening and might not fall.	Soil saturation for one day or longer, plants most sensitive when stressed and/or podding.	Poor drainage due to compacted soils or subsoil constraints.	Ensure good paddock drainage. Avoid irrigation during and after podding, particularly if plants are already moisture stressed.

Faba bean

Key considerations for 2025

- Test sowing seed for germination, vigour and virus infection with time allowed to source replacement seed if required.
- Grade retained seed for sowing and check seed size to ensure the correct sowing rate.
- Inoculate seed thoroughly to achieve the highest possible nitrogen (N) fixation and build soil N reserves for the following crop.
- Sowing into standing stubble can reduce the incidence and severity of aphid-borne virus diseases such as *Bean yellow mosaic virus* (BYMV) and *Bean leafroll virus* (BLRV).
- Source key inputs, such as fungicides, early in the season to avoid any supply issues that might arise.

Crop management

In winter crop rotations, faba bean are sometimes succeeded by canola in 'double break' sequences. Overall farming system weed management benefits from including faba bean's unique pre-emergent herbicide options, early sowing date and capacity for later in-crop weed suppression. Other farming system benefits from faba bean (and other pulses) include reduced inorganic nitrogen inputs, reduced financial risk and increased farm resilience and sustainability.

Many dryland and irrigated grain growing areas are well suited for faba bean production. All current varieties are suitable for stockfeed or human consumption. However, in some warmer and drier environments, seed size and colour could limit the potential to achieve human consumption market specifications. The highest yield potential is achieved on deep, neutral–alkaline, well-structured soils. Avoid shallow, light to sandy textured soils with low water-holding capacity and acidic layers below pH_{Ca} 5.2 in the root zone.

Well-nodulated faba bean can enhance soil N levels. Recent research findings in southern and central NSW have shown that faba bean fix more N than other pulses. The amount of fixed N is closely related to biomass production. Faba bean grain N concentration – 41 kg N/t, (similar to field pea and lentil) – influences the amount of N removed at harvest and the N balance after the crop. Substantial amounts of N were added to the soil, with overall N balances frequently exceeded 100 kg N/ha. Together with disease and weed management, these features combine to benefit subsequent crops in the rotation.

Faba bean can be sown immediately following maize, sorghum or cotton, where there is adequate moisture present and provided no damaging residual herbicides have been applied in the preceding crop.

The optimum temperature range for growth is 15–25 °C, with flowering ideally from August to late September. Flowering could start in late June if crops are sown early in northern NSW and can extend to mid October in southern NSW. High temperatures and hot, dry winds during flowering can affect pod formation and reduce yield. Severe frost following mild weather often causes stems to elongate, developing a bent stick (hockey stick) appearance, blackened leaf margins and aborted flowers and pods in some varieties.

Faba bean is an open-pollinated crop, so out-crossing from one variety to another is likely. If retaining faba bean for seed, aim to separate crops of different varieties by 500 m or more to reduce out-crossing and varietal contamination.

Introducing beehives to paddocks at flowering has been shown to benefit pod set and increase yields in areas where there are low naturalised honey bee or native bee populations.

Grain yield potential and N benefit are closely related to growth – the more dry matter produced, the higher the potential yield and the more N added to the soil.

Crop stubbles and grain left on the ground after harvest can provide valuable grazing with no stock health risks. Adhere to harvest withholding periods (WHP) for all herbicides, insecticides and fungicides applied to the crop.

Soil types

Good soil and paddock drainage are preferable, however, faba bean can withstand short periods of waterlogging much better than chickpea, field pea or lupin. If possible, locate crops at least 500 m from faba bean stubble to reduce disease risk. In northern NSW, faba bean should be sown on a minimum of 100 mm plant available water (PAW) at sowing.

In southern NSW most cropping soils have acidic subsurface layers that can affect root growth, nodulation, crop vigour and yield potential. Severely acidic layers (pH_{Ca} <4.5), are commonly found at depths of 5–10 cm and 10–15 cm. Liming programs should be planned at least 2 years before sowing acid-sensitive pulses using analyses from soil samples collected at 5 cm intervals to 20 cm deep. This data shows the depth and severity of acidity in subsurface layers, and guides lime rate and the appropriate incorporation method needed for effective amelioration.

A medium-term to long-term approach is necessary to manage acidity in layers below 10 cm. Initial lime applications should target a pH_{Ca} >5.8 in the top 0–10 cm to facilitate the downward movement of lime. Strategic incorporation that effectively mixes appropriate rates of fine-grade lime will accelerate pH increase in subsurface layers. Ongoing soil testing is recommended to guide subsequent liming treatments. Where deep lime incorporation is not an option, liming soil above the acid layers to target pH_{Ca} 5.8 is needed to help move the lime effect to the depth of acidity. Liming significantly improves faba bean yield potential.

Sowing

Seeds are relatively large and flat compared with cereal seed. Some sowing equipment cannot successfully sow seed of this size and shape. It is important to test equipment with inoculated seed before sowing as the peat carrier increases seed bridging in seed boxes and air seeder bins. Ensure the air seeder sowing boots and hoses have the capacity to handle large seeds. Check with machinery manufacturers, but sowing at a slower ground speed will reduce the chance of hose blockages and ensure air seeders have enough airflow to push the seed evenly to the sowing boot.

Ideally, sow faba bean into cereal stubble with low soil N for maximum N fixation, rotational benefits and to minimise aphid infestation. Sowing on wider row spacing can improve stubble flow.

Faba bean is generally sown 4–6 cm deep, depending on soil moisture, but it can be sown up to 12–13 cm deep if needed due to its hypogeal germination. Deep furrow or moisture-seeking techniques can be used to sow on time. The large seed size makes faba bean suitable for this type of sowing system. Deep sowing can also reduce potential effects on crop establishment from post-sow, pre-emergent herbicides. Under furrow-irrigated conditions, it is best to sow shallow (2–3 cm) and before applying water.

Sowing time

Aim to sow in the earlier part of the sowing window to maximise yield potential. Avoid sowing earlier than the suggested sowing times, particularly under irrigation, as this can promote excessive vegetative growth and consequently increase crop lodging and foliar diseases. Sow irrigated crops in southern NSW in early to mid May. See Table 63 for the suggested sowing window for different regions.

Sowing rate

Sowing rates for faba bean vary according to seed size, germination percentage, sowing time and region. Over a wide range of plant populations under favourable conditions, faba bean can yield well due to its ability to compensate and fill in plant rows.

Trials conducted in northern and southern NSW under dryland conditions show that plant densities below the recommended populations reduce yield in most years. Later-sown crops require a higher plant population to minimise potential yield loss. A 20 plants/m^2 population has been acceptable on a 50–100 cm row spacing in northern NSW dryland crops and southern NSW irrigated crops. Plant populations of 20–35 plants/m^2 are recommended for southern NSW dryland crops, depending upon sowing time.

Table 63. Suggested sowing times.

Region	April				May				June			
Week	1	2	3	4	1	2	3	4	1	2	3	4
Northern												
Narrabri–Boggabilla		>	★	★	★	<	<					
Walgett–Coonamble	>	★	★	★	<	<						
Liverpool Plains				>	★	★	★	★	<	<		
Central West												
Dubbo–Warren		>	★	★	★	<	<					
Cowra–Forbes		>	★	★	★	<	<					
Central and Southern												
Temora–Wagga; Wagga–Lockhart			>	★	★	★	<					
Griffth–Hillston (irrigated)				>	★	★	<	<				

> Earlier than recommended, yield reduction likely.
★ Best sowing time.
< Later than recommended, yield reduction likely.

Your calculation

(100 seed weight ❶ (grams) ..... × target plant population (plants/m²) ..... × 1000) ÷ (establishment percentage ❷ ..... × germination percentage .....) = your sowing rate ..... kg/ha

❶ To determine your seed weight, weigh 100 seeds in grams.
❷ Establishment percentage – 90% is a reasonable estimate, unless sowing into adverse conditions.

Table 64. Sowing rates for faba bean varieties.

Sowing rates	Average 100 seed weight (g)	Seed rate (kg/ha) 20 plants/m²	Seed rate (kg/ha) 30 plants/m²
	Establishment %	90	90
Doza	50 (40–60)	111	166
FBA Ayla	65 (61–68)	144	216
PBA Warda	55 (52–57)	122	183
PBA Nanu	59 (57–61)	131	196
PBA Nasma	70 (61–79)	156	233
PBA Bendoc	64 (50–72)	142	212
Fiesta VF, Farah, Nura	68 (60–75)	151	226
PBA Marne, PBA Samira, PBA Amberley	74 (61–87)	164	246
PBA Rana, PBA Zahra	75 (65–85)	167	250

Note: calculations based on 100% seed germination and 90% establishment.

Table 65. Target plant density by region.

Plant population target	Plants/m²
North dryland	15–25
North irrigated	15–20
South dryland	20–35
South irrigated	20–30

Inoculation

Inoculation is essential on all soil types. Use the improved, commercially available, faba bean inoculant (Group F) (see New Group F rhizobia inoculant for faba and broad bean).

Faba bean rhizobia are very sensitive to soil acidity. Some inoculants are more sensitive to drying out than others, so ensure seed is sown into good soil moisture, especially when moisture seeking. Calibrate the planter using inoculated seed. To optimise all stages of the nodulation process, follow all the manufacturer's guidelines regarding storage and inoculant application.

GO TO PAGE
New Group F rhizobia inoculant for faba and broad bean (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-f-rhizobia-inoculant-for-faba-and-broad-bean)

Nutrition

Phosphorus (P) is the main nutrient required by faba bean. Apply P fertiliser to deficient soils at equivalent rates to that used on cereals. Phosphorus is best banded close to, but not in direct contact with, the seed at sowing, especially in soils that have grown rice within the previous 2 years. Yield responses to zinc (Zn) have been recorded on alkaline clay soils, but only where Zn had not been applied to other crops in the rotation. Select paddocks with a low level of residual N to promote effective nodulation and N fixation. Consider applying molybdenum (Mo) to acid soils to aid nodulation. Fifty grams of Mo per hectare applied every 5 years is recommended.

Variety selection

When selecting a variety consider season length, seed size with reference to sowing machinery, disease tolerance, seed availability and suitability to buyers and markets. Many varieties are now available with different characteristics, and most are suited to specific growing regions in NSW, see Table 66 on page 122 for characteristics.

Northern NSW

DozaΦ. Released in 2008 by Pulse Breeding Australia's (PBA) northern faba bean breeding node at Narrabri. It is better adapted to warmer spring temperatures than Barkool, Cairo Φ and Fiord; higher yielding than Cairo Φ, with improved rust resistance. Smaller seed than Cairo Φ, but more uniform; light buff colour. Licensed to Seednet; available through local seed suppliers. End point royalty (EPR)$3.63/tonne incl. GST.

FBA AylaΦ. Released in spring 2021 for northern NSW and southern Queensland (Qld). *Bean leafroll virus* (BLRV) resistance is similar to PBA Nanu Φ. It has larger seed than PBA Warda Φ, but smaller than PBA Nasma Φ, placing it in the same category as PBA Nanu Φ. Flowering and maturity times are similar to PBA Nanu Φ, but about a week earlier than Cairo Φ. FBA Ayla Φ is suggested as an alternative to PBA Warda Φ and PBA Nasma Φ, where very large seed size can be an issue. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA WardaΦ. Released in 2012 for the northern region with higher yield and bigger seed than Doza Φ. Best adapted to eastern areas with higher rainfall. It is the most consistent and highest yielding variety in north-western NSW. Similar to Doza Φ for earliness, chocolate spot and rust resistance, but has better tolerance than Doza Φ to BLRV and vegetative frost damage. Its seed is more uniform and bigger than Doza Φ making it suitable for the human food market. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA NanuΦ. Released in spring 2018. Highest yielding variety in the state's north-east. It has good overall resistance to disease and is MR to BLRV. It has similar agronomic traits to other northern varieties. PBA Nanu Φ seed is smaller than PBA Nasma Φ, but is larger than PBA Warda Φ so more suited to Middle Eastern markets. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA NasmaΦ. Released in spring 2015 for northern NSW and southern Queensland. It has a larger and more uniform seed than PBA Warda Φ making it readily acceptable into the human consumption market. Flowering, maturity time, disease resistance and frost tolerance are similar to PBA Warda Φ. It also has improved resistance to BLRV over PBA Warda Φ. Licensed to Seednet. EPR $3.85/tonne incl. GST.

Southern NSW

NuraΦ. Released in 2005 from the southern node of the National Faba Bean Breeding Program. Produced from a cross between Icarus and Ascot and selected for improved resistance over Fiesta VF to chocolate spot and ascochyta blight. Later flowering than Fiesta VF, but has similar maturity. Suited to the medium–high rainfall areas of southern NSW; not recommended for northern NSW. Shorter height than Farah Φ and Fiesta VF and less likely to lodge. Seed is slightly smaller than Farah Φ and coloured light buff. Licensed to Seednet; available through local seed suppliers. EPR $3.30/tonne incl. GST.

PBA AmberleyΦ. Released in 2019. It is adapted to the medium–high rainfall and longer season environments of southern NSW, Victoria (Vic) and South Australia (SA). It is the first faba bean variety rated MR–MS to chocolate spot and is MR to ascochyta blight. It has the best chocolate spot resistance of all faba bean varieties. It flowers and matures at about the same time as Nura Φ and PBA Samira Φ. PBA Amberley Φ has excellent stem strength and standing ability. Seed size is similar to PBA Samira Φ and should be suitable to co-mingle with other major varieties for the Middle Eastern market. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA BendocΦ. Released in spring 2018. The first faba bean variety with tolerance to some imidazolinone herbicides. A minor use permit PER14726 (expiry 30 Sept 2029) is currently available for applying imazamox post emergence. Adapted to southern NSW. It flowers at the same time as Nura Φ and PBA Samira Φ. Seed is a similar size to Nura Φ and suited to the Middle Eastern market. PBA Bendoc Φ is not recommended for northern NSW. Licensed to Seednet. EPR $4.29/tonne incl. GST.

GO TO PAGE
PER14726 (https://permits.apvma.gov.au/PER14726.PDF)

PBA MarneΦ. Released in spring 2018. It is adapted to the lower rainfall or shorter season environments of southern NSW. It has good stem strength and standing ability. Seed is similar in size to PBA Samira Φ and should be suitable to co-mingle with other major varieties destined for the Middle Eastern market. Suited to Middle Eastern markets. Commercialised by Seednet. EPR $3.85/tonne incl. GST.

PBA RanaΦ. Released in 2011. Mid–late flowering, it is suited to the higher rainfall, longer season growing areas. Large, plump, light-brown seed that is bigger than most other varieties. Investigate marketing options as PBA Rana Φ needs to be segregated to achieve a premium for its larger seed size. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA SamiraΦ. Released in spring 2014. Adapted to a wide range of environments in the southern region. Mid flowering with similar maturity to Farah[Φ] and Fiesta VF. Seed is slightly larger than Farah[Φ] and Fiesta VF, but the same colour and should be suitable for co-mingling with other varieties for human consumption. Suited to Middle Eastern markets. Licensed to Seednet. EPR $3.85/tonne incl. GST.

PBA ZahraΦ. Released in spring 2015. Selected for the southern region where it has shown very high yield potential and is particularly responsive to high-yielding environments. Flowers at the same time as Nura[Φ] and PBA Samira[Φ], but can mature slightly later under conducive seasonal conditions. Large, plump seed, similar to PBA Rana[Φ] so these 2 varieties could be co-mingled for a large-seeded category for the Middle Eastern market. Licensed to Seednet. EPR $3.85/tonne incl. GST.

Table 66. Faba bean variety characteristics and reactions to pathogens.

Variety	PBR	Maturity	Seed colour	Seed size (g/100 seeds)	Pathogen				
					Ascochyta blight ❶	Chocolate spot ❶	Rust	Cercospora leaf spot	*Pratylenchus thornei* ❶
Doza	yes	early	light buff	40–60	S Ⓟ	S	MR	S	MS–S
FBA Ayla	yes	early	beige to brown	51–68	MS Ⓟ	S	MR	S	MR–MS
Nura	yes	mid	light buff	50–65	MR Ⓟ	MS	VS	S	MS
PBA Amberley	yes	mid	light buff	60–84	MR	MR–MS	VS	S	MR–MS
PBA Bendoc	yes	early–mid	light brown	50–71	MR (MS) Ⓟ	S	VS	S	MR–MS
PBA Marne	yes	early–mid	light buff	57–87	MS	MS	MR–MS	S	MS
PBA Nanu	yes	early	beige to brown	57–61	MS Ⓟ	S	MR	S	MR–MS
PBA Nasma	yes	early	beige to brown	61–79	S Ⓟ	S	MR–MS	S	MS–S
PBA Rana	yes	mid	light buff	62–94	MR–MS Ⓟ	MS	VS	S	MS
PBA Samira	yes	mid	light buff	58–87	MR Ⓟ	MS	S	S	MR–MS
PBA Warda	yes	early	beige to brown	58–70	S	S	MR–MS	S	MR–MS
PBA Zahra	yes	mid	light buff	58–91	MR–MS	MS	S	S	MR–MS

❶ NVT disease resistance ratings at March 2025.
Ⓟ Provisional.

Table 67. Faba bean performance in northern NSW compared with PBA Warda[Φ] = 100%.

North east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Warda (t/ha)	**1.99**	**2.57**	**1.99**	**0.9**	**2.61**	**1.85**	
Doza	96	83	90	86	84	89	7
FBA Ayla	106	89	114	93	96	100	7
PBA Nanu	104	88	119	98	98	101	7
PBA Nasma	92	96	99	87	103	95	7
PBA Warda	**100**	**100**	**100**	**100**	**100**	**100**	**7**

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Warda (t/ha)	**2.58**	**3.58**	**3.49**	**1.07**	**3.29**	**2.88**	
Doza	91	94	91	83	79	88	17
FBA Ayla	99	97	100	94	93	97	17
PBA Nanu	95	99	105	95	95	98	17
PBA Nasma	98	89	93	106	94	94	17
PBA Warda	**100**	**100**	**100**	**100**	**100**	**100**	**17**

Table 68. Faba bean performance in southern NSW compared with PBA Samira[Φ] = 100%.

South west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Samira (t/ha)	**4.25**	**4.4**	**3.66**	**1.69**	**3.11**	**3.37**	
FBA Ayla	–	–	–	127	100	106	3
Nura	88	94	64	98	90	86	6
PBA Amberley	97	100	–	100	99	98	5
PBA Bendoc	89	100	69	105	93	90	6
PBA Marne	98	113	87	120	98	101	6
PBA Nasma	–	–	–	143	103	112	3
PBA Rana	–	88	73	88	81	88	5
PBA Samira	**100**	**100**	**100**	**100**	**100**	**100**	**6**
PBA Zahra	94	98	–	99	100	98	5

Irrigation

Faba bean can be grown in rotation with irrigated summer crops such as cotton, rice, maize or sorghum. Faba bean is a safe crop to sow dry and water-up on either beds or hills. To increase rhizobium inoculum survival, dry-sown beans should be watered immediately after sowing. Always ensure good seed-soil contact.

North

Plant population can be lowered to 15 plants/m^2 without yield penalties, provided plant establishment is even. In short-season northern areas, one irrigation at early pod-fill (early to mid August) might be all that is required. Avoid irrigating before flowering as often tall, vegetative, low-yielding crops can result.

South

Plant population can be lowered to 20 plants/m^2 without yield penalties, provided plant establishment is even.

Apply the first spring irrigation early to avoid stress during flowering and early pod-filling as delays will reduce yield potential. Follow-up irrigations can be scheduled according to plant water use. Although the crop tolerates some waterlogging, a good layout is essential and irrigation times should be kept as short as possible for high yields.

Furrow irrigation is preferred over spray irrigation as overhead watering encourages foliar disease. The bankless channel system of furrow irrigated beds inside flat bays is now the dominant layout in the Murrumbidgee Valley. Border check layouts increase the risk of waterlogging during and after irrigation. In these layouts, irrigation and drainage should be completed within 8 hours.

Weed control

To maximise farming system rotational benefits, effective weed control is essential as part of an integrated approach to weed management (see WeedSmart Big 6).

A sound integrated approach to weed control within the faba bean crop and to following crops includes:

- growing in a 'double break' sequence
- using a unique pre-emergent herbicide option
- early sowing date
- capacity for later in-crop weed suppression.

Herbicides can damage faba bean, so use only registered products and follow the label directions. Current permits for weed control include PER82634 (exp 31/7/26) and PER14726 (exp 30/9/29).

Plants weakened by herbicide injury are more susceptible to diseases, especially chocolate spot. The most common problems come from residual herbicides applied to preceding cereal crops, but non-residual herbicides have also been implicated. Examples include:

- **Sulfonylurea herbicides** (triasulfuron, chlorsulfuron, metsulfuron methyl, metosulam) applied to preceding cereal crops. Take special note of label instructions concerning crop rotation and plantback periods, particularly on high pH and/or compacted soils where rainfall has been limited. Residues could persist longer in soils that have received surface-applied lime to raise soil pH.
- **Clopyralid** applied to preceding cereal crops and summer fallows; it can carry over in straw and affect subsequent crops.
- **Atrazine** applied at full rates to preceding maize and sorghum crops; check the label for crop rotation guidelines.
- **Picloram** and **aminopyralid** formulations e.g. Grazon™ Extra and FallowBoss® or Tordon® applied to previous summer fallows. Under dry conditions, fallow herbicide breakdown is reduced and subsequent crops can suffer herbicide injury.
- **Triazine herbicides** (simazine, cyanazine, terbuthylazine) which, when applied in-crop can potentially cause crop damage in some circumstances – application rates influence herbicide action on different soil types. Follow label recommendations and avoid spray overlaps.

Some spray oils used with post-emergent selective grass herbicides can cause minor leaf spotting and/or burning; do not confuse these with disease symptoms. Correct boom spray decontamination procedures must be followed to avoid potential herbicide injury.

Be aware of the plantback periods for the post-sowing pre-emergent herbicides (e.g. imazethapyr – Spinnaker®) used in faba bean as these can affect subsequent crops, especially other non-pulse broadleaf crops such as sunflower and canola.

Read pesticide labels for further information on current weed control recommendations, plantback periods and correct spray unit decontamination procedures.

For information on avoiding herbicide residues in delivered product, see the GRDC *Pre-harvest herbicide use factsheet*.

GO TO PAGES

WeedSmart Big 6 (https://www.weedsmart.org.au/big-6/)
PER82634 (https://permits.apvma.gov.au/PER82634.PDF)
PER14726 (https://permits.apvma.gov.au/PER14726.PDF)

Insects

A range of pests can attack faba bean plants and pods, but they all have natural predators that can help keep them in check. Monitoring pest and beneficial populations will show if chemical control is needed as it is important in improving crop health and vigour. The 2 critical times when pests need monitoring are at establishment and from flowering to grain fill.

Redlegged earth mite and blue oat mite

Large populations can cause distorted early growth and kill seedlings. The rasping of the leaf surface during feeding results in a distinctive silvering or whitening on the leaves. Symptoms can be confused with frost damage.

Lucerne flea

Damage is characterised by clear membranous windows chewed into leaf surfaces. It is a sporadic pest in the paddock, so not all the crop will be infested. Its activity is usually limited with high humidity and mild temperatures. Hot spots can occur along weedy fence lines and around trees and rocky outcrops in paddocks. A border spray around crop boundaries will often be enough to control lucerne flea (*Sminthurus viridis*).

Detecting and controlling mite and flea damage early improves crop health and vigour.

Aphids

Monitor from early establishment. Dense colonies of **cowpea aphid** (*Aphis craccivora*), consisting of shiny black adults and dull grey juveniles, often damage shoot tips early in the season and can reduce yield. **Pea aphid** (*Acyrthosiphon pisum*) and **blue green aphid** (*Acyrthosiphon kondoi*) are large green aphids that are less conspicuous on plants. They are not known to cause major feeding damage. All 3 aphid species (cowpea, pea and blue green) are vectors for a range of faba bean viruses.

Faba bean aphid (*Megoura crassicauda*) was recorded in Australia in 2016 and since then has established in NSW, spread to Qld and Vic, and observed in Tasmania.

The aphid has an extremely fast reproduction rate and an ability to create large colonies on faba bean plants in just a few days. Faba bean and vetch are its preferred hosts. It can also survive and reproduce on field pea and lentil. Sub clover and lucerne appear to be the least favourable hosts. The aphid can transmit viruses such as *Bean yellow mosaic virus* (BYMV) and *Pea seed-borne mosaic virus* (PSbMV).

Economic thresholds for faba bean aphid have not been established. Various insecticides are used in faba bean such as imidacloprid, pirimicarb, pymetrozine and dimethoate. However, only pymetrozine (Chess®) is registered and permitted for faba bean aphid control.

Aphid monitoring needs to be conducted in autumn and during winter to prevent aphids from establishing and transmitting viruses in crops.

Thrips

Monitor from early establishment. Thrips are not usually considered a major pest, however, their feeding can damage seedlings and high populations can cause seedling death. Fields sown close to cotton often have high populations. Thrips can cause flower and early pod abortion and should be monitored regularly during flowering. Thrips can also spread *Tomato spotted wilt virus* in faba bean.

Mirids

Green mirids (*Creontiades dilutus*) are pod-sucking insects. Monitor crops from early pod-fill for nymphs and adults. Mirids have been shown to cause spotting on the seed coat and, in high populations, reduce seed size and yield. Mirids are quite mobile within the crop; there are no spray thresholds for control.

Helicoverpa spp.

Base control decisions on regular monitoring. Crops should be monitored twice weekly from flowering onwards. Larvae feed on leaves, stems and pods. Once they are of sufficient size, larvae burrow into pods and feed on the developing seed. Spraying is usually recommended when the average number of small larvae (less than 10 mm) exceeds 2–4 /m^2. Human consumption markets have strict limits on *Helicoverpa*-damaged seeds, so spray thresholds of 1/m^2 warrant control. Early sown crops can mature before *Helicoverpa* moth infestation, avoiding the need for control. *Helicoverpa* spp. can develop resistance to certain insecticides, so check the resistance status for your region.

The recommended strategy for limiting resistance is:

- check crops regularly to detect eggs and small caterpillars
- correctly identify the species present
- spray caterpillars when they are less than 10 mm long
- rotate insecticides from different chemical groups according to the *Helicoverpa* strategy for each region
- encourage beneficial insects and combine different strategies, including weed control, biological control and chemical control, for sustainable *Helicoverpa* management.

GO TO PAGE

Check the resistance status for your region (https://thebeatsheet.com.au/key-pests/helicoverpa-insecticide-resistance-surveillance/)

Guidelines to support effective, sustainable integrated pest management are available at *IPM Checklist: a step-by-step guide for a sustainable grains industry* – Cesar Australia. See the NSW DPIRD guide *Insect and mite control in field crops* for more detailed information on pest control measures and thresholds. Table 69 itemises the permits available to control pests in faba bean.

Table 69. Faba bean insecticide permits as at March 2025 ❶.

Active ingredient	Registered trade name	Permit number	Date	Pests	Rate (per ha)
Alpha-cypermethrin 100 g/L	Pacific Alpha Cypermethrin 100 EC plus other registered products	PER85447	16 April 2018 to 31 December 2029	False codling moth (*Thaumatotibia leucotreta*)	175 mL
Alpha-cypermethrin 250 g/L	4Farmers Alpha Cypermethrin 250 SC plus other registered products				70 mL
Chlorpyrifos 500 g/L	Agro-Essence Chlorpyrifos 500 plus other registered products	PER8522	9 March 2006 to 30 September 2025	Wireworm black field earwig field cricket, false wireworm	100 mL product plus 125 mL sunflower oil per 2.5 kg cracked sorghum or wheat seed
Deltamethrin 27.5 g/L EC	Ballistic Elite plus other registered products	PER80969	22 July 2016 to 31 March 2025	Turnip moth (*Agrotis segetum*)	500 mL product
Fenitrothion 1000 g/L EC	Nufarm Fenitrothion 1000 plus other registered products	PER12751	11 May 2011 to 31 July 2025	Spur-throated locust (*Austracris guttulosa*)	350 mL
Fenitrothion 1230 g/L ULV	Sumitomo Sumithion ULV Premium Grade Insecticide				285 mL
Fipronil 200 g/L SC	Barmac Fipronil 200 SC Insecticide				Maximum 6.25 mL

❶ All current APMVA pesticide permits are available at the APVMA website.

Disease management

Proactive decisions will help to manage disease risks. Monitoring from emergence for disease, especially during favourable conditions, is crucial. *Managing diseases of faba bean 2025* has the latest information from the department.

- Effective disease control depends on strategic fungicide use, but careful attention to other management practices can reduce disease pressure making the fungicide program more effective, including:
  - growing faba bean no more than once in 4 years in the same paddock
  - separating crops by 500 m from preceding faba bean crops
  - reducing disease-infected stubble load by grazing and/or incorporating stubble
  - controlling volunteer faba bean
- using clean, *Ascochyta*-free seed
- growing locally adapted varieties that are the most resistant to the major regional diseases.

Fungicide management

Adopting an approach to minimise the risks of fungicide resistance is recommended, see the *Fungicide resistance five*.

- Mancozeb, carbendazim, chlorothalonil, tebuconazole + azoxystrobin, azoxystrobin + cyproconazole, mefentrifluconazole + fluxapyroxad, prothioconazole + bixafen, fludioxonil + pydiflumetofen, copper, metiram, tebuconazole, and azoxystrobin with prothioconazole, a tank mix of azoxystrobin + tebuconazole, and procymidone are all registered. Check pesticide permits and registrations for any changes in use patterns before using fungicides.
- Mancozeb, chlorothalonil, metiram and copper are protectants and have no curative action on existing infections. Newly emerged, untreated foliage will not be protected.
- The more recent fungicides Aviator® Xpro® and Miravis® Star have excellent protectant as well as limited curative activity.
- Carbendazim and procymidone have very limited curative action and work best when applied before infection occurs. These fungicides are not translocated from sprayed leaves so foliage that develops after applying fungicide is not protected.

Spray on time

Organise spraying ahead of schedule so that fungicides can be applied as soon as a decision is made. Frequently viewing the four-day weather forecasts can help decision making. Do not compromise a fungicide spray to wait for a herbicide application. Plan to spray one or 2 days before a significant rain period, but do not delay spraying because of the threat of rain. Light rain (less than 12 mm) can increase mancozeb efficacy. For ground application, aim for 100 L water/ha. If the label or permit specifies a minimum water rate, the fungicide must be applied at that specified water rate. Correctly timing fungicide application is essential for good disease control.

GO TO PAGES

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)
Insect and mite control in field crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops) APVMA website (https://portal.apvma.gov.au/pubcris).
PER85447 (https://permits.apvma.gov.au/PER85447.PDF)
PER8522 (https://permits.apvma.gov.au/PER8522.PDF)
PER80969 (https://permits.apvma.gov.au/PER80969.PDF)
PER12751 (https://permits.apvma.gov.au/PER12751.PDF
Managing diseases of faba bean 2025 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1562037/Managing-diseases-of-faba-bean-2025.pdf#:~:text=Faba%20bean%20crops%20require%20vigilant%20and%20proactive%20disease,waterlogging.%20Eliminate%20volunteer%20faba%20bean%20plants%20over%20summer%2Fautumn).
Fungicide resistance five (https://afren.com.au/understanding/)
Pre-harvest herbicide use factsheet (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/preharvest-herbicide-use-fact-sheet)

Ascochyta blight, chocolate spot, Cercospora, rust and sclerotinia management in southern NSW

Research and commercial evaluation have shown that strategic spraying with older actives such as mancozeb, carbendazim, chlorothalonil or procymidone in combination with new systemic products is effective for disease management. Drier conditions in southern NSW in spring 2024 limited foliar disease development in faba bean, and the need for foliar fungicides. Despite low disease pressure, growers should be prepared to manage disease in 2025.

The recommended fungicide program includes an application of foliar fungicide 4–6 weeks after emergence to control seed-borne *Ascochyta*, *Cercospora* and early chocolate spot. Fungicides containing tebuconazole are effective at managing *Cercospora*, which develops where there is a history of faba bean production either in the paddock or surrounding paddocks. This disease is identified by the large, round, dark lesions that form first on the lowest leaves. Mancozeb, carbendazim, chlorothalonil, procymidone and newer actives can then be applied for continued chocolate spot control throughout the growing season, following label application guidelines. The number of spray applications depends on the number of infection periods, (i.e. rain events). Monitor crops regularly in spring for chocolate spot development, which can be rapid under favourable conditions, (i.e. following canopy closure, mild temperatures and frequent rain). Check crops every few days when conditions are favourable.

Older fungicide actives are effective for up to 14 days, with newer systemic products offering longer periods of protection. Severe disease pressure will reduce the protection period, as will rapid growth, which will be totally unprotected. A final fungicide application should be considered for rust and late control of *Ascochyta*, which can cause blemishes on the seed. Older protectant fungicides can be used at this late growth stage as the actives do not move within the plant.

The new generation fungicides have shown excellent chocolate spot control. They have strict limitations on the number and timing of application. Be sure to follow label guidelines. Growers are strongly advised to follow these restrictions as fungicide residues in the grain will have implications on the grain markets.

Be aware of the critical spray application timings as part of an overall fungicide program. This includes:

- **First critical period** – 4–6 weeks after emergence to manage seed-borne disease and *Cercospora*.
- **Second critical period** – during early flowering just before canopy closure. This is the last opportunity to apply fungicides that will penetrate the crop canopy and protect potential infection sites from disease establishment and spread, which is particularly important for managing chocolate spot.
- **Third critical period** – at the end of flowering and early pod fill. Fungicide applications at this time should be aimed at protecting developing pods and preventing any further disease spread. The target diseases at this time are ascochyta blight, chocolate spot and rust. An insecticide might also be required during this period. For registered foliar fungicides see Table 95 on page 182.
- The increase in continuous cropping and frequency of canola within cropping rotations has resulted in *Sclerotinia* disease becoming a concern for faba bean producers. While faba bean is not as susceptible to *Sclerotinia* disease compared with other pulse crops, faba bean can still host the pathogen and suffer yield loss under high disease pressure conditions.
- The conditions leading to *Sclerotinia* infection are very similar to that of chocolate spot, hence disease management is also similar. Applying foliar fungicides to manage chocolate spot will also have activity against *Sclerotinia* disease, in particular those fungicides containing procymidone and newer generation systemic fungicides registered to manage chocolate spot.

Rust and chocolate spot disease management in northern NSW

Rust and chocolate spot are the main diseases in the northern region.

To manage both diseases:

- control volunteer faba bean over summer
- select paddocks as far from preceding faba bean crops as possible (preferably at least 500 m).

Apply a mancozeb spray 4–6 weeks after crop emergence or before significant rain or canopy closure. This can be combined with a grass herbicide spray if the timing is correct for both products. This early spray is critical and will help to control early chocolate spot and rust infection.

Monitor crops for signs of rust and chocolate spot. It is very important to protect the crop during flowering and early pod set.

Spraying just before canopy closure is more effective than after as the fungicide can still reach the lower parts of the plant. Mancozeb is still the preferred fungicide for disease control in northern NSW because of its proven effectiveness against both rust and chocolate

spot, and because there are no restrictions on the number of applications. Note that mancozeb has no translaminar activity, so good leaf coverage is essential.

Tebuconazole has excellent action on rust, but limited activity on chocolate spot. It is therefore advisable to only use tebuconazole if rust is detected in the crop. At late crop stages consult your agronomist as disease levels, seasonal conditions and outlook, crop development stage, yield potential and grain prices determine spraying economics. In high rainfall years, chocolate spot can cause severe crop losses. For chocolate spot control follow the recommendations listed above for disease management control in southern NSW.

During 2016, high incidences of stemphylium blight were noted in several paddocks. Initial research indicated that this disease might only be a problem in years with very high rainfall. However, no significant stemphylium blight has since been observed in commercial crops. There are large differences in susceptibility among faba bean varieties, with PBA Warda$^{\Phi}$ among the more susceptible. Currently no advice can be given on fungicide use for control.

Virus disease management

Virus diseases in faba bean crops can be a problem throughout NSW, even though varieties released for the north have greatly improved resistance compared with older varieties. Disease management still depends on reducing aphids from entering the crop and spreading the viruses they picked up from other host plants.

During the 2020 season unusually severe virus symptoms were observed in many paddocks in northern NSW. Extensive testing of symptomatic samples showed that the symptoms were caused mainly by BYMV and in some cases by a co-infection of BYMV with *Alfalfa mosaic virus* (AMV). The level of infection was related to high aphid numbers early in the season (mainly cowpea aphids). Late summer rains, following a two-year drought, triggered the emergence of naturalised pasture legumes on which the aphid vectors could multiply before crops emerged.

Crop management techniques to reduce aphids entering faba bean crops include:

- retaining standing cereal stubble to deter aphids
- sowing at the recommended times for your district but, where possible, avoiding autumn flights of aphids
- sowing at recommended sowing rates for early canopy closure
- separate faba bean crops as much as possible from lucerne or clover and medic pastures, which can act as reservoirs for the aphid species that vector viruses to faba bean.

Research on controlling aphids in crops and reducing virus transmission through insecticide application is continuing; no clear thresholds have yet been determined for the different viruses and the type or number of aphids infesting faba bean crops. The systemic seed-applied insecticide imidacloprid is registered for faba bean and will provide early control of aphid feeding and prevent infection from persistently transmitted viruses such as BLRV. Infection from non-persistently transmitted viruses such as BYMV and AMV are not protected with this seed dressing. However, the imidacloprid treatment could slow aphid multiplication in the crop during early growth and limit secondary virus infections. Further research is needed to demonstrate the economic benefits from insecticidal seed treatments in faba bean.

Growers should consult their agronomist if considering either a seed dressing and/or a foliar insecticide, see Table 94 Canola and pulse seed dressings on page 179. Ensure that the viral disease is correctly identified before deciding to apply any insecticides. The NSW DPIRD website has further information including *Aphid management in pulse crops.*

GO TO PAGE

Aphid management in pulse crops 2022 (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Harvesting

Faba bean should be harvested to target 14% seed moisture at delivery (maximum receival standard). At this stage, the crop will be black, although some top growth could still be green. If the pod splits and the seeds become exposed, direct sunlight can darken them or rainfall stain them. It is preferable to harvest the crop before the seed changes colour, is stained, becomes brittle or splits, particularly for human consumption markets.

Faba bean can be windrowed, potentially allowing an earlier harvest and to reduce harvest problems from crop lodging and late-maturing weeds.

Harvest efficiency surveys in northern NSW showed windrowed crops had less grain losses than direct heading, but were not always more profitable due to the extra costs of windrowing. In large biomass crops, windrowing faba bean crops can be beneficial as it quickens crop dry-down and allows crops to be harvested before rainfall. Consider windrowing for potentially higher yielding crops.

Windrowed faba bean samples can contain more dirt, especially if rain falls on the windrow. Where possible, avoid placing windrows onto deepened wheel tracks where controlled traffic farming systems are used.

Swath width might need adjusting according to crop biomass. Large bulky windrows will result in slower dry-down time, delaying harvest. In seasons with low crop biomass, avoid windrowing as small windrows might not pick up well and the extra cost will not be recouped. Crops can appear green at the correct windrow timing; determining windrow timing is relatively simple, see Pulse Point 9 *Windrowing faba bean* for more detailed information.

Faba bean pods thresh easily so reduce rotor speed to 400–600 rpm and set concave clearance at 15–35 mm to reduce mechanical damage to the grain. Remove blanking plates and alternative wires from the concave so that the grain is not cracked, as separation can occur at the concave. Use a top sieve of 32–38 mm and a bottom sieve of 16–19 mm.

Run a harvest test on the crop and check what is being collected and what is lost at the back of the header – adjust settings as necessary to optimise both yield and quality.

Grain damaged during harvest or subsequent auger movement can be downgraded and have a lower germination percentage and reduced seedling vigour. Lower grain moisture reduces grain soundness, which is more easily damaged. Rotary harvesters and belt conveyers are gentler on the grain and generally cause less grain damage than conventional augers.

GO TO PAGES

Windrowing faba bean (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/157203/pulse-point-09.pdf)
ABARES – DAFF (https://www.agriculture.gov.au/abares)
Grain Trade Australia (https://www.graintrade.org.au/commodity_standards)

Marketing

In the 2024–25 season, NSW grew 350,000 tonnes of faba bean, a record high from a record 160,000 ha (ABARES – DAFF). This was equivalent to 50% of Australia's total production in 2024–25. Globally, Australia is the largest exporter of faba bean. Most of the Australian faba bean crop is exported for human consumption, predominantly to Egypt (~70% of exports in 2024), but also to Saudi Arabia, South East Asia, the United Arab Emirates and India. Around 10% is retained domestically for stockfeed and aquaculture, and some is split for human consumption or processed into plant-based protein ingredients. The market visually assesses faba bean (subjectively) so size, colour and shape are important for buyers. It is difficult to achieve food quality standards where disease or insects have not been controlled, seed is damaged or defective, or after prolonged storage causing seed darkening. Check with local buyers for market requirements and variety acceptance.

Australian exporters are well regarded in export markets as reliable shippers. Exported grain has low moisture content, and crops are harvested in the northern hemisphere's offseason. Northern NSW and southern Qld grown crops often have smaller seed than the main growing areas in southern Australia. This situation has improved with the release of the larger seeded varieties PBA Nasma$^{\Phi}$ and PBA Ayla$^{\Phi}$. Small seed is a marketing disadvantage, however, good quality grain marketed before the southern harvest can achieve human consumption export grade and premium prices. After this window of opportunity, northern faba bean will normally be traded domestically at reduced prices. Faba bean seeds darken quickly, particularly in heat, so grain storage is generally not recommended if targeting export human consumption markets.

Domestic uses of faba bean as a source of feed protein include the aquaculture, pig, poultry, sheep meat and horse industries and hence it competes with field pea, fishmeal, lupin, soybean meal and other protein supplements. There are now several processing plants in Vic and SA that are sourcing domestic faba bean for processing into plant-based protein ingredients for plant-based human foods.

The current Receival and Trading Standards for the different grades of faba bean can be found at the Grain Trade Australia.

Further information

NSW DPIRD

Agnote DAI 128, *Honey bees in faba bean pollination* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/117110/bee-faba-bean-pollination.pdf)

Aphid management in pulse crops 2022 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Insect and mite control in field crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

NSW Southern Research Results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results)

Primefact 1163, *Nitrogen benefits of chickpea and faba bean* (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/general-information/nitrogen-chickpea-faba-bean)

Pulse Point 7, *Reducing disease risk* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/157144/pulse-point-07.pdf)

Pulse Point 9, *Windrowing faba beans* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/157203/pulse-point-09.pdf)

Pulse Point 12, *Seeding equipment problems with faba beans* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/157306/pulse-point-12.pdf)
Pulse Point 20, *Germination testing and seed rate calculation* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

GRDC

GRDC website (https://grdc.com.au/).
Scaling up 10 years of farming systems research: The return on assets managed (ROAM) and practicality of increasing pulse crops at the whole farm level(https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2025/02/scaling-up-10-years-of-farming-systems-research-the-return-on-assets-managed-and-practicality-of-increasing-pulse-crops-at-the-whole-farm-level)
GrowNotes™ Faba beans northern region – GrowNotes (https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/fababeangrownotes)
GrowNotes™ – *Faba Bean Southern Region* (https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/faba-bean-southern-region-grownotes)
Legumes in acidic soils – maximising production potential (https://grdc.com.au/resources-and-publications/all-publications/publications/2021/legumes-in-acidic-soils)
New Group F rhizobia Inoculant for faba and broad bean (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-f-rhizobia-inoculant-for-faba-and-broad-bean)
Faba beans in southern and central NSW farming systems - GRDC (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2025/02/faba-beans-in-southern-and-central-nsw-farming-systems)
Pre-harvest herbicide use factsheet (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2022/preharvest-herbicide-use-fact-sheet)

Grain Trade Australia

Grain Trade Australia (https://www.graintrade.org.au/commodity_standards)
Australian Pulse Trading Standards Grain Trading Standards – GTA (http://grain-trade-au.vwln84w72s-rz83yyy8e3d7.p.temp-site.link/grain-trading-standards/)

Other

ABARES – DAFF (https://www.agriculture.gov.au/abares) at March 2025
APVMA website (https://portal.apvma.gov.au/pubcris)
Grain Legume Extension Hub - Southern Pulse Agronomy hub (https://spahub.com.au)
WeedSmart Big 6 (https://www.weedsmart.org.au/big-6/)
Fungicide resistance five (https://afren.com.au/understanding/)
IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)
PER14726 (https://permits.apvma.gov.au/PER14726.PDF)
PER82634 (https://permits.apvma.gov.au/PER82634.PDF)
PER85447 (https://permits.apvma.gov.au/PER85447.PDF)
PER8522 (https://permits.apvma.gov.au/PER8522.PDF)
PER80969 (https://permits.apvma.gov.au/PER80969.PDF)
PER12751 (https://permits.apvma.gov.au/PER12751.PDF
PER14726 (https://permits.apvma.gov.au/PER14726.PDF)
WeedSmart: *Stewardship for pre-harvest application of herbicides in winter crops* (https://www.weedsmart.org.au/pdf/stewardship-for-pre-harvest-application-of-herbicides-in-winter-crops/)

Contributing authors

NSW DPIRD: Mark Richards, Pulse Research Agronomist, Wagga Wagga; Kurt Lindbeck, Senior Plant Pathologist, Wagga Wagga; Joop van Leur, Pulse Pathologist, Tamworth; Zorica Duric, Field Crop Entomologist, Tamworth; Branko Duric, Research Officer, Tamworth; Jenny Wood, Pulse Quality Chemist, Tamworth.

Kedar Adhikari, Faba bean breeder, University of Sydney, Narrabri; Samuel Catt, Faba bean breeder, University of Adelaide.

Rohan Brill – BrillAg; Phil Bowden – Agronomist, Bowden Rural Services.

Table 70. Faba bean disease and crop injury guide.

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Foliar diseases				
Ascochyta blight *Ascochyta fabae*	Small, grey, circular leaf spots, showing through both sides of the leaf, developing light brown centres with age. Under humid conditions lesions become dotted with black specks. The disease also causes stem breakage and pod lesions, which result in seed discolouration.	Wet conditions in mid–late winter or when late rain occurs before harvest and cause pod infection.	Spores spread by wind and rain splash. Infected seed, faba bean residues and volunteer plants are sources of initial infection.	Disease-free seed. Crop rotation. Destroy or incorporate infected stubble. Locate crops at least 500 m from last year's faba bean crop. Control volunteer plants. Use resistant varieties. Foliar fungicides.
Chocolate spot *Botrytis fabae*	Leaf spots are initially reddish–brown, pin-head sized and on one side of the leaf only. Under suitable conditions spots expand into large, irregular, black, dead areas, expanding onto the stem. Flowers and pods can also be affected.	Extended (>day) periods of leaf wetness. Favoured by mild temperatures 15–20 °C, which can rapidly spread the disease.	Infected faba bean residues. Infected volunteer plants. Spores spread by wind and rain.	Use resistant varieties, foliar fungicides, crop rotation and good crop hygiene. Locate crops at least 500 m from last year's faba bean crop or from wind-blown stubble residues. Control volunteer faba bean.
Rust *Uromyces viciae-fabae*	Several spore stages can appear on leaves, stems and sometimes pods at the same time. Early on, creamy–yellow pustules form on leaves. These are soon replaced by orange–brown pustules. Later, black spore masses develop on stems.	Only a short period of leaf wetness during the night (e.g. heavy morning dew) can cause infection. A wide range of temperatures can cause disease, but high (>20 °C) temperatures favours development and therefore of more importance in northern NSW and towards the end of the season in southern NSW.	Infected volunteer plants are high risk. Infected faba bean residues.	Use resistant varieties. Foliar fungicides. Locate crops at least 500 m from last year's faba bean crop. Control volunteer faba bean. Crop rotation.
Stemphylium blight *Stemphylium eturmiunum*	Large grey–black necrotic lesions restricted to leaves only, often starting from the leaf edge.	Extended periods of leaf wetness and relatively high temperatures.	Survival on crop residue is likely.	There is little information on the relative value of different fungicides, however it is likely that fungicide application will help to control stemphylium blight. Growers are advised to continue with normal fungicide programs.
Virus diseases				
Necrosis: *Tomato spotted wilt virus* (TSWV)	Large dark lesions form on the leaves and later dark brown streaks develop on the upper stem, often on one side. The shoot's growing point is often killed. Seed production from affected plants is severely reduced.	Common in some years in northern NSW, but incidence is yet to exceed 5% of infected plants.	TSWV survives in weeds and is spread by thrips. The western flower thrips is the most effective vector.	No proven control.
Virus yellowing diseases: *Bean leafroll virus*, *Soybean dwarf virus*, *Subterranean clover redleaf virus*, *Subterranean clover stunt virus*	Yellowing, interveinal at first, and often prominent at shoot tips. Leaves are stiffer than normal and often rolled upwards at the edges, and pointing upwards. Infected plants are usually stunted and often die prematurely.	Seasons or districts with major aphid flights.	These viruses survive in weeds and pastures, particularly in forage legumes. All are spread by aphids and are persistently transmitted (aphids remaining infective for 4 days or longer).	Follow best management recommendations including: • retaining standing cereal stubble (deters aphids) • using recommended sowing rates • sowing on time • controlling weeds. The systemic seed-applied insecticide imidacloprid will provide early control against. Poorly established, weedy crops suffer most. If detected early, controlling aphids with a registered aphicide can help limit virus spread. Seek advice from your agronomist.
Virus mosaic diseases: *Bean yellow mosaic virus*, *Alfalfa mosaic virus*	Leaves show mosaic, dark green colour against a pale green or yellow background. Leaf texture is abnormal, ranging from uneven to crinkled. Early infection by BYMV can lead to reduced pod set and pod discolouration. Late infection is unlikely to lead to yield loss. Combined BYMV and AMV infections can be lethal to faba bean.	Seasons or districts with major aphid flights.	These viruses survive in weeds and pastures, particularly in forage legumes. BYMV and AMV are spread by aphids and are non-persistent, lasting no more than 4 hours in aphids and usually less.	Follow best management recommendations including: • retaining standing cereal stubble (deters aphids) • using recommended sowing rates • sowing on time • controlling weeds. Poorly established, weedy crops suffer most. Foliar- or seed-applied insecticides are not reliable for controlling these non-persistently transmitted viruses.
Herbicide injury				
Group 1 such as fops and dims	Grey or brown spotting or burning on the upper sides of leaves, which can be confused with diseases such as chocolate spot.	More common where cheap oil adjuvants are added to post-emergent grass herbicides.	–	Follow label recommendations and only use adjuvants specified on the label.
Group 2 such as sulfonylureas (SUs)	Seedlings become stunted, stem and leaf margins blackened, leaflets cupped and lateral root growth reduced. Plants often die.	Related to use of pre- and post-emergent herbicides. Alkaline soils increase risk of injury.	–	Follow label recommendations especially plantback periods, soil pH and minimum rainfall requirements. Avoid spray overlaps and drift.
Group 4 such as phenoxys	'Hormone-type' injury including abnormal leaves.	Related to herbicide use in previous crops and fallows, also drift from neighbouring crops.	–	Follow label recommendations and be aware of rainfall and soil pH requirements in plantback periods.
Group 5 such as triazines	Leaves blackened and die back from edges and tips.	Alkaline soils or sandy soils, low in organic matter. Shallow sowing. Wet conditions following application to dry soil.	–	Follow label recommendations especially plantback periods. Avoid spray overlaps and drift.

Field pea

Key considerations for 2025

- Select an appropriate variety to suit regional sowing time and maturity windows.
- Sow as early as possible within the recommended window to maximise yield potential.
- Sow high quality seed that has been tested for both germination and vigour before sowing.
- Timely weed and insect control are critical management factors to produce high yields.
- Harvest as soon as seed moisture content is below 14%, using header settings optimised for each individual crop.

Crop management

Field pea is a valuable pulse crop rotation option in cereal farming systems. The crop fixes nitrogen (N) from the atmosphere and conserves soil mineral N. It uses less subsoil water than other crops because of its shallower root system and earlier maturity. Grain can be produced for both stockfeed and human consumption.

Growing field pea increases flexibility for weed control options and provides a break for cereal disease cycles. Alternatively, field pea can be grown for hay or silage, or used as a brown manure crop, providing a double-break crop. Wheat yields after field pea are well above those of wheat after wheat, and increased wheat protein is common.

Field pea is suited to a wide range of soils from light to heavy textured with pH_{Ca} 4.8–8.0. The crop is sensitive to high soil-exchangeable aluminium levels and does not tolerate extended periods of waterlogging.

In central and southern NSW, most cropping soils have acidic subsurface layers that can affect root growth, nodulation, crop vigour and yield potential. Severely acidic layers, with pH_{Ca} below 4.5, are commonly found at depths of 5–10 cm and 10–15 cm. Liming programs should be planned at least 2 years before sowing acid-sensitive pulses, using analyses from soil samples collected at 5 cm intervals to a depth of 20 cm. This data supplies the depth and severity of acidity in subsurface layers and guides lime rate and the appropriate incorporation method needed for effective amelioration.

To address acidity in layers below 10 cm, a medium to long-term approach is necessary. Initial lime applications should aim for a pH_{Ca} target above 5.8 in the top 0–10 cm to facilitate the downward movement of alkali. Strategic incorporation that effectively mixes appropriate rates of fine-grade lime will accelerate pH increase in subsurface layers. Ongoing soil testing is recommended to guide subsequent liming treatments. To maintain the movement of alkali into deeper acidic layers, pH_{Ca} in the 0–10 cm layer must be kept above 5.5.

Sowing time

Field pea is one of the few crops that can yield well from a later sowing window relative to other pulse crops, giving it the edge when there is a late autumn break, plus an extended pre-sowing weed control period. Sowing as early as possible within the recommended window for each region will maximise yield potential. Sowing too early increases the risk of disease and frost damage; delayed sowing increases the risk of moisture stress and high temperatures during the critical grain filling stage.

The suggested sowing times in Table 71 apply to average–wet years. Grower experience and research over the past 2 decades clearly show positive yield responses from sowing up to 2 weeks earlier in dry seasons when disease in spring has not been a problem.

There is now a wide range of varieties available, with differing maturities and some with shatter-resistant pods. Growers should consider their preferred sowing window and select a variety that has a maturity to match. Any variety intended as a brown or green manure crop, or for hay, should be sown as early as possible within the recommended sowing window, to maximise dry matter production.

Table 71. Field pea sowing times.

Region	May				June			
Weeks	1	2	3	4	1	2	3	4
Western zone	>	★	★	★	<			
Eastern zone			>	★	★	★	<	

> Suggested only for the lower rainfall areas of zones or for hay crops.
★ Preferred sowing time.
< Later than recommended, yield reduction likely.

Sowing rate

Optimum plant populations vary depending on the height and vigour of the specific variety, and on sowing time. Population targets for tall, vigorous, scrambling types such as Morgan(Φ), PBA Percy(Φ), or Sturt(Φ) can be as low as 30 plants/m² when sown early, or as high as 40 plants/m² when sown late. For hay/brown manure crops, establish at least 40–50 plants/m² to maximise biomass. For the shorter, less vigorous group of varieties such as PBA Pearl(Φ), PBA Oura(Φ), and GIA Ourstar(Φ), (see Table 74. Field pea variety characteristics and reaction to diseases on page 136), target 40 plants/m² with early sowing, increasing up to 60 plants/m² when sowing late. Kaspa-type varieties with intermediate growth characteristics such as GIA Kastar(Φ), PBA Butler(Φ), PBA Taylor(Φ) and PBA Wharton(Φ) should be sown to establish 35–50 plants/m².

These establishment targets can only be achieved by considering seed size, germination and sowing conditions when calculating sowing rates. Also, consider the seedbed condition and adjust accordingly. Use Your calculation to calculate the desired sowing rate based on target density, seed size, germination and the seed's estimated establishment percentage.

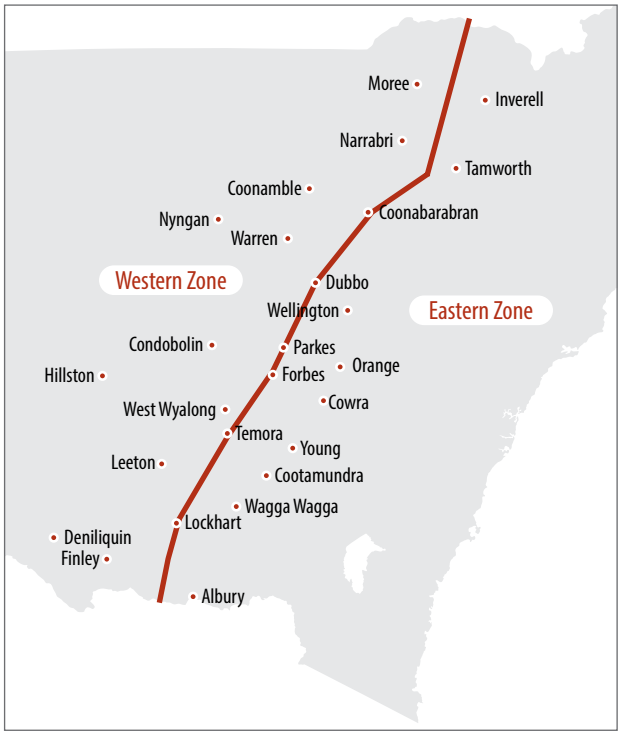


Figure 10. Map of NSW showing field pea growing zones.

Air seeders can reduce germination and establishment, particularly with weather-damaged seed or seed with low moisture content. Larger, round-seeded varieties such as PBA Pearl(Φ) are particularly susceptible to impact damage from distributor heads and other hard surfaces, as their seed coats are less tightly attached to the cotyledons. Lowering the seeder's air speed reduces the impact from the seed distributor heads and other hard surfaces on the seed. Adjust ground speed to avoid seed and fertiliser blockages. Lowering the seeder's ground speed and air flow at sowing also reduces seed bounce and improves seed placement in the furrow, aiding establishment.

Table 72. Sowing rate (kg/ha) based on 100% germination and 80% establishment.

Field pea type	Variety	100 seed weight (g)	Target plant density/m²			
			30	40	50	60
Tall scrambling	Morgan	18	68	90	–	–
	Sturt	19	71	95	–	–
	PBA Percy	23	86	115	–	–
Medium–tall semi-leafless	APB Bondi, GIA Ourstar, PBA Noosa	19	71	95	119	142
	PBA Oura, PBA Pearl	20	75	100	125	150
Kaspa types	GIA Kastar, PBA Butler, PBA Wharton	18	68	90	112	–
	PBA Taylor	19	71	95	119	–

Reported in order of 100 seed weight high to low within each field pea type.

Your calculation

(100 seed weight ❶ (grams) ..... × target plant population ..... × 1000) ÷ (establishment percentage ❷ ..... × germination percentage .....) = your sowing rate ..... kg/ha

❶ To determine your seed weight, weigh 100 seeds in grams.
❷ Establishment percentage – 80% is a reasonable estimate, unless sowing into adverse conditions.

Sowing depth

Field pea seed should be sown 3–5 cm deep. Seed can emerge from deeper sowing (up to 7 cm) provided moisture is adequate for consistent germination. Do not sow dry or deep sow if there is uneven moisture, as crops will germinate unevenly causing subsequent management difficulties, such as herbicide timing. Crops sown later in the sowing window (for example due to a delay in sowing rainfall) should be sown shallower to improve germination and allow quicker emergence under cold soil conditions.

Inoculation

Inoculation each season is essential on all soil types. Use the commercially available New Group E field pea inoculant for field pea lentil and vetch. Check for effective nodulation 6–10 weeks after sowing to ensure inoculation has been successful.

Take care with seed inoculation. If seed is to be treated with a fungicide before sowing, apply fungicide first as a separate operation then apply inoculant just before sowing. An alternative method that gives better rhizobia survival is to use inoculum slurry sprayed directly into the furrow at sowing (liquid inject method), thus avoiding contact with the fungicide.

Avoid inoculating directly into air seeder bins. Newly inoculated seed is often sticky and does not flow properly, leading to uneven seed flow in the bin. In turn, this causes blocked hoses and patchy establishment across the paddock, which can then also lead to weed issues. The seed will need to dry in the short period before being sown.

Several new inoculant products are available for pulse crops, such as freeze-dried and dry granular products. Read and follow the instructions carefully to avoid inoculation problems.

GO TO PAGE

New Group E field pea inoculant for field pea lentil and vetch (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-e-rhizobia-inoculant-for-field-pea,-lentil-and-vetch)

Nutrition

Apply phosphorus (P) fertiliser at rates equivalent to those used with cereals (10–25 kg P/ha). Adjust the P rate according to the paddock cropping history and potential crop yield for your area. A long history of P use can build up soil P levels; at high levels little or no additional P will be required.

Select paddocks with a low level of residual nitrogen (N) to promote effective nodulation and N fixation. Consider applying molybdenum (Mo) to acid soils to aid nodulation. Fifty grams of actual Mo per hectare applied every 5 years is recommended in moderately acidic soils.

Paddock rolling

Rolling paddocks after sowing levels the ground and presses loose stones and sticks into the soil, avoiding header damage and reducing grain contamination from soil at harvest. Rolling can be carried out either directly after sowing or at the 2–3 node stage. Rolling after the crop has emerged has the advantage of avoiding crusting on soils prone to this condition, but can increase the chance of bacterial blight disease infection.

Variety selection

When selecting a variety consider:

- varietal maturity and sowing date
- disease resistance
- seed shattering resistance and ease of harvest
- yield potential in your region
- market outlets for the end-use of each seed type (dun, white, blue).

Many varieties are available with a wide range of characteristics, however, some are more suited to specific growing regions in NSW and growers should select varieties carefully based on local advice. For characteristics of the different varieties, including latest NVT disease resistance ratings, refer to Table 74. Field pea variety characteristics and reaction to diseases on page 136.

Field pea yield performance 2020–2024

Table 73. Field pea performance in southern NSW compared with PBA Wharton(ф) = 100%.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% PBA Wharton (t/ha)	**2.29**	**2.05**	**1.20**	**1.99**	**n.d.**	**1.88**	
Kaspa-type dun field pea							
APB Bondi	116	121	134	116	n.d.	120	8
GIA Kastar	83	79	69	85	n.d.	80	8
PBA Butler	110	123	141	113	n.d.	119	8
PBA Taylor	111	111	112	110	n.d.	111	8
PBA Wharton	**100**	**100**	**100**	**100**	**n.d.**	**100**	**8**
Dimpled type dun field pea							
GIA Ourstar	72	85	98	76	n.d.	81	8
PBA Oura	91	102	115	93	n.d.	98	8
PBA Percy	86	104	121	89	n.d.	97	8
White field pea							
PBA Pearl	101	123	158	104	n.d.	117	8
Sturt	95	102	115	95	n.d.	100	8
Blue field pea							
PBA Noosa	104	111	120	105	n.d.	109	8

South west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
% PBA Wharton (t/ha)	**2.00**	**2.46**	**1.53**	**1.22**	**1.58**	**1.72**	
Kaspa-type dun field pea							
APB Bondi	109	108	121	110	107	110	13
GIA Kastar	87	88	53	83	76	80	13
PBA Butler	110	107	132	105	95	108	13
PBA Taylor	106	106	110	108	110	108	13
PBA Wharton	**100**	**100**	**100**	**100**	**100**	**100**	**13**
Dimpled type dun field pea							
GIA Ourstar	92	88	106	77	63	85	13
PBA Oura	102	98	125	93	86	99	13
PBA Percy	104	99	143	90	79	101	13
White field pea							
PBA Pearl	110	104	160	100	85	109	13
Sturt	102	100	127	99	n.d.	103	10
Blue field pea							
PBA Noosa	105	104	122	103	100	106	13

Note: there are no NVT results available for northern NSW.
Varieties listed in order of most preferred type for both grower uptake and marketability
n.d. no data.

Kaspa-type (non-dimpled) dun field pea

APB Bondi(ф). Released in 2023 by Australian Pea Breeding (APB) as a Kaspa-type field pea with dun seed. APB Bondi(ф) (tested as OZP1903) incorporates a number of resistance traits against diseases and soil constraints to make it the most consistently high yielding field pea variety currently available. It is a mid flowering field pea, similar to PBA Taylor(ф) and mid maturing, slightly later than PBA Butler(ф). APB Bondi(ф) exhibits the same Kaspa-type features as previous varieties – semi dwarf, semi leafless plant type, with non-shattering pods and Kaspa-type grain. It has resistance to *Pea seed borne mosaic virus* (PSbMV), *Bean leaf roll virus* (BLRV) and *Bean yellow mosaic virus* (BYMV). It is resistant to powdery mildew and resistant/moderately resistant to downy mildew. Licensed to Seednet. EPR $2.97/tonne incl. GST.

GIA Kastar(ф). Released in 2019 by Grains Innovation Australia (GIA). First Kaspa-type variety with improved tolerance to common in-crop and residual Group 2 (previously Group B) imidazolinone (IMI) herbicides. Similar plant type to PBA Wharton(ф) with semi-leafless erect growth and distinctive pink–white flowers. Mid flowering (similar to PBA Wharton(ф)) and early to mid maturing, suitable for crop-topping. Pod shatter resistance at maturity. Disease resistance similar to PBA Wharton(ф). Produces a medium sized, non-dimpled, red–brown coloured seed; marketed as a Kaspa-type grain for human consumption in the Indian subcontinent. Commercialised by AG Schilling and Co. EPR $3.30/tonne incl. GST.

Kaspa(ф). Original benchmark variety for marketing non-dimpled, dun coloured seed. Released in 2002 but now outclassed for yield and disease ratings. Dun seed type with smooth, round, light brown–red seeds. Licensed to Seednet. EPR $2.20/tonne incl. GST.

PBA ButlerΦ. Released in 2017 by Pulse Breeding Australia (PBA). Broadly adapted Kaspa-type that performs best in medium to long season climates. Mid–late flowering with early to mid maturity, erect, semi-dwarf, semi-leafless type. Sugarpod trait, resistant to pod shattering at maturity. Produces a medium sized, non-dimpled, tan coloured seed; marketed as a Kaspa-type grain to suit Asian subcontinent human consumption requirements (dahl, flour and roasted snack foods). Licensed to Seednet. EPR $2.97/tonne incl. GST.

PBA TaylorΦ. New variety released in 2021 by PBA. A broadly adapted Kaspa-type variety, mid flowering and early to mid maturing, slightly later than PBA WhartonΦ. Semi-leafless and semi-dwarf plant architecture, non-shattering pods and Kaspa-type grain. Produces medium sized spherical grain. Seed coat has a uniform tan colour and is suitable for dahl and split pea production. Licensed to Seednet. EPR $2.97/tonne incl. GST.

PBA WhartonΦ. Released in 2013 by PBA. Kaspa-type variety well suited to all field pea production regions of NSW, including central and northern NSW, due to powdery mildew and virus resistance. Semi-leafless erect growth with distinctive pink–white flowers. Early to mid flowering and early maturing. Sugarpod trait, resistant to pod shattering at maturity. Produces medium sized, non-dimpled, tan coloured seed; marketed as a Kaspa-type grain to suit Asian subcontinent human consumption requirements (dahl, flour and roasted snack foods). Licensed to Seednet. EPR $2.86/tonne incl. GST.

Dimpled type dun field pea

GIA OurstarΦ. Released in 2019 by GIA. First dun-type variety with improved tolerance to common in-crop and residual Group 2 (previously Group B) IMI and sulfonylurea herbicides. Similar plant type to PBA OuraΦ with semi-leafless semi-erect growth and purple flowers. Early to mid flowering with a long flowering window; early to mid maturing, suitable for crop-topping. Pod shatter resistance at maturity. Produces a medium sized, dimpled, green–tan coloured seed; marketed as Australian dun-type grain for human consumption or stockfeed. Commercialised by AG Schilling and Co. EPR $3.30/tonne incl. GST.

MorganΦ. Released in 1998 by NSW DPIRD. Tall semi-leafless dun type with excellent vigour and bulky upright growth. Late flowering, purple flowered with small, dimpled, dun-coloured seed. NVT field pea national disease ratings not available as MorganΦ is no longer included in NVT testing. Best choice for hay, forage, silage and green/brown manure. Licensed to Hart Bros Seeds. No EPR.

PBA OuraΦ. Released in 2011 by PBA. Broadly adapted across all major field pea production regions; performs well in short growing seasons and low-rainfall zones. Erect semi-dwarf, semi-leafless type with vigorous early growth, medium height and purple flowers. Early to mid flowering and early maturing. Suitable for crop-topping in longer seasons. Fair to good lodging resistance; moderate pod shatter resistance at maturity. Produces a light green, medium sized, dimpled dun-type seed. Marketed as Australian dun-type grain, which is exported to the Asian subcontinent to produce dahl (splits) and pea flour; also sold for stockfeed. Licensed to Seednet. EPR $2.86/tonne incl. GST.

PBA PercyΦ. Released in 2011 by PBA. Broadly adapted across all major field pea production regions; performs well in short growing seasons and low-rainfall zones. Conventional tall type with vigorous early growth and purple flowers. Very early flowering (one week earlier than PBA OuraΦ) and early maturing. Suitable for crop-topping in longer seasons. Lodges at maturity; moderate pod shatter resistance at maturity. Produces a tan–green, very large, dimpled dun-type seed. Marketed as Australian dun-type grain, which is exported to the Asian subcontinent for dahl production (splits) and pea flour; also sold for stockfeed. Licensed to Seednet. EPR $2.86/tonne incl. GST.

White field pea

PBA PearlΦ. Released in 2012 by PBA. Broadly adapted across all major field pea production regions. Semi-leafless, semi-dwarf erect growing variety with white flowers. Early to mid flowering and early maturing (earlier than SturtΦ). Ideally suited to crop-topping due to early maturity. Superior lodging resistance compared with other semi-dwarf varieties. Produces medium–large, spherical, white pea seed (larger than SturtΦ) suitable for human consumption or stockfeed markets. Recommended for regions where growers can deliver white pea seed for export or for domestic sale. Licensed to Seednet. EPR $2.97/tonne incl. GST.

SturtΦ. Released in 2005. Conventional, tall plant type; scrambling growth habit, early to mid season flowering; small, smooth white seeds. Still one of the most adapted and highest yielding varieties in the drier production areas of south-western NSW. No EPR.

Blue field pea

PBA Noosa[Φ]. New variety released in 2021 by PBA. High yield potential and competes well with other varieties in field pea production zones throughout Australia. Its early vigour makes it well suited to some of the drier field pea environments. Early to mid flowering (similar to PBA Wharton[Φ]) with early to mid maturity. Sugar pod trait reduces shattering at harvest; semi-dwarf semi-leafless trait improves standability and harvesting. PBA Noosa[Φ] will require a strong focus on managing pea weevil and timely harvest to achieve a premium grain product suited to human consumption markets. Licensed to PB Seeds. EPR $7.15/tonne incl. GST.

Table 74. Field pea variety characteristics and reactions to diseases.

Variety	Standing at maturity	Leaf type	Height	Maturity	Shatter resistance	Diseases					Viruses ❻	
						Bacterial blight ❷	Downy mildew ❸		Powdery mildew ❹	Blackspot ❺	*Pea seed-borne mosaic virus*	*Bean leafroll virus*
						Pseudomonas syringae	Kaspa strain	Parafield strain				
Kaspa-type dun field pea												
APB Bondi	4	SL	M	5	R	S	R–MR	R–MR	R–MR	MS	R	R
GIA Kastar	4	SL	M	4	R	S	S	S	R–MR	MS	R	n.d.
PBA Butler	4	SL	M	5	R	MS	S	MS	S	MS	S	S
PBA Taylor	4	SL	M	5	R	S	S	S	S	MS	R	R
PBA Wharton	4	SL	M	5	R	S	S	S	R	MS	R	R
Dimpled type dun field pea												
GIA Ourstar	4	SL	M	4	MR	S	S	S	S	MS	S	n.d.
PBA Oura	4	SL	M	5	MR	MS	S	S	S	MS	S	MR
PBA Percy	2	C	T	5	MR	MR-MS	S	S	S	MS	S	S
White field pea												
PBA Pearl	5	SL	M	4	MR	MS	S	S	S	MS	S	R
Sturt	2	C	T	5	MR	MS	S	S	S	MS	S	S
Blue field pea												
PBA Noosa	4	SL	M	5	R	S	MS	MS	S	MS	S	R

Source: NVT field pea national disease ratings.

n.d. no current data.
❶ Provisional rating.
❷ Bacterial blight ratings are from 2021 data except new variety APB Bondi is 2024 data.
❸ Downy mildew ratings (Kaspa strain and Parafield strain) are from 2024 data.
❹ Powdery mildew ratings are from 2024 data.
❺ Blackspot ratings are from 2020 data except new variety APB Bondi is 2024 data.
❻ Virus ratings are from 2020 data except new variety APB Bondi is 2024 data.
Standing: 1–9 (1 = flat on ground, 9 = erect)

Leaf type: C = conventional; SL = semi-leafless
Height: T = tall; M = medium; S = short.
Maturity 1 to 9
1 early
9 late
<5 best for crop-topping.
Shatter resistance and disease resistance ratings
R Resistant
MR Moderately resistant
MS Moderately susceptible
S Susceptible

Weed control

Field pea provides valuable management strategies for integrated weed management and has unique features to improve weed control in the cropping rotation. The first feature is a relatively late sowing window compared with other crops, which allows more timely weed control before sowing. The second feature is the availability of earlier maturing varieties that enable crop-topping to be synchronised with maturity. Additional weed control options are now available with the release of 2 herbicide tolerant (HT) varieties: GIA Kastar[Φ] has improved tolerance to in-crop and residual Group 2 IMI herbicides; GIA Ourstar[Φ] has improved tolerance to in-crop and residual Group 2 IMI and sulfonylurea herbicides.

Crop-topping and brown manuring are important tools in integrated weed management. Field pea has the widest range of herbicides available for broadleaf weed control of any pulse crop. There are several soil-applied residual herbicides registered, which provide an excellent opportunity to use alternative herbicides as part of a herbicide resistance management program. They might also be more cost effective than post-emergent herbicide options for weed control. As residual herbicides applied to the previous cereal crop can affect field pea establishment and growth, refer to current labels for information on plant back periods. Residues could persist longer in both naturally occurring alkaline soils, and soils that have received surface-applied lime to raise soil pH.

For detailed information on registered herbicides, refer to the NSW DPIRD guide *Weed control in winter crops*, and pesticide labels.

GO TO PAGE
Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Insect control

Field pea can host several common pests so careful monitoring is required to ensure they do not cause economic damage. These pests all have natural predators that can help keep them under threshold levels. Insect control thresholds provide guidelines to allow well-timed decisions for crop spraying. This can reduce unnecessary spraying and keep populations from reaching a level where damage is high.

The most common threshold used is an economic threshold, which involves control at the density that will prevent the pest numbers from reaching an economically damaging population. Economic thresholds can be enhanced by adding costs of control and grain price matrices to give a more accurate indication of when it is economic to treat pests (dynamic ET). The aim of pest management is to keep pest populations below this economic threshold.

Based on research, guideline thresholds exist for some pests, but most thresholds fluctuate depending upon a number of factors. Monitoring and sampling crops is essential to determine these factors and their influence on where the threshold lies. Farmers who maintain a close watch on pest activity through regular crop inspections and thorough sampling, are in a better position to decide if, and when, treatment is needed.

The following factors should be monitored and considered when using thresholds and making spray decisions:

- environmental conditions and the condition of the crop
- extent and severity of the infestation and how quickly the population increases
- prevalence of natural control agents such as parasitic wasps, predatory shield bugs, ladybirds and diseases
- type and location of pest damage and whether it affects yield indirectly or directly
- stage in the life cycle of the pest and the potential for damage
- crop stage and ability of the crop to compensate for damage
- amount of damage which has already occurred and the additional damage that will occur if the crop is not sprayed
- value of the crop (high value crops cannot sustain too much damage as a small loss in yield or quality could mean a large financial loss)
- the cost of the spray and its application and the likely yield or quality benefit gained from control.

Further information on understanding insect control thresholds, including the use of integrated pest management with beneficial insects and biopesticides as alternatives to chemical spraying, can be found in the NSW DPIRD guide *Insect and mite control in field crops*.

Redlegged earth mite, blue oat mite and lucerne flea

Monitor closely from emergence up to the 4-node stage. These pests are likely to be more common in southern NSW, and control is more likely to be warranted in southern NSW. Redlegged earth mite and blue oat mite cause damage to cotyledons, which can lead to stunting and seedling death. Lucerne flea cause damage to leaves, reducing seedling leaf area by up to 50%. If crop damage becomes apparent, refer to the NSW DPIRD guide *Insect and mite control in field crops* to check both threshold levels for each particular pest, and the registered pesticide products which are available for control.

Aphids

Monitor from the early establishment stage. High numbers of aphids, particularly pea aphids (*Acyrthosiphon pisum*) can cause feeding damage and yield loss. Controlling aphids could be more important for reducing certain viruses that are persistently transmitted than actual feeding damage.

For more information see *Aphid management in pulse crops* on the NSW DPIRD website.

Pea weevil

Pea weevil is a continuing problem in most areas. Be careful not to introduce this pest onto the farm as an impurity in purchased seed or any other seed containing field pea. Monitor crops at least weekly from flowering through to early pod set for pea weevil adults. Apply a border spray of insecticide if pea weevils are found, or if crops are grown in a known pea weevil area. Fumigate all seed with phosphine in a sealed silo soon after harvest to destroy any pea weevil that might be present or developing in the grain.

On-farm pea weevil infestations can be reduced by:

- harvesting promptly to prevent late insect pressure
- fumigating carry-over seed soon after harvest
- controlling all self-sown field pea in following crops.

For further information, see Pulse Point 4 – *Managing pea weevil* on the NSW DPIRD website.

GO TO PAGES

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Aphid management in pulse crops (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Managing pea weevil (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0020/157034/pulse-point-04.pdf)

Helicoverpa spp. (Heliothis)

Most crops require spraying during late flowering and pod filling and should be checked at least twice a week during this time. The spray threshold for human consumption grade is 1–2 larvae per 10 sweeps, and for stockfeed, 4 or more larvae per 10 sweeps. One well-timed early spray before larvae get too large (10 mm) is generally adequate. However, control can be very difficult once larvae enter the pods. Monitor crops after spraying to determine effectiveness.

Guidelines to support effective, sustainable integrated pest management are available at IPM Checklist: a step-by-step guide for a sustainable grains industry, available from the Cesar Australia website. For detailed information on insect threshold levels and registered pesticides for control, refer to the NSW DPIRD guide *Insect and mite control in field crops* and pesticide labels.

GO TO PAGES

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Disease management

Disease effects on field pea production can be minimised by:

- sowing disease-free and virus-free seed
- using a fungicide seed dressing in disease risk situations
- planning sensible crop rotations (not growing field pea in the same paddock more than once every 5 years)
- eliminating volunteer field pea plants
- sowing away from or not immediately downwind of the previous season's field pea paddock
- sowing field pea into cereal stubble and leaving the stubble standing rather than burnt or mulched
- avoiding frost-prone paddocks.

The following diseases have the potential to cause severe yield losses when conditions are favourable.

Bacterial blight

This disease is very sporadic and often unpredictable. It is caused by the bacterium *Pseudomonas syringae*. There are 2 pathovars (pv) of *P. syringae* found in NSW: *P. syringae* pv *pisi* and *P. syringae* pv *syringae*. Frost damage followed by wind and frequent rain encourages the disease to develop and spread. This highly infectious disease can be easily spread by machinery, and people and animals moving through the crop. There are currently no post-emergence control options available to manage bacterial blight outbreaks. Note that fungicide products are not effective for controlling bacterial diseases.

The *Pseudomonas syringae* bacterium can survive on both seed and infected plant material – the main means of disease transmission to new crops. Therefore, do not use seed harvested from infected crops for sowing. Also note that wind and water can move pea stubble to adjacent paddocks and should be closely monitored, as should moving stubble baled for hay, as these are a ready source of infective bacteria. Finally, crops having no obvious signs of disease can still carry the bacteria at low levels.

Operations favouring rapid pea trash breakdown can greatly reduce the bacterium's survival rate. Controlling volunteer pea plants is equally important to manage this disease between seasons. Survival can be up to 3 years on seed in storage.

Bacterial blight will often begin to develop in frost-prone, low-lying areas of crops. Be aware that frosts can trigger disease development so check these areas first for symptoms. Avoid sowing field pea crops in paddocks prone to frequent frosts.

Traditionally, major outbreaks of bacterial blight in NSW result from early frost coinciding with wet conditions. Outbreaks of bacterial blight were widespread in southern NSW in 2024 due to damaging frosts over winter.

Management factors that favour a bacterial blight outbreak include sowing field pea crops earlier than recommended, sowing infected seed, and new season crops coming into contact with infected pea straw. Field pea crops sown into cereal stubble mulch (soil surface covered by straw) are also very prone to frost injury and highly predisposed to developing bacterial blight. If field pea crops are to be sown into cereal stubble, leave the stubble standing.

The varieties PBA Oura$^{\Phi}$ and PBA Percy$^{\Phi}$ were released in 2011 with significantly improved resistance to *P. syringae* pv. *syringae*. PBA Butler$^{\Phi}$ (released 2017) is now also recommended for bacterial-blight-prone regions. In the older varieties, Morgan$^{\Phi}$ and Sturt$^{\Phi}$ displayed the best field tolerance, while Kaspa$^{\Phi}$ was one of the most susceptible varieties. The safest strategy is to grow the more resistant varieties and only use seed from crops inspected as visibly free of symptoms.

Blackspot and septoria blotch

These 2 fungal diseases regularly infect pea crops in southern and central NSW. In wetter years and in high-rainfall production zones, yield losses of 10–30% are common. Dry conditions over the spring period in 2024 kept disease levels low over most regions of NSW. This means there will be low to moderate levels of inoculum in paddocks in 2025. The highest levels of disease traditionally develop in crops sown early and/or adjacent to last year's field pea stubble, or with a recent history (past 3 years) of field pea in the same paddock.

Effects from these fungal diseases can vary with proximity to old field pea stubble and paddock rotation history. Using a fungicidal seed dressing, crop rotation and separation from last year's field pea stubble by at least 500 m will reduce disease potential. In recent years, blackspot has been observed at high levels in some districts, mainly in field pea crops sown early for manuring. Dry summer conditions in combination with early sowing opportunities and wet winter/spring conditions favour a disease epidemic.

Foliar fungicides are available to manage blackspot, but economic returns are limited to crops in medium to high rainfall zones with a high yield potential. There are currently no fungicides registered to control septoria blotch disease.

Downy mildew

Cool and wet conditions favour fast disease development (5–15 °C and wet for 4–5 days), often when field pea crops are emerging and in the early vegetative stage. Heavy dews will promote spore production, and rain splash is the main means of disease spread within a crop. Outbreaks of downy mildew were widespread in 2024, depending on rainfall during early crop establishment. The fungus *Peronospora viciae* causes the disease, which can survive in soil, on old field pea trash and on seed. The most notable symptom of downy mildew is the appearance of stunted, yellowish pale-green seedlings within a crop, which have fluffy grey spore masses on the underside of infected leaves. Heavy infection can stunt plants early and kill seedlings if favourable conditions continue. Downy mildew can impair wax formation on leaves, rendering field pea plants more susceptible to post-emergent herbicides. Options for managing downy mildew include using a fungicide seed dressing containing metalaxyl, crop rotation (at least 4 years between field pea crops), and separating this year's field pea crop from last year's field pea paddock.

Powdery mildew

This disease can cause yield losses and occurs more frequently in the drier areas of the central and northern wheat belt, generally towards the end of the season. Mild day temperatures and cool nights with dew formation favour the disease's rapid development within days. Variety resistance is the best method of control. Of the newer varieties, only PBA Wharton$^{\Phi}$ carries a powdery mildew resistance gene that provides complete protection against this disease. Other currently commercially available varieties have varying degrees of susceptibility. Foliar fungicides can be used to manage the disease in more susceptible varieties but must be applied early before the disease becomes damaging.

Virus diseases

Several virus species cause disease in field pea and other pulses. As virus infection symptoms can be easily confused with those caused by environmental stresses, expert advice should be sought to correctly identify the virus. All the important pulse viruses are aphid transmitted and most need to survive in living plants between cropping seasons. Control strategies for virus diseases can only be preventative as infected plants cannot be cured. Plants might often have a virus, but do not show symptoms until plants come under stress (most commonly from moisture or nutrients).

Not enough is known about virus and vector epidemiology in NSW to recommend economic control of aphid vectors. Following the recommended crop management guidelines will reduce the risk of virus infections, as poorly growing crops and plants are more prone to infection. Aphid vectors are most active during the warmer periods of autumn and spring. Avoid sowing crops early in virus-prone areas so that plants can miss autumn infections. Plant resistance is the best defence against virus infection and the National Field Pea breeding program is making rapid progress in developing varieties with adequate resistance to the most important field pea viruses.

For more information see *Managing viruses in pulse crops in 2021* and *Aphid management in pulse crops* on the NSW DPIRD website.

Pea seed-borne mosaic virus

The *Pea seed-borne mosaic virus* (PSbMV) survives between seasons in infected seed. It is found wherever susceptible pea varieties are grown and infected seed has been sown. PSbMV reduces yields and can, depending on the plant's growing environment, cause

GO TO PAGES 4-

Managing viruses in pulse crops in 2021 (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Aphid management in pulse crops (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

distinctive brown-ringed markings on the seed. Seed lots with high levels of infection have lower levels of plant emergence and seedling vigour. Growers are advised to have their seed tested and not to use seed lots with infection levels greater than 1%. Of the current varieties, APB Bondi$^{\Phi}$, GIA Kastar$^{\Phi}$, PBA Taylor$^{\Phi}$ and PBA Wharton$^{\Phi}$ are resistant to PSbMV, while PBA Noosa$^{\Phi}$ is susceptible.

Bean leafroll virus

Bean leafroll virus (BLRV) infection results in leaves yellowing and stiffening. BLRV can cause severe yield losses and, with early infection, stunting and plant death. The virus survives between seasons on pasture legumes and lucerne. Higher levels of infection are generally found in the higher rainfall cropping zones or near irrigated lucerne paddocks. Kaspa$^{\Phi}$ is highly susceptible to BLRV and should not be grown in virus-prone areas. The 3 new varieties, APB Bondi$^{\Phi}$, PBA Noosa$^{\Phi}$ and PBA Taylor$^{\Phi}$, as well as the older varieties PBA Oura$^{\Phi}$, PBA Pearl$^{\Phi}$ and PBA Wharton$^{\Phi}$ have good resistance, while several other breeding lines with good BLRV resistance are in advanced testing.

Desiccation and harvest

Desiccation

Desiccation advances pea maturity and harvest by up to 10 days, reducing problems caused by uneven ripening and/or late weed growth. However, desiccation must be strategically timed when field pea pod and seed development have finished so that grain yield and quality are not compromised. Desiccating seeds that have not yet reached physiological maturity can result in reduced seed size or defective grain such as shrivelled grain and green seeds.

Desiccation can also double as a spray-topping operation to prevent seed set in weeds, provided timing is targeted at the correct stage of the weed's growth.

Field pea crops can be desiccated using glyphosate (470/570/600 g/L) ± saflufenacil (700 g/kg), or diquat (200 g/L). Ensure that harvest withholding periods are observed according to the desiccation product label used (i.e. 7 days for glyphosate and saflufenacil products; nil for diquat products). If retaining seed on-farm for sowing, the preferred product for desiccation is diquat, because glyphosate products can reduce seed viability particularly if used before the correct timing stage for pod and seed maturity.

Desiccation timing

Note and record the end-of-flowering date and, from then on, start regular monitoring every few days for changes in pod colour, and particularly seed development and colour changes within the pod. From the end of flowering, days to desiccation vary enormously depending on the length of the spring and finishing conditions, but should occur within 3–4 weeks.

Desiccate when:

- the lower three-quarters of pods along the stem are brown
- seeds are firm and rubbery, and split rather than squash when squeezed
- pod shells are thin and leathery.

Field pea pods mature from the lowest flowering node upwards. Many plants at this stage can still have green tips.

Seed moisture changes can also be monitored. Desiccate when seed moisture drops to around 30%. To collect seed for this, randomly pick 10–20 stems or more across the paddock. Further information on desiccation timing can be found in Pulse Point 5, *Desiccation and harvest of field pea*.

Harvest

Field pea should be harvested to give 14% seed moisture at delivery to grain traders to maximise yield and minimise grain damage during harvest and subsequent handling. This normally occurs well ahead of the wheat harvest and seed moisture can fall rapidly if not harvested preferentially to other cereal and oilseed crops.

Delayed harvest leads to:

- seed quality loss and shattering, thus reducing both yield and price
- harvest clashes with other crops
- more severe crop lodging with the potential for greater soil contamination
- increased pod splitting and seed loss
- pea weevil emergence in the field
- problems with late weed growth
- increased vulnerability to late-season rain and hail damage.

Plan to start harvest as soon as the seed moisture content is less than 14%. Harvesting early (from dawn) can help to reduce shattering as humidity is often higher and temperatures cooler.

Minimise grain damage during harvest by reducing harvest speed and lowering the drum speed. Some growers have found that fitting cross-augers to their header has improved harvest speed and crop catchment. Run a test strip in each crop and examining what the header captures and loses. This can guide setting adjustments so that optimum quality grain is collected with minimum contamination from defective screenings and foreign material. Optimising harvest settings will reduce the need for subsequent seed cleaning before delivery.

Rolling after sowing reduces rock and clod pick up at harvest. Crops sown into cereal straw have considerably less soil contamination in the grain sample. Use contour-following crop lifters. Seed to be kept for future sowing should be harvested first when moisture content is higher and header damage is least. Minimise subsequent handling to reduce seed cracking and splitting.

Marketing

The domestic stockfeed industry continues to be the main user of field pea produced in NSW, as supply and grain quality over the past few years have been erratic from either drought conditions or wet weather at harvest resulting in reduced yields. In 2024, exports totalled 110,495 tonnes. Whole seed exports were dominated by China (51%) followed by Sri Lanka (10%), Bangladesh (8%), the Philippines (7%) and Malaysia (7%). Split field pea exports went to Sri Lanka (46%), Bangladesh (22%), China (14%) and Yemen (7%). All other countries were <5%.

Each type of field pea (dun, white, and blue) has its own markets and end uses. Dun field pea continues to be the most robust of the pea types, with both food-market and feed-market opportunities, and remains the preferred type to be exported to Asia and the subcontinent. The smooth, non-dimpled Kaspa-type varieties such as APB Bondi$^{\Phi}$, PBA Taylor$^{\Phi}$, PBA Butler$^{\Phi}$ and PBA Wharton$^{\Phi}$ can attract a small premium in human consumption export markets, particularly in southern India and Sri Lanka. However, quality is an ongoing issue, particularly with damage from pea weevil and heliothis grubs, and the amount of soil in samples. These issues will trigger price penalties (refer to the Australian Pulse Trading Standards for the allowable tolerances).

The recent erratic supply of Australian white field pea has hampered overseas market development, with the main competitor, Canada, producing large quantities of high quality white field pea. The domestic stockfeed industry has been the major white field pea consumer, and this is expected to continue until there is more stable production allowing export markets to be reliably supplied.

The Australian blue field pea crop supplies a small but increasing niche domestic market and a few niche export markets. Quality is vital. Colour bleaching, pea weevil, heliothis grub damage and contamination from other pea types are major problems that growers need to manage carefully to avoid price penalties.

The Grains Australia website has the current marketing specifications for the different grades of field pea. Field pea is currently assessed by buyers using visual (subjective) standards, so colour, size and shape are still important quality parameters.

GO TO PAGES

Australian Pulse Trading Standards (https://www.graintrade.org.au/sites/default/files/Standards/Pulse%20Trading%20Standards%202024 25%20Web%20Revised%2026Nov24.pdf)

Grains Australia website (https://www.graintrade.org.au/commodity_standards)

Further information

NSW DPI

Aphid management in pulse crops (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1422168/Aphid-management-in-pulse-crops-2022.pdf)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Managing viruses in pulse crops in 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Northern NSW research results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/ngrt-results)

Pulse Point 4, *Managing pea weevil* (3rd edition) (http://archive.dpi.nsw.gov.au/__data/assets/pdf_file/0020/157034/pulse-point-04.pdf)

Pulse Point 5, *Desiccation & harvest of field pea* (2nd edition) (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/157099/pulse-point-05.pdf)

Pulse Point 7, *Reducing disease risk* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/157144/pulse-point-07.pdf)

Pulse Point 13, *Strategies to minimise bacterial blight in field pea* (http://archive.dpi.nsw.gov.au/__data/assets/pdf_file/0006/157335/pulse-point-13.pdf)

Pulse Point 14, *Powdery mildew in field peas: A growers guide to management* (http://archive.dpi.nsw.gov.au/__data/assets/pdf_file/0011/157349/pulse-point-14.pdf)

Pulse Point 20, *Germination testing and seed rate calculation* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

Southern NSW research results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results)

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

GRDC website

Group E field pea inoculant (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-e-rhizobia-inoculant-for-field-pea,-lentil-and-vetch)

GrowNotes™ *Field pea northern region* (https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/fieldpeasgrownotesnorth)

GrowNotes™ *Field pea southern region* (https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/field-pea-southern-region-grownotes)

NSW DPIRD and GRDC Bulletin: *Legumes in acidic soils – maximising production potential* (https://grdc.com.au/resources-and-publications/all-publications/publications/2018/legumes-in-acidic-soils)

Grains Australia

Grains Australia website (https://www.graintrade.org.au/commodity_standards)

Australian Pulse Trading Standards (https://www.graintrade.org.au/sites/default/files/Standards/Pulse%20Trading%20Standards%20202425%20Web%20Revised%2026Nov24.pdf)

Other

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Contributing authors

NSW DPIRD: Kurt Lindbeck, Senior Plant Pathologist, Wagga Wagga; Joop van Leur, Pulse Pathologist, Tamworth; Mark Richards, Pulse Research Agronomist, Wagga Wagga; Jenny Wood, Pulse Quality Research Scientist, Tamworth; Leigh Jenkins, Research and Development Agronomist, Trangie.

Babu Pandey, Field pea breeder, Agriculture Victoria.

Phil Bowden, Agronomist, Bowden Rural Services (former Industry Development Manager, Pulse Australia).

Table 75. Field pea disease guide.

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Seedling disease				
Damping off *Pythium* spp., *Rhizoctonia* spp.	Seedlings collapse within a few days of emergence. Stem/taproot near ground level sunken, water soaked.	Cool, wet, poorly drained soils. Late sowing leading to slow germination.	Spores survive in soil for extended periods. Wide host range among other broadleaf crops.	Sow on time into well-drained soils. Treat seed with fungicide seed dressing. Cultivate below seed sowing depth.
Root diseases				
Foot rot *Phoma medicaginis* var. *pinodella* *Mycosphaerella pinodes*	Purplish–black rot of lower stem. Black rot of upper tap root.	Cool, damp weather. Paddocks with a recent field pea history or adjacent paddocks.	Survives on infected pea trash and as spores in soil for several years. Also seed-borne at low levels.	Crop rotation – 4 years between pea crops and avoid sowing into paddocks beside last year's field pea crop.
Root rots *Pythium*, *Rhizoctonia* and *Fusarium* spp.	Dark brown, girdling lesions on taproot and lateral roots. Patches of stunted plants within crops.	Wet, poorly drained conditions. Variable moisture.	Survives in soil and on plant debris.	Crop rotation – 4 years between field pea crops. Aim to sow on time. Avoid poorly drained paddocks.
Foliar diseases				
Black spot complex *Mycosphaerella pinodes*, *Ascochyta pisi*, *Phoma medicaginis* var. *pinodella*	Dark brown to black spots on leaves, with reddish/purplish margin, often with an irregular outline. Girdling of lower stem and tendrils with a dark lesion. Bluish–black sunken spots on pods.	Cool, wet conditions. More severe on early sown crops.	Spores survive in soil and plant debris. Spread by rain splash and wind-blown rain.	Avoid early sowing. Crop rotation – 4 years between field pea crops and avoid sowing into paddocks adjacent to last year's field pea crop.
Septoria blotch *Septoria pisi*	Spreading, light brown, angular leaf lesions containing very small, dark brown to black spots. Tends to appear on moisture-stressed crops in spring.	Cool, wet conditions. More severe on early sown crops.	The fungus survives on infected plant debris and can be seed-borne at low levels.	Avoid early sowing. Crop rotation – at least 4 years between pea crops and avoid sowing into paddocks adjacent to last year's field pea crop.
Sclerotinia wilt *Sclerotinia sclerotiorum*	White, cottony fungal growth on aerial parts of plants. Plants wilt. Sclerotia of fungus form on plant surfaces and inside stems.	Humid conditions following rain in spring. Worse in early sown and dense crops.	Survives as resting sclerotia in soil. Sclerotia germinate in spring and infect with airborne spores.	Difficult because of wide host range and long survival in soil – 10 years. Avoid sowing consecutive broadleaf crops.
Downy mildew *Peronospora viciae*	Thick, grey–brown fungal growth on lower leaf surface. Upper leaf surface turns yellow above growth on lower surface. Leaf death.	Favoured by cool, moist conditions. Rarely causes economic damage.	Survives on plant debris and soil. Spores spread by wind.	Crop rotation. Grow resistant varieties.
Powdery mildew *Erysiphe polygoni*	White, powdery growth on upper leaf surface. Leaf withering. Poor seed-set in late pods.	Warm, humid (but not wet) weather. More likely when sowing is late or on late-maturing varieties.	Over-summers on infected pea trash or volunteer plants. Spores blown by wind into new crops.	Crop rotation. Grow resistant varieties. Foliar fungicides in susceptible varieties. Burn or incorporate infected crop residue after harvest.
Bacterial disease				
Bacterial blight *Pseudomonas syringae* pv. *pisi* *Pseudomonas syringae* pv. *syringae*	Fan-shaped, water-soaked lesion spreading into the leaf from the base. Dark brown, spreading stem lesions. Sometimes a sheen on the lesion when dry.	Frosts followed by cool, wet weather.	Infected seed. Infected crop debris. Easily spread in crop by machinery, people and animals.	Crop rotation. Seed testing. Do not keep seed from infected crops for sowing. Use newer resistant varieties. Fungicides will not control bacterial blight disease.
Major virus diseases				
Bean leafroll virus (BLRV), *Soybean dwarf virus* (SbDV, syn. *Subterranean clover redleaf virus*).	Yellowing or sometimes reddening, stunting, leaf stiffening, premature death.	Areas prone to aphid flights. Can be very damaging, occasionally causing complete crop loss.	Survives in legumes including lucerne, subterranean clover and medic. Spread by aphids.	Follow best management recommendations including retaining standing cereal stubble to deter aphids from landing in the crop.
Pea seed-borne mosaic virus (PSbMV)	Commonly symptomless. Can show leaf mosaic, stunting, pod abortion, seed markings.	Has the potential to reach high incidence in all districts.	Source is usually infected seed. Spread within crops by aphids.	Use seed that has been tested and found to be free of PSbMV. Grow resistant varieties.
Cucumber mosaic virus (CMV), *Alfalfa mosaic virus* (AMV)	Mosaic, mottle or yellowing along leaf veins. Early infection can result in stunting, stem necrosis and premature death.	Uncommon in the major pea growing areas.	Range of weed and pasture species. AMV also in lucerne. Spread by aphids.	Follow best management recommendations including retaining standing cereal stubble to deter aphids from landing in the crop.

Lentil

Key considerations for 2025

» Select a variety to suit sowing time, maturity, disease resistance, access and availability to the target market.

» Test sowing seed for germination, vigour and virus infection with time allowed to source replacement seed if necessary.

» Lentil requires annual rainfall greater than 300 mm. Production risk is reduced when sowing into high soil moisture profiles.

» Paddock selection is critical to minimise production risk. Plan and prepare paddocks 2 years in advance.

» Sowing into standing stubble can reduce the incidence and severity of aphid-borne virus disease such as *Cucumber mosaic virus* (CMV).

Crop management

Lentil production was established in Australia over 30 years ago and has become a mature industry in key growing areas of Victoria (Vic) and South Australia (SA). In New South Wales (NSW), lentil has been grown intermittently on small areas across parts of the main cropping belt over the past 20–25 years. Currently, it is grown mainly in southern NSW. As an alternative winter pulse option in farming systems, the inclusion of lentil is largely viewed through the lens of grain value, using herbicide-tolerant varieties and disease break benefits.

A high value pulse food crop, lentil is Australia's leading exported pulse grain. The grain can also be used as livestock feed when the grain does not meet market specifications, is damaged, or when prices are low. In many cases, lentil is a paddock-to-plate product where the harvested grain is cooked and served as whole grain, so visual appearance is important.

Breeding programs are widening lentil's adaptability. New varieties feature improvement in plant physiology and architecture, yield potential and herbicide tolerance. NSW agronomy research began around 10 years ago, investigating sowing dates, plant population targets and row spacing for specific varieties. More recent research has focused on:

- crop development
- critical growth period and optimum flowering windows for varieties across the contrasting environments of southern and central western NSW
- the capacity for nitrogen (N) fixation
- its broader role as a pulse alternative in farming systems.

Research findings in southern and central NSW have shown that lentil generally fix less nitrogen (N) than other pulses, largely due to its inherent low biomass. The amount of fixed N is closely related to biomass production. Lentil grain N concentration – 42 kg N/t, (similar to field pea and faba bean) influences the amount of N removed at harvest and the N balance after the crop. Due to its low biomass production, overall lentil N balance was less than 100 kg N/ha.

As a non-host to important cereal diseases, lentil is an important break crop in winter cereal rotations. The opportunity to include herbicide-tolerant varieties offers additional opportunities in broader integrated weed management programs. These characteristics combine to benefit other crops in the farming system. Growers have greater confidence to incorporate lentil into farming systems.

Soil types

Lentil prefers neutral to alkaline soils (pH_{Ca} 6.0–8.0) with high fertility and good water-holding capacity. In Vic, lentil is grown on the medium to heavy clays of the northern Wimmera through to the loamy sands of the Mallee. In NSW, the crop is currently grown on soil types from clay loams through to sandy loams. Lentil requires soil types with good drainage that are not prone to waterlogging. Hard-setting, dispersive soils should be avoided, as should soils that are sodic in the root zone. Lentil is very susceptible to salinity, however, some varieties have improved tolerance, see Table 76 Agronomic characteristics of lentil varieties on page 148.

In central and southern NSW, most cropping soils have acidic subsurface layers that can affect root growth, nodulation, crop vigour and yield potential. Severely acidic layers, with pH_{Ca} below 4.5, are commonly found at depths of 5–10 cm and 10–15 cm. Liming programs

should be planned at least 2 years before sowing acid-sensitive pulses, using analyses from soil samples collected at 5 cm intervals to a depth of 20 cm. This data shows the depth and severity of acidity in subsurface layers, and guides lime rate and the appropriate incorporation method needed for effective amelioration.

A medium-term to long-term approach is necessary to manage acidity in layers below 10 cm. Initial lime applications should target pH_{Ca} >5.8 in the top 0–10 cm to facilitate the downward movement of lime. Strategic incorporation that effectively mixes appropriate rates of fine-grade lime will accelerate pH increase in subsurface layers. Ongoing soil testing is recommended to guide subsequent liming treatments. Liming significantly improves lentil yield potential, improving nodulation and N fixation.

Paddock selection

Paddocks that have an even soil type are easier to manage and are preferred for lentil. Changes in soil type across a paddock can lead to uneven crop maturation, harvest delays and increased grain losses from shattering. Suitable paddocks must:

- have a relatively flat soil surface, as unevenness could reduce harvest efficiency
- be free of stones, large clods and sticks, and have a low broadleaf weed burden.

It is very important to select paddocks with a low weed burden with no damaging herbicide residues. Consider selecting a suitable herbicide-tolerant variety where Group 2 chemical residues are suspected of carrying over from previous crops.

Avoid paddocks with a history of vetch to avoid risks of seed contamination at harvest.

Sowing

Stubble

Sowing lentil directly into previous cereal stubble is the preferred method of establishment. The benefits of retained stubble enable more timely sowing in the early part of the sowing window through conserving extra soil moisture. Standing stubble deters aphids, provides crop canopy support and enhances harvest efficiency. Sowing configuration can be GPS-guided inter-row sowing or adjusted closer to the previous year's cereal stubble row. Stubble management starts at harvest the previous year.

Sowing depth

Lentil has hypogeal emergence, the same as chickpea, field pea and faba bean so can, for example, be sown deeper than lupin. Sowing 4–6 cm deep will place the seed deeper into soil moisture. It lessens the risk from herbicide washing into the sowing furrow and damaging the seed as it germinates.

Sowing rate

Target plant densities for lentil in NSW are 110–130 plants/m^2. Due to variation in a variety's seed size and seasonal production variations, seeding rates range from 45–55 kg/ha for small-seeded varieties, to 55–70 kg/ha for medium-seeded varieties.

Your calculation

(	100 seed weight ❶ (grams)	×	target plant population (plants/m^2)	× 1000	)	÷	(establishment percentage ❷	×	germination percentage	)	=	your sowing rate ..... kg/ha

❶ To determine your seed weight, weigh 100 seeds in grams.
❷ Establishment percentage – 80% is a reasonable estimate, unless sowing into adverse conditions.

Row spacing

Most current stubble retention/no-till farming systems in southern and central NSW are set up on row spacings of 22, 30 or 33 cm. This enables inter-row sowing and stubble trash flow when sowing. Row spacing of 30 cm or less, with retained standing stubble, will provide some trellising support for the plant.

Rolling

Rolling the seedbed after sowing is a key management step to improve harvest efficiency. The lentil plant grows to between 20 cm and 60 cm high depending on sowing time and seasonal conditions, especially rainfall. Rolling with a round steel roller pushes stones and clods into the soil, which helps the harvester front to capture the lowest setting pods without major soil contamination problems.

Sowing time

Mid May is the preferred sowing time in southern and central NSW. In the central west and western areas, sowing can start 7–10 days earlier. Later sowing exposes the crop to more heat and moisture stress during the critical flowering and pod-filling phases. Sowing the crop too early can lead to bulky growth, increasing the risk of disease, especially botrytis grey mould. It also increases the risk of frost damage.

Inoculation

Inoculating lentil with the new Group E rhizobia, (Strain WSM-4643) is recommended. This strain has improved acid soils tolerance, improving nodulation at pH_{Ca} 4.6. It is the same inoculant required for field pea and vetch. For more information, see *New Group E rhizobia inoculant for field pea, lentil and vetch*.

Nutrition

In most situations, a phosphorus-based starter fertiliser is all that is required. The application rate will depend on soil test results and potential crop removal, but in general will be similar to that applied to field pea. It is important to apply some phosphorus (P), even at low rates, close to the seed at sowing.

Variety selection

Varieties have been listed in alphabetical order within herbicide tolerance groups. The agronomic characteristics in these descriptions are provided as a guide only and have been compiled from breeder observations, National Variety Testing, agronomic research projects and/or seed companies.

When selecting a variety, growers are encouraged to consider their individual farm and paddock situation along with access to markets and their requirements. NSW NVT data is limited, so growers are advised to take note of variety performance in the northern Wimmera and the southern Mallee regions of Victoria. Other sources of agronomy information should be sought through grower group publications, GRDC Update papers, *NSW Southern Research Results* book, the Grain Legume Extension Hub.

Conventional

PBA Ace$^{\Phi}$. Vigorous, medium-sized, mid season red lentil with a grey seed coat. High milling quality. Released 2012. Seed available from PB Seeds. EPR $5.50/tonne incl. GST.

PBA Giant$^{\Phi}$. The largest seeded green lentil in Australia. PBA Giant$^{\Phi}$ is broadly adapted but best suited to the medium-rainfall growing regions. Similar yield to Boomer with improved shattering resistance, though timely harvest is still required to minimise shattering. Less susceptible to lodging at maturity than Boomer. Released in 2014. Seed available from PB Seeds. EPR $5.50/tonne incl. GST.

PBA Greenfield$^{\Phi}$. A medium-sized green lentil broadly adapted but best suited to the medium-rainfall growing regions. Highest yielding green lentil variety with yields similar to PBA Ace$^{\Phi}$. Improved salinity tolerance and resistance to shattering, although timely harvest is still required. Released in 2014. Seed available from PB Seeds. EPR $5.50/tonne incl. GST.

PBA Jumbo2$^{\Phi}$. High yielding large-seeded red lentil with a grey seed coat. Mid flowering and maturity. Improved tolerance to soil boron over other conventional varieties. Adapted to medium to higher rainfall regions. Released in 2014. Seed available from PB Seeds. EPR $5.50/tonne incl. GST.

GO TO PAGES

New Group E rhizobia inoculant for field pea, lentil and vetch (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-e-rhizobia-inoculant-for-field-pea,-lentil-and-vetch)

GRDC Update papers (https://grdc.com.au/resources-and-publications/grdc-update-papers?grdc=true)

NSW Southern Research Results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results)

Grain Legume Extension Hub (https://spahub.com.au)

Imidazolinone tolerant

ALB TerrierΦ. An imidazolinone (IMI) tolerant small red lentil released in 2024. Mid flowering and mid maturing. It has broad adaptation to NSW growing areas. Commercialised by Seednet. EPR – $5.94/tonne incl. GST. Seed available for the 2025 season.

GIA LeaderΦ. An IMI-tolerant red lentil variety suited to reliable lentil growing areas in medium–higher rainfall zones. It is suited to early sowing. Mid–late flowering and mid–late maturity, its spreading plant type can support pod protection at maturity. Phenology is similar to Nugget. Compared to PBA Hurricane XTΦ it has improved vegetative frost tolerance. Similar IMI and soil residue sulfonylurea (SU) herbicide tolerance to existing XT varieties. GIA LeaderΦ grain is well suited to the medium sized Nugget-type market. Bred by Grains Innovation Australia (GIA) and released in 2021. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

GIA LightningΦ. An IMI-tolerant, small rounded red lentil. Similar Group 2 (IMI and soil residue SU) herbicide tolerance to existing XT varieties. Mid–late flowering, with mid maturity. It has an upright plant type that improves harvestability. Bred by GIA and released in 2022. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

GIA ThunderΦ. A broadly adapted IMI-tolerant, small rounded red lentil suited to the small premium round grain market with a uniform grey seed coat with seed size similar to PBA Hurricane XTΦ. Similar Group 2 (IMI and soil residue SU) herbicide tolerance to existing XT varieties. Mid flowering and mid maturity. Bred by GIA and released in 2023. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

PBA Hallmark XTΦ. A mid season maturing variety, medium-sized seed and grey seed coat. Greater early vigour and improved resistance to BGM compared with PBA Hurricane XTΦ. Tolerant to Intercept® herbicide, improved tolerance to the herbicide flumetsulam (e.g. Broadstrike®) and diflufenican (e.g. Brodal® Options) plus reduced sensitivity to some SU-herbicide and IMI-herbicide residues from earlier crop applications. Released 2018. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

PBA Highland XTΦ. Herbicide tolerant, early to mid maturing small red lentil. Tolerant to Intercept® herbicide, improved tolerance to the herbicide flumetsulam (e.g. Broadstrike®), plus reduced sensitivity to some SU-herbicide and IMI-herbicide residues from earlier crop applications. High early vigour and early flowering. Released 2019. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

PBA Hurricane XTΦ. A small-seeded red lentil, mid flowering and mid maturing. Tolerant to Intercept® herbicide, improved tolerance to the herbicide flumetsulam (e.g. Broadstrike®), plus reduced sensitivity to some SU-herbicide and IMI-herbicide residues from earlier crop applications. Released in 2013. Seed available from PB Seeds. EPR $5.94/tonne incl. GST.

PBA Kelpie XTΦ. Large-seeded herbicide-tolerant lentil variety. Tolerant to Intercept® herbicide, improved tolerance to the herbicide flumetsulam (e.g. Broadstrike®), plus reduced sensitivity to some SU-herbicide and IMI-herbicide residues from earlier crop applications. Moderate to good early vigour, early to mid flowering and maturity. Widely adapted to Australian lentil-growing regions. Released in 2020. Seed available from Seednet. EPR $5.94/tonne incl. GST.

Dual herbicide tolerant

GIA MetroΦ. The first lentil to combine IMI and metribuzin herbicide tolerances. Mid*+–late maturity. A lower yielding variety in the absence of weed pressure, or where weeds are controlled effectively without crop damage from Group 5 herbicides. Metribuzin is under permit for application at the 3–6 growth node stage (PER92810 Expires 31/12/25). Released in 2022. Bred by GIA using a metribuzin trait from a project funded by GRDC and SARDI. Seed available from PB Seeds. EPR $8.25/tonne incl. GST.

GO TO PAGE
PER92810 (https://permits.apvma.gov.au/PER92810.PDF)

GIA SireΦ. The first IMI-tolerant lentil with improved tolerance to clopyralid herbicide soil residues from a previous crop when applied according to product label directions. Tolerance to IMI and soil residue SU similar to existing XT varieties. GIA SireΦ is slow growing with smaller plant parts, increased basal branching and shorter plant height compared to other lentil varieties. Best suited to early sowing and favourable growing areas. Avoid low fertility sandy soils. Bred by GIA and released in 2022. Seed production is under a small-scale release by PB Seeds. Not widely available for the 2025 season. EPR to be advised.

Table 76. Agronomic characteristics of lentil varieties.

Variety	Seed coat colour	Cotyledon colour	Seed shape	Market	Vigour	Plant height	Flowering	Maturity	Resistance			Salinity tolerance
									Lodging	Pod drop	Shattering	
Conventional												
PBA Ace	grey	red	lens	MRS	good	medium	mid	mid	MR–MS	R	MR–MS	I
PBA Giant	green	yellow	round	LG	–	–	mid	mid–late	MS	–	MR–MS	I
PBA Greenfield	green	yellow	lens	MG	–	–	mid	mid–late	MS	–	MR	MI
PBA Jumbo2	grey	red	lens	LRS	moderate–good	medium–tall	mid	mid	MR–MS	MR	R	I
Imidazolinone tolerant												
ALB Terrier	grey	red	lens	SRP	moderate	medium	mid	mid	MR–MS	MR	MR	MI
GIA Leader	grey	red	lens	MRS	moderate	medium	mid–late	mid–late	MR	MR	R–MR	I
GIA Lightning	grey	red	round	SRP	moderate	medium	mid–late	mid	MR	MR	R–MR	MI
GIA Thunder	grey	red	round	SRP	moderate	medium	mid	mid	MR–MS	MR	R–MR	MI
PBA Hallmark XT	grey	red	round	MRS	moderate–good	medium	mid	mid	MR	MR	R	MI
PBA Highland XT	grey	red	lens	SRP	moderate–good	medium	early	early–mid	MR	MR	MR	MI
PBA Hurricane XT	grey	red	round	SRP	moderate	medium	mid	mid	MR	MR	R	I
PBA Kelpie XT	grey	red	lens	LRS	moderate–good	medium	early–mid	early–mid	MR–MS	MR	R	MI
Dual herbicide tolerant												
GIA Metro	grey	red	lens	LRS	moderate–poor	short–medium	late	mid–late	MR	MR	R–MR	I
GIA Sire	grey	red	round	SRP	poor	short	mid–late	mid	MR	MR	R–MR	MI (P)

Source: GIA breeding program and NVT website.
(P) Provisional

Resistance
R resistant
R–MR resistant to moderately resistant
MR moderately resistant
MR–MS moderately resistant to moderately susceptible
MS moderately susceptible
S susceptible
VS very susceptible

Tolerance
I intolerant
MT moderately tolerant
MI moderately intolerant

– denotes no rating available

Market category
SRP Small red premium round (football)
MRS Medium red split
LRS Large red split
MG Medium green
LG Large green

Lentil yield performance experiments from 2020–2024

The yield results presented are NVT 'Production value' multi-environment trial (MET) data shown on a yearly regional group mean and regional mean basis from 2020–2024. Further results are on the NVT website.

GO TO PAGE
NVT website (https://nvt.grdc.com.au/)

Table 77. Lentil performance in southern NSW compared with PBA Kelpie XT = 100%.

Performance data for varieties is limited due to changes in NVT that precluded breeder trials from 2020 being included in the NVT analysis. Yield data in 2021 should be treated with extreme caution due to adverse seasonal conditions.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Kelpie XT t/ha	**3.03**	**0.91**	**3.17**	**2.1**	**1.87**	2.22	
Conventional							
PBA Ace	77	107	107	116	–	100	4
PBA Jumbo2	98	108	115	107	102	106	5
Imidazolinone tolerant							
ALB Terrier	–	110	124	111	101	107	4
GIA Leader	75	98	111	103	93	95	5
GIA Lightning	76	103	121	114	110	104	5
GIA Thunder	98	115	127	114	107	112	5
PBA Hallmark XT	72	92	113	100	93	94	5
PBA Highland XT	78	94	111	103	101	97	5
PBA Hurricane XT	82	98	108	104	98	98	5
PBA Kelpie XT	**100**	**100**	**100**	**100**	**100**	**100**	**5**
Dual herbicide tolerant							
GIA Metro	–	72	76	79	70	71	4
GIA Sire	–	61	90	79	79	71	4

Table 78. Lentil performance in Victoria's Mallee and Wimmera regions compared with PBA Kelpie XT = 100%.

Variety	Mallee							Wimmera						
	Yearly group mean					Regional mean	Number of trials	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024			2020	2021	2022	2023	2024		
PBA Kelpie XT t/ha	**1.37**	**2.68**	**3.21**	**1.68**	**1.12**	**2.05**		**2.59**	**–**	**2.48**	**1.33**	**1.52**	**2.1**	
Conventional														
PBA Ace	123	109	87	113	–	104	10	101	–	77	82	–	97	4
PBA Jumbo2	119	102	115	109	112	113	11	99	–	114	97	112	104	5
Imidazolinone tolerant														
ALB Terrier	–	103	120	117	112	120	8	–	–	115	87	123	103	3
GIA Leader	122	101	–	113	115	109	8	91	–	94	74	115	93	5
GIA Lightning	139	111	95	115	118	110	11	101	–	79	104	128	100	5
GIA Thunder	135	105	123	116	121	122	11	101	–	120	103	123	109	5
PBA Hallmark XT	124	101	100	111	109	107	11	91	–	87	83	111	92	5
PBA Highland XT	122	105	92	108	106	103	11	97	–	79	100	112	95	5
PBA Hurricane XT	117	103	–	109	110	105	8	96	–	90	88	112	96	5
PBA Kelpie XT	**100**	**100**	**100**	**100**	**100**	**100**	**11**	**100**	**–**	**100**	**100**	**100**	**100**	**5**
Dual herbicide tolerant														
GIA Metro	–	–	73	97	90	82	7	–	–	66	45	84	73	3
GIA Sire	–	98	62	99	84	83	8	–	–	38	75	89	71	3

Weed control

Lentil is viewed as a relatively poor competitor against weeds with few herbicide control options, especially for broadleaf weeds, although weed control options have expanded over the past few years. Breeding imidazolinone-tolerant and more recently dual-tolerant varieties to imidazolinone and metribuzin has coincided with recent herbicide registrations in 2022: Group 14 herbicides fomesafen (e.g. Reflex®) in 2021 and flumioxazin (e.g. Terrain®). These alternatives have enabled more reliable and effective weed control.

In most situations it is essential to apply a pre-sowing or pre-emergent herbicide with residual activity. This strategy gives early weed control when the lentil plant is establishing and reduces reliance on broadleaf herbicides for complete weed control after sowing.

Check current pesticide registrations for problem weeds in your paddock. To maximise farming system rotational benefits, an integrated approach to weed management is essential, see WeedSmart Big 6. Current NSW herbicide registrations are listed in *Weed control in winter crops*.

Injury from herbicide residues

Lentil is extremely sensitive to some residual herbicides. Residues might come from the previous crop, the crop 2 years earlier, or from fallow weed control, see Table 80. Lentil disease and crop injury guide on page 153.

Some lentil varieties are very sensitive to soil carryover of Group 2 and Group 4 herbicides. Group 2 herbicides include chlorsulfuron (e.g. Glean®), triasulfuron + butafenacil (e.g. Logran® B-Power), metsulfuron methyl (e.g. Associate®) and metosulam (e.g. Eclipse®), all SU herbicides. Imazamox + imazapyr (e.g. Intercept®) and imazethapyr (e.g. Spinnaker®) are examples of IMI herbicides. Clopyralid (e.g. Lontrel®), a Group 4 herbicide applied to preceding wheat crops, can be carried over in stubble and cause damage to seedling lentil.

Tolerance to Group 2 herbicides has been incorporated into varieties since 2012, most recently ALB Terrier$^{\Phi}$ in 2024. The 2022 release of dual-herbicide tolerant varieties GIA Sire$^{\Phi}$ (IMI + clopyralid) and GIA Metro$^{\Phi}$ (IMI + metribuzin) with tolerance to Group 4 (clopyralid) and Group 5 (metribuzin) respectively, improved soil/stubble herbicide residue management and in-crop weed control. These varieties have expanded growers' options after the earlier release of XT varieties with improved tolerance to SUs. Compared to other pulse crops, lentil is highly sensitive to Group 14 herbicides. Strict adherence to recommended lower label rates and use pattern is essential.

It is important to note that herbicide-tolerant varieties can be susceptible to other herbicides within the same mode of action (MOA) group. For example, GIA Metro$^{\Phi}$ is susceptible to severe damage from the Group 5 herbicide terbuthylazine, but is tolerant to metribuzin, also a Group 5 herbicide.

GO TO PAGES

WeedSmart Big 6 (https://www.weedsmart.org.au/big-6/)

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Insects

Like other winter pulses and canola, redlegged earth mite, blue oat mite, cutworm, wireworm, aphids, lucerne flea and slugs are potential establishment pests that might warrant control in any season. A permit, PER8522 (expires 30/9/25) is registered to control wireworm, black field earwig, field cricket and false wireworm using cracked grain bait.

Aphid

Lentil is a favoured host for multiple aphid species. Aphids can cause damage by direct feeding, but the main risk for the crop is through aphids spreading viruses, particularly early in the season. Sowing crops into standing stubble can reduce the incidence, and often severity, of aphid-transmitted virus diseases.

Etiella and *Helicoverpa*

Etiella (also known as lucerne seed web moth) and *Helicoverpa* spp. are the main pests of lentil later in the growing season. These 2 pests will attack when seeds are beginning to form inside the pods. Following egg laying and hatching, the first instar of *Etiella* larvae bore into pods and begin feeding on developing seeds, whereas *Helicoverpa*, as young larvae, often feed on leaves before causing any pod damage.

Etiella requires close monitoring for the very small larvae. A hand lens is useful to detect the larvae as once inside the pods they cannot be controlled.

Guidelines to support effective, sustainable integrated pest management are available at IPM Checklist: a step-by-step guide for a sustainable grains industry – Cesar Australia. See *Insect and mite control in field crops* for more detailed options on pest control measures and lentil thresholds.

GO TO PAGES

PER8522 (https://permits.apvma.gov.au/PER8522.PDF)

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Insect and mite control in field crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Disease

Disease management is important to ensure a quality, blemish-free seed product for human consumption markets. Ascochyta blight (AB) and Botrytis grey mould (BGM) are the 2 important foliar diseases of lentil.

Ascochyta blight

The initial ascochyta blight (AB) symptoms are lesions on the leaves and stems of young plants shortly after emergence. A distinguishing feature is the fungal fruiting structures (small black dots) visible within the centre of pale lesions. These become visible after the first few days of lesion development. Infected seedlings can deteriorate quickly and plant parts above the lesion can die and break off, making symptoms difficult to detect. Closely monitor crops following rain or heavy dew. Pod infection can cause seed infection and discolouration. New varieties have strong AB resistance when released, but resistance status can change over time, hence the need for ongoing monitoring.

Botrytis grey mould

Botrytis grey mould (BGM) is more likely to develop in bulky crops that have been sown early and/or have been sown on narrow row spacings. Crops that have a thick canopy by late winter are more prone to developing the disease. Prolonged wet conditions following canopy closure will also favour disease development. Lodging within crops can significantly increase disease risk. Symptoms appear initially as small tan or white spots on lower leaves or under the canopy. Light brown or blanched stem lesions later develop and become covered in fluffy grey mould, girdling the stems and leading to dead patches within the crop. Very small black sclerotes can form on the stem lesions. Infected flowers lead to flower drop and lesions can also develop on pods, leading to seed abortion or shrivelled and discoloured seed.

Fungicide management

There are 3 critical periods for fungicide application:

1. just before canopy closure so that the fungicide penetrates lower into the canopy; this is important for BGM management
2. at mid-flowering/early pod fill if the weather is conducive to disease infection and development
3. at the end of flowering/mid pod fill where protecting the pods from AB might be needed to ensure good seed quality.

Adopting an approach to minimise the risks of fungicide resistance is recommended. Practice *The fungicide resistance five*.

There is a range of fungicides available to control AB and BGM. Selecting the most appropriate fungicide will depend on the level of disease pressure, fungicide efficacy and cost effectiveness. Careful selection and rotating products with different chemical activity will reduce the risk of developing resistance, see *Fungicide resistance in pulses*. Older registered fungicides for AB and BGM with protectant properties include mancozeb and chlorothalonil, while the recently registered fungicides Aviator® Xpro, Miravis® Star and Veritas® Opti have

GO TO PAGES

The fungicide resistance five (https://afren.com.au/understanding/)

Fungicide resistance in pulses (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2021/fungicide-resistance-in-pulses)

protectant as well as limited curative activity. Fungicides containing boscalid are registered to control SSR, AB and BGM under PER82476 expires 31/5/27. Be aware of the restrictions on the number of applications of a fungicide per season. Carbendazim and procymidone are the two most cost-effective protectant fungicides against BGM, applied just before canopy closure, see Table 95 Canola and pulse foliar fungicides on page 182.

GO TO PAGE
PER82476 (https://permits.apvma.gov.au/PER82476.PDF)

Fungicide seed dressing

Both AB and BGM are highly seed-borne, so using a fungicide seed treatment is recommended. P-Pickel-T® (thiram + thiabendazole) is registered for use on lentil and will significantly reduce disease transmission. It is also registered to control *Fusarium* spp. seedling root rots and *Pythium* spp., see Table 94 Canola and pulse seed dressings on page 179.

Viruses

A wide range of viruses similar to those that infect other pulse species can infect lentil. There are 4 main viruses known to have the potential to cause serious damage:

1. *Alfalfa mosaic virus* (AMV)
2. *Cucumber mosaic virus* (CMV)
3. *Bean leafroll virus* (BLRV)
4. *Turnip yellows virus* (TuYV).

Cucumber mosaic virus largely depends on seed transmission for survival. Sowing seed, therefore, should be tested for this virus if there are any doubts.

All lentil viruses are spread by aphids from other grain, forage legumes or from weeds. The effect on the crop from the virus infection depends on the lentil variety and virus species, with early infection more likely to result in significant damage to the crop and reduced yields.

Aphid population development and movement are unpredictable; hence it is very difficult to predict virus epidemic years.

Strategic disease management

Non-chemical strategies that can be used to avoid disease development within lentil crops include:

- Separation of this years' crop away from last years' lentil or vetch stubble where BGM and AB pathogens can harbour.
- Avoid sowing lentil more than once in 4 years within the same paddock.
- Following recommended sowing times and sowing rates for your district to avoid large, bulky crops.
- Selection of lentil varieties with suitable levels of resistance against BGM and AB.
- Harvest crops on time and avoid exposure of mature crops to rain.
- Monitor crops regularly during the growing season for disease development and act early if symptoms are observed.

Table 79. Lentil disease ratings.

Herbicide tolerance/ variety	Ascochyta blight pathotype 1 – Nipper	Ascochyta blight pathotype 2 – Hurricane	Botrytis grey mould (BGM)	Root lesion nematode (*Pratylenchus* spp.)	
				P. neglectus	*P. thornei*
Conventional					
PBA Jumbo2	R	R–MR	MR	MR	MR–MS
Imidazolinone tolerant					
ALB Terrier	R	MR	MR–MS	MR	MR
GIA Leader	MR	MR	MR–MS (P)	MR–MS (P)	MR (P)
GIA Lightning	R (P)	MR–MS (P)	MS	MR–MS (P)	MR (P)
GIA Thunder	R (P)	MR–MS (P)	MR–MS	MR (P)	MR(P)
PBA Hallmark XT	R–MR	MR–MS	MR–MS	MR	MR–MS
PBA Highland XT	MR	MR	MS	MR	MR–MS
PBA Hurricane XT	R–MR	MR–MS (P)	MS	MR–MS	MR–MS
PBA Kelpie XT	MR–MS	MR–MS	MS	MR–MS	MR–MS
Dual herbicide tolerant					
GIA Metro	MR	R–MR	MR–MS	MR (P)	MR–MS (P)
GIA Sire	R (P)	MR–MS (P)	MS	MR–MS (P)	MR–MS (P)

Source: NVT lentil disease ratings (as at March 2025).

(P) Provisional ratings – treat with caution.
R Resistant
R–MR Resistant to moderately resistant
MR Moderately resistant
MR–MS Moderately resistant to moderately susceptible
MS Moderately susceptible

Desiccation

Desiccating the crop is an essential prerequisite for a successful harvest. Rarely do crops mature evenly, and with a high value commodity in the paddock, desiccation brings harvest forward, improving harvest efficiency and grain quality. Desiccation timing is critical to ensure grain yield and quality are not compromised. Desiccating too early can lead to significant yield penalties and grain size problems. As a guide, desiccate when 60% of pods in the top third of the canopy are coloured yellow–buff. Seek advice from an experienced agronomist.

See 'Harvest aid' or 'Salvage spraying winter crops' on page 170 in *Weed control in winter crops* for currently registered herbicides for crop desiccation.

Harvesting

The harvesting process should focus on maximising grain quality as lentil is graded on visual standards. Lentil should be harvested as soon as the crop is mature. Start harvesting as soon as the seed moisture drops to 14%, the lowest pods on the plant start to turn light brown and gently shaking the pod produces a rattle. An early harvested crop will have less lodging, better grain weight and quality, and fewer harvest losses from pod shatter and pod drop. Delaying harvest will increase losses, especially when weather such as rain and strong winds occur on mature crops, while the seed can become brittle, sustain physical damage, weathering and staining.

In addition to timing, harvest success comes from having the correct harvesting equipment and settings. Pod drop and shattering can occur before harvest, and upon intake into the harvester. Recommended conclave clearances are 10–30 mm, with a thresher speed adjusted to 300–600 rpm and a fan speed of 60–85%. For rotary machines, a rotor speed of 350–450 is recommended, depending on the drum/rotor diameter. The top and bottom sieves for red lentil should be around 16 mm (top) and 3–10 mm (bottom), and for green lentil 32 mm (top) and 8–16 mm (bottom). Reel speed should be slow (slightly faster than ground speed) and spiral clearance low.

Various modifications can assist lentil harvesting and improve harvest efficiency. A flex-front with air reels can limit shatter on the knife front, providing speed is maintained. Extension fingers can be fitted to the draper front to catch pods that have fallen off the front of the knife. Extended fronts and platform sweeps or belts can help to reduce losses from plant material bunching at the front, similar to draper fronts. Light crop lifters can assist with lodged crops.

Run a harvest test on the crop and check what is being collected and what is lost at the back of the header – adjust settings as necessary to optimise both yield and quality.

Marketing

In the 2024–25 season, NSW grew 39,900 tonnes of lentil, an increase of 166% on the previous season and a record high (ABARES – DAFF). This was equivalent to 4% of Australia's total production. Most Australian lentils are grown in South Australia and Victoria.

GO TO PAGE
ABARES – DAFF (https://www.agriculture.gov.au/abares)

Lentil is Australia's leading exported pulse grain with the bulk of the Australian crop exported. Less than 5% is retained domestically. The high value grain is used for human consumption as whole seeds or splits. Almost 89% is sold to the Indian subcontinent (India – 46%, Bangladesh – 24% and Sri Lanka – 6%), while 10% is exported to the Middle East. Countries throughout the rest of the world purchase the remainder. A small proportion is sold whole or split in Australia and consumed locally. Canada is the largest lentil exporter, but this is mainly large green lentil; Australia has a niche market for the small–medium red lentil.

All pulses are graded on visual standards. Grain size, shape and colour are key factors, with no disease or insect blemishes and no soil or foreign material. The grain appearance is very important for buyers. Australia has a good reputation for high quality grain.

Evenly coloured, sized and shaped (rounds or footballs) seeds are important considerations for buyers. Careful harvesting and storage are necessary to achieve the highest returns.

India's lentil tariff exemption, due to expire at the end of March 2025 changed unexpectedly. Effective from March 8, lentil imports attract a 10% tariff, composed of 5% import duty and a 5% Agri Infrastructure Fund Cess.

Most Australian export is in December. Prices in the Indian subcontinent are often lower from April to June, and Turkish or East African imports often fill the period from August to November. Hence the best opportunity for Australian export is December to March. Lentil stores well, encouraging growers to wait for marketing opportunities.

Table 80. Lentil disease and crop injury guide. (Page 1 of 2.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Fungal diseases				
Ascochyta blight *Ascochyta lentis*	Initially grey, spot-like lesions that change to tan with a dark brown margin. Lesion centre becomes speckled with pycnidia. Occurs on leaves, stems and pods from seedling stage to mature plant.	Cool wet conditions in winter.	Seed, crop residue and volunteers.	Use high vigour, disease-free seed. Grow resistant varieties. Apply registered seed treatment. Allow a break of at least 3 years between lentil crops. Apply registered fungicides consistent fungicide resistance management guidelines. Permit PER82476 (Exp. 31/5/27) is registered for control.
Botrytis grey mould *Botrytis cinerea* *Botrytis fabae*	Initially discrete greyish brown or cream coloured lesions on lower leaves. Infected leaves can become covered with a fuzzy layer of grey mould towards the plant base. Stem lesions appear light brown or bleached and can be covered in grey mouldy growth.	Warm (>15 °C), humid and overcast conditions, lodged crops, dense canopies.	Sclerotia survives on stubble (including chickpea (*B. cinerea*) and faba bean (*B. fabae*) and in soil. Can also be carried on infected seed.	Use clean seed and varieties with improved resistance. Avoid paddocks near old lentil, chickpea, faba bean, vetch or lathyrus stubble. Allow a break of at least 3 years between lentil crops. Pre-emptive spraying might be possible; check current recommendations. Permit PER82476 (Exp. 31/5/27) is registered for control.
Sclerotinia stem rot *Sclerotinia sclerotiorum*	White mycelial growth mainly on stems (sometimes branches, leaves, flowers, and pods). A slimy rot can develop, sometimes with brown liquid exudate. Black sclerotia form on stem. Individual or small patches of affected plants wilt and die rapidly, without turning yellow.	Sporadic. Occurs in wet seasons following ongoing showery conditions. Incidence increases in regions where intensive canola and pulse production dominates.	Sclerotia can survive in the soil for up to 8 years. Seed can be contaminated with fungus and/or sclerotia might be present in seed sample.	Widen rotations between host crops to reduce inoculum levels. Source uncontaminated seed. Permit PER82476 (Exp. 31/5/27)) is registered for control.
Virus diseases				
Virus mosaic diseases: *Alfalfa mosaic virus* (AMV) *Bean yellow mosaic virus* (BYMV) *Cucumber mosaic virus* (CMV)	BYMV: mild mosaic, light green/yellow leaves, small leaves, stunting. AMV: necrotic tip growth, twisted and deformed leaves, stunting. CMV: leaf chlorosis develops with distorted, stunted plants.	Mild weather favours aphid multiplication. Infection events coincides with major aphid flights.	Multiple host plants and aphid species transmit viruses. BYMV, AMV and CMV are all potentially transmitted by seed (generally low).	Aim for prevention. Use infection-free seed. Target rapid, uniform crop establishment in standing stubble.
Virus yellowing diseases: *Bean leafroll virus* (BLRV), *Turnip yellows virus* (TuYV)	BLRV: stunting, yellowing, small leaves. TuMV: stunting, yellowing on the lower and middle leaves.	Wet summers provide alternative hosts for aphid survival. BLRV: natural host is limited to the Fabaceae family. TuMV: host range is broad including pulses, medics, clovers and many common broadleaf weeds.	BLRV and TuMV are spread by various aphid species e.g. cowpea aphid (*Aphis craccivora*) and green peach aphid (*Myzus persicae*).	Sow into standing stubble, Insecticide-treated seed can prevent early aphid colonisation and reduce virus infection. Control alternative host plant volunteers. TuMV: infected plants cannot be cured.
Nematodes				
Ill thrift *Pratylenchus neglectus*, *P thornei*	Patchy crop with unthrifty and/or yellowing plants. brown root discolouration. Fewer and shorter root branches.	Occurs where alternative hosts have increased populations. Effects are greater in dry seasons due to affected root system.	Non-host break crops. Hygiene: focus on movement of soil.	Identify nematode species. Use non-host break crops. Select varieties with best resistance available to individual nematode species.
Herbicide injury				
Group 2 e.g. sulfonylureas (SUs) and imidazolinones (IMIs)	Conventional (non-herbicide tolerant) varieties: stunted plants with shortened internodes. Yellow to red to purplish coloured new growth. Leaf curl. Reduced lateral root growth.	Symptoms can appear 5–8 days after application or in the presence of soil residues.	Persistence increases in high pH calcareous soils (pH_{Ca} >7.5). Grass herbicides (Group 1) can strip residues from the spray boom and tank.	Select IMI-tolerant variety. Follow label recommendations.
Group 3 e.g. trifluralin and propyzamide	Poor crop emergence with shortened and thickened hypocotyl. Emerging leaves are twisted and distorted. Shortened, thickened roots.	Occurs when seed is sown into layer of herbicide-treated soil.	Exacerbated by wet cold conditions that slow germination and emergence.	Lentil is the most sensitive pulse crop to Group 3 herbicides. Accurate seed placement and avoiding soil throw is essential.

Table 80. Lentil disease and crop injury guide. (Page 2 of 2.)

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Herbicide injury (continued)				
Group 4 e.g. phenoxys	Plants start to twist and bend within 3–4 days of application. Swelling at stem nodes, elongation, leaf cupping and curling, followed by growing point yellowing, reduced growth, wilting and necrosis. Leaves might be mottled. Leaf spotting without the 'hormonal' distortion can occur with MCPA.	Death occurs slowly over 3–5 weeks.	Observe plantback period.	Follow label recommendations. Avoid sowing where risk of residues is likely.
Groups 5 and 6 e.g. triazines, metribuzin	Susceptible varieties: leaf edges yellow and die. Interveinal or veinal chlorosis can occur.	Symptoms can appear 4–6 days after application or when crop emerges after soil applications.	Persistence increases in alkaline calcareous soils and free draining soils with low organic matter.	Select variety with metribuzin tolerance (e.g. GIA Metro). Follow label recommendations. Lentil is more sensitive to Group 6 herbicides than most pulses. Avoid spraying ahead of forecast heavy rainfall that can move herbicide into the furrow.
Group 9 e.g. glyphosate	Leaves turn yellow to red, followed by browning.	Symptoms appear at growing points 5–7 days after application.	Not persistent in soil.	Monitor spray conditions e.g. consult the Weather and Networked Data (WAND) system to avoid off-target drift. Use appropriate nozzles and pressure. Maintain accurate records.
Group 12 e.g. diflufenican	Within 3–4 days of application, white or yellow spots/ bands can appear (2 days in bright, sunny weather). Plants turn light green and whole leaves turn yellow to cream colour. Long-term effects fade as new growth develops.	Damage increases in stressed crops or when high temperatures occur soon after spraying.	Contact and residual activity. Residual activity can be up to 8 weeks under favourable conditions.	Follow label directions. Observe crop growth stage recommendations. Consider variety options with improved tolerance (e.g. PBA Hallmark XT).
Group 14 e.g. fomesafen, flumioxazin	Droplets form white spots at point of contact within 1 or 2 days of application. Plant desiccation and death can occur.	Occurs where herbicide-treated soil is in contact with seed. Avoid soil throw into seeding furrow.	Observe plantback period.	Use lower rate as per label. Press wheels can help to prevent furrow wall collapse. Maintain accurate records.
Group 15 e.g. tri-allate	Seedling shoots are swollen and bright green. Shoots might not emerge. Roots are often pruned, leaving stubby root knobs.	Cold wet conditions slow germination and emergence.	Primarily degraded by soil microbes.	Ensure seed is not sown into the band of herbicide in the soil.
Group 15 e.g. metolachlor	Reduced crop emergence. Deformed and twisted seedlings with transitory yellowing.	Damage is more severe in light textured soils with low organic matter, in stressed crops (waterlogged, moisture stressed, nutrient deficiency) and when frost occurs within 10 days of applications.	Primarily degraded by soil microbes.	Ensure seed is not sown into the band of herbicide in the soil.
Group 22 e.g. paraquat and diquat	Spots of dead tissue appear within hours where herbicide droplet has contacted the plant. Effects can disappear as new growth occurs.	High coverage can cause plants to shrivel and die within days.	Variable degradation pathways.	Monitor spray conditions e.g. WAND to avoid off-target drift. Use appropriate nozzles and pressure. Maintain accurate records.
Waterlogging				
Saturated soil/standing water	Stunted plants. Plants yellow before turning red and can wither and die. Root and collar rot might form.	Occurs after prolonged wet weather on poorly drained soils, on shallow duplex soils and where hardpans are present.	–	Lentil is the most sensitive pulse to waterlogging.

Source: NSW DPIRD, Agriculture Victoria, GRDC.

Further information

NSW DPIRD

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Insect and mite control in field crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

NSW Southern Research Results (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/southern-nsw-research-results)

Pulse Point 20, *Germination testing and seed rate calculation* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

Agriculture Victoria

Growing lentil in Victoria (https://agriculture.vic.gov.au/crops-and-horticulture/grains-pulses-and-cereals/growing-grains-pulses-and-cereals/growing-lentil-in-victoria)

GRDC

GRDC Update papers. (https://grdc.com.au/resources-and-publications/grdc-update-papers?grdc=true)

Scaling up 10 years of farming systems research: The return on assets managed (ROAM) and practicality of increasing pulse crops at the whole farm level – GRDC (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2025/02/scaling-up-10-years-of-farming-systems-research-the-return-on-assets-managed-and-practicality-of-increasing-pulse-crops-at-the-whole-farm-level)

New Group E rhizobia inoculant for field pea, lentil and vetch (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2023/new-group-e-rhizobia-inoculant-for-field-pea,-lentil-and-vetch)

GrowNotes™ – *Lentil southern region* (https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/lentil-southern-region-grownotes)

Fungicide resistance in pulses (https://grdc.com.au/resources-and-publications/all-publications/factsheets/2021/fungicide-resistance-in-pulses)

NVT website (https://nvt.grdc.com.au/)

Victorian crop sowing guide (https://grdc.com.au/resources-and-publications/all-publications/nvt-crop-sowing-guides/vic-crop-sowing-guide)

Grain Trade Australia

Grain Trade Australia – Trading Standards (https://graintrade.org.au/commodity_standards)

Other

ABARES – DAFF (https://www.agriculture.gov.au/abares)

CESAR Australia (https://cesaraustralia.com/)

Grain Legume Extension Hub (https://spahub.com.au)

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

PER8522 (https://permits.apvma.gov.au/PER8522.PDF)

PER82476 (https://permits.apvma.gov.au/PER82476.PDF)

PER92810 (https://permits.apvma.gov.au/PER92810.PDF)

WeedSmart Big 6 (https://www.weedsmart.org.au/big-6/)

The fungicide resistance five (https://afren.com.au/understanding/)

Contributing authors

NSW DPIRD: Mark Richards, Pulse Research Agronomist, Wagga Wagga; Leigh Jenkins, Research & Development Agronomist, Trangie; Kurt Lindbeck, Plant Pathologist, Wagga Wagga; Joop van Leur, Plant Pathologist, Tamworth and Zorica Duric, Entomologist, Tamworth.

Agriculture Victoria: Joshua Fanning, Arun Shunmugam, PB Seeds: Janine Sounness.

Phil Bowden, Agronomist – Bowden Rural Services.

Lupin

Key considerations for 2025

» Select a variety to suit sowing time, maturity, disease resistance and target market.

» Test sowing seed for germination, vigour and virus infection with time allowed to source replacement seed if necessary, especially seed retained from crops exposed to weather damage in November 2024. Test albus seed for bitterness.

» Choose paddocks carefully. Narrow-leaf lupin is adapted to moderately acid, sandy soils, whereas albus lupin is less tolerant of low pH and more susceptible to waterlogging. Consider the risk of herbicide residues especially in soils with low organic matter.

» Consider the risk of sclerotinia stem rot (SSR) in paddocks with a recent history of canola and lupin. Outbreaks of SSR in 2022 have created a legacy-effect for susceptible crops in 2025.

» Sowing into standing stubble can reduce the incidence and severity of aphid-borne virus disease such as *Cucumber mosaic virus* (CMV).

Crop management

Including a pulse crop can be profitable, reduce financial risk and inorganic nitrogen (N) inputs, and increase the resilience and sustainability of the farming system into the future.

Lupin is a profitable pulse crop well suited to the lighter soil types in central and southern NSW. It has many advantages in both cropping and mixed cropping and/or livestock farming systems.

Extend cereal crop rotations by including lupin in your farming system to:

- act as a break crop for cereal diseases
- work as part of an integrated weed management program to particularly target herbicide-resistant annual ryegrass
- build soil nitrogen.

Two species of lupin, narrow-leaf (*Lupinus angustifolius*) and albus (*L. albus*), are widely grown. Although narrow-leaf lupin tolerates moderately acid soils (pH_{Ca} 4.5–5.5) and high levels of exchangeable aluminium and manganese, its vigour and yield potential can be affected when soil pH_{Ca} drops below 5.0. Most pulses in southern NSW are grown in soils where pH stratification (acid soil layers) can affect root growth, nodulation, crop vigour and yield potential. Severely acidic layers (pH_{Ca} <4.5) are common at depths of 5–10 cm and 10–15 cm in the main cropping soils of central and southern NSW. Check for acidic layers by sampling soils at 5 cm intervals to 20 cm deep 2 years before sowing acid-sensitive pulses.

Where acidity is detected below the surface soil, the most rapid method to increase pH is to incorporate fine-grade lime to 10 cm deep, at least 12 months before sowing lupin, with a goal to maintain pH_{Ca} >5.5 in the top 0–10 cm.

Albus lupin is less tolerant of acid soils than narrow-leaf lupin (but more tolerant than canola or wheat) and can accumulate high manganese levels in the grain when grown in soils with high manganese. Both species are sensitive to soil containing free lime (bicarbonate). High pH soils (pH_{Ca} 7.0–8.0) can be tolerated provided free lime is not present. High pH soil can reduce nodulation as symbiosis with rhizobia is impaired. Albus lupin is more susceptible to waterlogging than narrow-leaf lupin.

Well-nodulated lupin can enhance soil nitrogen (N) levels. Recent research findings in southern and central NSW have shown that in side-by-side comparisons, in the absence of constraints such as waterlogging, both narrowleaf lupin and albus lupin can produce similar biomass levels to that of faba bean. The amount of fixed N is closely related to biomass production. On average, albus lupin contained the highest grain N concentration of all winter pulses, 60 kg N/t, followed by narrowleaf lupin 52 kg N/t.

Grain N content influences the amount of N removed at harvest and the N balance after the crop. Recent research found substantial amounts of N were added to the soil. Overall N balances exceeded 180 kg N/ha. Together with disease and weed management, these features combine to benefit subsequent crops in the rotation.

Albus lupin yields an average 5–15% higher than narrow-leaf lupin under high rainfall conditions. The lupin anthracnose biosecurity zone in place for southern NSW in 2016–2018 was lifted in 2019. There are now no restrictions on where albus lupin can be grown.

Sowing

Direct drilling lupin into cereal stubble is a successful crop establishment method. Stubble conserves soil moisture, reduces brown leaf spot incidence, and discourages aphid infestations which, in turn, minimises virus infection and transfer.

Dry sowing lupin is an option in higher rainfall areas, with grower experience showing it to be successful for timely crop establishment (see Pulse Point 6, *Dry sowing*). Dry sowing can be difficult on virgin lupin paddocks where inoculation will be required and rhizobia survival could be poor, but new, granular inoculants can be used.

GO TO PAGE
Dry sowing
(https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0004/157117/pulse-point-06.pdf)

Aim to sow at a depth of up to 5 cm. Albus lupin has a much larger seed than narrow-leaf types. If soil moisture is marginal, albus seeds are at greater risk of not imbibing sufficient water, resulting in non-viable germination. Deeper sowing into warmer soil (moisture seeking) can be a successful method to allow earlier sowing, but is risky, especially with larger-seeded albus lupin.

Low vigour seed and sowing late into soils with low temperatures results in poor establishment and often crop failure, especially in albus lupin.

Sowing time

All current lupin varieties are susceptible to frost damage. Lupin is most vulnerable during the reproductive phase, which occurs once they initiate stem elongation. Frost damage risk can be reduced by not sowing varieties earlier than the recommended sowing window to avoid flowering in July to early August. For most lupin-growing areas in southern NSW, sowing before late April with early flowering varieties such as PBA Bateman[◊] increases the risk of frost damage.

Table 81. Suggested sowing times for narrow-leaf lupin.

Region	April				May			
Week	1	2	3	4	1	2	3	4
Low rainfall			★	★	<	<		
Medium rainfall				★	★	<	<	
High rainfall					★	★	<	<

Table 82. Suggested sowing times for albus lupin.

Region	April				May			
Week	1	2	3	4	1	2	3	4
Low rainfall				★	★	<		
Medium rainfall					★	★	<	
High rainfall						★	★	<

★ Preferred sowing time
< Later than recommended, yield reduction is likely depending on spring conditions.

Seed quality

Profitable crops start with quality planting seed (i.e. high germination and vigour). Always do a germination test on seed and adjust the sowing rate accordingly. Mature lupin crops exposed to heavy rain before harvest are at high risk of producing low viability seed even though the seed can appear normal. In trials, yields increased by 20% when using high-germination seed (more than 80%) compared with low-germination seed (50%), even when the seed rate was doubled to compensate.

Headers easily damage seed, as does excessive handling during harvesting, grading and sowing. Rotary headers cause less damage than conventional headers. Seed that is to be kept for sowing should be harvested as soon as seed moisture content reaches 14%. Use a low header-drum speed, open the concave, and also minimise subsequent handling.

GO TO PAGE
Germination testing and seed rate calculation
(https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

Test germination in a laboratory or at home, counting only healthy seedlings – those with both cotyledons (seed leaves) present. Test narrow-leaf lupin seed for *Cucumber mosaic virus* (CMV) and obtain documentation of germination, seeds/kg and CMV status when purchasing seed. For further details see Pulse Point 20, *Germination testing and seed rate calculation*.

Sowing rate

Aim to establish 35 plants/m^2 for early sowing and up to 45 plants/m^2 for later sowing. Sowing rates will vary depending on seed size and germination percentage. Albus lupin seed rates are much higher than narrow-leaf varieties due to their large seed size.

Table 83. Sowing rates (kg/ha) based on 100% germination and 80% establishment.

Lupin type	100 seed weight (g)	Target plant density	
		35 plants/m^2	45 plants/m^2
Narrow-leaf lupin	13	56	73
Albus lupin	35	153	197

Your calculation

(100 seed weight ❶ (grams) ..... × target plant population (plants/m^2) ..... × 1000) ÷ (establishment percentage ❷ ..... × germination percentage .....) = your sowing rate . ..... kg/ha

❶ To determine your seed weight, weigh 100 seeds in grams.
❷ Establishment percentage – 80% is a reasonable estimate, unless sowing into adverse conditions.

Bitterness in albus lupin seed

To maintain the seed quality standards for the low seed alkaloid albus lupin industry, growers should test all sowing seed for possible bitter (high alkaloid) contamination. Bitterness seed testing for albus lupin is available through Futari Grain Technology Services, 34 Francis Street, Narrabri 2390 (t: 02 6792 4588).

GO TO PAGE
Futari Grain Technology Services (https://www.futari.com.au/)

The albus industry has set a zero bitter contamination level for seed to be used for sowing.

Avoid growing lupini bean – also known as yellow lupin – (100% bitter, large seeded albus) in sweet albus production areas. These measures are to protect the 100% sweet albus varieties Luxor$^{\Phi}$, Rosetta$^{\Phi}$ and Murringo$^{\Phi}$ from bitter pollen contamination. Bitterness prevention in these new varieties is crucial to maintain the albus threshold standards set for both human consumption and stockfeed use.

Albus lupin is an out-crossing crop, so only grow one albus variety on the farm – discard old varieties – and keep a minimum one kilometre isolation from all other albus crops. Check with neighbours about their albus sowing intentions. If growing a small quantity of albus for seed increase, surround it with a narrow-leaf lupin crop – the agronomy is similar and the albus crop will be protected from pollen contamination caused by foraging bees. Test all sowing seed for bitterness every year. Do not buy any albus seed without a testing certificate showing that the seed is free from bitterness.

Inoculation

Lupin requires Group G rhizobium to form active root nodules. Take care with seed inoculation techniques, especially into paddocks where lupin has not previously been grown. Adequate inoculum can persist for more than 5 years once established, but survival is reduced with increasing soil acidity, or prolonged periods of low rainfall or drought. If the sowing seed is to be treated with a fungicide, treat first and allow the seed to dry thoroughly. Apply inoculant immediately before sowing. Several inoculant products are available for lupin such as freeze-dried and dry granular products – read the instructions and follow them carefully to avoid inoculation failure.

Nutrition

Phosphorus – Application rates on responsive soils should be similar to cereals to achieve optimum yields and maintain soil phosphorus (P) levels – usually 15–25 kg P/ha. Responses in albus lupin are often very low or negligible to these rates of applied P due to lupin's proteoid root system. Be careful when using higher rates of high-analysis fertilisers as lupin seed is sensitive to fertiliser burn. Select paddocks with a low level of residual N to promote effective nodulation and N fixation.

Wider rows and narrow tynes exacerbates the risk of fertiliser burn as the seed and fertiliser can be concentrated together in a narrow band. Sowing into marginal moisture conditions can also increase this risk. Consider separating the seed and fertiliser by banding fertiliser below the seed where possible.

Sulfur – Fertilisers blended with a sulfur component are recommended. Sulfur is an essential nutrient for N fixation.

Molybdenum – If soil pH_{Ca} is below 5.0, molybdenum might be deficient. In this case an application every 5 years is recommended for effective N fixation by rhizobia. Sodium molybdate is relatively cheap and is compatible in mixes with most herbicides.

Variety selection

Select lupin varieties depending on yield potential for your environment and resistance to diseases that cause regular problems in your area.

For characteristics and reactions to disease, refer to Table 84 on page 160.

Narrow-leaf lupin

CoyoteΦ. Released in 2019 by AGT in Western Australia. Coyote[Φ] is the highest yielding variety in northern NSW NVT trials. Adaptable, early maturing variety. Resistance to stem phomopsis is lower than that of PBA Bateman[Φ], PBA Jurien[Φ] and PBA Gunyidi[Φ]. Tolerance to metribuzin is equal to Mandelup[Φ]. Seed is available from Australian Grain Technologies (AGT) affiliates. EPR $3.30/tonne incl. GST.

LawlerΦ. Released in 2022. High and stable yield in NSW growing regions, with maturity slightly quicker than Mandelup[Φ] and quicker than Coyote[Φ]. Tolerance to metribuzin is similar to PBA Jurien[Φ]. Lawler[Φ] offers improved resistance to stem phomopsis compared with Coyote[Φ], similar to Wonga[Φ] and PBA Barlock[Φ]. Released by AGT, seed is available from AGT affiliates. EPR $4.40/tonne incl. GST.

PBA BarlockΦ. Released in 2013 by Pulse Breeding Australia (PBA). Compared with Mandelup[Φ], PBA Barlock[Φ] is slightly later flowering and maturing, but has a shorter harvest height. It is moderately resistant to lodging in high rainfall regions and is more resistant to pod shattering than Mandelup[Φ]. Tolerance to metribuzin is equal to Mandelup[Φ]. Commercialised by Seednet. EPR $2.75/tonne incl. GST.

PBA BatemanΦ. Released in 2018 by PBA. It offers significant yield improvements over current varieties, particularly in the southern NSW where virus infection from CMV and *Bean yellow mosaic virus* (BYMV) can cause significant yield loss in susceptible varieties when seasonal conditions are conducive to high aphid numbers. Since last season, its rating to phomopsis pod infection has changed from moderately susceptible to susceptible. Commercialised by Seednet. EPR $2.86/tonne incl. GST.

PBA GunyidiΦ. Released in 2011 by PBA in Western Australia, as a replacement for all varieties in the medium and low rainfall zones of WA. Tolerance to metribuzin is equal to Mandelup[Φ], but is more susceptible to damage from Eclipse®. Commercialised by Seednet. EPR $2.75/tonne incl. GST.

PBA JurienΦ. Released in 2015 by PBA in Western Australia. It is a broadly adapted, high-yielding variety. It tolerates metribuzin (similar to PBA Barlock[Φ]) with early flowering and maturity similar to other current varieties. NSW trials have shown it to be more susceptible to plant lodging than other varieties in high rainfall areas, particularly when sown early and when conditions suit high biomass levels. Commercialised by Seednet. EPR $2.75/tonne incl. GST.

RosemontΦ. Released in 2023 by AGT in WA. It is a high yielding alternative to PBR Jurien[Φ], Coyote[Φ] and Mandelup[Φ]. Compared to PBR Jurien[Φ] and Coyote[Φ], Rosemont[Φ]. has a taller harvest height, a white flower with a slight pink blush, and predominantly white seed with a faint speckle. Rosemont[Φ] offers good early vigour and, unlike PBA Jurien[Φ], has a low risk of split seed and lodging. Slightly slower maturity relative to PBA Jurien[Φ], slightly quicker than Coyote[Φ]. Tolerance to metribuzin is similar to PBA Jurien[Φ]. It has improved resistance to stem phomopsis compared with Coyote[Φ]. Seed is available from AGT affiliates. EPR $4.50/tonne incl. GST.

Albus lupin

LuxorΦ. Released in 2005 by NSW DPIRD. Higher yielding than Kiev Mutant or Ultra. Resistant to pleiochaeta root rot (the cause of many seedling deaths in older varieties). Luxor[Φ] is 7 days later flowering than Ultra, but earlier flowering than its sister line Rosetta[Φ]. Suited to the medium–low rainfall zones of NSW. Commercialised by Seednet. EPR $3.08/tonne incl. GST.

MurringoΦ. Released in 2017 by NSW DPIRD. Early to mid flowering, its phenology is similar to Luxor[Φ], while slightly later in maturity but earlier than Rosetta[Φ]. Commercialised by Seednet. EPR $3.52/tonne incl. GST.

RosettaΦ. Released in 2005 by NSW DPI, it is a high yielding albus lupin, later flowering and taller than Luxor[Φ], suited to longer season environments. Less resistant than Luxor[Φ] to pleiochaeta root rot. Commercialised by Seednet. EPR $3.08/tonne incl. GST.

Table 84. Lupin varietal characteristics and reactions to diseases.

Variety	Flowering time	Pod loss, shatter resistance ❸	Lodging resistance	Seed size (g/100 seeds)	Disease						
					Anthracnose ❷	BYMV ❷	Brown leaf spot ❸	CMV ❶	Phomopsis pod infection ❷	Phomopsis stem infection ❷	Pleiochaeta root rot ❸
Narrow leaf											
Coyote	early	G	MG	14	MR–MS	MR Ⓟ	MS	MR–MS	MR–MS	S	MR
Jenabillup	early	G	MG	14	MS	–	MR–MS	MR–MS	MR	MS	MR
Lawler	very early	G	MP	14	MR	MS Ⓟ	MS Ⓟ	MR–MS	MS	MR	MR Ⓟ
Mandelup	very early	MP	MP	14	MR–MS	S Ⓟ	MS	MR–MS	S	MR	MR–MS
PBA Barlock	early	MG	MG	13	R–MR	MS Ⓟ	MS	MR–MS	MR	MR	MR–MS
PBA Bateman	very early	MG	MP	14	MR–MS	MR Ⓟ	MS	MR	S	R–MR	MR
PBA Gunyidi	very early	MG	MG	13	MR–MS	MS Ⓟ	MS	MR–MS	MR–MS	R–MR	MR
PBA Jurien	early	MP	MP	13	R–MR	MR–MS Ⓟ	MS	MS	MR–MS	R–MR	MR
Rosemont	early	MG	MG	14	MR–MS	MR–MS Ⓟ	MS	MR	MR–MS	MR	MR
Wonga	early–mid	G	MG	13	MR	MS Ⓟ	MS	MR	MR	MR	MR
Albus ❹											
Luxor	early–mid	G	G	35	VS	na	MR	Immune	–	MR	R
Murringo	early–mid	G	G	32	VS	na	MR	Immune	–	MS	MR
Rosetta	mid	G	G	35	VS	na	R	Immune	–	R	MR

Sources: NVT lupin national disease ratings and breeding program data as at March 2025.

Ⓟ Provisional rating
❶ CMV ratings as at January 2025.
❷ Rating as at March 2025.
❸ Ratings are based on 2020 and breeder data.
❹ Disease resistance screening in albus lupin is no longer conducted. The ratings for albus are from 2016.
– Insufficient or no data.

Lodging, pod loss and shattering resistance
Reviewed by Matt Aubert, AGT Breeding
MP Moderately poor
MG Moderately good
G Good
VG Very good

Disease resistance
VS Very susceptible
S Susceptible
MS Moderately susceptible
MR Moderately resistant
R Resistant

Table 85. Lupin performance in northern NSW compared with PBA Bateman(ⓘ) = 100%.

North west							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Bateman (t/ha)	**2.05**	**4.33**	**2.76**	**1.1**	**1.41**	**2.28**	
Coyote	104	–	117	96	109	106	7
Jenabillup	86	–	99	79	66	89	7
Lawler	–	101	114	–	72	93	5
Mandelup	87	98	105	73	68	90	9
PBA Barlock	89	97	96	87	73	91	9
PBA Bateman	**100**	**100**	**100**	**100**	**100**	**100**	**9**
PBA Gunyidi	94	–	99	91	87	95	7
PBA Jurien	89	–	104	83	72	93	7
Rosemont	–	–	121	–	71	95	3
Wonga	89	91	78	85	76	86	9

Table 86. Lupin performance in southern NSW compared with PBA Bateman(ⓘ) = 100%.

South east							
Variety	Yearly group mean					Regional mean	Number of trials
	2020	2021	2022	2023	2024		
PBA Bateman (t/ha)	**3.16**	**3.09**	**3.35**	**1.75**	**2.22**	**2.69**	
Coyote	106	100	95	100	95	99	12
Jenabillup	83	–	101	94	88	95	10
Lawler	–	102	92	–	79	91	7
Mandelup	85	102	95	91	83	92	12
PBA Barlock	86	100	104	97	94	97	12
PBA Bateman	**100**	**100**	**100**	**100**	**100**	**100**	**12**
PBA Gunyidi	93	101	99	97	95	97	12
PBA Jurien	86	100	104	98	91	97	12
Rosemont	–	–	96	–	80	93	5
Wonga	87	103	92	87	92	92	12

– Insufficient or no data.

Weed control

There is a range of herbicides to control both broadleaf and grass or cereal weeds in lupin that are part of an integrated approach to weed management (WeedSmart BIG 6). Sowing early with good crop establishment is essential to achieve more effective herbicide results.

Metribuzin products are registered for the suppression of brome grass in metribuzin-tolerant varieties only, including Mandelup$^{\Phi}$, PBA Barlock$^{\Phi}$, PBA Jurien$^{\Phi}$ and PBA Leeman$^{\Phi}$ under PER94921 (expires 31/10/29).

Herbicide damage from both residual herbicides applied before cereal crops and from in-crop herbicides has caused yield losses in lupin crops. Plants weakened by herbicides are more susceptible to root and foliar diseases such as phytophthora root rot, pleiochaeta root rot and brown leaf spot:

- **Sulfonylurea herbicides** (e.g. Glean® or Logran B-Power®) when applied to preceding cereal crops. Take special note of label instructions concerning crop rotation and plantback intervals, particularly on high pH and/or compacted soils, and after prolonged periods of low rainfall or drought. Residues could persist longer in no-till system soils that have received surface-applied lime to raise soil pH.
- **Triazine herbicides** (e.g. simazine, terbuthylazine); be aware that application rates vary significantly on different soil types. Follow label recommendations and avoid spray overlaps. Albus lupin is more sensitive to triazine damage than narrow-leaf lupin.
- **Clopyralid** (e.g. Lontrel®) when applied to preceding cereal crops and in fallow tank mixes. Clopyralid can carry over in straw and affect subsequent crops.
- **Metosulam** (e.g. Eclipse®); damage can occur if applied beyond the recommended growth stage. Some varieties are sensitive and have narrow safety margins. Follow label recommendations.

For more detailed information on current weed control and plantback intervals, refer to pesticide labels and *Weed control in winter crops*.

GO TO PAGES

WeedSmart BIG 6 (https://www.weedsmart.org.au/big-6/)

PER94921 (https://permits.apvma.gov.au/PER94921.PDF)

GO TO PAGE

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Insect control

A range of pests can be found in lupin. They have natural enemies that can affect pest populations during the season. With regular monitoring and good record keeping, population dynamics will show if pest populations are increasing and if chemical control might be needed.

Redlegged earth mite and blue oat mite

Large mite populations are common and can cause distorted early growth and kill seedlings. The rasping of the cotyledon and leaf surface during feeding results in a distinctive silvering on the leaves. Symptoms can be confused with frost damage, so correct identification is required before using control measures. Early detection and control will improve crop health and vigour.

Lucerne flea

Damage is common and is characterised by clear membranous windows chewed into cotyledons and skeletonised leaf surfaces. Early detection and control will improve crop health and vigour.

Cutworms, armyworms and pasture cockchafers

These larvae pests can cause sporadic damage to seedlings and young plants and are often seen in patches rather than across the whole paddock. Monitor crops regularly during the establishment phase and control as necessary.

Aphids

Aphids rarely cause significant feeding damage on lupin in NSW, but can transmit viruses. Aphids are vectors of 2 potentially serious lupin viruses: CMV and BYMV. Yield losses are greatest when aphids arrive early in the season, usually following wet seasonal conditions that provide a green bridge of weed hosts over summer. BYMV is seed-borne in albus lupin, but not in narrow-leaf lupin, whereas the opposite is the case with CMV – high seed-borne transmission has been found in narrow-leaf lupin but not in albus lupin. Lupin varieties differ in their susceptibility to viruses (see the Disease section on *Cucumber mosaic virus* on page 163). PBA Bateman$^{\Phi}$ appears to have more resistance to aphid attack than other varieties. Uniform plant density, early canopy closure and retaining cereal stubble can reduce aphid visitation.

Thrips

Monitor for thrips from early flowering. Thrips can cause reduced vigour, and flower and early pod abortion. Thrips can be particularly damaging to albus lupin. Critical control decisions should be made at early flowering. Control threshold is 1–2 thrips per open flower, not 1–2 per flowering spike.

Helicoverpa spp.

Occurrence is common and control decisions should be based on regular monitoring. Crops should be monitored twice weekly once flowering has started. Larvae feed on leaves,

stems and pods and, when big enough, burrow into pods and feed on the developing seed. Flowering and podding are the most critical times to protect lupin and specific thresholds for when to take action can vary. Human consumption markets have strict limits on insect-damaged seeds, so populations of 1–2 larvae/m^2 warrant control.

Guidelines to support effective, sustainable integrated pest management are available at IPM Checklist: a step-by-step guide for a sustainable grains industry – Cesar Australia. Refer to the NSW DPIRD guide *Insect and mite control in field crops* for more detailed information on pest control measures and thresholds.

GO TO PAGES

IPM Checklist: a step-by-step guide for a sustainable grains industry (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

Insect and mite control in field crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

PER82209 (https://permits.apvma.gov.au/PER82209.PDF)

PER82226 (https://permits.apvma.gov.au/PER82226.PDF)

Disease

Anthracnose (*Colleotrichum lupini*)

This destructive fungal disease was detected for the first time in commercial lupin crops in NSW in 2016. A thorough surveillance program showed no reoccurrence of the disease since 2016, so the disease was declared eradicated in NSW in 2019. PBA Jurien$^{\Phi}$ and PBA Barlock$^{\Phi}$ are rated R–MR, Lawler$^{\Phi}$ is MR. All albus lupin varieties are susceptible to anthracnose.

Anthracnose is specific to lupin species only and does not affect other pulse species including field pea, faba bean, chickpea or lentil. The fungus survives on infected lupin stubble and can be carried on, or within, infected seed, which is the main means of disease survival and spread. Infected seed will lead to infected seedlings the following year and initiate the disease. The fungus does not survive in the soil.

Disease symptoms include a distinct bending and twisting of stems into a shepherd's crook. Lesions formed within the bend's crook cause cells to collapse down one side, creating the bend. Within the lesion are bright pink to orange spore masses that spread the disease within the crop. Lesions can also later form on developing pods. Symptoms become most obvious when crops enter the reproductive phase and start flowering and podding. The disease attacks the soft plant tissue at the growing points (including stem tips, flowering spikes and pods) and works downwards into the crop canopy. Anthracnose will develop in patches or hotspots within the crop. The disease is spread through rain splash of spores, causing patches of deformed plants within the crop following rain.

A five-point management plan is recommended for all lupin producers in NSW to prevent the disease from establishing and spreading.

1. Treat seed for sowing with a fungicide seed treatment containing thiram (see Table 94. Canola and pulse seed dressings on page 179).
2. Separate this year's lupin crop away from last year's lupin stubble.
3. Control volunteer lupin.
4. Control machinery and people movement into and out of lupin crops.
5. Apply a foliar fungicide at 6–8 weeks post emergence (with a grass spray) using fungicides containing mancozeb or chlorothalonil, and a follow up at pre-canopy closure. The permits PER82209 (exp 30/6/2026) and PER82226 (exp 31/10/2029) are for albus lupin only.

Growers are encouraged to inspect lupin crops regularly and report any unusual disease symptoms to their nearest NSW DPIRD or LLS office.

The movement of lupin (seed and plant material) and machinery into NSW from SA and WA (including seed for livestock feed) is prohibited by law and carries the high risk of introducing anthracnose into NSW.

Brown leaf spot

Brown leaf spot (BLS) can potentially be a damaging disease affecting narrow-leaf lupin. It is more likely to occur in crops that are sown into a paddock with a bare soil surface and in paddocks with a recent narrow-leaf lupin history. Albus lupin is less affected by BLS and is not usually a significant problem – some lesions might develop on pods but do not cause any yield loss. Cool, wet conditions during seedling emergence favour the disease when soil-borne spores are splashed onto leaves and cause infection. Seedlings can rapidly become defoliated and die. Proactive crop management can prevent losses from BLS. A number of foliar fungicides are registered to manage the disease (see Table 95).

Preventative measures to protect crops in high disease risk situations, particularly in areas with intensive lupin production include:

- crop rotation (at least 4 years between lupin crops)
- paddock separation from last year's lupin crop
- cereal stubble cover and minimum tillage
- using a fungicide seed dressing such as Rovral® (iprodone) or Sumisclex® (procymidone) (see Table 94 on page 179).

Pleiochaeta root rot

Albus lupin is reasonably tolerant to *Pleiochaeta* when grown on red–brown loamy soils. Older varieties such as Ultra and Kiev Mutant are S to the disease. The *Pleiochaeta setosa* fungus causes the disease. Soil-borne spores infect the albus plant taproot leading to stunting and premature death. Disease management is the same as for BLS. Treat seed at sowing with a fungicide seed dressing, separate this year's crop from last year's lupin paddock and avoid growing lupin for at least 4 years in the same paddock.

Cucumber mosaic virus

Cucumber mosaic virus tends to be more prevalent in central and northern NSW in narrow-leaf lupin only. Albus lupin is immune. The disease is spread through infected seed and aphid movement. Wonga is the most resistant narrow-leaf lupin to CMV seed transmission. CMV can cause symptoms in all narrow-leaf lupin varieties, but it is the seed transmission from infected plants that causes problems for growers. The infected seed carries over the disease into next year's lupin crop. Infected plants are most commonly seen around crop margins and in areas of low plant density or in gaps.

Very severe CMV infections were found in narrow-leafed lupin crops throughout NSW during 2024. Tests on seed harvested from these paddocks showed high levels of CMV seed transmission. Grower-retained seed should be tested for CMV infection. Growers should consider purchasing fresh, virus-free seed.

Lupin growers are encouraged to monitor crops for virus symptoms during the season and, if symptoms are found, to contact NSW DPIRD to have samples tested for virus presence.

The DPIRD website has further information including *Managing viruses in pulse crops 2021*. Best management practices include retaining standing cereal stubble to deter aphids, and weed control, to reduce disease incidence.

Bean yellow mosaic virus

Bean yellow mosaic virus is a common virus disease in both narrow-leaf and albus lupin. It causes yellowing, wilting and plant death. It is most common on crop margins and near gaps in the crop where aphids land more often. BYMV infection in narrow-leaf lupin can cause 3 types of symptoms:

1. When infected before pod set, the most common symptom is necrosis that kills the infected plant.
2. The less common non-necrotic symptom causes stunting without killing the plant.
3. Plants can be infected after pod set where black pods develop (black pod syndrome).

No BYMV seed-transmission has been found in narrow-leaf lupin in Australia, however, BYMV seed transmission can occur in albus lupin. Management practices, including retaining standing cereal stubble and weed control (to deter aphids), will reduce disease incidence.

Phomopsis and lupinosis

Be aware of the potential danger to stock grazing in lupin stubble, and seed infected with the phomopsis stem blight fungus (*Diaporthe toxica*). The fungus that causes phomopsis infects lupin plants in winter, but it does not express and develop in plants until maturity. Often early development of the fungus and toxin production can occur following moisture stress before harvest, while summer rain stimulates fungal growth and toxin production within stubble.

All varieties are a risk for lupinosis. Strategies to avoid lupinosis in stock involve careful grazing management in the first few months after harvest and growing a narrow-leaf lupin variety with the best available phomopsis resistance. Albus lupin varieties have a good level of resistance to stem infection from the phomopsis pathogen, but are susceptible to pod and seed infection especially after heavy rain, wind, or hail close to harvest. Be aware the disease can develop in lupin crops before harvest as a result of plant stress, e.g. water stress or herbicide injury. This results in lupin stubble being toxic before harvest and so cannot be safely grazed. Look for pink, tan or brown discoloured or mouldy seed. Do not feed grain to stock or deliver for human consumption if phomopsis-infected seed is suspected. Manage the disease through separating this year's crop from last year's paddock and avoid growing lupin for at least 4 years in the same paddock. For further information see the NSW DPIRD Primefact 1308, *Reducing the risk of lupinosis and the incidence of phomopsis*.

Phytophthora root rot ('sudden death')

This is a serious disease in years when late winter and early spring are wet. Plants suddenly wilt and die around the pod set stage. The disease can occur in individual plants or patches within a crop. Disease occurrence can be associated with soil hard pans or perched water tables as initiation requires a brief period of waterlogging to infect lupin roots. In narrow-leaf lupin, an undescribed species of *Phytophthora* causes the disease. In albus lupin the disease is caused by *Phytophthora cryptogea*. The latter fungus is also highly pathogenic to lentil. Disease management is difficult because the fungus survives for an extended period in the soil. Methods to minimise disease occurrence include crop rotation and avoiding paddocks with a known waterlogging or hard pan problem.

GO TO PAGES

Managing viruses in pulse crops 2021 (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Reducing the risk of lupinosis and the incidence of phomopsis (https://www.dpi.nsw.gov.au/___data/assets/pdf_file/0010/478243/Reducing-the-risk-of-lupinosis-and-the-incidence-of-phomopsis.pdf)

Sclerotinia stem rot

All current varieties of narrow leaf and albus lupin are provisionally rated as susceptible to sclerotinia stem rot (SSR).

Sclerotinia stem rot is caused by the same fungus that infects canola and other broadleaf species. Prolonged wet conditions in late winter followed by periods of prolonged leaf wetness during flowering and canopy closure favour disease development. Districts with reliable spring rainfall, long flowering periods and canola within the crop rotation appear to develop the disease more frequently. In 2024, most NSW districts had favourable winter and spring rain allowing the disease to develop in some areas. These SSR outbreaks will have increased the populations of sclerotia in paddocks and result in a legacy effect for the next few seasons. Consider this when sowing lupin in 2025. Crop sequences that include lupin and canola in close rotation will increase soil-borne sclerotia and therefore disease pressure in future years.

The environmental conditions for SSR to develop are very specific and will not occur every year, so even when the fungus is present the disease could fail to develop if dry conditions occur in spring. Burning canola or lupin stubble will not effectively control SSR as sclerotia survive mainly on, or in, the soil. Crop rotation with cereals, following recommended sowing times and ensuring crops do not develop heavy vegetative growth (which is likely to reduce air circulation) are the best means of managing the disease.

Foliar fungicide options to manage SSR are limited to Miravis® Star. Check currently registered products before use. Foliar fungicides are best applied before complete canopy closure where the crop canopy can be penetrated. This should be during mid to late flowering.

Botrytis grey mould

Botrytis grey mould (BGM) is becoming more common in commercial lupin crops in southern NSW. The fungus *Botrytis cinerea* causes the disease and is normally associated with lentil, chickpea and faba bean. BGM outbreaks are initiated on senescent plant tissues, such as old leaves and flower parts, before developing into larger, more damaging lesions. The disease develops rapidly following canopy closure and frequent rainfall. Disease symptoms include stem and leaf infections, and infections of old flower parts and pods. While the disease can be confused with SSR, the fluffy mycelium the fungus produces is grey rather than white and no sclerotia are produced. Currently a number of foliar fungicides are registered to manage this disease and should be applied just before canopy closure (see Table 95).

Harvest

Lupin seed should be harvested to give 14% moisture at delivery (maximum receival standard). Timing is critical to maximise yields. Pods are prone pod drop and shattering if left too long after maturing, especially albus lupin. If harvest is delayed or dry conditions prevail, harvest at night or in the early morning with dew to minimise shattering and pod drop. Use extended fingers to help trap pods. Minimise grain damage during harvest by reducing harvest speed and reducing the header drum speed. Grower experience suggests pod loss is reduced if draper fronts are used. Windrowing and crop desiccation are viable options, particularly for crops with variable maturity or high weed burdens. For further details see Pulse Point 10, *Windrowing lupin*. Registered products for desiccation are listed in the NSW DPIRD update 'Harvest aid or salvage spraying winter crops' in *Weed control in winter crops*; see also *Stewardship for pre-harvest application of herbicides in winter crops*. As desiccation timing is similar to windrowing, seek advice from your local agronomist if unsure.

Marketing

Lupin is a high protein grain. Narrow-leaf lupin seeds are round, speckled and slightly smaller than field pea with a protein content around 32%. Albus lupin seeds are white, squarish and flat, larger than narrow-leaf lupin seeds and contain a slightly higher protein content (~36%).

The plant-protein industry can use either type of lupin, but albus lupin is often preferred for its higher protein content and better taste profile.

Domestically, demand for human consumption is increasing. Most domestic end use is as a high protein stockfeed in pig, poultry, dairy, aquaculture and feedlot rations. Readily marketable, lupin can be valuable as part of a profitable livestock enterprise.

Narrow-leaf lupin grain quality is largely determined by visual standards; grain size, shape and colour are key factors. Preference is for large, even sized and shaped, and light-coloured grain with no blemishes.

Albus lupin is mostly exported, principally to Egypt for human consumption. They are used in traditional food products such as 'termes', a popular snack food. Albus lupin suits dairy and cattle feedlot rations, but are not readily accepted into pig rations at high inclusion rates. The seed is commonly de-hulled, increasing the protein content to ~46% for use in feed mixes or as a plant-protein ingredient, while the hulls provide a fibre source.

GO TO PAGES

Windrowing lupin (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/lupins/windrowing-lupins)

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Stewardship for pre-harvest application of herbicides in winter crops (https://www.weedsmart.org.au/pdf/stewardship-for-pre-harvest-application-of-herbicides-in-winter-crops/)

In 2024, around 430,000 tonnes of lupin were exported. The Netherlands and South Korea bought around 40% each, and Egypt 10%. The Netherlands and South Korea are both pro plant-based foods and support new products and industry growth. Price is driven by competition with soybean meal. The current strong $USD for imported soymeal benefits for local pulse stockfeed prices.

In the 2024–25 season, NSW grew 125,000 tonnes of lupin, equivalent to 16% of Australia's total production. Western Australia grows the majority of Australia's lupin crop.

The current Receival and Trading Standards for the different grades of lupin can be found on the Trading Standards | Grain Trade Australia website.

Further information

NSW DPIRD

Weed control in winter crops (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/weed-control-winter-crops)

Insect and mite control in field crops (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/guides/publications/insect-mite-crops)

Lupin anthracnose (https://www.dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/lupin-anthracnose).

Managing viruses in pulse crops 2021 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1299965/Managing-viruses-in-pulse-crops-in-2021.pdf)

Primefact 1308, *Reducing the risk of lupinosis and the incidence of phomopsis* (http://www.dpi.nsw.gov.au/animals-and-livestock/sheep/health/other/lupinosis-phomopsis)

Pulse Point 6, *Dry sowing* (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/general-information/dry-sowing)

Pulse Point 10, *Windrowing lupin* (http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/winter-crops/lupins/windrowing-lupins)

Pulse Point 17, *Phytophthora root rot of lupin* (http://archive.dpi.nsw.gov.au/__data/assets/pdf_file/0019/157411/pulse-point-17.pdf)

Pulse Point 18, *Cucumber mosaic virus in lupins* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157433/pulse-point-18.pdf)

Pulse Point 20, *Germination testing and seed rate calculation* (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf)

GRDC

GRDC website (https://grdc.com.au/).

Scaling up 10 years of farming systems research: The return on assets managed (ROAM) and practicality of increasing pulse crops at the whole farm level - GRDC (https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2025/02/scaling-up-10-years-of-farming-systems-research-the-return-on-assets-managed-and-practicality-of-increasing-pulse-crops-at-the-whole-farm-level)

Other

IPM Checklist: a step-by-step guide for a sustainable grains industry – Cesar Australia (IPM Checklist: a step-by-step guide for a sustainable grains industry – Cesar Australia) (https://cesaraustralia.com/pestfacts/ipm-checklist-grains/)

PER82209 (https://permits.apvma.gov.au/PER82209.PDF)

PER82226 (https://permits.apvma.gov.au/PER82226.PDF)

PER94921 (https://permits.apvma.gov.au/PER94921.PDF)

WeedSmart BIG 6 (https://www.weedsmart.org.au/big-6/)

WeedSmart: *Stewardship for pre-harvest application of herbicides in winter crops* (https://www.weedsmart.org.au/pdf/stewardship-for-pre-harvest-application-of-herbicides-in-winter-crops/).

Contributing authors

NSW DPIRD: Mark Richards, Research Agronomist, Wagga Wagga; Kurt Lindbeck, Plant Pathologist, Wagga Wagga; Joop Van Leur, Plant Pathologist, Tamworth; Zorica Duric, Entomologist, Tamworth and Jenny Wood, Pulse Chemist, Tamworth.

Matt Aubert, Lupin Breeder, AGT, Northam WA.

Rohan Brill, BrillAg.

Phil Bowden, Agronomist Bowden Rural Services.

Table 87. Lupin disease guide.

Disease/cause	Symptoms	Occurrence	Survival/spread	Control
Root diseases				
Damping off, *Pythium* spp., *Rhizoctonia* spp.	Seedlings collapse within a few days of emergence. Stem/taproot near ground-level sunken, water soaked.	Cool, wet, poorly-drained soils. Late sowing leading to slow germination and emergence.	Spores survive in soil for long periods. Wide host range among other broadleaf crops.	Sow on time into well-drained soils.
Pleiochaeta root rot, *Pleiochaeta setosa* (mainly in albus lupin, rare in narrow-leaf lupin)	Dark brown, girdling lesions on taproot and lateral root spots.	Winter/spring. More severe in older albus varieties. In paddocks with a recent lupin history.	Survives in soil and on infected plant debris.	Crop rotation: 4 years or more between crops. Avoid growing near last year's lupin stubble. Grow resistant albus varieties Luxor or Rosetta.
Rhizoctonia root rot, *Rhizoctonia* spp.	Dark brown, girdling lesions on taproot, fine roots rotted with 'spear point' effect. Patches of stunted plants within crops.	Favoured by minimum tillage, marginal soil moisture, mild conditions and some herbicide residues. Survives as fungal fragments in soil.	Host range depends on strain but can include cereals and other broadleaf crops.	Suppressed by frequent cultivation. Cultivate below seed-sowing depth.
Phytophthora root rot, *Phytophthora* spp.	Plants wilt, turn yellow and die suddenly between flowering and pod set. Roots are completely rotted with a blackish, sunken lesion extending up to 5 cm up the stem base.	Favoured by wet, late winters and early springs on poorly-drained, heavier soils, especially with hard pans.	Resting spores survive for extended periods in soil.	Avoid hard pans and poorly-drained sites.
Foliar diseases				
Anthracnose, *Colletotrichum lupini*	Twisting of stems and 'shepherd's crook' syndrome. Dark lesions with pale pink centres on stems, leaves and pods.	Detected in a small number of crops in southern NSW. Currently under surveillance in NSW.	Seed-borne and on trash. Spread by rain splash, machinery and animal movement.	Narrow-leaf varieties with improved resistance are available. Resistance in albus lupin is poor. Crop rotation: use fungicide seed dressings and foliar fungicides.
Brown leaf spot, *Pleiochaeta setosa* (mainly in narrow-leaf lupin, rare in albus lupin)	Initially dark brown spots on cotyledons, which die and drop off. Dark brown spots on leaves. Leaves distorted, can be shed. Lesions might girdle stems in extreme cases.	Cool, wet conditions. Worse on late sown crops, low pH soils and exacerbated by wetting agents used with herbicides. Mainly a problem in narrow-leaf lupin.	Spores survive in soil and on infected plant debris. Spread by rain splash and wind-blown rain.	Crop rotation: 4 years between crops. Early sowing. Retain cereal stubble. Minimum tillage and soil disturbance at sowing. Avoid growing near last year's lupin stubble. Use fungicide seed dressings.
Grey mould, *Botrytis cinerea*, *B. fabae*	Dead areas on stem, covered with fluffy, greyish-brown fungal growth, usually near ground level. Stem girdling leads to wilting and premature death.	The disease is worse in dense crops. The fungus can survive in infected trash for extended periods as resting mycelium. It is favoured by cool to mild, wet conditions in spring.	Survives on many alternative hosts. Aerial spores blown considerable distances.	Consider wider rows and/or lower plant populations to reduce dense canopies and increase air movement in the canopy. Use foliar fungicides.
Phomopsis stem blight, *Diaporthe toxica*	Generally few symptoms on living plants. Black fruiting bodies of the fungus form on the surface of dead stems after harvest. Infected seeds discoloured, especially visible in albus lupin. Fungal toxin poisons stock causing lupinosis.	Plants can be infected at any time during growth. Infection usually occurs during cool, moist conditions in autumn, winter or spring.	Survives on infected stubble. Spores spread by rain splash and in wind-blown rain. Infected seed can spread disease.	Resistant varieties. Safe grazing practices reduce lupinosis.
Sclerotinia stem rot, *Sclerotinia sclerotiorum*	White cottony fungal growth on stem at ground level and sometimes in upper canopy. Plants wilt. Sclerotia of the fungus develop on plant surfaces and inside stems. Can sometimes cause a basal rot.	Humid conditions following rain in spring. Worse in dense crops.	Survives as resting sclerotia in soil. Sclerotia germinate in late winter and early spring and infect with airborne spores.	Difficult because of wide host range and long survival in soil (10 years). Canola is a major host of sclerotinia and should not be sown too close to lupin in the crop rotation. Consider wider rows in high rainfall areas to increase air movement in the canopy.
Virus diseases				
Bean yellow mosaic virus, (BYMV)	Narrow-leafed lupin: plants yellow with blackened, flat pods. Plants wilt and die. The non-necrotic strain causes downturned leaflets. Albus lupin: severe stunting (depending on the time of infection), yellowing, less pods.	Mainly in mild conditions during spring. Often seen at crop margins.	Survives in many legume and weed species. Spread by several aphid species. Seed-borne in albus lupin.	Follow best management practices including retaining standing cereal stubble and weed control.
Cucumber mosaic virus, (CMV) (narrow-leaf lupin only)	Plants stunted, foliage distorted, bunchy leaves with upturned leaflets. Persistent green plants at harvest. Infected narrow-leaf lupin seeds smaller.	Occurs early in the season from infected seed; at any other time from aphid transmission.	Survives in many legume and weed species. Infected seed of narrow-leaf lupin only. Spread by several aphid species.	Grow narrow-leaf lupin varieties resistant to seed transmission, e.g. Wonga. Use virus-tested narrow-leaf lupin seed. Follow best management practices including retaining standing cereal stubble and weed control. In high-risk areas, grow albus lupin.

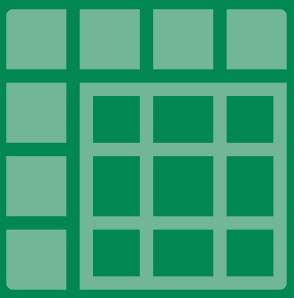
NVT tools

GRDC NATIONAL VARIETY TRIALS™

Harvest Reports & Crop Sowing Guides

Trial results

Long Term Yield Reporter



NVT Disease Ratings

Subscribe

NVT Trial Notification Service

Get an email the moment results for your local NVT trials are available.

NVT publications

Get an email as soon as your selected NVT Harvest Report is published.

nvt.grdc.com.au

@GRDC_NVT

Grain insects – options for control

Key considerations for 2025

» Monitor stored grain often, particularly in warmer months to ensure aeration systems and insecticide protection treatments are still effectively managing grain insect build up.

» Common grain insects at high internal silo temperatures >35 °C have a life cycle of 3–4 weeks, so can quickly become out of control.

Keeping stored grain free from insect damage is becoming increasingly important, with increased on-farm silo storage and use of temporary storage system such as grain bags.

Growers need to be aware of the options available to keep grain free from grain insect infestation and damage, which can render grain unsaleable. Additional reading on grain storage and fumigation practices can be found in the following publications:

Further information

GROWNOTES™: Grain storage
Grain fumigation – a guide
Stored grain information hub

Any queries, please seek information from Joanne Holloway
NSW DPIRD Grain Storage Unit, Wagga Wagga, NSW 2650
t: 02 6938 1605.

GO TO PAGES

GROWNOTES™ - *Grain storage* (https://storedgrain.com.au/grdc-grownotes-grain-storage/)

Stored grain (http://storedgrain.com.au)

Stored grain information hub (https://storedgrain.com.au/grdc-grownotes-grain-storage/)

Table 88. Insecticides for disinfesting empty grain storages and grain handling equipment.

Purpose	Insecticide	Mixing rate	Summary notes: **READ THE LABEL BEFORE USING**
Desiccant dust treatments (activated amorphous silica or diatomaceous earth) for treating clean empty storage surfaces and equipment such as grain driers, headers, augers, mobile bins.	Dryacide®	120 g/L (1 L/20 m^2)	Spray surfaces using a slurry (10–20% depending on product) with a centrifugal pump or venturi-type sand blaster with continuous agitation. Alternatively apply dust to empty silos and bins (2 g/m^2) using a hand- or power-operated duster (a venturi blower is effective). Avoid heavy deposits of dust that can dislodge. Header/harvesters can be treated with 2.5 kg of dry dust. Refer to label for instructions. Always wear a disposable dust mask/respirator and goggles for safety. Please note: Some desiccant dust products are ineffective against rust red flour beetle (*Tribolium* spp.), studies have shown Dryacide® to be most efficacious.
	Perma-Guard™ D-10	200 g/L (1 L/33 m^2)	
	Absorba-cide®	120 g/L (1 L/20 m^2)	
	Cut N Dry®	120 g/L (1 L/20 m^2)	
	Abrade®	240 mL/L (1 L/20 m^2)	
Disinfesting empty silos, storage areas and equipment such as headers, augers, mobile bins.	Carbaryl® 500 (500 g/L carbaryl)	10 mL/L per 10 m^2	Ensure silos are cleaned thoroughly before any treatment. Carbaryl is registered only to control lesser grain borers. Mixtures of carbaryl with any of the other components listed here can be used to control all species. Follow label precautions about mixing. Do not premix. Agitate thoroughly and clean equipment after use. Refer to label for spraying rates.
	Actellic® 900 (900 g/L pirimiphos-methyl)	11 mL/L or 22 mL/L	Actellic® and Fenitrothion are not effective against lesser grain borer. Can be mixed with carbaryl (above), or methoprene (IGR). However, methoprene will not kill any live adult lesser grain borers that are present. **Note**: None of these chemicals are to be used in storages where canola and other oilseeds or pulses are to be stored. **Note**: These products are anti-cholinesterase compounds.
	Fenitrothion® 1000 (1000 g/L fenitrothion)	10 mL/L	
	500 g/L Chlorpyrifos-methyl + 30 g/L S methoprene e.g. Genfarm chlorpyrifos-methyl plus grain protectant®	20 mL/L	
	Insectigas-D® (50 g/kg dichlorvos)	200 g/300 m^3	Self-propelled gas. **Note**: Do not re-enter treated area for at least 4 days after treatment – follow label directions. **Note**: This product is an anti-cholinesterase compound.

Registered insecticides as at February 2025
The product names are supplied on the understanding that no preference between equivalent products is intended, and that including a product does not imply endorsement by NSW DPIRD over any other equivalent product from another manufacturer. ALWAYS READ THE LABEL.

Cereal grains include wheat, barley, oats, maize, sorghum, triticale, paddy rice and millet. Canola and other oilseeds may only be treated with phosphine. Withholding periods listed on some labels ensure that residues decay to acceptable levels before grain is sold.

Table 89. Fumigants for grain in storage.

Grain situation	Fumigant	Summary notes: READ THE LABEL BEFORE TREATING for limitations and full instructions.
Disinfest cereals, pulses, oilseeds and malting barley by fumigation	Aluminium phosphide (330 g/kg phosphine) 150 tablets/100 m^3 or 3 tablets/2 m^3 producing phosphine gas	Ensure silo is gas-tight. Calculate fumigant dose on total volume of silo. Fumigate for 7–20 days, withholding period 2 days after ventilation. Do not mix tablets in with the grain. Other phosphine formulations are available, including bag chains, belts, blankets and cylinder gas. Refer to labels for rates and methods of use.
Disinfest cereal grains and oilseeds by fumigation	Vapormate® Fumigant (166.7 g/kg ethyl formate) (420 g/m3–24 hours exposure time or 660 g/m3–3 hours exposure time)	Rate depends on exposure time (3 or 24 hours; see label). To be dispensed into sealed/gas-tight storage. **Note**: For use only by people trained under a BOC training program.
Disinfest cereals only by fumigation	Profume® (998 g/kg sulfuryl fluoride)	Requires a licensed fumigator trained to use Profume® and a gas-tight storage.

Do you know what is eating at your profits? – common stored grain insect pests of NSW

Lesser grain borer – *Rhyzopertha dominica*

Key features: dark brown, pellet shaped, 3 mm long, eyes and mouth parts tucked underneath.

Rice weevil – *Sitophilus oryzae*

Key features: dark brown to black, 2–4 mm long, long weevil snout.

Flat grain beetle or rusty grain beetle – *Cryptolestes ferrugineus*

Key features: brown, small, 2 mm long, fast moving, keen to hide, long thin antennae.

Rust-red flour beetle – *Tribolium castaneum*

Key features: red brown, 3–4 mm long, 3 larger segments at end of antennae.

Saw-toothed grain beetle – *Oryzaephilus surinamensis*

Key features: dark brown, 3 mm long, fast moving, saw tooth pattern on side of body behind head.

India meal moth – *Plodia interpunctella*

Key features: distinctive bicoloured wings, 5–7 mm long, larvae create webbing on grain surface.

Figure 11. Common stored grain insects

A – Images courtesy Department of Agriculture, Fisheries and Forestry, Queensland.
B – Image courtesy K Walker, PaDIL www.padil.gov.au

Table 90. Protectants for treating cereal grain in storage.

Grain situation	Insecticide rate per 100 L		Summary notes: READ THE LABEL BEFORE TREATING for limitations and full instructions.
Protect cereal grain (including malting barley, rice and maize)	Conserve™ Plus (100 g/L spinosad and 100 g/L S-methoprene) 1 L in 100 L of water		Ensure treatment is acceptable to buyer. Conserve™ Plus should NOT be applied to any cereal grain to be sold into markets designated pesticide residue free (PRF). Durum wheat is assumed to have a PRF delivery requirement, as it is regularly sold into European markets, which have low maximum residue limits (MRL) for grain protectant compounds. Apply at the rate of 1 L diluted spray per tonne of grain for up to 9 months protection. One application per parcel of grain. To control *Sitophilus* spp. (e.g. rice weevil) tank mix with a compatible product suitable for your grain type (see product labels).
	K-Obiol® EC Combi (50 g/L deltamethrin + 400 g/L piperonyl butoxide) 2.0 L in 100 L of water PLUS an additional registered grain protectant* at the recommended rate		Ensure treatment is acceptable to buyer. K-Obiol® can be used against all the major stored grain insect pests. However, K-Obiol® is restricted to one application per parcel of grain. This product can only be used by approved users. For further information go to (https://www.au.envu.com/stored-grain/products/k-obiol-ec-combi). Apply at the rate of 1 L of diluted spray per tonne of grain entering storage. Apply through standard grain spraying equipment. The output of spray through the nozzle must be regulated according to the flow rate. Ensure an even coverage of the grain. * Choose an additional grain protectant which contains fenitrothion or chlorpyrifos-methyl and registered for your grain type (check pesticide labels). See mixing/application instructions on label. This treatment will provide up to 9 months protection. Treat only non-infested grain with protectants. Check labels for withholding period (WHP). **Warning**: Resistant or tolerant strains of some grain insects might be present and could require adding a second insecticide to achieve control.
Protect cereal grain except malt barley	GROUP A	Actellic®900 (900 g/L pirimiphos-methyl) 0.45 L Imtrade Diplomat 500 EC (500 g/L chlorpyrifos-methyl) Fenitrothion 1000 (1000 g/L fenitrothion) 1.2 L	Ensure treatment is acceptable to buyer. Make up ONE Group A insecticide to strength before adding the required amount of ONE Group B insecticide to the spray mix. Mixtures are needed to control the whole range of grain insects. Apply 1 L of diluted spray per tonne of grain entering storage. Ensure an even coverage of the grain. Treat only non-infested grain with protectants. Check labels for WHP. **Note**: Resistance in lesser grain borer to IGR is widespread.
	GROUP B	Rizacon-S® (300 g/L S-methoprene) 0.2 L IGR grain protectant (S-methoprene) various rates	
	Twin pack pre-mixed Various brands	Two-component packs e.g. Genfarm chlorpyrifos-methyl plus grain protectant 2.0 L ❶	Ensure treatment is acceptable to buyer. Different twin pack premixed formulations might be available and can be used to control all stored grain insect pests. **Note**: Resistance in lesser grain borer to IGR is widespread.
Protect malting barley	K-Obiol® EC Combi 2.0 L❷		See directions above. **Note**: Using chlorpyrifos-methyl as a mixing partner is not permitted on malting barley.
	Grain-guard Duo® (600 g/L fenitrothion + 60 g/L S-methoprene) 1.0 L		Ensure treatment is acceptable to buyer. Different twin pack premixed formulations may be available and can be used to control all stored grain insect pests. Apply 1 L of diluted spray per tonne of grain entering storage. Ensure an even coverage of the grain. Treat only non-infested grain with protectants. Check labels for WHP. **Note**: Resistance in lesser grain borer to IGR is widespread.
	Conserve™ Plus ❷ 1 L		See directions above
Protect cereal grain (for treating cereal grain to be retained and used on farm only)	Dryacide® Perma-Guard® D-10 Absorba-cide® Cut 'N Dry®	1 kg/tonne 1 kg/tonne 1 kg/tonne 1 kg/tonne	Apply dusts evenly and reduce auger rate to prevent choking. Not accepted off-farm by most traders. DO NOT treat grain to be delivered to grain handling authorities.
Protect organic cereal grain	Dryacide® Perma-Guard® D-10 Absorba-cide® Cut 'N Dry®	1 kg/tonne 1 kg/tonne 1 kg/tonne 1 kg/tonne	Dusted grain can retain protection for more than 12 months if grain moisture is low. Higher rates can be used for dirty or infested grain, but not where grain is for human consumption. Apply dusts evenly and reduce auger rate to prevent choking. Check with buyers before application.

❶ A premixed formulation of chlorpyrifos-methyl and S-methoprene.

❷ When using K-Obiol® Combi or Conserve™ Plus to control *Sitophilus* spp. (e.g. rice weevil) fenitrothion needs to be added at 1.2 L per 100 L water.

Table 91. Cereal seed dressings – 2025: control of seed-borne disease. (Page 1 of 3.) **Always check the label before using farm chemicals.**

Cereal seed dressings control smuts and bunt, and some can suppress certain leaf and root diseases. Outbreaks of bunt and flag smut in wheat and loose smut in barley emphasise the need for annual seed treatment to avoid diseases building up in seed crops, or causing grain delivery issues.

Recommendations for controlling smuts are:

- discard grain carrying the disease
- avoid sowing wheat for at least 2 seasons into land where flag smut or bunt have occurred
- treat all seed for sowing

Some fungicides only control one or 2 of the 3 smuts.

Use a product controlling all three diseases. Some dressings can reduce the coleoptile length and emergence of some varieties. The risk of emergence failure is increased when some fungicides are used on varieties with short coleoptiles, or when seed is sown deeply, into a poor seedbed or under dry conditions.

Active ingredient of fungicide or insecticide	Examples of seed treatment trade name and manufacturer	Rate to apply to each 100 kg	Approx. cost to treat 100 kg of seed ($) ❶	Smuts controlled: B – Bunt; C – Covered smut; L – Loose smut				F – wheat flag smut		Diseases suppressed								
								Wheat	Wheat	Wheat				Wheat/ barley	Barley			Grazing withholding period (weeks)
				Wheat	Barley	Oats	Triticale	Seed-borne flag smut	Soil-borne flag smut	Septoria tritici	Stripe rust	Leaf rust	Take-all	Rhizoctonia	Scald	Powdery mildew	Seed-borne net blotch	
Powders – various trade names sometimes available under these active ingredients, concentrations and formulations. See specific labels for details.																		
Flutriafol 100 g/kg + cypermethrin 4 g/kg	Armour® C SD – FMC	100 g	–	BL	CL	–	–	F	F	✓	✓	–	–	–	✓	✓	–	4
Tebuconazole 25 g/kg + triflumuron 4 g/kg	Conquest Veto T – Conquest Agrichemicals	100 g	2.26	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	4
Triadimenol 150 g/kg + cypermethrin 4 g/kg	Triadimenol 150+® SD – 4 Farmers	100 g 150 g	– –	BL BL	CL CL	CL CL	– –	F F	F F	– ✓	✓ ✓✓	– –	– –	– –	✓ ✓✓	✓ ✓✓	– –	5 5
Flowable liquids – water based – various trade names sometimes available under these active ingredients, concentrations and formulations. See specific labels for details.																		
Carboxin 400 g/L + cypermethrin 3.2 g/L	Vitaflo® C ST – UPL Australia Ltd ❸	125 mL 250 mL	4.05 8.10	B BL	C CL	CL –	– L	F ❸ F	– –	– –	– –	– –	– –	– –	– –	– –	– –	7 7
Carboxin 200 g/L + thiram 200 g/L	Vitavax® 200 FF ST – UPL Australia Ltd ❸	250 mL 375 mL 500 mL	– – –	B B BL	C C CL	CL – –	– – L	F ❸ F F	– – F	– – –	– – –	– – –	– – –	– – –	– – –	– – –	✓ ✓✓ ✓✓	7 7 7
Cyclobutrifluram 200 g/L ⓲	Victrato® – Syngenta ⓲	200 mL 400 mL	37.40 74.80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6 6

✓ Affords useful suppression in early crop growth stages. ✓✓, ✓✓✓ and ✓✓✓✓ affords extended suppression.

❶ Prices quoted are GST inclusive at February 2025 and approximate only. Prices will vary depending on pack size purchased and special marketing arrangements.

❷ Rate of product varies for disease controlled, check label.

❸ Also controls seed-borne flag smut in triticale. There is no registered seed treatment for cereal rye.

❹ *Barley yellow dwarf virus* (BYDV). Hombre® Ultra provides early season control of BYDV.

❺ Plus Raxil® T with Jockey® Stayer® at 100 mL/100 kg seed.

❻ Also provides control of pythium root rot.

❼ Also provides control of pythium root rot, leaf rust and net blotch in barley and suppression of yellow spot.

❽ Suppresses rhizoctonia root rot in oats.

❾ Suppression only.

❿ Withholding period – livestock producing milk for human consumption 12 weeks.

⓫ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed. DO NOT mix leaves treated with this product with feed intended for animal consumption.

⓬ Rancona® Dimension is registered for the suppression of crown rot and rhizoctonia root rot, at 320 mL/100 kg.

⓭ In furrow application must be combined with a seed treatment of 40 mL/100 kg of EverGol® Prime for control.

⓮ Vibrance® registered at 90–180 mL/100 kg seed for control of covered and loose smut in barley. Use the higher rate when known levels of loose smut infection are present within the seedlot or when treating a highly susceptible barley variety.

⓯ 180–360 mL/100 kg seed will give suppression of rhizoctonia root rot in barley.

⓰ EverGol® Energy is registered for the suppression of crown rot and pythium root rot for seed treatment, see label for rates.

⓱ EverGol® Energy is registered for the suppression of crown rot and pythium root rot for in-furrow application at 300 mL/ha. Only apply direct into sowing furrow, do not apply EverGol® Energy to solid fertiliser.

⓲ Victrato® is registered for the suppression of crown rot see label for rates.

Treated seed must not be used for animal or human consumption.

Caution: observe stock withholding periods on crops produced from treated seed.

Seed dressings and foliar fungicides

Table 91. Cereal seed dressings – 2025: control of seed-borne disease. (Page 2 of 3.) **Always check the label before using farm chemicals.**

Active ingredient of fungicide or insecticide	Examples of seed treatment trade name and manufacturer	Rate to apply to each 100 kg	Approx. cost to treat 100 kg of seed ($) ❶	Smuts controlled: B – Bunt; C – Covered smut; L – Loose smut				F – wheat flag smut		Diseases suppressed								
								Wheat	Wheat	Wheat				Wheat/ barley	Barley			Grazing withholding period (weeks)
				Wheat	Barley	Oats	Triticale	Seed-borne flag smut	Soil-borne flag smut	Septoria tritici	Stripe rust	Leaf rust	Take-all	Rhizoctonia	Scald	Powdery mildew	Seed-borne net blotch	
Difenoconazole 66.2 g/L + metalaxyl-M 16.5 g/L + sedaxane 13.8 g/L	Vibrance® – Syngenta ❻	90 mL	4.11	B	CL ⓮	L	BL	F	F	–	–	–	–	–	–	–	–	6
		180 mL	8.22	BL	CL	L	BL	F	F	–	–	–	–	✓ ⓯	–	–	✓	6
		360 mL	16.43	BL	CL	L	BL	F	F	–	–	–	–	✓ ❽	–	–	✓✓	6
Fluquinconazole 167 g/L	Fluquinconazole 167 SC – Titan ❷	300 mL	–	BL	CL ❺	–	–	F	F	✓	✓✓✓	✓	–	–	✓✓✓ ❺	✓✓ ❺	–	6, 12 ⓾
		450 mL	–	BL	–	–	–	F	F	✓✓	✓✓✓✓	✓✓	✓	–	–	–	–	6, 12 ⓾
Flutriafol 6.25 g/L	Vincit® Zinc FSD – FMC	400 mL	–	BL	CL	CL	L	F	F	–	–	–	–	–	–	–	–	4
Flutriafol 25 g/L + cypermethrin 4 g/L	Vincit® C FSD – FMC	100 mL	2.81	BL	CL	CL	L	F	F	–	–	–	–	–	–	–	–	4
Flutriafol 100 g/L + cypermethrin 4 g/L	Arrow® C FSD – Nufarm	100 mL	–	BL	CL	–	–	F	F	✓	✓	–	–	–	✓	✓	–	4
Flutriafol 6.25 g/L + metalaxyl-M 15 g/L + imidacloprid 180 g/L	Pontiac® Seed Treatment– Nufarm ❹	400 mL	16.06	BL	CL	CL	L	F	F	–	–	–	–	✓❾	–	–	–	9
Fluxapryroxad 333 g/L	Systiva – BASF	150 mL	38.28	B	L	–	–	–	–	✓	–	–	–	✓❾	✓✓✓	✓✓✓	✓✓✓	4
Ipconazole 20 g/L + cypermethrin 4 g/L	Rancona® C – UPL Australia Ltd	100 mL	3.96	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	6
Ipconazole 25 g/L + metalaxyl 20 g/L	Rancona® Dimension ❻ ⓬ – UPL Australia Ltd	80 mL	3.65	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	10
		200 mL	9.13	–	L	–	–	–	–	–	–	–	–	–	–	–	–	10
		320 mL ⓬	14.61	–	–	–	–	–	–	–	–	–	–	✓	–	–	–	10
Penflufen 240 g/L	EverGol® Prime – Bayer CropScience	40 mL	6.93	BL	CL	CL	–	F	F	–	–	–	–	✓	–	–	–	5
		80 mL	13.86	BL	CL	CL	–	F	F	–	–	–	–	✓✓	–	–	–	5
Penflufen 38.4 g/L + metalaxyl 61.4 g/L + prothioconazole 76.8 g/L	EverGol® Energy⓰ Bayer CropScience	65 mL	3.89	B	C	–	–	–	–	–	–	–	–	–	–	–	–	6
		100 mL	5.98	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
		130 mL	7.78	L	L	L	L	F	F	–	–	–	–	✓	–	–	–	6
		260 mL	15.56	–	–	–	–	–	–	–	–	–	–	✓✓	–	–	–	6
Tebuconazole 25 g/L + cypermethrin 4 g/L	various	100 mL	–	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	0
Tebuconazole 12.5 g/L + imidacloprid 360 g/L	Hombre® Ultra – Bayer CropScience Proguard® Ultra – UPL Australia Ltd❹	200 mL	8.69	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	9
Tebuconazole 25 g/L + triflumuron 4 g/L	Raxil® T FSD – Bayer CropScience	100 mL	2.48	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	4
Triadimenol 150 g/L + cypermethrin 4 g/L	Foliarflo® C ST – UPL Australia Ltd	100 mL	–	BL	CL	CL	–	F	F	–	✓	–	–	–	✓	✓	–	5
		150 mL	–	BL	CL	–	–	F	F	✓	✓✓	–	–	–	✓✓	✓✓	–	5
Triadimenol 56 g/L + imidacloprid 180 g/L	4 Farmers Imid-Triadimenol Seed Dressing – 4 Farmers Australia ❹	400 mL	–	BL	CL	CL	–	F	F	✓✓	✓✓	–	–	–	✓✓	✓✓	–	9

Table 91. Cereal seed dressings – 2025: control of seed-borne disease. (Page 3 of 3.) **Always check the label before using farm chemicals.**

Active ingredient of fungicide or insecticide	Examples of seed treatment trade name and manufacturer	Rate to apply to each 100 kg	Approx. cost to treat 100 kg of seed ($) ❶	Smuts controlled: B – Bunt; C – Covered smut; L – Loose smut				F – wheat flag smut		Diseases suppressed								
				Wheat	Barley	Oats	Triticale	Wheat	Wheat	Wheat				Wheat/ barley	Barley			Grazing withhold-ing period (weeks)
								Seed-borne flag smut	Soil-borne flag smut	Septoria tritici	Stripe rust	Leaf rust	Take-all	Rhizoctonia	Scald	Powdery mildew	Seed-borne net blotch	
Triadimenol 150 g/L + triflumuron 4 g/L	Baytan® T FSD – Bayer CropScience	100 mL 150 mL	2.74 4.11	BL BL	CL CL	CL –	– –	F F	F F	– ✓	✓ ✓✓	– –	– –	– –	✓ ✓✓	✓ ✓✓	– –	5 5
Triticonazole 25 g/L + cypermethrin 4 g/L	Premis® Pro C – BASF	100 mL	–	BL	CL	CL	–	F	F	–	–	–	–	–	–	–	–	Nil
In furrow treatments – various trade names sometimes available under these active ingredients, concentrations and formulations. See specific labels for details.																		
		Rate and approximate cost $/ha																
Azoxystrobin 322 g/L + metalaxyl-M 124 g/L	Uniform®– Syngenta❼	200 mL/ha 300 mL/ha 400 mL/ha	8.69 13.04 17.38	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– ✓✓ ✓✓✓✓	– – –	– – –	✓ ✓✓ ✓✓✓	– – –	– ✓ ✓✓	– – –	6 6 6
Flutriafol 250 g/L	various	200 mL/ha 400 mL/ha	– –	– –	– –	– –	– –	– –	– –	– ✓	✓✓ ✓✓✓✓	– –	– ✓	– –	✓ ✓✓	✓ ✓✓	– –	4 4
Flutriafol 500 g/L	Intake® HiLoad Gold NuFarm ❷	100 mL/ha 200 mL/ha 400 mL/ha	3.19 6.38 12.76	– – –	– – –	– – –	– – –	– – –	– – –	– ✓ ✓	✓✓ ✓✓✓ ✓✓✓✓	– – –	– ✓ ✓	– – –	✓ ✓✓ ✓✓	✓ ✓✓ ✓✓	– – ✓	4 4 4
Penflufen 240 g/L	EverGol® Prime – Bayer CropScience	60 mL/ha 120mL/ha	10.40 20.79	BL ⓭ BL ⓭	CL ⓭ CL ⓭	CL ⓭ CL ⓭	– –	F ⓭ F ⓭	F ⓭ F ⓭	– –	– –	– –	– –	✓✓ ✓✓✓	– –	– –	– –	5 5
Penflufen 38.4 g/L + metalaxyl 61.4 g/L + prothioconazole 76.8 g/L	EverGol® Energy ⓱ Bayer CropScience	300 mL/ha	17.95	–	–	–	–	–	–	–	–	–	–	✓✓✓	–	–	–	6
Triadimefon 500 g/kg	Triadimefon 500 WG – FMC	200 g/ha	6.09	–	–	–	–	–	–	–	✓✓	✓	–	–	–	✓	–	No grazing ⓫
Triadimefon 500 g/kg	Triadimefon 500 DRY – 4 Farmers	200 g/ha	5.08	–	–	–	–	–	–	–	✓✓	✓	✓	–	–	✓	–	No grazing ⓫

✓ Affords useful suppression in early crop growth stages. ✓✓, ✓✓✓ and ✓✓✓✓ affords extended suppression.

❶ Prices quoted are GST inclusive at February 2025 and approximate only. Prices will vary depending on pack size purchased and special marketing arrangements.

❷ Rate of product varies for disease controlled, check label.

❸ Also controls seed-borne flag smut in triticale. There is no registered seed treatment for cereal rye.

❹ *Barley yellow dwarf virus* (BYDV). Hombre® Ultra provides early season control of BYDV.

❺ Plus Raxil® T with Jockey® Stayer® at 100 mL/100 kg seed.

❻ Also provides control of pythium root rot.

❼ Also provides control of pythium root rot, leaf rust and net blotch in barley and suppression of yellow spot.

❽ Suppresses rhizoctonia root rot in oats.

❾ Suppression only.

❿ Withholding period – livestock producing milk for human consumption 12 weeks.

⓫ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed. DO NOT mix leaves treated with this product with feed intended for animal consumption.

⓬ Rancona® Dimension is registered for the suppression of crown rot and rhizoctonia root rot, at 320 mL/100 kg.

⓭ In furrow application must be combined with a seed treatment of 40 mL/100 kg of EverGol® Prime for control.

⓮ Vibrance® registered at 90–180 mL/100 kg seed for control of covered and loose smut in barley. Use the higher rate when known levels of loose smut infection are present within the seedlot or when treating a highly susceptible barley variety.

⓯ 180–360 mL/100 kg seed will give suppression of rhizoctonia root rot in barley.

⓰ EverGol® Energy is registered for the suppression of crown rot and pythium root rot for seed treatment, see label for rates.

⓱ EverGol® Energy is registered for the suppression of crown rot and pythium root rot for in-furrow application at 300 mL/ha. Only apply direct into sowing furrow, do not apply EverGol® Energy to solid fertiliser.

⓲ Victrato® is registered for the suppression of crown rot see label for rates.

Treated seed must not be used for animal or human consumption.

Caution: observe stock withholding periods on crops produced from treated seed.

Table 92. Cereal insecticide seed dressings for aphid and *Barley yellow dwarf virus* (BYDV) control 2025. **Always check the label before using farm chemicals.**

Active ingredient of insecticide and fungicide – various trade names sometimes available under these active ingredients, concentrations and formulations. See specific labels for details.	Examples of seed treatment trade name and manufacturer	Rate to apply to each 100 kg ❷	Approx. cost to treat 100 kg of seed ($) ❶	Aphid feeding damage suppression (wheat aphid and corn aphid)	Reduces spread of BYDV	Grazing withholding period (weeks)
Imidacloprid 360 g/L + tebuconazole 12.5 g/L	Hombre® Ultra – Bayer CropScience Proguard® Ultra – UPL Australia Ltd	200 mL	8.69	✓	✓	9
Imidacloprid 180 g/L + triadimenol 56 g/L	4 Farmers Imid-Triadimenol Seed Dressing – 4 Farmers Australia	400 mL	–	✓	✓	9
Imidacloprid 180 g/L + flutriafol 6.25 g/L + metalaxyl 15 g/L	Pontiac® – Nufarm	400 mL	16.06	✓	✓	9
Imidacloprid 600 g/L	Gaucho® 600 Red – Bayer CropScience Senator® 600 RED – Nufarm	120–240 mL	5.87–11.75	✓	✓	9
Lambda-cyhalothrin 37.5 g/L + thiamethoxam 210 g/L	Cruiser® Opti – Syngenta	165–330 mL	17.24–34.49	✓	–	8
Thiamethoxam 350 g/L	Cruiser® 350FS	100–200 mL	5.15–10.30	✓	✓	8

✓ Affords useful suppression in early crop growth stages.

❶ Prices quoted are GST inclusive at February 2025 and approximate only. Prices will vary depending on pack size purchased and special marketing arrangements.

❷ Rate of product varies for length of disease control and risk level, check label.

Table 93. Cereal foliar fungicides – 2025 currently registered products (NSW) – winter cereals. (Page 1 of 4.) **Always check the label before using farm chemicals.**

Various trade names sometimes available under these active ingredients and concentrations. **See specific labels for details.**

Active and concentration	Examples of commercial trade names: Product and manufacturer	WHP (weeks) W – Wheat B – Barley: Grazing	WHP (weeks) W – Wheat B – Barley: Harvest	Cost/L ❶ Cost range $/ha	Adjuvant (as per label)	Diseases controlled ❷: Stripe rust	Stem rust	Leaf rust	Crown (leaf) rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow spot	Barley scald	Net blotch	Powdery mildew	Registered for aerial application
Azoxystrobin 250 g/L	Accolade® (requires a fungicide mixing partner) Sipcam	3	6	$21.73 $3.48–13.90 (only for Accolade® not mixing partners which are applied at label rates)	May be required for some diseases at lower rates. Refer to label.	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide OR 320–640 mL + 125 g/L epoxiconazole	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide OR 320–640 mL + 125 g/L epoxiconazole	–	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide OR 320–640 mL + 125 g/L epoxiconazole	**Wheat** 160–320 mL + 430 g/L tebuconazole fungicide	**Barley** 160 mL + 430 g/L tebuconazole fungicide OR 320–640 mL + 125 g/L epoxiconazole	**Barley** ❺ 320–640 mL + 125 g/L epoxiconazole	**Barley** 160–320 mL + 430 g/L tebuconazole fungicide OR **Wheat and barley** 320–640 mL + 125 g/L epoxiconazole	Yes
Azoxystrobin 625 g/L	Mirador® 625 (requires a fungicide mixing partner) Adama Australia	3	Depends on fungicide mixing partner 4–6	$60.50 $3.93–15.13 (only for Mirador®625 not mixing partners, which are applied at label rates)	May be required for some diseases at lower rates. Refer to label.	**Wheat** 65–250 mL	**Wheat and oats** 65–250 mL	**Wheat and barley** 65–250 mL	**Oats** 65–250 mL	**Wheat** 65–250 mL	**Wheat** 65–250 mL	**Wheat** 65–250 mL	**Barley** 65–250 mL	**Barley** 65–250 mL	**Wheat and barley** 65–250 mL	Yes
						Note: A mixing partner of epoxiconazole , propiconazole, prothioconazole or tebuconazole must be added for control, depending on the disease. Mirador® 625 rate depends on mixing partner. **Refer to label.**										
Azoxystrobin 200 g/L + cyproconazole 80 g/L	Amistar® Xtra Syngenta	3	6	$27.23 $5.45–21.78	Barley – addition of Adigor® at 2% v/v improves disease control at lower rate.	**Wheat** 400–800 mL	**Wheat** 400–800 mL	**Wheat** 400–800 mL **Barley** 200–800 mL	**Oats** 400–800 mL	**Wheat** 400–800 mL	**Wheat** 400–800 mL	**Wheat** 400–800 mL	**Barley** 400–800 mL	**Barley** 200–800 mL	**Wheat and barley** 400–800 mL	Yes

❶ Prices where available are indicative costs only: significantly lower prices are often obtained for bulk purchases of commonly used products.
❷ Body of table shows rate mL/ha, g/ha and associated cost $/ha for registered products.
❸ Registered for the control of septoria leaf blotch in oats
❹ Spot form of net blotch.
❺ Net form of net blotch only.
❻ Tazer®Expert™ is registered for control of septoria leaf blotch in oats.
❼ Registered for the control of fusarium head blight.
❽ Suppression only.
❾ Various formulations and active ingredient concentrations of flutriafol, propiconazole, tebuconazole and triadimefon are available.
❿ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed. Do not mix leaves treated with this product with feed intended for animal consumption.
+ ESI Export slaughter interval applies. Do not slaughter animals destined for export within 7 days of consumption of treated cereal forage or straw.
NR Not required when used as directed.

Growers applying a foliar fungicide to control rust or other diseases need to observe the withholding period (WHP). Fungicides applied late, closer to harvest, can produce an excessive, illegal residue if applied within the WHP. For most of the fungicides registered to control diseases in winter cereals, the maximum residue limit (MRL) is set very low, at the limit of detection. A residue above the MRL is illegal under the *Pesticides Act 1999* and renders the offender liable to prosecution and a fine. Excessive residues also put Australia's export trade at risk. If it is necessary to apply a fungicide late, select a product with a short WHP.

Table 93 Cereal foliar fungicides – 2025 currently registered products (NSW) – winter cereals. (Page 2 of 4.) **Always check the label before using farm chemicals.**

Active and concentration	Examples of commercial trade names: Product and manufacturer	WHP (weeks) W – Wheat B – Barley: Grazing	Harvest	Cost/L ❶ Cost range $/ha	Adjuvant (as per label)	Diseases controlled ❷: Stripe rust	Stem rust	Leaf rust	Crown (leaf) rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow spot	Barley scald	Net blotch	Powdery mildew	Registered for aerial application
Azoxystrobin 80 g/L + epiconazole 31.25 g/L	Tazer® Xpert™ ❻ Nufarm	3		$26.68 $13.34–53.35	Plus Banjo® 1% v/v for some diseases. Adding Banjo® may improve efficacy at lower rates. Refer to label.	**Wheat** 1000–2000 mL OR 500 mL + Banjo® at 1% v/v	**Wheat and barley** 1000– 2000 mL OR 500 mL + Banjo® at 1% v/v **Oats** 1000 mL OR 500 mL + Banjo® 1% at v/v	**Wheat and barley** 1000– 2000 mL OR **Wheat** 500 mL + Banjo® 1% at v/v **Barley** 500–1000 mL + Banjo® 1% at v/v	–	**Wheat** 1000 mL OR 500 mL/ha + Banjo® at 1% v/v	**Wheat** 1000– 2000 mL	**Wheat** 1000– 2000 mL	**Barley** 1000–2000 mL	**Barley** 1000– 2000 mL OR 500–1000 mL + Banjo® 1% at v/v	**Wheat and barley** 1000– 2000 mL OR **Barley** 500–1000 mL + Banjo® 1% at v/v	Yes
Azoxystrobin 75 g/L + epoxiconazole 75 g/L	Radial® Adama Australia	3 + ESI	NR	– –	Can improve efficacy at lower rates for some diseases.	**Wheat** 420–840 mL	**Wheat** 420–840 mL	**Wheat and barley** 420–840 mL	–	**Wheat** 420–840 mL	**Wheat** 420–840 mL	**Wheat** 420–840 mL	**Barley** 420–840 mL	**Barley** 420–840 mL	**Wheat and barley** 420–840 mL	Yes
Azoxystrobin 320 g/L + epoxiconazole 250 g/L	Radial®Opti Adama Australia	3 + ESI	NR	$88.00 $11.00–22.00	Can improve efficacy at lower rates for some diseases.	**Wheat** 125–250 mL	**Wheat** 125–250 mL **Oats** 125 mL	**Wheat and barley** 125–250 mL	**Oats** 125 mL	**Wheat** 125–250 mL	**Wheat** 125–250 mL	**Wheat** 125–250 mL	**Barley** 125–250 mL	**Barley** 125–250 mL	**Wheat and barley** 125–250 mL	Yes
Azoxystrobin 120 g/L + tebuconazole 200 g/L	Veritas® Adama Australia	3 +ESI	6	$27.23 $8.58 OR $17.15	–	**Wheat** 315 mL OR 630 mL	**Wheat** 315 mL OR 630 mL	**Wheat and barley** 315 mL OR 630 mL	–	**Wheat** ❹ 315 mL OR 630 mL	**Wheat** 315 mL OR 630 mL	**Wheat** 315 mL OR 630 mL	**Barley** 315 mL	**Barley** ❽ 315 mL OR 630 mL	**Barley** 315 mL OR 630 mL	Yes
Azoxystrobin 222 g/L + tebuconazole 370 g/L	Veritas® Opti Adama Australia	3 +ESI	6	$42.35 7.20–14.40	–	**Wheat** 170 mL OR 340 mL	**Wheat** 170 mL OR 340 mL	**Wheat and barley** 170 mL OR 340 mL	–	**Wheat** 170 mL OR 340 mL	**Wheat** 170 mL OR 340 mL	**Wheat** 170 mL OR 340 mL	**Barley** 170 mL	**Barley** ❽ 170 mL OR 340 mL	**Barley** 170 mL OR 340 mL	Yes
Azoxystrobin 200 g/L + propiconazole 200 g/L	Topnotch® Adama Australia	3 +ESI	4	$27.23 $5.45–16.34	–	**Wheat** 300–600 mL	**Wheat** 600 mL **Oats** 200–400 mL	**Wheat** 200–600 mL **Barley** 300–600 mL	**Oats** 300–600 mL	**Wheat** 300–600 mL	**Wheat** 200–600 mL	**Wheat** 300–600 mL	**Barley** 300–600 mL	**Barley** 300–600 mL	**Wheat and Barley** 200–600 mL	Yes
Azoxystrobin 133 g/L + prothioconazole 100 g/L	Maxentis® EC Adama Australia	3	5	$30.25 $9.08–18.15	Can improve efficacy at lower rates for some diseases	**Wheat** 300–600 mL	**Wheat and oats** 300–600 mL	**Wheat and barley** 300–600 mL	**Oats** 300–600 mL	**Wheat and oats** 300–600 mL	**Wheat** 300–600 mL	**Wheat** 300–600 mL	**Barley** 300–600 mL	**Barley** 300–600 mL	**Wheat and barley** 300–600 mL	Yes
Azoxystrobin 200 g/L + prothioconazole 150 g/L	Maxentis® Opti Adama Australia	3	5	$43.89 $8.78–17.56	Can improve efficacy at lower rates for some diseases	–	–	–	–	**Wheat** 200–400 mL	–	–	**Barley** 200–400 mL	**Barley** 200–400 mL	–	Yes
Benzovindiflupyr 40 g/L + propiconazole 250 g/L	Elatus® Ace Syngenta	10 days	NR	$47.19 $23.60	–	**Wheat** 500 mL	**Wheat** 500 mL	**Wheat and barley** 500 mL	–	**Wheat** 500 mL	–	**Wheat** 500 mL	**Barley** 500 mL	**Barley** 500 mL	**Wheat and barley** 500 mL	No
Epoxiconazole 125 g/L	Opus® 125 BASF	6 + ESI	6	$32.45 $8.11–16.23	200 mL/100 L Chemwet may assist in certain conditions	**Wheat** 250–500 mL	–	**Wheat** 500 mL **Barley** 250–500 mL	–	–	**Wheat** 250–500	–	**Barley** 250 mL	**Barley** ❺ 250–500 mL (net form)	**Wheat and barley** 250 mL	Yes

Table 93. Cereal foliar fungicides – 2025 currently registered products (NSW) – winter cereals. (Page 3 of 4.)

Active and concentration	Examples of commercial trade names: Product and manufacturer	WHP (weeks) W – Wheat B – Barley: Grazing	Harvest	Cost/L ❶ Cost range $/ha	Adjuvant (as per label)	Diseases controlled ❷: Stripe rust	Stem rust	Leaf rust	Crown (leaf) rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow spot	Barley scald	Net blotch	Powdery mildew	Registered for aerial application
Epoxiconazole 500 g/L	Soprano® 500 Adama Australia	3 + ESI	NR	$86.90 $5.65–10.86	200 mL/100 L Chemwet may assist in certain conditions	**Wheat** 65–125 mL	**Wheat** 65–125 mL	**Wheat and barley** 65–125 mL	–	**Wheat** 65–125 mL	**Wheat** 65–125 mL	**Wheat** 65–125 mL	**Barley** 65–125 mL	**Barley** 65–125 mL	**Wheat and barley** 65–125 mL	Yes
Flutriafol 250 g/L ❾	Various	7-W 10-B	7-W 10-B	– –	200 mL/100 L BS1000®	**Wheat** 250–500 mL	–	**Wheat** 250–500 mL	–	**Wheat** 250–500 mL	**Wheat** 250–500 mL	–	–	–	**Barley** 250–500 mL	Yes
Flutriafol 500 g/L	Jubilee® Loaded Adama Australia	7-W 10-B	7-W 10-B	$31.90 $3.99–7.98	200 mL/100 L BS1000®	**Wheat** 125–250 mL	–	**Wheat** 125–250 mL	–	**Wheat** 125–250 mL	**Wheat** 125–250 mL	–	–	–	**Barley** 125–250 mL	Yes
Mefenthriflu-conazole 100 g/L + fluxapyroxad 50 g/L	Revystar BASF	4 + ESI	NR	$74.25 $55.69	–	**Wheat** 750 mL	**Wheat** 750 mL	**Wheat and barley** 750 mL	–	**Wheat** 750 mL	**Wheat** 750 mL	**Wheat** 750 mL Suppression only	**Barley** 750 mL	**Barley** 750 mL	**Wheat and barley** 750 mL	Yes
Propiconazole 250 g/L❾	Various	1	4	$12.38 $1.86–6.19	Not required	**Wheat** 250–500 mL	**Wheat and oats** 500 mL	**Wheat** 150–500 mL	**Oats** 250–500 mL	**Wheat and oats** ❸ 250–500 mL	**Wheat** 150–500 mL	**Wheat** 250–500 mL	**Barley** 500 mL	**Barley** 250–500 mL	**Wheat and barley** 150–500 mL	Yes
Propiconazole 435 g/L	PropiMax® Corteva Agri-Science	1	4	– –	Not required	**Wheat** 145 mL OR 285 mL	**Wheat and oats** 285 mL	**Wheat** 85–285 mL	**Oats** 145–285 mL	**Wheat and oats** ❸ 145–285 mL	**Wheat** 145–285 mL	**Wheat** 145–285 mL	**Barley** 285 mL	**Barley** ❹ 285 mL	**Wheat and barley** 85–285 mL	Yes
Propiconazole 500 g/L	Throttle®500 Nufarm	1	4	$24.75 $1.86–6.19	Not required	**Wheat** 125–250 mL	**Wheat and oats** 250 mL	**Wheat** 75–250 mL **Barley** 125–250 mL	**Oats** 125–250 mL	**Wheat and oats** ❸ 125–250 mL	**Wheat** 75–250 mL	**Wheat** 125–250 mL	**Barley** 250 mL	**Barley** 125–250 mL	**Wheat and barley** 75–250 mL	Yes
Propiconazole 250 g/L + tebuconazole 250 g/L	Cogito® Syngenta	2	5	$32.45 $4.06–8.11	Not required	**Wheat** 125 – 250 mL	**Wheat** 125–250 mL **Oats** 250 mL	**Wheat and barley** 125–250 mL	**Oats** 125–250 mL	**Wheat and oats** ❸ 125–250 mL	**Wheat** 125–250 mL	**Wheat** 125–250 mL	**Barley** 250 mL	**Barley** 125–250 mL	**Wheat and barley** 125–250 mL	Yes
Prothioconazole 250 g/L	Proviso® ❼ (requires a fungicide mixing partner) Adama Australia	2	5	$31.90 $3.99–7.98	May improve efficacy for some diseases. Refer to label.	**Wheat** 125–250 mL	**Wheat** 125–250 mL **Oats** 250 mL	**Wheat and barley** 125–250 mL	**Oats** 250 mL + ORIUS® at 145 mL	**Wheat and oats** ❸ 125–250 mL	**Wheat** 125–250 mL	**Wheat** 125–250 mL	**Barley** 125–250 mL	**Barley** 125–250 mL	**Wheat and barley** 125–250 mL	Yes
						Note: Requires a fungicide mixing partner. Rate dependent on mixing partner and disease pressure. **Refer to label.**										

❶ Prices where available are indicative costs only: significantly lower prices are often obtained for bulk purchases of commonly used products.
❷ Body of table shows rate mL/ha, g/ha and associated cost $/ha for registered products.
❸ Registered for the control of septoria leaf blotch in oats
❹ Spot form of net blotch.
❺ Net form of net blotch only.
❻ Tazer®Expert™ is registered for control of septoria leaf blotch in oats.
❼ Registered for the control of fusarium head blight.
❽ Suppression only.
❾ Various formulations and active ingredient concentrations of flutriafol, propiconazole, tebuconazole and triadimefon are available.
❿ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed. Do not mix leaves treated with this product with feed intended for animal consumption.

+ ESI Export slaughter interval applies. Do not slaughter animals destined for export within 7 days of consumption of treated cereal forage or straw.
NR Not required when used as directed.

Growers applying a foliar fungicide to control rust or other diseases need to observe the withholding period (WHP). Fungicides applied late, closer to harvest, can produce an excessive, illegal residue if applied within the WHP. For most of the fungicides registered to control diseases in winter cereals, the maximum residue limit (MRL) is set very low, at the limit of detection. A residue above the MRL is illegal under the *Pesticides Act 1999* and renders the offender liable to prosecution and a fine. Excessive residues also put Australia's export trade at risk. If it is necessary to apply a fungicide late, select a product with a short WHP.

Table 93. Cereal foliar fungicides – 2025 currently registered products (NSW) – winter cereals. (Page 4 of 4.)

Active and concentration	Examples of commercial trade names: Product and manufacturer	WHP (weeks) W – Wheat B – Barley: Grazing	Harvest	Cost/L ❶ Cost range $/ha	Adjuvant (as per label)	Diseases controlled ❷: Stripe rust	Stem rust	Leaf rust	Crown (leaf) rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow spot	Barley scald	Net blotch	Powdery mildew	Registered for aerial application
Prothioconazole 480 g/L	Proline® 480 SC ❼ (requires a fungicide mixing partner) Bayer CropScience	2	5	$52.80 $3.70–8.45	Apply with a suitable adjuvant for the disease. Refer to label.	**Wheat** 70–130 mL + tebuconazole fungicide	**Wheat** 70–130 mL + tebuconazole fungicide **Oats** 130 mL + tebuconazole fungicide	**Wheat and barley** 70–130 mL + tebuconazole fungicide	**Oats** 130 mL + tebuconazole fungicide	**Wheat** 70–160 mL **Oats** 70–130 mL + tebuconazole fungicide	**Wheat** 70–130 mL + tebuconazole fungicide	**Wheat** 70–130 mL + tebuconazole fungicide	**Barley** 70–130 mL + tebuconazole fungicide	**Barley** 70–160 mL (Net form) 70–130 mL + tebuconazole fungicide (Spot form)	**Wheat and barley** 70–130 mL + tebuconazole fungicide	Yes
Prothioconazole 150 g/L + bixafen 75 g/L	Aviator® Xpro® Bayer CropScience	4	NR	$49.72 $14.92–24.86		**Wheat** 300–500 mL	–	**Barley** 400–500 mL	–	**Wheat** 300–500 mL	**Wheat** 300–500 mL	**Wheat** 300–500 mL	**Barley** 300–500 mL	**Barley** 300–500 mL	**Wheat and barley** 300–500 mL	Yes
Prothioconazole 210 g/L + tebuconazole 210 g/L	Prosaro® 420 SC ❼ Bayer CropScience	2	5	$35.20 $5.28–10.56	Various (adjuvants required for some diseases). As per label directions.	**Wheat and triticale** 150–300 mL	**Wheat** 150–300 mL **Oats** 300 mL	**Wheat and barley** 150–300 mL	**Oats** 300 mL	–	**Wheat and oats** 150–300 mL	**Wheat** 150–300 mL	**Barley** 150–300 mL	**Barley** 150–300 mL	**Wheat and barley** 150–300 mL	Yes
Pyraclostrobin 85 g/L + epoxiconazole 62.5 g/L	Opera® BASF	3 + ESI	NR	$40.59 $20.30–40.59	Non-ionic surfactant may assist in improving coverage.	**Wheat** 500 mL	**Wheat** 500 mL	**Wheat** 500–1000 mL **Barley** 500 mL	–	**Oats** 500 mL	**Wheat** 500 mL	–	**Barley** 500 mL	**Barley** 500–1000 mL	**Wheat** 500 mL **Barley** 500–1000 mL	Yes
Tebuconazole 430 g/L ❾	Various	2	5	$16.23 $2.35–4.71	Adding mineral crop oil at 1% may improve performance.	**Wheat** 145 or 290 mL	**Wheat and oats** 145 or 290 mL	**Wheat** 145 or 290 mL	**Oats** 145 or 290 mL	**Wheat** 290 mL	**Wheat** 145 or 290 mL	**Wheat** 145 or 290 mL	**Barley** 145 mL	–	**Barley** 145 or 290 mL	Yes
Tebuconazole 45 g/kg + sulfur 700 g/kg	Unicorn 745 WG Sulphur Mills Aust. Limited	2	5	– –	–	**Wheat** 1370 g or 2750 g	**Wheat and oats** 1370 g or 2750 g	**Wheat** 1370 g or 2750 g	**Oats** 1370 g or 2750 g	**Wheat** 2750 g	**Wheat** 1370 g or 2750 g	**Wheat** 1370 g or 2750 g	**Barley** 1370 g	–	**Barley** 1370 g or 2750 g	No
Triadimefon 125 g/L	Triadimefon 125 Genfarm	Not stated see footnote ❿	4	$8.20 $4.10–8.20	Not required.	**Wheat** 500 mL or 1000 mL	–	–	–	–	–	–	**Barley** 1000 mL	–	**Barley** 1000 mL	Yes
Triadimefon 500 g/kg ❾	Various	Not stated see footnote ❿	4	$32.06 $4.01–8.01	Not required.	**Wheat** 125–250 g	–	**Wheat** 125–250 g	–	**Wheat** 125–250 g (southern NSW only)	–	–	–	–	**Barley** 250 g	Yes

❶ Prices where available are indicative costs only: significantly lower prices are often obtained for bulk purchases of commonly used products.
❷ Body of table shows rate mL/ha, g/ha and associated cost $/ha for registered products.
❸ Registered for the control of septoria leaf blotch in oats
❹ Spot form of net blotch.
❺ Net form of net blotch only.
❻ Tazer®Expert™ is registered for control of septoria leaf blotch in oats.
❼ Registered for the control of fusarium head blight.
❽ Suppression only.
❾ Various formulations and active ingredient concentrations of flutriafol, propiconazole, tebuconazole and triadimefon are available.
❿ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed. Do not mix leaves treated with this product with feed intended for animal consumption.

+ ESI Export slaughter interval applies. Do not slaughter animals destined for export within 7 days of consumption of treated cereal forage or straw.
NR Not required when used as directed.

Growers applying a foliar fungicide to control rust or other diseases need to observe the withholding period (WHP). Fungicides applied late, closer to harvest, can produce an excessive, illegal residue if applied within the WHP. For most of the fungicides registered to control diseases in winter cereals, the maximum residue limit (MRL) is set very low, at the limit of detection. A residue above the MRL is illegal under the *Pesticides Act 1999* and renders the offender liable to prosecution and a fine. Excessive residues also put Australia's export trade at risk. If it is necessary to apply a fungicide late, select a product with a short WHP.

Table 94. Canola and pulse seed dressings – 2025. (Page 1 of 3.)

Active ingredient of fungicide or insecticide	Example seed treatment, trade name and manufacturer	Resistance group/s	Rate to apply to each 100 kg of seed	Approximate cost to treat 100 kg ($) ❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin	WHP weeks grazing
Clothianidin 360 g/L + imidacloprid 240 g/L	Poncho® Plus – BASF	4A	500 mL	134.60	Wireworm, cutworm, aphids, redlegged earth mite, blue oat mite, lucerne flea (suppression)	–	–	–	–	–	8
Fipronil 500 g/L	Cosmos® – BASF	2B	400 mL	259.00	Redlegged earth mite	–	–	–	–	–	9
Fludioxonil 25 g/L + metalaxyl-M 10 g/L	Maxim® XL – Syngenta ❷	12 + 4	200–400 mL	43.24–86.48	Damping-off (*Pythium* spp.), *Rhizoctonia solani*	–	–	–	–	–	6
			400 mL	86.48	Seedling blackleg (suppression)						
Fludioxonil 25 g/L + metalaxyl-M 10 g/L + pydiflumetofen 200 g/L	Maxim® XL – Syngenta + Saltro® – Syngenta ❸	12 + 4 + 7	400 mL + 200 mL	102.36	Seedling blackleg	–	–	–	–	–	8
Fluopyram 380 g/L	ILeVO® – BASF	7	800 mL	195.12	Blackleg	–	–	–	–	–	8
Fluquinconazole 167 g/L	Fluquinconazole 167 SC – Titan	3	2 L	–	Blackleg (suppression)	–	–	–	–	–	8
Imidacloprid 600 g/L	Gaucho® 600 Red Flowable – Bayer CropScience	4A	400 mL	18.36	Aphids	–	–	–	–	–	6
			300 mL	13.77	Redlegged earth mite, blue oat mite	–	–	–	–	Redlegged earth mite, blue oat mite	6 – canola 16 – faba bean, field pea, lentil and lupin
			240 mL	11.02	–	–	–	–	Aphids		
			120 mL	5.51	–	–	Aphids	–	–	–	
			60 mL	2.75	–	–	–	Aphids	–	–	
Iprodione 250 g/L	Rovral® Liquid Seed Dressing – FMC	2	100–500 mL	2.33–11.64	–	–	–	–	–	Brown leaf spot	–
Ilsocycloseram 100 g/L	Equento – Syngenta	30	400 mL	–	Redlegged earth mite (*Halotydeus destructor*)	–	–	–	–	–	6
Isocycloseram 100 g/L + thiamethoxam 600 g/L	Equento Extreme – Syngenta (applied as a mixture of Equento and Cruiser® 600 by accredited seed treaters)	30 + 4A	As per Equento and Cruiser® 600 labels.	–	Redlegged earth mite (*Halotydeus destructor*), green peach aphid (*Myzus persicae*), grey cabbage aphid (*Brevicoryne brassicae*) ❹	–	–	–	–	–	6

❶ Prices quoted are GST Inclusive at March 2025 and approximate only. Prices will vary depending on pack size purchased, seed treatment services and special marketing arrangements.

❷ Also registered in mustard (oilseed varieties) for *Pythium* spp, *Rhizoctonia solani* at 200–400 mL/100 kg seed and seedling blackleg suppression at 400 mL, 6 weeks grazing WHP.

❸ To control blackleg in control add Saltro® at 200 mL/100 kg. Note grazing WHP is 8 weeks.

❹ Also registered for protection from vegetable weevil (*Litroderes difficilis*), spotted vegetable weevil (*Steriphus diversipes*), slaters (*Armadillidium* spp), Portuguese millipede (*Ommatoiulus moreletii*).

❺ Wettable granule formulation.

❻ Desi chickpeas only.

❼ Kabuli chickpeas only.

Table 94. Canola and pulse seed dressings – 2025. (Page 2 of 3.)

Active ingredient of fungicide or insecticide	Example seed treatment, trade name and manufacturer	Resistance group/s	Rate to apply to each 100 kg of seed	Approximate cost to treat 100 kg ($) ❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin	WHP weeks grazing
Metalaxyl-M 350 g/L	Apron® XL 350 ES – Syngenta	4	75 mL	32.46	–	Phytophthora root rot	–	Damping-off, downy mildew	–	–	Not required
			400 mL	173.10	Seedling blackleg suppression	–	–	–	–	–	–
Procymidone 500 g/L	Sumisclex® Broadacre - Sumitomo	2	50, 100 or 200 mL	1.58, 3.16 or 6.32	–	–	–	–	–	Brown leaf spot (*Pleiochaeta setosa*)	13
			100 or 200 mL	3.16 or 6.32	–	–	–	–	–	Brown leaf spot (*Pleiochaeta setosa*)	13
Pydiflumetofen 200 g/L	Saltro®– Syngenta	7	200 mL	15.88	Seedling blackleg	–	–	–	–	–	8
Pydiflumetofen 200 g/L +fludioxonil 25 g/L + metalaxyl-M 10 g/L	Saltro® Duo – Syngenta	7 + 4 + 12	200 mL Saltro + 200 mL Maxim-XL	85.60	Seedling blackleg, Damping-off and root rot (*Pythium* spp. and *Rhizoctonia solani*)	–	–	–	–	–	8
Thiamethoxam 350 g/L	Cruiser 350FS – Syngenta	4A	300–600 mL	14.05–28.10	Green peach aphid (*Myzus persicae*), grey cabbage aphid (*Brevicoryne brassicae*)	–	–	–	–	–	6
			600 mL	28.10	Lucerne flea (*Sminthurus viridis*) suppression, protection from wireworm including bronze field beetle	–	–	–	–	–	6
			150 mL	7.02	–	Green peach aphid (*Myzus persicae*), pea aphid (*Acyrthosiphon pisum*)	Green peach aphid (*Myzus persicae*), pea aphid (*Acyrthosiphon pisum*)	Green peach aphid (*Myzus persicae*), pea aphid (*Acyrthosiphon pisum*)	Green peach aphic (*Myzus persicae*), pea aphid (*Acyrthosiphon pisum*)	Green peach aphid (*Myzus persicae*), pea aphid (*Acyrthosiphon pisum*)	10
Thiamethoxam 600 g/L	Cruiser 600FS – Syngenta ❹	4A	175–350 mL	–	Green peach aphid (*Myzus* spp.), grey cabbage aphid (*Brevicoryne* spp.)	–	–	–	–	–	6
			350 mL	–	Lucerne flea (*Sminthurus* spp.) suppression, protection from wireworm including bronze field beetle	–	–	–	–	–	6
Thiamethoxam 210 g/L + lambda-cyhalothrin 37.5 g/L	Cruiser® Opti – Syngenta	4A + 3A	500–1000 mL	48.50–97.00	Green peach aphid and grey cabbage aphid	–	–	–	–	–	6
			1000 mL	97.00	Suppression of: redlegged earth mite, lucerne flea. Wireworm (protection)	–	–	–	–	–	6
Thiram 600 g/L	Thiram 600 ❺ Fungicide – Genfarm	M3	200 mL	2.65	–	Damping-off (*Pythium* spp.), seed-borne botrytis	–	–	–	–	–
			170–200 mL	2.25–2.65	–	–	–	–	–	Seed-borne anthracnose	–

Table 94. Canola and pulse seed dressings – 2025. (Page 3 of 3.)

Active ingredient of fungicide or insecticide	Example seed treatment, trade name and manufacturer	Resistance group/s	Rate to apply to each 100 kg of seed	Approximate cost to treat 100 kg ($) ❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin	WHP weeks grazing
Thiram 800 g/kg	Thiragranz – Nufarm	M3	150 g	–	–	❻ Seed-borne botrytis, seed-borne ascochyta blight ❼ Seed-borne botrytis, seed-borne ascochyta blight, damping off (*Pythium* spp) and other soil-borne fungi	–	–	–	–	–
			125–150 g	–	–	–	–	–	–	Seed-borne anthracnose	–
Thiram 360 g/L + thiabendazole 200 g/L	P-Pickel T® – Nufarm	M3 + 1	200 mL	6.50	–	Seed-borne ascochyta blight, botrytis seed rot, seedling root rots (*Pythium* spp., *Fusarium* spp.)	Seedling root rots (*Pythium* spp., *Fusarium* spp.)	Black spot, (leaf and pod spot and collar rot), seedling root rots (*Pythium* spp., *Fusarium* spp.) *Macrophomina phaseolina*	Ascochyta blight (seed-borne), seedling root rots (*Fusarium* spp., *Pythium* spp.)	–	Not required
In furrow treatments			Rate per hectare	Cost per hectare ($)							
Flutriafol 500 g/L	Intake® Hiload Gold In-furrow – Nufarm	3	200–400 mL	5.80–11.60	Blackleg	–	–	–	–	–	4

❶ Prices quoted are GST Inclusive at March 2025 and approximate only. Prices will vary depending on pack size purchased, seed treatment services and special marketing arrangements.
❷ Also registered in mustard (oilseed varieties) for *Pythium* spp, *Rhizoctonia solani* at 200–400 mL/100 kg seed and seedling blackleg suppression at 400 mL, 6 weeks grazing WHP.
❸ To control blackleg in control add Saltro® at 200 mL/100 kg. Note grazing WHP is 8 weeks.
❹ Also registered for protection from vegetable weevil (*Litroderes difficilis*), spotted vegetable weevil (*Steriphus diversipes*), slaters (*Armadillidium* spp), Portuguese millipede (*Ommatoiulus moreletii*).
❺ Wettable granule formulation.
❻ Desi chickpeas only.
❼ Kabuli chickpeas only.

Table 95. Canola and pulse foliar fungicides – 2025. (Page 1 of 4.)

Active ingredient	Example foliar fungicide trade name and manufacturer	Resistance group/s	Withholding period (WHP) – days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per hectare ($)❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin
			Harvest	Grazing								
Azoxystrobin 250 g/L	Amistar® 250 SC – Syngenta	11	28	28	500 mL	9.40	–	–	–	–	–	Anthracnose (PER82226, expiry 31/10/29) ❷
Azoxystrobin 625 g/L	Mirador® 625 – Adama	11	Not required	14	160–190 mL in a tank mix with 300–360 mL Proviso®	8.99–9.40 + 8.75–10.44	Blackleg seedling and upper canopy infections, sclerotinia stem rot	–	–	–	–	–
			Not required	28	150–190 mL in a tank mix with 350–460 mL Orius® 430 SC	8.43–9.40 + 4.52–5.93	–	Botrytis grey mould, ascochyta blight, chocolate spot	Botrytis grey mould, ascochyta blight	Botrytis grey mould, black spot	Botrytis grey mould, ascochyta blight, chocolate spot	Botrytis grey mould
					60 mL in a tank mix with 140 mL Orius® 430 SC	5.18	–	Rust, cercospora leaf spot	–	–	–	–
Azoxystrobin 200 g/L + cyproconazole 80 g/L	Amistar® Xtra – Syngenta	3 + 11	56	28	400–800 mL	8.64–17.28	–	Ascochyta blight, botrytis grey mould, chocolate spot (suppression), cercospora leaf spot, rust	Ascochyta blight, botrytis grey mould	Ascochyta blight, botrytis grey mould, rust	–	Botrytis grey mould
					400–600 mL	8.64–12.96	–	–	–	–	Ascochyta blight, botrytis grey mould	–
Azoxystrobin 133 g/L + prothioconazole 100 g/L	Maxentis® EC – Adama	11 + 3	Not required	14	750–900 mL	20.63–24.75	Blackleg, including upper canopy infection, sclerotinia stem rot	–	–	–	–	–
Azoxystrobin 200 g/L + prothioconazole 150 g/L	Maxentis® Opti – Adama	11 + 3	Not required	14	500–600 mL	19.95–23.94	Sclerotinia stem rot	–	–	–	–	–
Boscalid 500 g/kg	Filan® – BASF	7	21	21	600 g	66.36	–	–	–	–	Sclerotinia stem rot, *Botrytis cinerea*, ascochyta blight (PER82476, expiry 31/5/27)	–
Carbendazim 500 g/L ❸	Spin Flo® – Nufarm	1	28	28	500 mL	6.25	–	Chocolate spot	Botrytis grey mould	–	Botrytis grey mould	–
Chlorothalonil 500 g/L	Echo® 500 – Sipcam	M5	7	–	1.6–2.6 L	28.32–46.02	–	Chocolate spot, rust	–	–		
		M5	14	14 ❹	2.0 L	35.40	–	–	–	–		Anthracnose (PER82209, expiry 30/06/26) ❷
Chlorothalonil 720 g/L	Bravo® Weather Stik – Syngenta	M5	14	14 ❹	1.4–2.3 L	15.54–25.53	–	Chocolate spot, rust	–	–	–	–
					1.0–2.0 L	11.10–22.20	–	–	Ascochyta blight	–	Ascochyta blight, botrytis grey mould	–
					1.5 L	16.65	–	–	–	–	–	Anthracnose (PER82209, expiry 30/06/26) ❷

Table 95. Canola and pulse foliar fungicides – 2025. (Page 2 of 4.)

Active ingredient	Example foliar fungicide trade name and manufacturer	Resistance group/s	Withholding period (WHP) – days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per hectare ($)❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin
			Harvest	Grazing								
Chlorothalonil 900 g/kg	Echo® 900 WDG – Sipcam	M5	14	14 ❹	1.2–1.9 kg	15.48–24.51	–	Chocolate spot, rust	–	–	–	–
					0.8–1.6 kg	10.32–20.64	–	–	Ascochyta blight	–	Ascochyta blight, botrytis grey mould	–
					1.1 kg	14.19	–	–	–	–	–	Anthracnose (PER82209, expiry 30/11/26) ❷
Fludioxonil 150 g/L + pydiflumetofen 100 g/L	Miravis® Star – Syngenta	7 + 12	Not required	42	600–900 mL❺	83.55–125.33	Blackleg, white leaf spot	–	–	–	–	–
					900–1000 mL	125.33–139.25	Blackleg, white leaf spot, upper canopy blackleg	–	–	–	–	–
					750–1000 mL	104.44–139.25	Sclerotinia stem rot	Botrytis rot (*Botrytis* spp.), chocolate spot, sclerotinia stem rot, Cercospora leaf spot	Botrytis rot, sclerotinia stem rot	Botrytis rot (*Botrytis* spp.), sclerotinia stem rot	Sclerotinia stem rot, Botrytis rot (*Botrytis* spp.)	Sclerotinia, botrytis rot (*Botrytis* spp.)
					250–500 mL	34.81–69.63	–		Ascochyta blight		Ascochyta blight	–
Iprodione 250 g/L	Rovral® Liquid – FMC	2	42	42	2.0 L	46.55	Sclerotinia stem rot	–	–	–	–	–
Mancozeb 625 g/kg + zinc as EDTA 17.3 g/ha	Manic WG Plus®– UPL	M3	28	14	1.2–2.64 kg	11.22–24.68	–	Ascochyta blight, chocolate spot, cercospora leaf spot, rust	Ascochyta blight, botrytis grey mould	Ascochyta blight, black spot, botrytis grey mould, rust	Ascochyta blight, botrytis grey mould	Anthracnose, botrytis grey mould
Mancozeb 750 g/kg	Dithane™ Rainshield™ Neo Tec™ – Corteva Agriscience	M3	28	14	1–2.2 kg	21.20–46.64	–	–	Ascochyta blight, botrytis grey mould	Ascochyta blight, black spot, botrytis grey mould, rust	Ascochyta blight, botrytis grey mould, rust	Anthracnose, botrytis grey mould
Mefentrifluconazole 100 g/kg + fluxapyroxad 50 g/L	Revystar® – BASF	3 + 7	Not required	28	0.75–1 L	51.38–68.50	Blackleg seedling infections, upper canopy infection blackleg, sclerotinia stem rot	Ascochyta blight, chocolate spot, rust, Cercospora leaf spot	–	–	–	
Metiram 700 g/kg	Polyram® DF – BASF	M3	42	21	1–2.2 kg	16.33–35.93	–	–	Ascochyta blight, botrytis grey mould	Black spot, botrytis grey mould	Ascochyta blight, botrytis grey mould, rust	–

❶ Prices quoted are GST inclusive at March 2025 and approximate only. Prices will vary depending on pack size purchased.
❷ Albus lupins only.
❸ Health warnings are in place for potential effects on male fertility.
❹ Do not feed to livestock producing milk for human consumption.
❺ Rate when combined with use of a seed treatment or in-furrow fungicide treatment.
❻ The grazing withholding period for lupin is 35 days.
❼ Price includes the prescribed tank-mix partner fungicide.
(*) Situation: low to moderate disease pressure.
(1) Without prior use of seed treatment or in-furrow treatment.

Table 95. Canola and pulse foliar fungicides – 2025. (Page 3 of 4.)

Active ingredient	Example foliar fungicide trade name and manufacturer	Resistance group/s	Withholding period (WHP) – days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per hectare ($)❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin
			Harvest	Grazing								
Procymidone 500 g/L	Sumisclex® 500 – Sumitomo	2	Not required	63	1.0 L	21.95	Sclerotinia stem rot	–	–	–	–	–
			21	21	0.5 L	10.98	–	Chocolate spot, grey mould (*Botrytis cinerea*) (PER92791, expiry 31/10/25)	–	–	Botrytis grey mould	–
					1–1.5 L	21.95–32.93		Chocolate spot, grey mould (*Botrytis cinerea*) (PER92791, expiry 31/10/25)				
Procymidone 800 g/L	Nosclex 800 WG - Imtrade	2	21	21	300 mL	2.81		–				
Prothioconazole 250 g/L	Proviso® – Adama	3	Not required	14	380 mL(*)	11.02	Blackleg seedling infections sclerotinia stem rot	–	–	–	–	–
			Not required	14	320–380 mL in a tank mix with 400 mL Veritas®	9.28–11.02 + 9.90	Blackleg seedling infections; upper canopy blackleg (suppression only)	–	–	–	–	–
			Not required	14	320 mL in a tank mix with 400 mL Veritas®	19.18	sclerotinia stem rot	–	–	–	–	–
Prothioconazole 480 g/L	Proviso® Opti – Adama	3	Not required	14	200–240 mL	–	Blackleg, sclerotinia stem rot	–	–	–	–	–
Prothioconazole 150 g/L + bixafen 75 g/L	Aviator® Xpro® – Bayer	3 + 7	Not required	28	550–650 mL	28.86–29.38	Blackleg	–	–	–	–	–
					650 mL	29.38	Blackleg upper canopy infection	–	–	–	–	–
					550–800 mL	28.86–36.16	Sclerotinia stem rot	–	–	–	–	–
					650 mL	29.38	Alternaria blackspot suppression of pod infection; powdery mildew suppression.	Ascochyta blight, cercospora leaf spot	–	–	–	–
				35	400–600 mL	18.08–27.12	–	Chocolate spot, rust	Ascochyta blight	–	Ascochyta blight, botrytis grey mould	–
					600 mL	27.12	–	–	–	Black spot complex	–	–
Prothioconazole 210 g/L + tebuconazole 210 g/L	Prosaro® 420 SC – Bayer	3 + 3	Not required	14	375–450 mL	12.01–12.81	Blackleg, sclerotinia stem rot	–	–	–	–	–
Pydiflumetofen 200 g/L	Miravis® Adepidyn – Syngenta	7	Not required	42	300–450 mL ❺	40.94–54.58	Blackleg, white leaf spot	–	–	–	–	–
					450–600 mL (1)	54.58–81.87	Blackleg, white leaf spot	Cercospora leaf spot, rust	–	–	–	–

Table 95. Canola and pulse foliar fungicides – 2025. (Page 4 of 4.)

Active ingredient	Example foliar fungicide trade name and manufacturer	Resistance group/s	Withholding period (WHP) – days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per hectare ($)❶	Canola	Chickpea	Faba bean	Field pea	Lentil	Lupin
			Harvest	Grazing								
Tebuconazole 430 g/L	Orius® 430 SC – Adama	3	21	14	145 mL	1.87	–	–	–		–	–
			3	3	145 mL	1.87	–	–	–	Powdery mildew	–	–
Tebuconazole 625 g/L	Orius® 625 – Adama	3	Not required	14	125 mL–150 mL	9.39–11.27	Blackleg, sclerotinia stem rot	–	–	–	–	–
					125 mL–150 mL in tank mix with 320–380 mL Proviso®	9.39–15.00 + 4.72–5.61	Blackleg, sclerotinia stem rot	Cercospora leaf spot, rust	–	–	–	–
			21		100 mL	1.48	–	–	–	–	–	–
Tebuconazole 370 g/L + azoxystrobin 222 g/L	Veritas® Opti – Adama	3 + 11	Not required	14	540 mL	17.96	Blackleg– vegetative and upper canopy, sclerotinia stem rot	Botrytis grey mould, ascochyta blight, chocolate spot	–	–	–	–
			28	28	400–540 mL	13.30–17.96	–	Cercospora leaf spot, rust	Botrytis grey mould, ascochyta blight	Botrytis grey mould, black spot	Botrytis grey mould, ascochyta blight, chocolate spot	Botrytis grey mould
					160 mL	5.32	–		–	–	–	–

❶ Prices quoted are GST inclusive at March 2025 are approximate only. Prices will vary depending on pack size purchased.
❷ Albus lupins only.
❸ Health warnings are in place for potential effects on male fertility.
❹ Do not feed to livestock producing milk for human consumption.
❺ Rate when combined with use of a seed treatment or in-furrow fungicide treatment.
❻ The grazing withholding period for lupin is 35 days.
❼ Price includes the prescribed tank-mix partner fungicide.
(*) Situation: low to moderate disease pressure.
(1) Without prior use of seed treatment or in-furrow treatment.

NSW DPIRD Agronomy PODCAST

Bringing you the latest research and developments in agriculture

NSW DPIRD works hand-in-hand with farmers, being the largest rural research provider in Australia.

The NSW DPIRD Agronomy podcasts deliver timely and relevant information to help growers and industry better manage and understand challenges in their farming systems.

Available on all good streaming services

SOUNDCLOUD Spotify

ADAMA

Tenet®

Flexible weed control in canola.

Tenet® 500 SC herbicide from ADAMA Australia provides greater flexibility for weed control programs in conventional and herbicide-tolerant canola.

- Alternative mode of action in canola (Group K/Group 15)
- Can be applied pre-sowing (IBS) or post-emergence
- Controls or suppresses 20 annual grass and broadleaf weeds (pre-sowing)
- Revised use patterns for improved crop safety
- Enhances control of emerged annual ryegrass and wild oats when applied with Platinum® Xtra 360
- Ideal partner to broaden weed spectrum and increase efficacy against key weeds

Scan here for more information

HERBICIDE

ADAMA.COM