

2019 SOUTH AUSTRALIAN CROP SOWING GUIDE



SOUTH AUSTRALIA
NOVEMBER 2018



WHAT TO SOW NEXT SEASON

THE ESSENTIAL GUIDE TO THE MOST SUITABLE VARIETIES

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THE SOUTH AUSTRALIAN SOWING GUIDE

The South Australian Sowing Guide outlines information on current varieties of the major winter crops grown in South Australia to assist growers in making decisions on variety selection for the upcoming season.

This edition of the SA Sowing Guide has been compiled by Officers with the South Australian Research and Development Institute.

It is proudly sponsored by the South Australian Grain Industry Trust in association with Primary Industry and Regions SA and the Grains Research and Development Corporation.

The SARDI Sustainable Systems Division Officers acknowledge the sponsorship of this guide by the SA Grain Industry Trust (SAGIT) and the Grains Research and Development Corporation (GRDC), the contributions of New Variety Agronomy and Oat Breeding research staff in SA, as well as collaborative research staff in Victoria in producing results published in this edition.



SA GRAIN GROWERS FUNDING RESEARCH SOLUTIONS

SAGIT has invested almost \$2 million in new projects in 2018 supporting research crucial to the advancement of the industry with funds from the 30c/tonne contribution on all grain delivered by SA growers.

New projects funded this year include 25 research projects and 6 grower group projects:

- 10th Australasian Soilborne Disease Symposium, Australasian Plant Pathology Association
- 2018 Ag Excellence Awards & Forum, Ag Excellence Alliance
- Adjuvants information workshops, EP Agricultural Research Foundation
- Benchmarking yield potential of barley in higher rainfall zones, SARDI
- Comparative effects of agricultural pesticides on SA soil microbial functions, University of South Australia
- Conversations with farmers agricultural practice change with the PA early adopters, Society of Precision Agriculture Australia
- Development of wheat population using speed breeding for salinity tolerance, University of Adelaide
- Drivers of flowering time in durum, SARDI
- Economics of high P rates on pulses, Agronomy Solutions
- Establishing current levels of salt tolerance in Australian bread wheats, SARDI
- Further development of crown rot resistance in durums, SARDI
- Grower crop root health workshops, SARDI
- Herbicide residue effects on soil microbial communities in alkaline soils, University of Adelaide
- Identifying nutrient requirements of lentils & chickpeas grown in Mallee sands, Mallee Sustainable Farming
- Improved capture of native soil N & urea fertiliser in wheat, CSIRO Agriculture & Food
- Improved crop nutrition for disease management and reduced fungicide dependency, SARDI
- Improved soil water decisions across the south-east cropping region, MacKillop Farm Management Group
- Investigating frost susceptibility in Clearfield varieties treated with imidazoline herbicide, Mallee Sustainable Farming
- Investigating the accuracy of plant traits measured using drones, University of Adelaide
- Making science useful for agriculture, SARDI
- Annual Trial Results Book 2018, MacKillop Farm Management Group
- More than Gumboots and Tractors, AgCommunicators
- On farm optimisation of oat grain production & marketing, MacKillop Farm Management Group
- Phenotypic evaluation of a wheat RIL population for salinity tolerance, University of Adelaide
- Plot sprayer for research on Kangaroo Island, Agriculture Kangaroo Island
- Profitable pulses for the Murray Plains, Moodie Agronomy
- Publication of the 2019 Farm Gross Margin Guide for SA, Rural Solutions
- Rapid development of innovative lentils for low rainfall regions, Global Grain Genetics
- SA high-rainfall zone canola VRN prescription project, Elders Rural Services
- Smarter Farmers Smarter Farms, Upskilling the women of the UN to be future ready sustainable more productive farmers, Upper North Farming Systems
- Survey potential emerging pulse root diseases, SARDI

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The SAGIT website features individual summaries of each research project and its outcomes, videos and photos. You can also access the Farm Gross Margin Guide and the Brome Grass Bulletin online, plus application forms and funding guidelines.

And, remember to follow SAGIT on social media!



Introduction

NATIONAL VARIETY TRIALS (NVT)

The variety trials presented in this book are sourced from the NVT program. NVT also provide data from some breeding trials to add to the information available.

NVTs provide independent information on varieties for growers. The aim of each NVT is to document a ranking of new and widely adopted varieties in terms of grain yield and to provide grain quality information relevant to delivery standards. NVTs are also used by pathologists to determine disease resistance ratings used in the Sowing Guide.

Conducted to a set of predetermined protocols, NVTs are sown and managed as close as possible to local best practice such as sowing time, fertiliser application, weed management and pest and disease control, including fungicide application. NVTs are not designed to grow varieties to their maximum yield potential.

It is acknowledged that an ongoing project of this type would not be possible without the cooperation of farmers prepared to contribute sites, and who often assist with the management of trials on their property.

PLANT BREEDING RIGHTS (PBR)

Varieties subject to Plant Breeding Rights at the time of printing are annotated with the symbol A. It should be noted that 'Unauthorised commercial propagation or any sale, conditioning, export, import or stocking of propagation material of these varieties is an infringement under the Plant Breeders Rights Act 1994 and that any breaching of PBR law is punishable by a maximum \$50,000 fine for each offence'.

End Point Royalties (EPRs)

EPRs payable for 2018-19 are quoted from www.varietycentral.com.au and are quoted ex GST. Compliance with EPR systems is vital to ensure the future of the Australian grains industry through the funding of new varieties and long-term productivity gains. EPRs for 2019-20 harvest will become available early in 2019 on the Variety Central website.

INTERPRETING LONG TERM YIELD DATA

The long-term yield data presented in the Sowing Guide is an output of NVT Long Term Multi Environment Trial (MET) analysis. NVT run trials in all cropping regions of Australia (e.g. Lower Eyre Peninsula, Mid North, Murray Mallee etc) and use a five-year rolling dataset in the MET analysis.

Historically, NVT used a variance component analysis model to produce long term yield predictions on a regional "mean" basis. In Australia, this model has been found to be inadequate in modelling Variety by Environment interaction (GxE) and reporting at a regional level often masked important GxE interactions. This meant that good and bad years were "averaged" together, making it difficult to understand the strengths and weaknesses of each variety when trialled in different environments.

Now, a factor analytic (FA) mixed model approach is used in the MET analysis using expertise from the GRDC supported Statistics for the Australian Grains Industry (SAGI) program. This approach generates long-term

MET predictions for varieties at an individual trial level. A prediction is generated for every variety in every trial in the entire dataset, regardless of whether the variety was actually tested at every location. Using the FA model, NVT can provide a yield prediction for every situation.

For instance, if the yield of five varieties were ranked in a similar order at multiple trials (sites A, B, C and D), but variety X was not grown at site D – the relative ranking of X against the other varieties can be used to predict the yield of variety X at site D.

The output used in this sowing guide presents the MET data on a region by year basis across the five years used in the MET dataset. The analysis, and subsequent reporting systems, have allowed NVT to bring together very large data sets and make more refined, relevant and robust predictions about the relative performance of each variety across different locations and seasons. Readers can now use this more detailed data to better understand a variety's performance over several years – rather than just a single averaged value.

Readers can further interrogate the data online to better understand the performance of varieties under a range of situations using the NVT Long Term Yield Reporting Tool. The FA method is a very powerful and accurate predictor of performance, and the yield predictions are best viewed at the individual trial/environment level. However, these detailed datasets are too large for printed sowing guides or quick reference summaries, such as the Sowing Guide. NVT have developed a system for viewing the complex dataset based on individual user preferences. Users can choose to view data in Year or Yield based groupings and can tailor site or region selections to their own needs, for instance by viewing METs only for sites where varieties were present in the trials (default option). In the SA Sowing Guide, we present results in Year groupings and only for varieties present in trials. The NVT Long Term Yield Reporting tool is designed to run on all web browsing platforms on computers, tablets and phones, and is available online at <http://app.nvtonline.com.au>.

Wheat variety sowing guide 2019

By Kenton Porker, Mellissa McCallum, Courtney Peirce and Hugh Wallwork, SARDI

Since publication of the 2018 sowing guide, there have been new releases. Milling wheats Vixen, and Clearfield varieties Sheriff CL and Razor CL have been added to the list including the introduction of selected winter wheats and feed wheats to the sowing guide. Other more recent releases including LongReach Havoc, and Chief ^{CL Plus}, have now been widely evaluated in the National Variety Trials (NVT) and longer term SA grain yield data is provided within this publication. Many older varieties such as AGT Katana, Barham, Correll, DS Darwin, Espada, Estoc, Gladius, Justica ^{CL Plus}, and Phantom are no longer included in yield tables.

Information on the most important selection criteria, grain yield, quality, developmental speed and disease resistance for each variety can be found in this guide. While the varieties listed are considered likely to provide the best return within each quality grade, farmers need to consider their individual farm and paddock situation and make their selection based on all available information.

DOMESTIC FLOUR MILLERS' WHEAT VARIETY PREFERENCES

Most of South Australia's wheat is exported to the Middle East for flat and pan bread production, and to a lesser extent noodle production. The domestic flour millers purchase a small proportion of South Australian wheat either from marketers or directly from growers. The domestic flour millers may have different quality requirements to export markets due to different end products and processes employed. For further information, contact Laucke Flour Mills (03 5431 5201).

AGRONOMY

Varieties differ in development speed. It is important to match variety development with sowing time since flowering time is critical for wheat yield. Growers need to understand the optimal flowering period for their environment. The optimal flowering period is a compromise between frost risk, moisture stress, and heat stress events and differs from region to region. The majority of widely adapted fast – medium developing wheat varieties are suited to early May sowing. There are a growing

number of varieties currently being evaluated that may offer potential for Mid-Late April sowing, however these need wider evaluation in the context of pre May sowing. The majority of long term data generated from NVT results presented in this publication are derived from commercially relevant May sowing dates. Extensive state-wide evaluation within NVT over coming seasons will provide more confidence in varieties that may have specific adaptation requirements. Figure 1 illustrates the range in development speeds of main season wheats sown during the period from May – June across SA NVT trials in 2016 – 2017.

DISEASE

Growers should note that a number of the newer varieties listed in this guide are below acceptable industry standards for rust resistance but offer other important or useful attributes. If grown, these varieties should be accompanied by suitable rust preventative strategies.

Where varieties do not meet minimum disease resistance standards for rust, as set by industry, they are listed with a cautioning note. The current status of selected early to mid-season wheat varieties is shown in Table 2, longer season wheat ratings are shown in Table 9, and Durum wheat in Table 11. The full SARDI cereal disease guide should always be consulted when selecting varieties and can be found at: http://pir.sa.gov.au/research/services/reports_and_newsletters/crop_performance

WHEAT VARIETY NOTES

BECKOM [Ⓢ]

Beckom is a mid-season maturing AH wheat suited to the medium-high yield potential environments of SA. Beckom carries good resistance to acid soils as well as boron toxic soils, and suits mid-season sowings. Beckom is resistant to CCN and shows moderate resistance (MRMS) to stripe rust, but is susceptible to leaf rust and septoria tritici blotch. Beckom has a tendency for small grain size especially in tight finishing seasons. Seed available from AGT affiliates and Seed Sharing TM (EPR \$3.25/t GST ex).

WHEAT

| TABLE 1 | |
|--------------------------------|---|
| Variety and current max. grade | Suitability and significant features |
| HARD (AH) | |
| Arrow | All districts, similar yields to Mace with shorter plant height, wheat on wheat option. |
| Beckom | Low to medium rainfall districts. |
| Cobra | Medium to high rainfall districts. |
| Cosmick | All districts, tendency for small grain screenings, wheat on wheat option. |
| Emu Rock | Low to medium rainfall districts, very fast development speed. |
| Grenade ^{CL Plus} | All districts, imidazolinone tolerant. |
| Hatchet ^{CL Plus} | Low to medium rainfall districts, imidazolinone tolerant, very fast development. |
| Illabo | Mid winter wheat, very early sowing and grazing opportunity in medium to high rainfall zones. |
| Kiora | High rainfall districts especially South East region and Kangaroo Island. |
| Kittyhawk | Mid winter wheat, very early sowing and grazing opportunity in medium to high rainfall zones. |
| Kord ^{CL Plus} | All districts, imidazolinone tolerant but avoid areas with potential pre harvest sprouting risk. |
| Mace | All districts but well below minimum standards for stripe rust resistance, wheat on wheat option. |
| Scepter | All districts broad adaptation, wheat on wheat option. |
| Scout | All districts, avoid wheat stubbles due to yellow leaf spot susceptibility. |
| Shield | Low to medium rainfall districts, excellent rust resistance, tendency for smaller grain. |
| Vixen | All districts, similar yields to Scepter, wheat on wheat option. |
| APW | |
| Chief ^{CL Plus} | All districts, imidazolinone tolerant, wheat on wheat option. |
| Corack | Low to medium rainfall districts. |
| Cutlass | All districts and early sowing situations. |
| DS Pascal | Earlier sowing in medium to high rainfall districts, good sprouting tolerance. |
| Havoc | All districts, suited to wheat on wheat. |
| Sheriff ^{CL Plus} | All districts, imidazolinone tolerant. Development speed similar to Trojan, suited to wheat on wheat. |
| Trojan | Medium to high rainfall districts. |
| ASW | |
| Razor ^{CL Plus} | All districts, imidazolinone tolerant, slightly higher yielding than Mace. |
| DS Bennett | Slow winter wheat, very early sowing and grazing opportunity in medium to higher rainfall zones. |
| SOFT | |
| Impala | Soft wheat producing districts |
| Orion | Soft wheat producing districts. Awnless hay option |
| FEED | |
| TenFour | All districts. |
| Manning | High rainfall, winter wheat suited to long season districts especially the South East region. |
| RGT Zanzibar | Medium to high rainfall districts, more evaluation needed. |
| RGT Accroc | Slow red winter wheat, very early sowing and grazing opportunity in medium to high rainfall zones. |
| Longsword | Fast winter wheat, very early to May sowing and grazing opportunity in all districts. |
| DURUM | |
| Caparoi | All durum districts. |
| DBA-Aurora | All durum districts. |
| Hyperno | All durum districts. |
| Saintly | All durum districts, fast development speed and potential for hay production (awnless). |
| Tjilkuri | All durum districts. |
| Spes | All durum districts. |
| Vittaroi | All durum districts, fast development speed. |

WHEAT

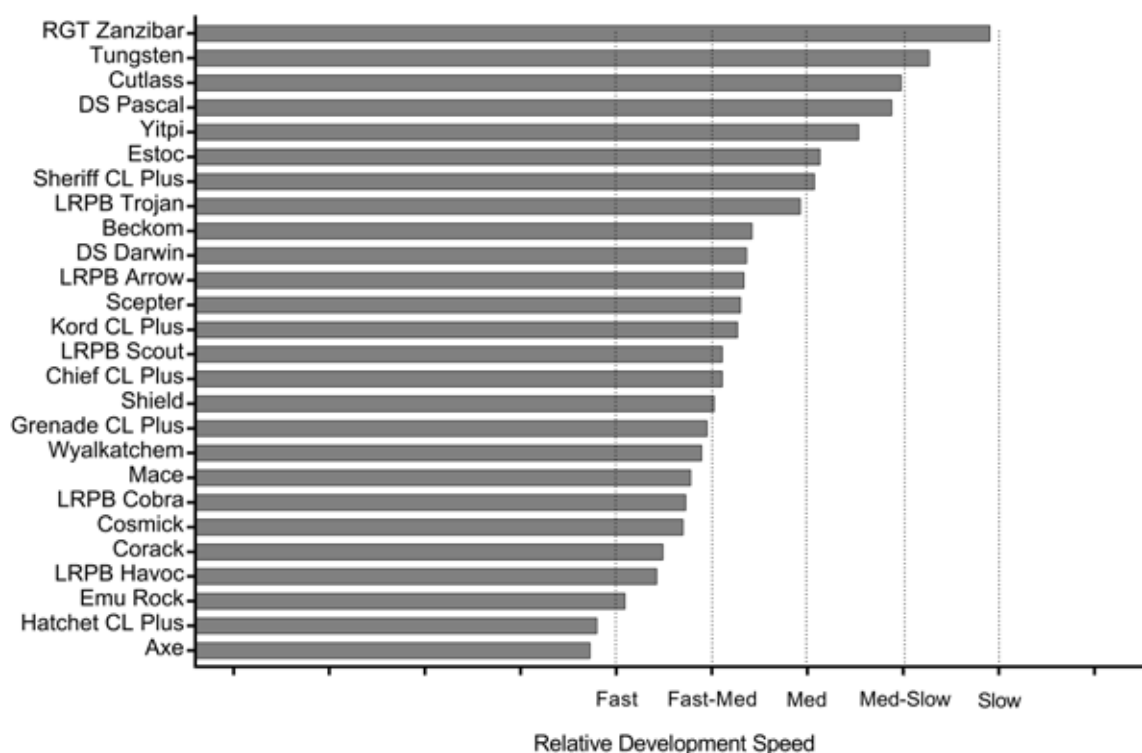


Figure 1. Relative speed of development of selected wheat varieties sown during May – Jun across SA, varieties are ranked according to time to flower. (Data Source 2016 – 2017 SA NVT Trials dataset)

CHIEF CL PLUS ^(b)

Chief CL Plus is a mid-season (maturing slightly later than Mace), imidazolinone herbicide tolerant (Clearfield® Plus) APW wheat, derived from Wyalkatchem and released in 2016 by Intergrain. Chief CL Plus is rated as moderately resistant (RMR) to leaf rust, stem rust and yellow leaf spot (MRMS), but is susceptible to stripe rust (MSS) and CCN (MS). Chief CL Plus was evaluated in SA NVT trials in 2014, and 2016 but not in 2015. The long term results show grain yields similar to Wyalkatchem in many districts. Seed is available for 2019 planting from local resellers or InterGrain Seedclub members (EPR \$4.25/t GST ex).

CORACK ^(b)

Corack is an early maturing, APW quality wheat derived from Wyalkatchem. It has CCN resistance and is MRMS to yellow leaf spot, MS to stripe rust and very susceptible to powdery mildew (SVS) and leaf rust (S). Long term NVT results in SA show a high yield potential, particularly in low to medium rainfall situations, with good grain quality size. Seed available from AGT affiliates and Seed Sharing™ (EPR \$3.00/t GST ex).

COSMICK ^(b)

Cosmick is a broadly adapted early to mid-season flowering, AH quality wheat targeted at medium rainfall districts. Cosmick has moderate susceptibility to stem rusts but is SVS to leaf rust

and S to CCN. Cosmick is rated MRMS to yellow leaf spot and stripe rust. Cosmick has shown high grain yield potential in SA NVT, although possesses moderate grain size characteristics. Cosmick is approved for farmer to farmer trade and seed from Intergrain (EPR \$3.85/t GST ex).

CUTLASS ^(b)

Cutlass has an APW classification in SA and was released by AGT in 2015. Cutlass is a mid to late maturing variety like Yitpi. Cutlass is rated as moderately resistant to CCN with good levels of resistance to all rusts (MS to Stripe Rust) but moderately susceptible (MSS) to yellow leaf spot. Yield data suggests Cutlass has a unique flowering behaviour and commercial data suggests it has an application for early sowing and frost risk management where Yitpi has been successful. Seed available from AGT affiliates and Seed Sharing™ (EPR \$3.00/t GST ex).

DS PASCAL ^(b)

DS Pascal is a variety released by Dow Seeds and is a slower developing APW variety. Pascal's long term yield performance has been below most new releases in NVT trials in SA and is generally outclassed. Pascal has good pre-harvest sprouting tolerance relative to other varieties, and is RMR for stripe rust, MR for leaf rust, MS for septoria tritici blotch and MSS for stem rust. DS Pascal seed is available from Seednet partners in 2018 (EPR \$4.25/t GST ex).

WHEAT

TABLE 2. Disease responses of main season wheats and reaction to common disorders

| Variety | Stem Rust | Stripe Rust# | Leaf Rust | Septoria tritici blotch | Yellow leaf spot | Powdery Mildew | Black point | CCN resis. |
|-----------------------------|-----------|--------------|-----------|-------------------------|------------------|----------------|-------------|------------|
| Arrow | S | S | S | S | MR | S | MRMS | MS |
| Axe | MS | RMR | SVS | SVS | S | MS | S | S |
| Beckom | MR | MRMS | S | S | MSS | MS | MRMS | R |
| Chief ^{CL Plus} | RMR | MSS | MR*R | MS | RMR | S | MS | MS |
| Cobra | RMR | MSS | MR | MS | MS | MRMS | MSS | MS |
| Corack | MR | MS | S | S | MRMS | SVS | S | RMR |
| Cosmick | MS | MRMS | SVS | S | MRMS | MSS | MRMS | S |
| Cutlass | R | MS | RMR | MSS | MSS | MSS | MS | MR |
| DS Pascal | MSS | RMR | MR | MS | MRMS | - | MS | S |
| Emu Rock | MRMS | MRMS | SVS | SVS | MRMS | S | MS | S |
| Grenade ^{CL Plus} | MR | MRMS | S | S | S | MS | MSS | MR |
| Harper | MRMS | MS | S | MSS | MSS | MS | MRMS | MR |
| Hatchet ^{CL Plus} | MS | MRMS | SVS | SVS | S | MS | S | MR |
| Havoc | S | MR | S | MSS | MRMS | - | MS | S |
| Impala | MR | MR | SVS | VS | MSS | RMR | MS | MSS |
| Kord ^{CL Plus} | MR | MRMS | MS | MS | MSS | MSS | MRMS | MR |
| Mace | MR | SVS | MSS | S | MRMS | MSS | MRMS | MRMS |
| Orion | MR | MSS | R | MRMS | MSS | SVS | S | MS |
| Razor ^{CL Plus} | MRMS | MS | S | SVS | MSS | - | MS | MR |
| Scepter | MR | MSS | MSS | S | MRMS | S | MS | MRMS |
| Scout | MR | MS | MS | S | SVS | MS | S | R |
| Sherriff ^{CL Plus} | MSS | MSS | SVS | S | MRMS | S | MRMS | MS |
| Shield | RMR | MR | R | MS | MS | MRMS | MSS | MRMS |
| Tenfour | S | SVS | MS | SVS | MRMS | - | MS | MS |
| Trojan | MRMS | MR | MRMS | MSS | MSS | MSS | MRMS | MS |
| Vixen | MRMS | MRMS* | SVS | S | MRMS | S | MS | MSS |
| Wyalkatchem | MS | S | SVS | S | MR | SVS | MS | S |
| Yitpi | S | MRMS | S | MSS | SVS | MRMS | MS | MR |

Disease rating codes:

R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible, - variety yet to be fully evaluated. * provisional rating based on limited NVT data. Ratings provided are primarily from 2017 and have not been updated with new data. A range of reactions is provided where different strains of the pathogen exist and where the variety may respond differently to them. Cereal Cyst Nematode (CCN) Resistance refers to the ability of the variety to reduce CCN carryover. Black Point is not a disease but is a physiological response to certain humid conditions.

Information on disease reaction was supplied by the Field Crop Pathology Unit (SARDI). Contact Dr Hugh Wallwork (08) 8303 9382.

WHEAT

EMU ROCK ^(b)

Emu Rock is a high yielding, AH quality variety for mid to late sowings in a broad range of environments across Southern Australia. This early maturing, large grained wheat, derived from Kukri, is susceptible to CCN, septoria tritici blotch (SVS), leaf rust and powdery mildew but has moderate resistance (MRMS) to stem and stripe rust and yellow leaf spot. Across NVT in SA, Emu Rock has shown yields aligned with Wyalkatchem. Seed is available from Intergrain and is approved for farmer to farmer trade (EPR \$3.50/t GST ex).

GRENADE ^{CL PLUS} ^(b)

Grenade ^{CL Plus} is an imidazolinone herbicide tolerant (Clearfield type) AH variety. It is early to mid-season flowering with moderate resistance to CCN, stem rust (MR) and stripe rust (MRMS). It is however susceptible to leaf rust and yellow leaf spot. Seed available from AGT affiliates (EPR \$3.80/t GST ex).

HATCHET ^{CL PLUS} ^(b)

Hatchet ^{CL Plus} is an imidazolinone herbicide tolerant (Clearfield type) replacement for Axe released by AGT in early 2015. It is derived from Axe but is much earlier flowering and has improved CCN resistance (MR), but like Axe, is susceptible to yellow leaf spot, leaf rust (SVS), septoria tritici blotch (SVS) and sprouting. Hatchet ^{CL Plus} has an AH classification with seed available from AGT affiliates (EPR \$3.80/t GST ex).

KIORA ^(b)

Kiora was released by AGT in 2014 as an alternative to Bolac for higher rainfall districts with AH quality, mid to late maturity and excellent rust resistance but susceptibility to CCN and black point (MS). Slightly earlier flowering than Bolac, Kiora offers higher yields with improved grain size. Seed available from AGT affiliates and Seed Sharing TM (EPR \$3.25/t GST ex).

KORD ^{CL PLUS} ^(b)

Kord ^{CL Plus} carries two genes for Clearfield resistance and is derived from Gladius with similar maturity and susceptibility to pre harvest sprouting but is MR to CCN. Kord ^{CL Plus} has an AH classification and has yielded similar to Gladius in all districts. Seed is available from AGT affiliates (EPR \$3.55/t GST ex).

LONGREACH ARROW ^(b)

LongReach Arrow is an AH quality wheat from Longreach Plant breeders, released in 2016. Arrow is a mid season wheat and develops at a similar speed to Scepter. For SA NVT, Arrow yields were similar to Mace in the lower-medium yielding environments and had a small improvement over Mace in the higher yielding environments. Arrow is susceptible to CCN, stripe, stem and leaf rust but is moderately resistant to yellow spot. Arrow has good physical grain quality with good black point resistance (MRMS) and relatively short plant height suited to stubble retained systems. Seed is available from Pacific Seeds (EPR \$3.00/t GST ex).

LONGREACH COBRA ^(b)

LongReach Cobra was released as an early maturing Westonia derivative with AH quality and high yield potential particularly in the medium to higher rainfall districts of SA. Cobra has good resistance to stem rust and leaf rust but rated MSS to stripe rust, and MS to CCN and yellow leaf spot. Cobra has good grain size and moderate test weight and is moderately susceptible to pre-harvest sprouting. Seed is available from Pacific Seeds (EPR \$3.50/t GST ex).

LONGREACH HAVOC ^(b)

LongReach Havoc is an early maturing Mace derivative with AH quality. Havoc has a shorter canopy than Mace, is moderately resistant to stripe rust, and susceptible to both leaf and stem rust. Havoc is MRMS to yellow leaf spot. Long term yield performance is similar or slightly below Mace in most environments. Seed is available from Pacific Seeds (EPR \$4.00/t GST ex).

LONGREACH SCOUT ^(b)

LongReach Scout is an AH quality variety with mid-season maturity, derived from Yitpi. It has moderate resistance to stem rust but is rated MS to stripe and leaf rust. Scout is R to CCN and MS to powdery mildew but rated SVS to yellow leaf spot. Scout has good physical grain quality and similar sprouting tolerance to Yitpi but is more susceptible to black point. Seed is available from Pacific Seeds (EPR \$2.80/t GST ex).

LONGREACH TROJAN ^(b)

LongReach Trojan is a mid-maturing (slightly later than Mace), APW quality variety with high yield potential, particularly in medium to high rainfall districts. Trojan is well suited to main season plantings in high production zones and slightly earlier planting in medium rainfall zones. It is moderately susceptible to CCN, moderately resistant to stripe rust but MRMS to stem and leaf rust and MSS to yellow leaf spot. Trojan is rated MSS for powdery mildew and septoria tritici blotch. Trojan has moderate boron tolerance and grain is large with low screenings, high test weight and good black point resistance. Seed is available from Pacific Seeds (EPR \$4.00/t GST ex).

MACE ^(b)

Mace with early to mid-season maturity, has an AH classification, is MR to stem rust, and rated MRMS to CCN and yellow leaf spot. Mace is now rated as MSS to a new leaf rust strain in SA and rated SVS to stripe rust. Mace has been widely tested since 2009 in NVT in SA and shows wide adaptation coupled with high yield potential and wheat on wheat application. Seed is available from AGT affiliates and Seed Sharing TM (EPR \$3.00/t GST ex).

WHEAT

RAZOR ^{CL Plus} (D)

Razor ^{CL Plus} is an Imidazolinone herbicide tolerant (Clearfield® Plus) ASW wheat released by AGT. Razor ^{CL Plus} is an early developing variety slightly quicker than Mace. The long term performance of Razor ^{CL Plus} suggests it is the highest yielding Clearfield variety and on average is 3% higher than Mace. Razor ^{CL Plus} is rated S to leaf rust, MRMS to stem and MS to stripe rust, MSS to yellow leaf spot, and MR to CCN. Seed is available from AGT affiliates (EPR \$3.30/t GST ex).

SCEPTER (D)

Scepter has an AH classification in SA and was released by AGT in 2015. Scepter is largely derived from Mace with many similar characteristics but improved grain yield and stripe rust resistance and slightly lower black point tolerance and powdery mildew resistance. Scepter is rated MR to stem rust, MSS to leaf rust and is rated MRMS to CCN and yellow leaf spot. Scepter is rated MSS to stripe rust being susceptible early in the season but may show useful resistance later in the season when the temperature warms up. Scepter shows wide adaptation and is suitable for wheat on wheat application. Seed available from AGT affiliates and Seed Sharing™ (EPR \$3.25/t GST ex).

SHERIFF ^{CL Plus} (D)

Sheriff ^{CL Plus} is an imidazolinone herbicide tolerant (Clearfield® Plus) APW wheat released by Intergrain in 2018. Sheriff ^{CL Plus} is a mid – late developing variety similar to Trojan in developmental speed and can be sown slightly earlier than the other Clearfield options. The long term performance of Sheriff ^{CL Plus} suggests it yields similar to Mace. Sheriff ^{CL Plus} is rated SVS to leaf rust, MSS to stem and stripe rust, MRMS to yellow leaf spot, and MS to CCN. Seed is available for planting in 2019 from local Seedclub members and resellers (EPR \$4.25/t GST ex).

SHIELD (D)

Shield is an early to mid-season flowering, moderate yielding milling wheat with AH classification and acid soils tolerance. Shield is MRMS to CCN, has good resistance to all rusts (stem rust – RMR, stripe rust – MR and leaf rust – R) and rated MS to yellow leaf spot. Shield has moderate susceptibility to black point, moderate test weight and low sprouting risk, but has shown a higher tendency for small grain screenings. Seed is available from AGT affiliates and Seed Sharing™ (EPR \$3.25/t GST ex).

VIXEN (D)

Vixen is an early – mid season variety that develops slightly quicker than Scepter. Vixen was released by Intergrain in 2018 and has an AH Classification in SA. Vixen has not been widely evaluated in some regions for more than one year. Long term data suggested performance is similar to Scepter, however it performed slightly above Scepter in 2016 evaluation. Vixen is rated SVS to leaf rust, MRMS to stem and stripe rust, MRMS to yellow leaf spot, and MSS to CCN. Seed is available for planting

in 2019 from local Seedclub members and resellers (EPR \$3.50/t GST ex).

SOFT WHEATS

LONGREACH IMPALA (D)

LongReach Impala is an early to midseason soft biscuit (ASF1) wheat targeted to eastern Australia. Impala has mid-season maturity, is susceptible to CCN, has good stem and stripe rust resistance, but is susceptible to leaf rust and septoria tritici blotch. Impala produces large grain with low screening losses and is MRMS to black point. Seed is available from Pacific Seeds (EPR \$3.50/t GST ex).

LONGREACH ORION (D)

LongReach Orion is a mid to long season maturing soft biscuit (ASF1) wheat targeted to eastern Australia. Orion is susceptible to CCN and yellow leaf spot but has good stem and leaf rust resistance and is MSS to stripe rust. Orion is S to black point and susceptible to sprouting. Seed is available from Pacific Seeds (EPR \$3.00/t GST ex).

FEED WHEATS

TENFOUR (D)

TenFour is a white grained feed wheat released in 2015 that has shown high yield potential in SA NVT trials across a wide range of environments. TenFour is available through Elders and through selected seed partners (EPR \$3.00/t GST ex).

RGT ZANZIBAR (D)

RGT Zanzibar is a red spring wheat with feed grain quality, suited to the medium high rainfall zone. RGT Zanzibar has good standability and is slow to develop, developing later than Cutlass. Disease ratings are currently under evaluation. Seed is available from Seed Force Broadacre Commercial Partners (EPR \$4.00/t GST ex).

YIELD PERFORMANCE
EXPERIMENTS FROM 2013-2017

The yield results presented on the following pages are multi environment trial (MET) data shown on a yearly regional group mean.

All yields are expressed as a percentage of mean yield from NVT data 2013 – 2017 inclusive, along with number of observations in adjacent columns.

Further results can be found on the NVT website:
www.nvtonline.com.au

WHEAT

TABLE 3. SOUTH EAST wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------------------|----------------------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 5.04 | 2.6 | 4.13 | 5.63 | 4.17 |
| Classification | Variety | No. Trials | 4 | 3 | 2 | 3 | 1 |
| MILLING WHEATS | | | | | | | |
| AH | Scepter | 6 | - | - | 122 | 106 | 110 |
| APW | LRPB Trojan | 13 | 109 | 109 | 108 | 114 | 104 |
| AH | Vixen | 3 | - | - | - | 110 | - |
| AH | Beckom | 13 | 106 | 110 | 114 | 107 | 104 |
| AH | LRPB Arrow | 6 | - | - | 108 | 106 | 108 |
| APW | Corack | 13 | 104 | 108 | 109 | 101 | 113 |
| AH | Cosmick | 9 | - | 107 | 110 | 106 | 102 |
| AH | LRPB Cobra | 13 | 111 | 97 | 99 | 111 | 108 |
| AH | LRPB Havoc | 4 | - | - | - | 100 | 114 |
| AH | Mace | 13 | 103 | 107 | 108 | 101 | 108 |
| AH | LRPB Scout | 13 | 104 | 100 | 102 | 107 | 100 |
| APW | Cutlass | 6 | - | - | 104 | 104 | 94 |
| APW | Wyalkatchem | 13 | 103 | 102 | 103 | 101 | 104 |
| AH | Emu Rock | 13 | 99 | 101 | 105 | 96 | 104 |
| AH | DS Darwin | 11 | 100 | 94 | - | 99 | 99 |
| AH | Shield | 13 | 95 | 101 | 104 | 94 | 94 |
| AH | Gladius | 13 | 96 | 97 | 96 | 96 | 96 |
| AH | LRPB Phantom | 13 | 96 | 95 | 92 | 101 | 90 |
| ASFT | LRPB Impala | 13 | 93 | 96 | 93 | 96 | 90 |
| AH | Tungsten | 4 | - | - | - | 97 | 89 |
| AH | Yitpi | 13 | 93 | 96 | 93 | 96 | 88 |
| APW | DS Pascal | 13 | 98 | 85 | 85 | 103 | 86 |
| AH | Axe | 13 | 90 | 94 | 93 | 87 | 98 |
| CLEARFIELD® PLUS | | | | | | | |
| ASW | Razor ^{CL Plus} | 1 | - | - | - | - | 111 |
| APW | Sheriff ^{CL Plus} | 3 | - | - | - | 105 | - |
| APW | Chief ^{CL Plus} | 7 | - | 103 | - | 98 | 104 |
| AH | Grenade ^{CL Plus} | 13 | 93 | 96 | 96 | 93 | 95 |
| AH | Hatchet ^{CL Plus} | 13 | 93 | 93 | 93 | 90 | 98 |
| AH | Kord ^{CL Plus} | 13 | 91 | 97 | 95 | 91 | 93 |
| FEED WHEATS | | | | | | | |
| FEED | RGT Zanzibar | 4 | - | - | - | 109 | 96 |

WHEAT

TABLE 4. YORKE PENINSULA wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 4.82 | 4.36 | 3.08 | 6.08 | 4.48 |
| Classification | Variety | No. Trials | 3 | 3 | 3 | 3 | 3 |
| MILLING WHEATS | | | | | | | |
| AH | Vixen | 6 | - | - | - | 111 | 110 |
| AH | Scepter | 9 | - | - | 113 | 105 | 111 |
| APW | LRPB Trojan | 15 | 107 | 108 | 103 | 114 | 107 |
| AH | Beckom | 15 | 107 | 110 | 104 | 107 | 105 |
| APW | Corack | 15 | 106 | 111 | 115 | 98 | 106 |
| AH | Mace | 15 | 105 | 109 | 110 | 99 | 105 |
| AH | Cosmick | 15 | 105 | 106 | 102 | 107 | 103 |
| AH | LRPB Arrow | 9 | - | - | 107 | 104 | 104 |
| AH | LRPB Cobra | 15 | 110 | 98 | 103 | 110 | 101 |
| AH | LRPB Scout | 15 | 103 | 98 | 97 | 110 | 100 |
| APW | Wyalkatchem | 15 | 104 | 103 | 104 | 99 | 101 |
| AH | Emu Rock | 15 | 102 | 103 | 105 | 98 | 99 |
| APW | Cutlass | 9 | - | - | 95 | 105 | 102 |
| AH | LRPB Havoc | 6 | - | - | - | 96 | 103 |
| AH | Gladius | 15 | 95 | 96 | 96 | 98 | 98 |
| AH | Shield | 15 | 97 | 101 | 96 | 96 | 97 |
| AH | Tungsten | 6 | - | - | - | 99 | 95 |
| AH | LRPB Phantom | 15 | 94 | 92 | 90 | 103 | 97 |
| AH | Axe | 15 | 92 | 95 | 99 | 89 | 95 |
| AH | Yitpi | 15 | 91 | 94 | 89 | 98 | 97 |
| APW | DS Pascal | 12 | 94 | 81 | - | 108 | 91 |
| CLEARFIELD® PLUS | | | | | | | |
| APW | Sheriff CL Plus | 3 | - | - | - | 105 | - |
| ASW | Razor CL Plus | 3 | - | - | - | - | 105 |
| APW | Chief CL Plus | 9 | - | 106 | - | 93 | 102 |
| AH | Grenade CL Plus | 15 | 94 | 95 | 96 | 95 | 96 |
| AH | Hatchet CL Plus | 15 | 94 | 93 | 98 | 93 | 95 |
| AH | Kord CL Plus | 15 | 91 | 96 | 95 | 93 | 97 |
| FEED WHEATS | | | | | | | |
| FEED | RGT Zanzibar | 3 | - | - | - | 111 | - |
| FEED | Supreme | 12 | - | 100 | 96 | 100 | 98 |

WHEAT

TABLE 5. MURRAY MALLEE wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 1.96 | 2.75 | 1.6 | 4.13 | 3.43 |
| Classification | Variety | No. Trials | 5 | 4 | 3 | 6 | 1 |
| MILLING WHEATS | | | | | | | |
| AH | Scepter | 10 | - | - | 116 | 111 | 115 |
| AH | Vixen | 7 | - | - | - | 113 | 109 |
| AH | Beckom | 19 | 105 | 112 | 111 | 110 | 110 |
| AH | Cosmick | 19 | 103 | 109 | 107 | 108 | 105 |
| APW | Cutlass | 10 | - | - | 109 | 106 | 105 |
| APW | LRPB Trojan | 19 | 101 | 112 | 107 | 109 | 107 |
| APW | Corack | 19 | 113 | 110 | 102 | 100 | 105 |
| AH | LRPB Arrow | 10 | - | - | 105 | 106 | 108 |
| AH | Mace | 19 | 109 | 109 | 104 | 102 | 106 |
| AH | Emu Rock | 19 | 109 | 105 | 98 | 100 | 97 |
| AH | Shield | 19 | 103 | 104 | 105 | 102 | 101 |
| AH | LRPB Havoc | 7 | - | - | - | 99 | 105 |
| APW | Estoc | 19 | 99 | 103 | 102 | 100 | 100 |
| AH | LRPB Scout | 19 | 98 | 102 | 98 | 105 | 96 |
| APW | Wyalkatchem | 19 | 100 | 98 | 102 | 101 | 105 |
| AH | Yitpi | 19 | 94 | 98 | 101 | 98 | 98 |
| AH | Axe | 19 | 107 | 99 | 91 | 90 | 89 |
| AH | LRPB Cobra | 19 | 93 | 90 | 94 | 104 | 98 |
| AH | LRPB Phantom | 19 | 92 | 96 | 97 | 99 | 94 |
| CLEARFIELD® PLUS | | | | | | | |
| APW | Sheriff CL Plus | 6 | - | - | - | 105 | - |
| APW | Chief CL Plus | 11 | - | 97 | - | 100 | 111 |
| ASW | Razor CL Plus | 1 | - | - | - | - | 102 |
| AH | Kord CL Plus | 19 | 103 | 103 | 98 | 94 | 95 |
| AH | Grenade CL Plus | 19 | 102 | 100 | 95 | 95 | 92 |
| AH | Hatchet CL Plus | 19 | 104 | 96 | 90 | 92 | 88 |
| FEED WHEATS | | | | | | | |
| FEED | Tenfour | 19 | 109 | 107 | 101 | 107 | 105 |
| FEED | RGT Zanzibar | 6 | - | - | - | 105 | - |

WHEAT

TABLE 6. MID NORTH wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 3.38 | 4 | 2.89 | 5.65 | 3.4 |
| Classification | Variety | No. Trials | 3 | 4 | 4 | 3 | 3 |

MILLING WHEATS

| | | | | | | | |
|------|-------------|----|-----|-----|-----|-----|-----|
| AH | Vixen | 3 | - | - | - | - | 112 |
| AH | Scepter | 10 | - | - | 112 | 108 | 111 |
| APW | Corack | 17 | 113 | 107 | 116 | 99 | 108 |
| AH | Mace | 17 | 109 | 105 | 110 | 100 | 106 |
| AH | Beckom | 17 | 105 | 107 | 102 | 108 | 105 |
| AH | LRPB Arrow | 10 | - | - | 105 | 105 | 105 |
| APW | LRPB Trojan | 17 | 102 | 106 | 103 | 112 | 103 |
| AH | Cosmick | 17 | 104 | 104 | 101 | 108 | 104 |
| AH | Emu Rock | 17 | 108 | 100 | 107 | 99 | 104 |
| AH | LRPB Cobra | 17 | 106 | 104 | 103 | 106 | 101 |
| AH | LRPB Havoc | 6 | - | - | - | 98 | 106 |
| APW | Wyalkatchem | 17 | 103 | 103 | 103 | 100 | 102 |
| AH | LRPB Scout | 17 | 101 | 100 | 99 | 107 | 100 |
| APW | Cutlass | 10 | - | - | 93 | 106 | 99 |
| AH | DS Darwin | 17 | 98 | 97 | 99 | 98 | 97 |
| AH | Shield | 17 | 98 | 98 | 95 | 99 | 100 |
| AH | Axe | 17 | 100 | 93 | 103 | 90 | 99 |
| ASFT | LRPB Impala | 17 | 90 | 94 | 92 | 98 | 95 |
| APW | DS Pascal | 13 | 86 | 91 | - | 103 | 90 |
| AH | Yitpi | 17 | 88 | 94 | 89 | 98 | 94 |
| ASFT | LRPB Orion | 8 | 82 | 90 | - | - | 90 |

CLEARFIELD® PLUS

| | | | | | | | |
|-----|-----------------|----|-----|-----|-----|-----|-----|
| ASW | Razor CL Plus | 3 | - | - | - | - | 107 |
| APW | Sheriff CL Plus | 3 | - | - | - | 105 | - |
| APW | Chief CL Plus | 10 | - | 105 | | 97 | 102 |
| AH | Grenade CL Plus | 17 | 98 | 94 | 98 | 95 | 98 |
| AH | Hatchet CL Plus | 17 | 100 | 93 | 102 | 92 | 98 |
| AH | Kord CL Plus | 17 | 95 | 94 | 97 | 94 | 97 |

FEED WHEATS

| | | | | | | | |
|------|--------------|----|-----|-----|-----|-----|-----|
| FEED | Tenfour | 17 | 117 | 110 | 116 | 107 | 109 |
| FEED | RGT Zanzibar | 6 | - | - | - | 107 | 96 |

WHEAT

TABLE 7. LOWER EYRE PENINSULA wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 4.07 | 3.45 | 3.65 | 4.91 | 2.96 |
| Classification | Variety | No. Trials | 3 | 3 | 4 | 2 | 3 |
| MILLING WHEATS | | | | | | | |
| AH | Scepter | 9 | - | - | 114 | 113 | 117 |
| AH | Vixen | 3 | - | - | - | - | 115 |
| AH | Beckom | 15 | 111 | 108 | 107 | 112 | 109 |
| APW | Corack | 15 | 108 | 107 | 114 | 103 | 109 |
| AH | LRPB Arrow | 9 | - | - | 109 | 110 | 106 |
| APW | LRPB Trojan | 15 | 110 | 107 | 105 | 107 | 106 |
| AH | Mace | 15 | 107 | 106 | 110 | 104 | 108 |
| AH | Cosmick | 15 | 107 | 105 | 104 | 110 | 105 |
| AH | LRPB Havoc | 5 | - | - | - | 106 | 106 |
| AH | LRPB Cobra | 15 | 110 | 104 | 107 | 109 | 98 |
| APW | Wyalkatchem | 15 | 105 | 103 | 105 | 103 | 103 |
| AH | Emu Rock | 15 | 100 | 101 | 105 | 105 | 102 |
| AH | LRPB Scout | 15 | 102 | 100 | 100 | 106 | 98 |
| APW | Cutlass | 9 | - | - | 95 | 101 | 103 |
| AH | Shield | 15 | 97 | 98 | 96 | 103 | 101 |
| AH | Axe | 15 | 86 | 93 | 96 | 90 | 95 |
| AH | Yitpi | 14 | 90 | 94 | 88 | 91 | 95 |
| APW | DS Pascal | 5 | - | - | - | 96 | 84 |
| CLEARFIELD® PLUS | | | | | | | |
| ASW | Razor CL Plus | 3 | - | - | - | - | 107 |
| APW | Sheriff CL Plus | 2 | - | - | - | 107 | - |
| APW | Chief CL Plus | 8 | - | 104 | - | 101 | 106 |
| AH | Grenade CL Plus | 15 | 90 | 95 | 95 | 95 | 96 |
| AH | Hatchet CL Plus | 15 | 89 | 93 | 96 | 94 | 94 |
| AH | Kord CL Plus | 15 | 88 | 94 | 93 | 91 | 97 |
| FEED WHEATS | | | | | | | |
| FEED | Zen | 14 | 107 | 105 | 108 | 102 | 106 |

WHEAT

TABLE 8. UPPER EYRE PENINSULA wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 2.36 | 2.42 | 1.86 | 2.36 | 1.1 |
| Classification | Variety | No. Trials | 6 | 3 | 7 | 7 | 6 |

MILLING WHEATS

| | | | | | | | |
|-----|-------------|----|-----|-----|-----|-----|-----|
| AH | Scepter | 20 | - | - | 111 | 106 | 112 |
| AH | Vixen | 6 | - | - | - | - | 111 |
| AH | Beckom | 29 | 109 | 107 | 106 | 109 | 106 |
| AH | LRPB Arrow | 20 | - | - | 108 | 105 | 104 |
| APW | Corack | 29 | 107 | 107 | 110 | 96 | 105 |
| AH | Cosmick | 29 | 106 | 107 | 101 | 108 | 104 |
| AH | Mace | 29 | 107 | 106 | 108 | 99 | 105 |
| AH | Emu Rock | 29 | 104 | 117 | 101 | 102 | 103 |
| AH | Shield | 29 | 102 | 112 | 99 | 106 | 103 |
| APW | Wyalkatchem | 29 | 104 | 100 | 106 | 102 | 102 |
| APW | Cutlass | 20 | - | - | 98 | 103 | 102 |
| AH | LRPB Havoc | 13 | - | - | - | 99 | 104 |
| APW | LRPB Trojan | 29 | 104 | 93 | 101 | 103 | 102 |
| AH | LRPB Cobra | 29 | 102 | 94 | 100 | 104 | 97 |
| AH | LRPB Scout | 29 | 100 | 104 | 94 | 105 | 98 |
| AH | Axe | 29 | 95 | 112 | 95 | 92 | 99 |
| AH | Gladius | 29 | 96 | 104 | 95 | 98 | 98 |
| AH | Yitpi | 29 | 93 | 93 | 93 | 98 | 97 |

CLEARFIELD® PLUS

| | | | | | | | |
|-----|-----------------|----|----|-----|----|-----|-----|
| ASW | Razor CL Plus | 13 | - | - | - | 104 | 105 |
| APW | Sheriff CL Plus | 13 | - | - | - | 104 | 103 |
| APW | Chief CL Plus | 16 | - | 94 | - | 101 | 104 |
| AH | Grenade CL Plus | 29 | 96 | 108 | 94 | 97 | 99 |
| AH | Hatchet CL Plus | 29 | 95 | 111 | 94 | 95 | 98 |
| AH | Kord CL Plus | 29 | 95 | 104 | 95 | 94 | 99 |

FEED WHEATS

| | | | | | | | |
|------|---------|----|---|-----|-----|-----|-----|
| FEED | Tenfour | 23 | - | 110 | 108 | 106 | 105 |
|------|---------|----|---|-----|-----|-----|-----|

WHEAT

GRAIN QUALITY

Grain quality for individual varieties vary from site to site and from year to year, however long term trends highlight varieties that can consistently achieve either higher testweights, or low grain screenings under a wider range of environments. The

following graphs are aimed at demonstrating variety trends in key grain quality traits from 2016 and 2017. Razor ^{CL Plus} and Vixen were omitted from 2016 and Sherriff ^{CL Plus} omitted from 2017 data due to limited data points.

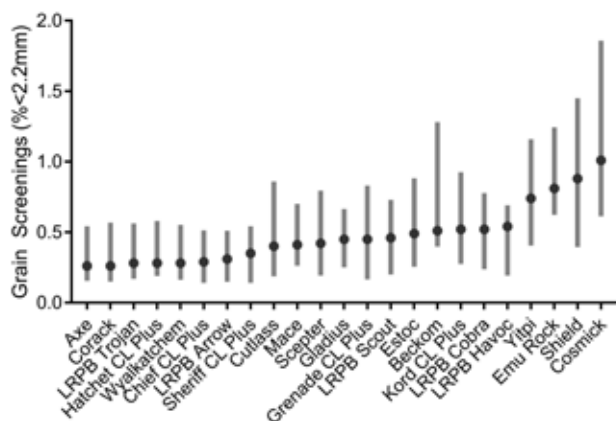


Figure 1. The diagram above shows the median grain screenings of wheat varieties in 2016 NVT trials (closed symbol). Varieties are ranked in increasing order of grain screenings for the 2016 season. The bars represent the range in which grain screenings have occurred in 50% of trials. The shorter the bar the more consistent the variety.

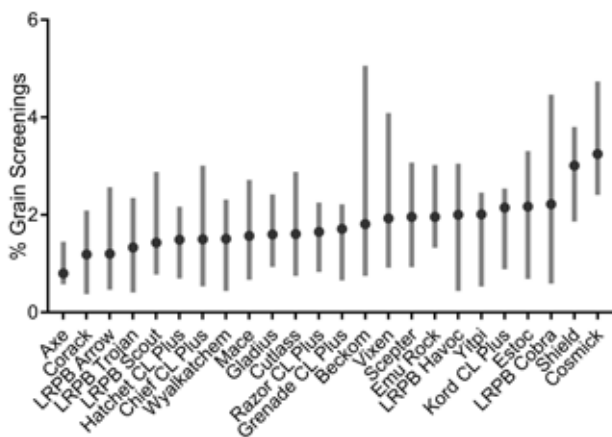


Figure 2. The diagram above shows the median grain screenings of wheat varieties in 2017 NVT trials (closed symbol). Varieties are ranked in increasing order of grain screenings for the 2017 season. The bars represent the range in which grain screenings have occurred in 50% of trials. The shorter the bar the more consistent the variety.

While screenings were low in 2016 the general trends demonstrated Shield and Cosmick had higher screening levels and were generally more variable. Grain size pressure was slightly higher in 2017, however the same general trends was observed as 2016 with Axe having superior grainsize whilst Shield and Cosmick had higher screening levels. Beckom was also more variable between sites showing a similar trend to 2016.

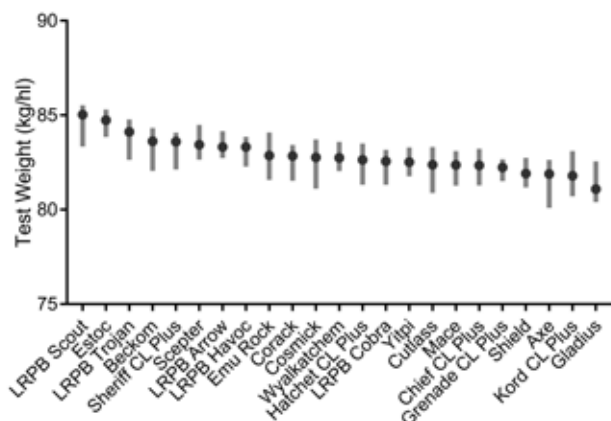


Figure 3. The diagram above shows the median testweight (kg/hl) of wheat varieties in 2016 NVT trials (closed symbol). Varieties are ranked in descending order of testweight for the 2016 season. The bars represent the range in which grain testweights have occurred in 50% of trials. The shorter the bar the more consistent the variety.

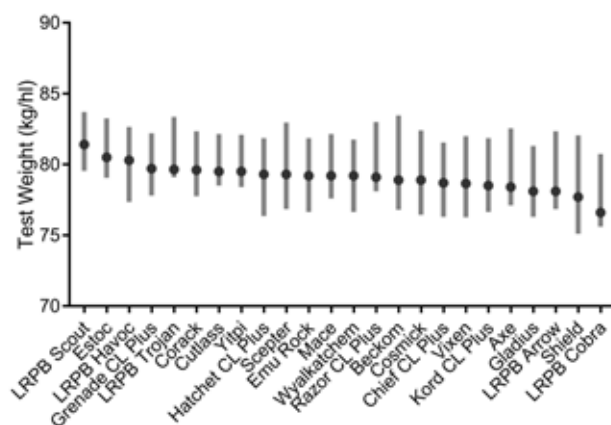


Figure 4. The diagram above shows the median testweight (kg/hl) of wheat varieties in 2017 NVT trials (closed symbol). Varieties are ranked in descending order of testweight for the 2017 season. The bars represent the range in which grain testweights have occurred in 50% of trials. The shorter the bar the more consistent the variety.

Testweights were lower and more variable in 2017 compared to 2016. Variety trends between seasons were similar. Scout and Estoc expressed consistently high testweights. While Shield, Axe and Gladius were consistently at the lower end.

WHEAT

TABLE 9. Disease responses of early season wheats and reaction to common disorders

| Variety | Stem Rust | Stripe Rust# | Leaf Rust | Septoria tritici blotch | Yellow leaf spot | Powdery Mildew | Black point | CCN resis. |
|---------------|-----------|--------------|-----------|-------------------------|------------------|----------------|-------------|------------|
| Beaufort | MRMS | RMR | MS | MSS | S | MRMS | MSS | MS |
| Bolac | MRMS | RMR | MRMS | MSS | MSS | MRMS | MS | S |
| DS Bennett | MRMS | R | S | MSS | MRMS | - | S | MSS |
| EGA Wedgetail | RMR | R | SVS | MS | MS | MR | MS | MSS |
| Illabo | MRMS | RMR | S | MSS | MRMS | - | MS | MS |
| Kiora | RMR | RMR | MRMS | MS | MSS | MS | MS | MS |
| Kittyhawk | R | MR | MR | MR | MRMS | R | MS | S |
| Longsword | MR | RMR | MSS | MSS | MRMS | - | MS | MRMS |
| Manning | MR | RMR | RMR | MR | MRMS | MS | SVS | S |
| Preston | SVS | RMR | SVS | S | S | R | MRMS | S |
| RGT Accroc | MS | R | S | MS | MRMS | - | MRMS | S |
| SQP Revenue | RMR | R | S | S | MS | MR | MS | S |

R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible, - variety yet to be fully evaluated. * provisional rating based on limited NVT data. Ratings provided are primarily from 2017 and have not been updated with new data. A range of reactions is provided where different strains of the pathogen exist and where the variety may respond differently to them. Cereal Cyst Nematode (CCN) Resistance refers to the ability of the variety to reduce CCN carryover. Black Point is not a disease but is a physiological response to certain humid conditions.

Information on disease reaction was supplied by the Field Crop Pathology Unit (SARDI). Contact Dr Hugh Wallwork (08) 8303 9382.

WINTER WHEAT VARIETY NOTES

Winter wheats may facilitate early sowing opportunities prior to 20th April in frost prone environments. Winter wheats have an obligate requirement for cold (vernalisation) in order for them to flower. While limited yield data is provided in this guide, the winter cultivars Longsword, Illabo, Kittyhawk, RGT Accroc and DS Bennett are all commercially available in 2019 and are being trialled in early sown NVT trials and a series of agronomy trials across SA as part of the GRDC management of early sown wheat project.

DS BENNETT [Ⓛ]

DS Bennett was released in 2018 and has an ASW classification in SA. DS Bennett is a slow developing winter wheat that has been developed for longer season and higher rainfall growing areas. It is suited to early planting or grazing opportunities and will be later to flower than Wedgetail. DS Bennett is rated S to leaf rust, MRMS to stem and R to stripe rust, MRMS to yellow leaf spot, and MSS to CCN. Seed is available from Seednet partners (EPR \$4.25/t GST ex).

ILLABO [Ⓛ]

Illabo was released in 2018 by AGT and has an AH classification in SA. Illabo is a mid developing winter wheat that has been developed for long season growing areas. It is suited to early

planting or grazing opportunities similar to Wedgetail in the higher rainfall zones. Illabo has shown a yield improvement compared to Wedgetail and Kittyhawk. Illabo is rated S to leaf rust, MRMS to stem and RMR to stripe rust, MRMS to yellow leaf spot, and MS to CCN. Seed is available from AGT affiliates and Seed Sharing™ (EPR \$3.50/t GST ex).

LONGSWORD [Ⓛ]

Longsword is classified as a feed wheat in SA. Longsword is a fast developing winter wheat meaning once its vernalisation requirement is met it is relatively fast to flower and is quicker to flower than Wedgetail. Longsword has a broad sowing window but will be most suited to April plantings. Longsword has not been widely tested in early sowing NVT, however data from agronomic trials have shown it is the highest yielding winter wheat in the low rainfall zones. Longsword has a good disease package and is rated MSS to leaf rust, MR to stem and RMR to stripe rust, MRMS to yellow leaf spot, and MRMS to CCN. Seed is available from AGT affiliates and Seed Sharing™ (EPR \$2.75/t GST ex).

LRPB KITTYHAWK [Ⓛ]

LRPB Kittyhawk is an AH mid winter wheat and has been developed for long season growing areas. It is suited to early planting or grazing opportunities similar to Wedgetail in the higher rainfall zones. Longreach Kittyhawk has improved

WHEAT

TABLE 10. SOUTH EAST long season wheat yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------------|-----------------|------------|------|------|------|------|------|
| | mean yield t/ha | | 7.04 | 4.65 | 5.9 | 5.6 | 5.85 |
| Classification | Variety | No. Trials | 1 | 1 | 1 | 1 | 1 |
| MILLING WHEATS | | | | | | | |
| ASW | DS Bennett | 3 | - | - | - | 118 | 109 |
| AH | Illabo | 3 | - | - | - | 109 | 112 |
| AH | Beckom | 3 | - | - | 111 | 99 | 108 |
| APW | DS Pascal | 6 | 109 | 114 | 108 | 98 | 103 |
| APW | LRPB Trojan | 6 | 104 | 107 | 108 | 104 | 107 |
| APW | Cutlass | 4 | - | - | 107 | 102 | 105 |
| AH | Kiora | 6 | 107 | 111 | 107 | 99 | 103 |
| AH | Chara | 5 | 103 | 106 | 103 | 97 | 101 |
| AH | Bolac | 6 | 102 | 104 | 102 | 98 | 100 |
| AH | Coolah | 5 | - | 99 | 102 | 102 | 102 |
| AH | LRPB Kittyhawk | 4 | - | - | 100 | 102 | 101 |
| APW | EGA Wedgetail | 6 | 98 | 93 | 97 | 106 | 99 |
| FEED WHEATS | | | | | | | |
| FEED | RGT Calabro | 3 | - | - | 114 | 127 | 121 |
| FEED | RGT Zanzibar | 2 | - | - | - | 119 | 118 |
| FEED | RGT Accroc | 4 | - | 104 | 112 | 126 | 117 |
| FEED | Manning | 5 | 123 | 100 | 105 | 121 | 112 |
| FEED | SF Adagio | 4 | - | 105 | 110 | 120 | 113 |
| FEED | LRPB Beaufort | 5 | 112 | 104 | 109 | 116 | 113 |
| FEED | Longsword | 3 | - | - | - | 104 | 111 |
| FEED | SQP Revenue | 5 | 112 | 95 | 102 | 119 | 109 |

Please note these data are generated from only the Conmurra site in the South East. Sowing dates from these trials have ranged from 28 April – 28 May during this period.

disease and grain quality package compared to Wedgetail especially for stem rust (R) and leaf rust (MR). More evaluation is needed. Seed is available from Pacific Seeds (EPR \$4.25/t GST ex).

MANNING ^(b)

Manning was released in 2013 as a very late flowering white grained feed wheat for high rainfall zones in SE Australia. It is a dual purpose, grazing/grain yield winter wheat with high yield potential and BYDV resistance coupled with good resistance to stem and stripe rust and other foliar diseases.

Seed is available from GrainSearch affiliates or contact GrainSearch for more details (EPR \$3.50/t GST ex).

RGT ACCROC ^(b)

RGT Accroc is a red winter wheat, feed grain quality, suited to the high rainfall zone and is suitable for sowing late February to early April for early grazing. Maturity is 3 to 5 days earlier than SF Adagio. RGT Accroc is rated S to leaf rust, MS to stem and R to stripe rust, MRMS to yellow leaf spot, and S to CCN. Seed is available via Seed Force Broadacre Commercial Partners (EPR \$4.00/t GST ex).

DURUM WHEAT VARIETY NOTES

CAPAROI

Caparoi is a slightly earlier flowering durum variety than Tamaroi. Caparoi has excellent physical grain quality, good semolina colour and high grain protein. It is RMR to stem, strip and leaf rust and MR to yellow leaf spot. Caparoi is eligible for APDR grade in SA and was released by Durum Breeding Australia's Northern Node (Tamworth, NSW DPI) in 2008 with seed available from Seednet (EPR \$2.60/t GST ex).

DBA SPES [Ⓛ]

DBA Spes has a similar maturity to Tamaroi with a good disease resistance profile, similar to other durum varieties, with improved stem rust resistance (R). It has good grain size and lower screenings compared to the majority of other durum varieties. DBA Spes is eligible for APDR grade in SA and was released from the Durum Breeding Australia's Southern Node (University of Adelaide) with seed available from Southern Australia Durum Growers Association (EPR \$3.00/t GST ex).

DBA VITTARO [Ⓛ]

DBA Vittaro is a slightly earlier maturing variety than DBA-Aurora with a good disease resistance profile. DBA Vittaro has large grain size and lower screenings than other durum variety and achieves high protein contents with excellent semolina colour and pasta making quality. It is shorter in stature than Caparoi and DBA-Aurora with good straw strength and tolerance to lodging. DBA Vittaro is eligible for APDR grade in SA and was released from Durum Breeding Australia's Northern Node (Tamworth, NSW DPI) in 2017 with seed available from Seednet (EPR \$3.30/t GST ex).

DBA-AURORA [Ⓛ]

DBA-Aurora has a similar maturity to Tamaroi with a good disease resistance profile similar to other durum varieties. DBA-Aurora has improved grain size and lower screenings compared to other varieties like Yawa. DBA-Aurora has also shown good early vigour and grass weed competitiveness. Released in 2014 from the Durum Breeding Australia's Southern Node (University of Adelaide) and eligible for APDR grade in SA. Seed is available from Southern Australia Durum Growers Association (EPR \$3.00/t GST ex).

HYPERNO [Ⓛ]

Hyperno has a similar maturity, adaptation and disease resistance profile to Kalka and Tamaroi, but generally offers greater yields, improved semolina colour and better sprouting and black point tolerance. Hyperno is eligible for APDR grade in SA (EPR \$3.00/t GST ex).

SAINTLY [Ⓛ]

Saintly is an awnless, earlier flowering durum variety than Kalka and Tamaroi, and has performed very well in dry finishing conditions in SA. Saintly has slightly less stem and leaf rust resistance compared to Hyperno. Saintly is eligible for APDR grade in SA (EPR \$3.00/t GST ex).

TJILKURI [Ⓛ]

Tjilkuri has a similar maturity, adaptation and disease resistance profile to Tamaroi, but generally offers greater yields and improved semolina colour. Tjilkuri is eligible for APDR grade in SA and was released from Durum Breeding Australia's Southern Node (University of Adelaide) in 2010 (EPR \$3.00/t GST ex). ■

TABLE 11. Disease responses of Durum wheats and reaction to common disorders

| Variety | Stem Rust | Stripe Rust# | Leaf Rust | Septoria tritici blotch | Yellow leaf spot | Powdery Mildew | Black point | CCN resis. |
|------------|-----------|--------------|-----------|-------------------------|------------------|----------------|-------------|------------|
| Caparoi | RMR | RMR | RMR | RMR | MR | MS | MSS | MS |
| DBA-Aurora | RMR | RMR | R | MS | MRMS | MR | MSS | MS |
| Hyperno | RMR | MR | R | MRMS | MRMS | MR | MS | MS |
| Saintly | MR | MR | MRMS | S | MRMS | MSS | MS | MS |
| Spes | R | RMR | R | MRMS | MRMS | MRMS | MS | MS |
| Tjilkuri | MR | MR | R | MSS | MRMS | MRMS | MSS | MS |
| WID802 | RMR | MR | R | MS | MRMS | MRMS | MSS | MS |
| Yawa | RMR | MR | R | MR | MRMS | MS | MRMS | MS |

Disease rating codes: R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very. Ratings provided are primarily from 2017 and have not been updated with new data. A range of reactions is provided where different strains of the pathogen exist and where the variety may respond differently to them. Cereal Cyst Nematode (CCN) Resistance refers to the ability of the variety to reduce CCN carryover. Black Point is not a disease but is a physiological response to certain humid conditions. Information on disease reaction was supplied by the Field Crop Pathology Unit (SARDI). Contact Dr Hugh Wallwork (08) 8303 9382.

WHEAT

TABLE 12. MID NORTH Durum wheat yield performance from 2013 - 2017. Long term predicted yield expressed as a percentage of mean yield.

| year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------|------------|------|------|------|------|------|
| mean yield t/ha | | 3.51 | 3.88 | 2.32 | 5.71 | 3.59 |
| Variety | No. Trials | 2 | 3 | 3 | 2 | 2 |
| DBA-Aurora | 12 | 103 | 101 | 110 | 106 | 108 |
| Saintly | 12 | 107 | 105 | 114 | 93 | 109 |
| DBA Vittaro | 5 | - | 101 | - | - | 107 |
| DBA Spes | 4 | - | - | - | 105 | 101 |
| Yawa | 10 | 100 | 99 | 99 | 106 | - |
| Caparoi | 12 | 99 | 100 | 95 | 92 | 102 |
| WID802 | 10 | 97 | 96 | 99 | - | 102 |
| Hyperno | 12 | 94 | 97 | 93 | 100 | 97 |
| Tjilkuri | 12 | 96 | 97 | 87 | 103 | 98 |

TABLE 13. YORKE PENINSULA Durum wheat yield performance from 2013 - 2017. Long term predicted yield expressed as a percentage of mean yield.

| year | | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------|------------|------|------|------|------|------|
| mean yield t/ha | | 4.35 | 3.61 | 2.08 | 5.83 | 3.71 |
| Variety | No. Trials | 3 | 3 | 3 | 3 | 3 |
| DBA-Aurora | 15 | 104 | 100 | 115 | 106 | 105 |
| DBA Spes | 6 | - | - | - | 107 | 103 |
| WID802 | 12 | 100 | 111 | 101 | - | 108 |
| Yawa | 12 | 100 | 107 | 97 | 108 | - |
| Saintly | 15 | 109 | 98 | 115 | 90 | 100 |
| Tjilkuri | 15 | 100 | 102 | 85 | 102 | 99 |
| Hyperno | 15 | 92 | 92 | 96 | 101 | 102 |
| DBA Vittaro | 6 | - | 90 | - | - | 102 |
| Caparoi | 15 | 102 | 94 | 94 | 88 | 98 |

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- Cereal following grassy pastures
- Durum crops (crown rot)

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- Take-all (including oat strain)
- Root lesion nematodes
- Cereal cyst nematode
- Stem nematode
- Blackspot (field peas)
- Yellow leaf spot
- Common root rot
- Pythium clade f
- Charcoal rot
- Ascochyta blight of chickpea
- White grain disorder
- Sclerotinia stem rot

Barley variety sowing guide 2019

By Kenton Porker and Courtney Peirce, New Variety Agronomy Group, SARDI

This sowing guide provides data and guidance on the most suitable barley varieties for sowing in South Australia in 2019.

Since publication of the 2018 sowing guide, Banks has been released and Spartacus CL and Compass are now accredited Malting varieties. Feed variety Maritime, malt variety Buloke, niche malt varieties Southern Star and Charger have been excluded as they are generally considered outclassed.

The decision to grow either a malting, food or feed variety may depend on one or more factors, including;

- Market demand and malting varietal storage segregations in bulk storage facilities
- The difference in payments between malting and feed grades compared to yield differences
- The likelihood of producing a malting grade barley within malt receival specifications;
- Disease resistance and agronomic considerations

MARKETING

Growers need to consider which varietal option will lead to the greatest profitability. The relative difference in the price premium paid for malt relative to feed may counteract the yield difference between malt and feed or food varieties. Other scenarios may favour high yielding feed or food varieties where there is a low probability of achieving malt and a desire for lower input costs. Among malt and food varieties differential pricing will be a continuing trend and growers need to consider market premiums and discounts in addition to agronomic performance to maximize profitability. Newer food and malt varieties are now offering good yield potential. Varieties accredited and varieties currently undergoing malt evaluation now have similar yield potential as feed varieties making it worthwhile for growers to consider including some malting varieties in their cropping program.

It is important that growers contact their grain marketers of choice to discuss market demand prior to sowing a malting variety. Malting barley is grown, stored and sold on a variety-specific basis and it is important to ascertain if the variety chosen is able to be stored and marketed in your area. The preferred list of Barley Australia is updated annually as a guide to industry on the market preferred varieties and can be found online at www.barleyaustralia.com.au. The preferred list is determined by marketing companies and reflects their

opinion on which malting varieties will be sought by purchasers of Australian malting barley. In many cases a new variety accreditation does not mean the variety will be a preferred variety until market demand is established. Table 2 lists the current released varieties under malt barley evaluation by the MBIBTC in conjunction with PBA and Barley Australia, including the anticipated timeline for accreditation. Accreditation is only granted if the variety satisfies the selection criteria set by MBIBTC and Barley Australia (see www.barleyaustralia.com.au). Westminster, while not yet segregated for malt in SA has some limited direct marketing opportunities in the South East (SE) and into Port Adelaide.

AGRONOMY

Barley varieties differ in development speed (figure 1). Most commonly grown varieties fall in the fast – medium development range and are best suited for planting dates after May 1. In regions of minimal frost risk, varieties can be sown in late April particularly in shorter season districts defined by terminal moisture and heat stress events during grain fill. Barley is slightly more frost tolerant than wheat however there are limited varieties with a suitable flowering behavior for sowing before April 25. Urambie is the only current winter barley that may be better suited for dual purpose graze and grain from early April planting but has not been included for evaluation in NVT in SA.

DISEASE

Net form net blotch remains a significant disease threat to barley production across South Australia and growers should refrain from growing barley on barley or planting highly susceptible varieties unless a vigilant fungicide strategy is planned. Newer releases Spartacus CL+ and RGT Planet are also highly susceptible to spot form net blotch and will need an appropriate fungicide strategy.

Cereal cyst nematode levels should be carefully monitored where there is a history of growing susceptible varieties such as Schooner, Scope, Buloke, Oxford and Gairdner. Seed dressings which have activity on powdery mildew should be applied to all varieties susceptible to powdery mildew. Hindmarsh, La Trobe, Spartacus CL+ and Rosalind are more susceptible to loose smut than other varieties and an appropriate seed smuticide in addition to foliar control of powdery mildew should be considered.

TABLE 1 Suitable barley varieties for planting in South Australia, listed according to current (2018/2019) quality classification grade and alphabetical order, not in order of preference.

| Variety | Max. Grade | Suitability and significant features |
|---------------|------------|--|
| Commander | malting | All areas, except areas prone to net form net blotch, risk of lodging in high yielding environments. |
| Compass | malting | All areas, at risk with some strains of leaf rust and lodging in high yielding environments. |
| La Trobe | malting | All areas, note modest early vigour and weed competitiveness especially in light soils. |
| GrangeR | malting | Medium to high rainfall areas, note limited malting marketing and segregation opportunities in SA. |
| Schooner | malting | All areas except leaf rust prone areas, now agronomically outclassed, declining industry demand. |
| Scope | malting | All areas except where leaf rust and CCN is a problem. Imidazolinone tolerant. |
| Spartacus CL+ | malting | All areas, imidazolinone tolerant. Similar competitive characteristics as Hindmarsh. |
| Westminster | malting | Higher rainfall and longer season areas, segregations available in South East region. |
| Hindmarsh | food | All areas, noting modest early vigour and weed competitiveness especially in light soils. |
| Alestar | feed | Targeted for medium – high rainfall zones, being evaluated for malt accreditation. |
| Banks | feed | Targeted for medium – high rainfall zones, being evaluated for malt accreditation. |
| Capstan | feed | Medium to high rainfall areas where very high yields are targeted and test weight is easily achieved. |
| Fathom | feed | All areas, noting susceptibility to net form net blotch. |
| Fleet | feed | All areas, particularly for districts with lower rainfall and light soils noting high net form net blotch risk. |
| Keel | feed | All areas except deep sandy soils of lower fertility and avoid areas prone to leaf rust. Earliest maturing feed variety. |
| Oxford | feed | Medium to high rainfall areas (>400mm). Early sowing. |
| RGT Planet | feed | All areas. Note lower testweights and higher small grain screenings under hot dry finishes and susceptibility to spot form and net form of net blotch. |
| Rosalind | feed | All areas, broadly adapted. |

TABLE 2 Released varieties undergoing malt evaluation and expected timeline (Barley Australia)

| Variety | Year 0 | Stage 1 | Stage 2 | Target Decision Date |
|------------|-----------------|---------------|---------|----------------------|
| Alestar | 2017 (accepted) | 2018 | - | March 2020 |
| Banks | 2016 (accepted) | 2017 (passed) | 2018 | March 2019 |
| RGT Planet | 2017 (accepted) | 2017 (passed) | 2018 | March 2019 |

VARIETY NOTES

ALESTAR ^(b)

Alestar is a variety currently undergoing malt accreditation, with a similar maturity to Commander, and is targeted for the medium to high rainfall regions of SA. Alestar has demonstrated a yield improvement compared to Westminster. More evaluation is required for its adaptation to SA. Seed is available through Elders and through selected seed partners (EPR \$3.00/t GST ex).

BANKS ^(b)

Banks is a mid-late maturing barley currently undergoing malting accreditation. Banks has been developed by Intergrain

and targeted for the medium to high rainfall environments. Banks is rated R-MRMS to net form net blotch resistance and is moderately susceptible to spot form net blotch. Its long term yield performance has been 4 – 7% above Commander in most SA districts. Seed is available for planting in 2019 from Intergrain Seedclub members and resellers (EPR \$4.00/t GST ex).

BASS ^(b)

Bass has been developed by Intergrain and is targeted as an export quality malting accredited variety principally for WA. Segregation and marketing opportunities for malting are currently limited in SA. It is a mid to late maturing variety with variable resistance to scald and leaf rust, resistance to barley

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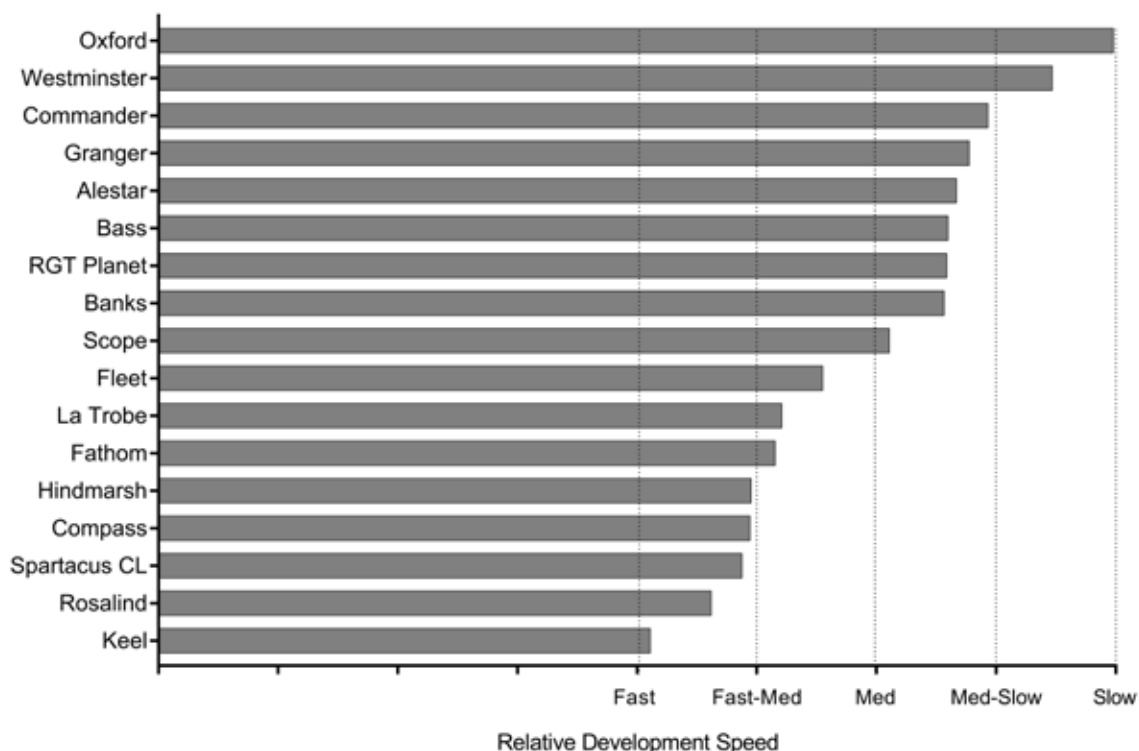


Figure 1. Relative speed of development of selected barley varieties sown during May – Jun across SA, varieties are ranked according to time to flower. (Data Source 2016 – 2017 SA NVT Trials dataset)

yellow dwarf virus but no CCN resistance and it is susceptible to both net and spot form net blotch. Bass has shown very good physical grain quality with high test weight and low screenings. Bass is approved for farmer to farmer trading and seed is available through Intergrain Seedclub members (EPR \$3.50/t GST ex).

COMMANDER ^(b)

Commander is a malting quality variety released by the University of Adelaide in 2008 and suitable for domestic, Chinese and SE Asian export brewing markets. Commander has mid-season maturity and across many seasons, demonstrates wide adaptation and very high yield relative to other malting varieties, particularly in seasons with favourable spring finishes. Commander has excellent grain plumpness, but generally has lower test weight relative to La Trobe. Commander is resistant to CCN but is moderately susceptible to most foliar diseases including net form net blotch. Compared to La Trobe, Commander has poor straw strength and is prone to lodging in high yielding environments and wet spring conditions. Seed is available through Seednet (EPR \$3.80/t GST ex).

COMPASS ^(b)

Compass has been developed by the University of Adelaide as an early – mid season maturing accredited malting quality variety. It is closely related to Commander but is higher yielding.

It has a similar growth habit to Commander but is earlier flowering with typical May sowing and improved net form net blotch resistance. Compass has similar straw strength to Commander and will be prone to lodging in high yielding environments. Compass is now susceptible (SVS) to a new strain of leaf rust in SA. Compass has shown good physical grain quality with high retention and low screenings and low-moderate test weight. Seed is available from Seednet (EPR \$3.80/t GST ex).

FATHOM ^(b)

Fathom is an early maturing feed quality variety developed using wild barley to improve stress tolerance and water use efficiency. Fathom has averaged very high yields similar to Hindmarsh based on NVT data since 2010 and shows good early vigour and weed competitiveness. Fathom typically flowers three to four days later than Hindmarsh with early May sowing and flowers similar to Hindmarsh with later sowings. Fathom has good levels of resistance to CCN, powdery mildew and spot form net blotch. Fathom has shown susceptibility to net form net blotch, scald and leaf rust. Seed is available from Seednet (EPR \$2.00/t GST ex).

FLEET ^(b)

Fleet is a midseason maturing, CCN resistant feed barley, developed by the University of Adelaide and released in 2006.

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TABLE 3 Disease reaction of selected barley varieties

| Variety | CCN resistance | CCN tolerance | Leaf rust | Net blotch (net form) | Net blotch (spot form) | Leaf scald | Powdery mildew | Black point |
|---------------|----------------|---------------|-----------|-----------------------|------------------------|------------|----------------|-------------|
| Alestar | - | T | R-MS | MR-S | MSS | MSS-VS | - | MRMS |
| Banks | S | T | R-S | R-MRMS | MS | R-SVS | - | MRMS |
| Bass | S | T | MR-VS | MS-SVS | MSS | MR-S | MSS | MS |
| Buloke | S | T | MS-SVS | MR | MS-S | MS-S | RMR | MS |
| Commander | R | T | MS-S | MSS-SVS | MSS | S-SVS | MRMS | MSS |
| Compass | R | T | SVS | MR-MS | MR-MSS | MS-SVS | MRMS | MS |
| Fathom | R | T | MRMS-S | MS-VS | RMR | R-MS | MRMS | MSS |
| Fleet | R | T | MRMS-S | S-VS | MR | MR-SVS | MRMS | MS |
| Flinders | S | T | MRMS-S | MR-MS | S | S | RMR | MRMS |
| GrangeR | S | T | MR-MS | MR-MSS | S | MS-SVS | R | MS |
| Hindmarsh | R | T | MRMS-S | MR-MS | S | R-VS | MR-S | MSS |
| Keel | R | T | VS | MS | MR | MS-SVS | S | SVS |
| La Trobe | R | T | MRMS-S | MR-MS | MSS | R-VS | MR-S | MSS |
| Maritime | R | T | MRMS-S | R-VS | MRMS | MS-S | SVS | MS |
| Oxford | S | T | R-MR | MR-SVS | S | MR-SVS | R | MRMS |
| RGT Planet | R | T | MR-MS | MRMS-SVS | S | R-S | R | MRMS |
| Rosalind | R | T | MR-MS | MR | MS-S | MR-SVS | RMR-S | MSS |
| Schooner | VS | T | S-VS | MR | MS | MS-S | SVS | MS |
| Scope | S | T | MS-SVS | MR | MS-S | MS-S | R-MR | MS |
| Spartacus CL+ | R | T | MR-S | MRMS-MSS | S | R-VS | MR-S | MSS |
| Westminster | - | T | R-MRMS | R-S | S | R-S | R | MRMS |

Disease rating codes: R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible

Ratings provided are primarily from 2017 and have not been updated with new data.

A range of reactions is provided where different strains of the pathogen exist and where the variety may respond differently to them. Cereal Cyst Nematode (CCN) tolerance indicates the ability of the variety to grow and yield in the presence of CCN. Resistance refers to the ability of the variety to reduce CCN carryover.

Information on disease reaction was supplied by the Field Crop Pathology Unit (SARDI). Contact Dr Hugh Wallwork (08) 8303 9382.

Fleet has a long coleoptile and has shown wide adaptation combined with good yield potential. Fleet exhibits an excellent disease resistance profile, although now highly susceptible to net form net blotch and some leaf rust strains. Fleet has plump grain but slightly lower test weights than other feed types. Its strong awn can reduce threshability and attention to concave and thresher adjustment is important, especially in maintaining test weight. Seed is available through Seednet (EPR \$1.50/t GST ex).

FLINDERS ^(b)

Flinders is a malting accredited variety developed by Intergrain. Segregation and marketing opportunities for malting are

currently limited in SA. It is a mid – late maturing variety with variable resistance to leaf rust and is susceptible to spot form net blotch, scald, and CCN. Flinders is approved for farmer to farmer trading and seed is available through Intergrain Seedclub members (EPR \$3.80/t GST ex).

GrangeR ^(b)

GrangeR is a high yielding variety accredited for malting in 2013. It is mid maturing and targeted for areas with more than 400mm rainfall. GrangeR has good levels of resistance to powdery mildew and is rated MR – MSS for net form net blotch, variable resistance to leaf rust and leaf scald and susceptibility to spot form net blotch. Segregation and marketing

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opportunities for malting are currently limited in SA. Seed is available from Heritage Seeds (EPR \$2.95/t GST ex).

HINDMARSH ^(b)

Hindmarsh is an early maturing, semi-dwarf, food quality variety developed by VicDPI, and released in 2006. Hindmarsh offers excellent yield potential and grain quality with resistance to CCN, variable resistance to leaf rust and leaf scald and susceptibility to spot form net blotch. In 2016 it became MS to net form net blotch in some areas. Hindmarsh has slow early growth and a short coleoptile and attention to seeding depth is important in stubble retained systems. Where triadimenol seed dressing and pre-emergent herbicide is used, research has shown shallow sowing with increased seed rates to be more advantageous than deeper sowing to avoid potential damage. Seed is available from Seednet (EPR \$1.50/t GST ex).

LA TROBE ^(b)

La Trobe is a malting accredited variety released from Intergrain in 2014 with early maturity and semi dwarf growth habit and plant architecture very similar to Hindmarsh. Its yield and agronomic performance in SA NVT since 2013 has also been very similar to Hindmarsh with slightly higher yield. La Trobe is resistant to CCN but susceptible to spot form net blotch, rated MR-MS to net form net blotch and shows variable resistance to leaf rust and leaf scald. La Trobe seed is approved for farmer to farmer trading and seed is available through Intergrain Seedclub members (EPR \$4.00/t GST ex).

OXFORD ^(b)

Oxford is a feed quality variety which has shown very high yield potential in seasons with high spring rainfall. Oxford can be sown in mid – late April scenarios. Oxford has late maturity, good straw strength and low shattering. While Oxford is susceptible to CCN, leaf scald and spot form net blotch, it has good resistance to leaf rust and powdery mildew. It is also now very susceptible to some strains of net form net blotch. Seed is available through Heritage Seeds (EPR \$2.50/t GST ex).

RGT PLANET ^(b)

RGT Planet is a direct introduction from Europe bred by RAGT seeds. RGT Planet is currently undergoing malt evaluation in Australia. RGT Planet is a mid-season flowering variety similar to Commander or slightly earlier from May sowing dates. RGT Planet was included in NVT SA for the first time in 2016 and was the highest yielding variety across the state for that season. RGT Planet has shown the highest potential yield compared to other currently available barley varieties particularly in the medium to high rainfall zones. RGT Planet is susceptible to spot and net form net blotch. Quality data suggests RGT Planet has a lower test weight than Commander and has a greater tendency for increased grain screenings under sub optimal grain fill conditions. Seed is available via Seed Force broadacre commercial partners (EPR \$4.00/t GST ex).

ROSALIND ^(b)

Rosalind is a feed quality variety released by Intergrain in 2015. It has been evaluated in SA NVT since 2014 and has demonstrated broad adaptation to low yielding environments and very high relative yields in high rainfall environments. Rosalind has a Hindmarsh plant type and is slightly faster to develop than Hindmarsh when sown in May. Rosalind has excellent straw strength and standability. Rosalind has resistance to CCN, net form net blotch, leaf rust, and variable resistance to powdery mildew and leaf scald but susceptibility to spot form net blotch. Rosalind seed is approved for farmer to farmer trading and seed is available through Intergrain Seedclub members (EPR \$3.50/t GST ex).

SCOPE CL ^(b)

Scope CL is a tall, malting quality, mid-season maturing, imidazolinone tolerant barley with moderate to high yield potential across a range of medium rainfall environments. Its disease resistance profile is very similar to Buloke with susceptibility to some strains of leaf rust but good resistance to net form net blotch and powdery mildew. Scope has registration for use with an appropriate BASF Clearfield herbicide and this herbicide tolerance makes Scope an attractive option for brome and other grass control, particularly in Mallee type soils. Seed is available through Seednet (EPR \$3.50/t GST ex).

SPARTACUS CL+ ^(b)

Spartacus CL+ is a malting accredited imidazolinone tolerant barley developed by Intergrain and released in 2016 with a similar plant type and flowering behaviour to Hindmarsh and La Trobe. Within SA NVT during 2014 - 2017, Spartacus CL has also exhibited similar agronomic performance for grain yield and disease resistance profile including resistance to CCN and susceptibility to loose smut. Yields have averaged similar to Compass across most districts and slightly higher in higher yielding districts. Spartacus CL has consistently averaged more than 15% above the widely grown imidazolinone tolerant Scope CL and has improved grain size. Seed is available for sowing from local resellers and Intergrain Seedclub members (EPR \$4.25/t GST ex).

WESTMINSTER ^(b)

Westminster is a mid – late maturing variety with medium – tall, stiff straw. Malting accreditation was completed in March 2013. Westminster now shows variable resistance to net form net blotch and leaf scald, has good resistance to black point but is susceptible to spot form net blotch. Westminster is well suited to the SE of SA and higher rainfall environments. Contact GrainSearch for details on obtaining seed for 2019 (EPR \$3.00/t GST ex).

YIELD PERFORMANCE EXPERIMENTS FROM 2013-2017

The yield results presented are multi environment trial (MET) data shown on a yearly regional group mean. All yields are expressed as a percentage of mean yield from NVT data 2013

– 2017 inclusive, along with number of observations in adjacent columns. Further results can be found on the NVT website (www.nvtonline.com.au) ■

TABLE 4. LOWER EYRE PENINSULA barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | LOWER EYRE PENINSULA | | | | |
|-----------------------------------|-----------------|----------------------|------|------|------|------|
| | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 4.31 | 3.74 | 4.01 | 4.99 | 3.28 |
| Variety | No. Trials | 2 | 3 | 3 | 3 | 3 |
| MALTING | | | | | | |
| Compass | 14 | 106 | 113 | 116 | 101 | 118 |
| Spartacus CL | 12 | - | 111 | 115 | 103 | 115 |
| La Trobe | 14 | 110 | 109 | 113 | 102 | 112 |
| Commander | 14 | 99 | 102 | 98 | 105 | 104 |
| Buloke | 9 | 100 | 99 | 99 | 98 | - |
| Granger | 14 | 101 | 98 | 98 | 101 | 96 |
| Bass | 14 | 106 | 97 | 98 | 99 | 94 |
| Scope | 14 | 97 | 98 | 99 | 96 | 100 |
| Flinders | 14 | 97 | 94 | 97 | 93 | 94 |
| Schooner | 7 | 89 | 92 | 94 | - | - |
| Westminster | 14 | 91 | 88 | 86 | 96 | 86 |
| Gairdner | 14 | 85 | 88 | 90 | 85 | 90 |
| FOOD | | | | | | |
| Hindmarsh | 14 | 108 | 109 | 114 | 99 | 113 |
| FEED | | | | | | |
| Rosalind | 12 | - | 114 | 118 | 110 | 113 |
| Fathom | 14 | 109 | 106 | 107 | 105 | 105 |
| Keel | 14 | 101 | 104 | 107 | 95 | 107 |
| Fleet | 14 | 100 | 103 | 100 | 103 | 105 |
| Oxford | 14 | 98 | 93 | 88 | 105 | 87 |
| PENDING MALT ACCREDITATION | | | | | | |
| Banks | 9 | - | - | 107 | 105 | 106 |
| RGT Planet | 6 | - | - | - | 111 | 101 |
| Alestar | 12 | - | 97 | 97 | 100 | 94 |
| Bottler | 3 | - | - | - | - | 96 |

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TABLE 5. UPPER EYRE PENINSULA barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | UPPER EYRE PENINSULA | | | | |
|-----------------------------------|-----------------|----------------------|------|------|------|------|
| Variety | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 2.88 | 3.17 | 2.49 | 3.98 | 2.16 |
| Variety | No. Trials | 4 | 4 | 4 | 4 | 2 |
| MALTING | | | | | | |
| Compass | 18 | 112 | 119 | 131 | 102 | 132 |
| Spartacus CL | 14 | - | 115 | 125 | 101 | 128 |
| La Trobe | 18 | 109 | 113 | 121 | 100 | 123 |
| Commander | 18 | 102 | 101 | 100 | 104 | 99 |
| Buloke | 16 | 99 | 98 | 99 | 98 | - |
| Bass | 18 | 100 | 94 | 95 | 103 | 102 |
| Scope | 18 | 98 | 97 | 98 | 96 | 108 |
| Granger | 12 | 98 | 96 | 93 | - | - |
| Flinders | 12 | 94 | 93 | 91 | - | - |
| Schooner | 12 | 90 | 88 | 93 | - | - |
| FOOD | | | | | | |
| Hindmarsh | 18 | 108 | 113 | 122 | 97 | 127 |
| FEED | | | | | | |
| Rosalind | 14 | - | 120 | 127 | 108 | 110 |
| Fathom | 18 | 110 | 109 | 116 | 112 | 112 |
| Keel | 18 | 105 | 107 | 117 | 102 | 126 |
| Fleet | 18 | 105 | 104 | 107 | 107 | 107 |
| Maritime | 16 | 95 | 95 | 97 | 90 | - |
| Oxford | 12 | 94 | 89 | 77 | - | - |
| PENDING MALT ACCREDITATION | | | | | | |
| Banks | 10 | - | - | 115 | 107 | 99 |
| Alestar | 18 | 96 | 96 | 92 | 98 | 84 |
| RGT Planet | 6 | - | - | - | 111 | 73 |

BARLEY

TABLE 6. MID NORTH barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | MID NORTH | | | | |
|-----------------------------------|-----------------|-----------|------|------|------|------|
| | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 3.64 | 4.95 | 3.34 | 6.69 | 4.91 |
| Variety | No. Trials | 3 | 3 | 3 | 3 | 3 |
| MALTING | | | | | | |
| Compass | 15 | 111 | 109 | 118 | 94 | 108 |
| Spartacus CL | 12 | - | 111 | 117 | 97 | 107 |
| La Trobe | 15 | 110 | 109 | 114 | 98 | 106 |
| Bass | 15 | 100 | 101 | 101 | 105 | 101 |
| Charger | 15 | 99 | 101 | 101 | 103 | 101 |
| Commander | 15 | 102 | 99 | 101 | 96 | 101 |
| Buloke | 12 | 99 | 100 | 100 | 96 | - |
| Granger | 15 | 99 | 99 | 96 | 103 | 98 |
| Scope | 15 | 97 | 99 | 99 | 95 | 98 |
| Flinders | 15 | 94 | 97 | 94 | 99 | 96 |
| Schooner | 9 | 89 | 94 | 95 | - | - |
| Westminster | 15 | 89 | 91 | 83 | 100 | 92 |
| Gairdner | 15 | 85 | 90 | 87 | 91 | 91 |
| FOOD | | | | | | |
| Hindmarsh | 15 | 109 | 109 | 114 | 96 | 105 |
| FEED | | | | | | |
| Rosalind | 12 | - | 113 | 119 | 110 | 110 |
| Fathom | 15 | 108 | 106 | 113 | 106 | 108 |
| Keel | 15 | 102 | 103 | 110 | 96 | 104 |
| Fleet | 15 | 103 | 101 | 106 | 98 | 104 |
| Oxford | 12 | 95 | 94 | 88 | - | 96 |
| PENDING MALT ACCREDITATION | | | | | | |
| RGT Planet | 6 | - | - | - | 123 | 107 |
| Banks | 9 | - | - | 108 | 105 | 105 |
| Bottler | 3 | - | - | - | - | 101 |
| Alestar | 15 | 97 | 97 | 93 | 104 | 97 |

BARLEY

TABLE 7. YORKE PENINSULA barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | YORKE PENINSULA | | | | |
|-----------------------------------|-----------------|-----------------|------|------|------|------|
| | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 4.28 | 4.32 | 3.63 | 6.36 | 4.7 |
| Variety | No. Trials | 5 | 5 | 4 | 5 | 5 |
| MALTING | | | | | | |
| Compass | 24 | 108 | 111 | 120 | 98 | 105 |
| Spartacus CL | 19 | - | 108 | 116 | 99 | 102 |
| La Trobe | 24 | 110 | 106 | 113 | 99 | 102 |
| Commander | 24 | 102 | 103 | 103 | 99 | 101 |
| Bass | 24 | 102 | 97 | 100 | 103 | 99 |
| Charger | 24 | 94 | 101 | 100 | 101 | 103 |
| Buloke | 14 | 99 | 98 | 100 | - | - |
| Granger | 24 | 100 | 97 | 95 | 101 | 99 |
| Scope | 24 | 97 | 98 | 99 | 96 | 98 |
| Flinders | 24 | 94 | 93 | 92 | 97 | 96 |
| Schooner | 14 | 89 | 91 | 94 | - | - |
| Westminster | 24 | 90 | 89 | 81 | 98 | 94 |
| Gairdner | 24 | 83 | 89 | 86 | 91 | 94 |
| FOOD | | | | | | |
| Hindmarsh | 24 | 108 | 105 | 113 | 97 | 101 |
| FEED | | | | | | |
| Rosalind | 19 | - | 112 | 118 | 108 | 107 |
| Fathom | 24 | 108 | 108 | 115 | 106 | 106 |
| Fleet | 24 | 103 | 105 | 109 | 101 | 103 |
| Keel | 24 | 101 | 104 | 112 | 98 | 103 |
| Oxford | 19 | 98 | 95 | 88 | - | 99 |
| PENDING MALT ACCREDITATION | | | | | | |
| RGT Planet | 10 | - | - | - | 116 | 110 |
| Banks | 14 | - | - | 109 | 105 | 106 |
| Bottler | 5 | - | - | - | - | 104 |
| Alestar | 24 | 96 | 97 | 92 | 102 | 99 |

BARLEY

TABLE 8. MURRAY MALLEE barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | MURRAY MALLEE | | | | |
|-----------------------------------|-----------------|---------------|------|------|------|------|
| | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 2.4 | 2.44 | 1.58 | 5.54 | 3.65 |
| Variety | No. Trials | 3 | 3 | 2 | 2 | 2 |
| MALTING | | | | | | |
| Compass | 12 | 115 | 122 | 123 | 101 | 103 |
| Spartacus CL | 9 | - | 111 | 120 | 102 | 106 |
| La Trobe | 12 | 97 | 111 | 117 | 102 | 105 |
| Commander | 12 | 100 | 93 | 96 | 100 | 102 |
| Scope | 12 | 96 | 98 | 99 | 96 | 97 |
| Buloke | 10 | 92 | 96 | 100 | 97 | - |
| Flinders | 10 | 91 | 96 | 95 | 96 | - |
| Granger | 8 | 94 | 95 | 94 | - | - |
| Bass | 12 | 82 | 90 | 105 | 96 | 100 |
| Schooner | 12 | 81 | 89 | 96 | 83 | 89 |
| FOOD | | | | | | |
| Hindmarsh | 12 | 98 | 113 | 117 | 101 | 103 |
| FEED | | | | | | |
| Rosalind | 9 | - | 118 | 122 | 111 | 111 |
| Fathom | 12 | 106 | 109 | 120 | 100 | 102 |
| Keel | 12 | 108 | 113 | 118 | 94 | 96 |
| Fleet | 12 | 106 | 100 | 106 | 98 | 100 |
| Oxford | 12 | 94 | 83 | 82 | 104 | 102 |
| PENDING MALT ACCREDITATION | | | | | | |
| RGT Planet | 4 | - | - | - | 119 | 108 |
| Banks | 6 | - | - | 111 | 106 | 102 |

BARLEY

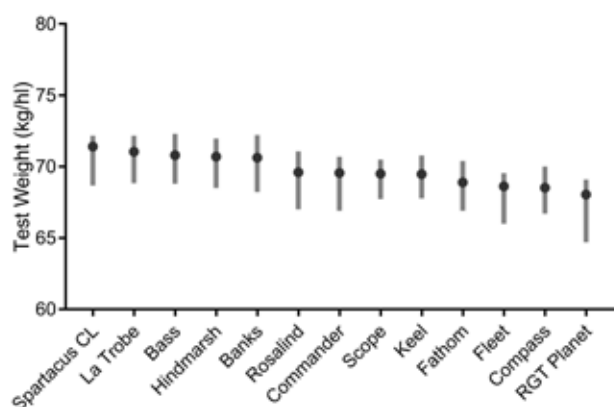
TABLE 9. SOUTH EAST barley yield performance.
Long term predicted yield expressed as a percentage of mean yield.

| | | SOUTH EAST | | | | |
|-----------------------------------|-----------------|------------|------|------|------|------|
| | year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 5.49 | 3.05 | 1.62 | 6.12 | 5.32 |
| Variety | No. Trials | 2 | 2 | 2 | 2 | 2 |
| MALTING | | | | | | |
| Spartacus CL | 8 | - | 114 | 136 | 99 | 105 |
| Compass | 10 | 99 | 116 | 139 | 93 | 99 |
| La Trobe | 10 | 100 | 112 | 131 | 99 | 105 |
| Bass | 10 | 99 | 102 | 103 | 109 | 103 |
| Charger | 10 | 102 | 102 | 110 | 95 | 97 |
| Buloke | 8 | 97 | 101 | 103 | 97 | - |
| Commander | 10 | 101 | 100 | 96 | 98 | 98 |
| Granger | 10 | 101 | 96 | 92 | 103 | 103 |
| Scope | 10 | 96 | 100 | 101 | 95 | 97 |
| Flinders | 10 | 96 | 96 | 94 | 98 | 99 |
| Schooner | 7 | 84 | 101 | 102 | - | 89 |
| Westminster | 10 | 98 | 85 | 67 | 100 | 99 |
| Gairdner | 10 | 90 | 93 | 83 | 87 | 89 |
| FOOD | | | | | | |
| Hindmarsh | 10 | 98 | 112 | 132 | 96 | 103 |
| FEED | | | | | | |
| Rosalind | 8 | - | 113 | 134 | 110 | 112 |
| Fathom | 10 | 102 | 112 | 123 | 109 | 101 |
| Keel | 8 | 95 | 112 | 125 | - | 95 |
| Fleet | 9 | 100 | 105 | 107 | 100 | 96 |
| Capstan | 9 | 109 | 94 | 79 | 117 | 101 |
| Oxford | 10 | 106 | 87 | 68 | 111 | 104 |
| PENDING MALT ACCREDITATION | | | | | | |
| RGT Planet | 4 | - | - | - | 118 | 112 |
| Banks | 6 | - | - | 112 | 103 | 100 |
| Bottler | 4 | - | - | - | 107 | 103 |

GRAIN QUALITY PERFORMANCE TRENDS

Grain quality for individual varieties vary from site to site and from year to year. However, long term trends highlight varieties which can consistently achieve either higher test weights, low grain screenings, or high grain retention under a wider range of environments.

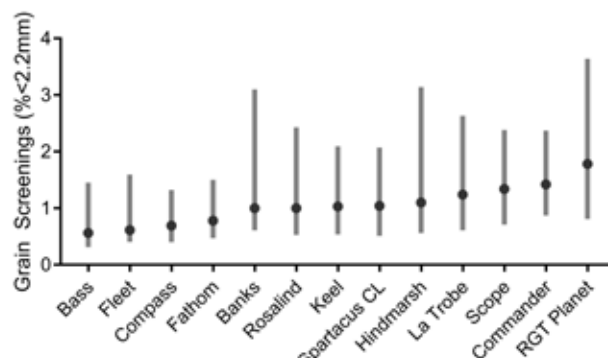
The following diagrams are aimed to demonstrate variety trends in key grain quality traits.



TEST WEIGHT (KG/HL)

Figure 2. The diagram above shows the median test weight of varieties in NVT trials 2016-2017 (closed symbol). Varieties are ranked in descending order of grain testweight based on the median value. The bars represent the range in which testweights have occurred in 50% of trials. The shorter the bar the more consistent the variety.

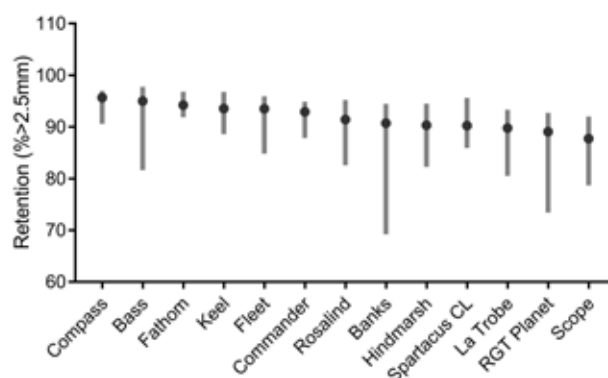
The varieties Spartacus CL, La Trobe, Bass, Hindmarsh and Banks all maintain relatively high and consistent testweights. Whereas Fathom, Fleet, Compass all trend lower and RGT Planet the lowest testweight in this dataset.



GRAIN SCREENINGS

Figure 4. The diagram above shows the median grain screenings of varieties in NVT trials 2016-2017 (closed symbol). Varieties are ranked in increasing order of grain screenings based on the median value. The bars represent the range in which grain screenings have occurred in 50% of trials. The shorter the bar the more consistent the variety.

The varieties Bass, Fleet, Compass and Fathom have consistently low grain screenings. RGT Planet has trended higher for grain screenings and is the most variable.



GRAIN RETENTION

Figure 3. The diagram above shows the median grain retention of varieties in NVT trials 2016-2017 (closed symbol). Varieties are ranked in descending order of grain retention based on the median value. The bars represent the range in which grain retention have occurred in 50% of trials. The shorter the bar the more consistent the variety.

The varieties Compass and Bass are the plumpest varieties, however Compass is more consistent. Bass, Banks and RGT Planet were the most variable in grain plumpness.

Canola variety sowing guide 2019

By Andrew Ware, SARDI

There have been seven new canola varieties released and available for planting in South Australia since the publication of the 2018 Canola Variety Sowing Guide. Of these, Pioneer 45Y93 and Pheonix CL are new Clearfield tolerant varieties. Hyola 550TT, Pioneer 45T03, SF Spark TT, and InVigor T3510 are all new hybrid TT varieties and Hyola 580CT is a new hybrid canola variety with tolerance to both the TT and imidazolinone herbicide chemistry groups.

There may be further variety releases in the months to follow, with seed possibly being available for planting in 2019, but these can't be confirmed at this time.

It should be noted that the marketing company responsible for each of the varieties listed in this document has advised that they are planning to have seed available for each of these varieties for planting in 2019, however not all varieties that are still marketed have been tested in NVT trials in 2018. Some older varieties have not been evaluated in NVT trials for several years, but seed remains available. Several new varieties are only being evaluated in NVT trials for the first time in 2018 and no NVT yield data for these varieties is currently available.

There are two groups NVT canola trials conducted in South Australia, mid-maturity and early maturity series. Both sets trials have similar sowing and harvest times and have a similar complement of varieties, although there may be several early maturity varieties in the early series that are not tested in the mid series, or vice versa.

The main difference between the series is that the trials are located in areas suited to their maturity, with the majority of the early series in the lower rainfall zone and the mid-season in the medium to high rainfall zones.

Seeding rates of NVT trials are adjusted to target 40 plants/m² in early maturity trials and 50 plants/m² in mid-maturity trials.

All NVT canola trials are treated with flutriafol in-furrow fungicide placed on fertiliser at sowing for the control of blackleg disease.

SPECIALITY TYPES

In recent years a number of specialty canola varieties have been released. These include the Victory® varieties (marketed by AWB/ Cargill) and Monola® varieties (marketed by Nuseed). These varieties have a different oil profile than commodity canola that is more suitable for use in the food industry. Agronomically specialty canola is the same as commodity

canola. Speciality canola is being offered to growers in a closed loop marketing systems, attracting a significant premium price. Production contracts for these varieties are available in the South East and Mid North regions.

WINTER TYPE/ GRAIN 'N GRAZE CANOLA

A number of winter type canola varieties are currently available. These varieties have a high vernalisation (or cold) requirement which mean they are capable of producing high quantities of biomass before they commence flowering and make use of extended growing seasons. This enables them to be grazed over a relatively large window with often little damage to grain yield. These varieties are not evaluated in NVT trials, however are suited to some environments that have a long growing season, such as the lower South East and Kangaroo Island, or in situations where growers are looking to utilise either spring, summer or early autumn rainfall events. They include, Hyola® 970CL, Edimax CL and Phoenix CL – all Clearfield® tolerant types.

VARIETAL SELECTION

The selection of the most suitable canola variety for a particular situation needs consideration of maturity, herbicide tolerance, blackleg resistance, relative yield, oil content and early vigour.

- The weed species expected may dictate the need for a herbicide tolerant production system (e.g., triazine tolerant or Clearfield). It should be noted that a triazine tolerant variety will incur a yield and oil penalty when grown in situations where they are not warranted.
- Blackleg has the potential to be a very destructive disease in canola and its management through varietal selection, fungicides and cultural practices are important in maximising yield potential. Varietal blackleg resistance and/or fungicide use should be considered, particularly when rotations are close.
- Recent research has found that early seeding canola has the potential to maximise water use efficiency. If canola is planted earlier than the traditional window of late April – early May, it is important to consider matching the varieties flowering time with the early seeding date, so that biomass is maximized and frost and heat risk are minimized. To do this planting fast flowering varieties in the medium and high rainfall areas in early to mid-April should be avoided.

CANOLA

TABLE 1. Agronomic and disease information of selected canola varieties

| Variety | Licensee | Release Year | Type [^] | Phenology ^{**} | Maturity | Blackleg Resistance (Bare) | Blackleg Resistance (+Jockey) | Blackleg Resistance Group |
|--------------------------|----------------|--------------|-------------------|-------------------------|----------|----------------------------|-------------------------------|---------------------------|
| TRIAZINE TOLERANT | | | | | | | | |
| ATR Bonito | Nuseed | 2013 | OP | Mid-fast | E-EM | MS | MR | A |
| ATR Mako | Nuseed | 2015 | OP | Mid-fast | EM | MR | R | A |
| ATR Stingray | Nuseed | 2011 | OP | Fast | E | MR | R | C |
| ATR Wahoo | Nuseed | 2013 | OP | Mid-slow | ML | MS | R-MR | A |
| DG 560TT | Seednet | 2016 | Hybrid | - | M | MR | R | BF |
| DG 670TT | Seednet | 2017 | Hybrid | Mid | ML | MR | R | BF |
| Hyola 350TT | Advanta Seeds | 2017 | Hybrid | Fast | E | R | - | ABDF |
| Hyola 559TT | Advanta Seeds | 2012 | Hybrid | Mid | M | MR | - | ABD |
| Hyola 580CT*** | Advanta Seeds | 2018 | Hybrid | Mid-fast | EM | R-MR | - | BC |
| Hyola 650TT | Advanta Seeds | 2014 | Hybrid | - | ML | R | - | ABD |
| HyTTec Trophy | Nuseed | 2017 | Hybrid | Mid | E-EM | R-MR | R | ABD |
| InVigor T 4510 | Bayer | 2016 | Hybrid | Mid-fast | EM | MR-MS | R | BF |
| Monola 515 TT | Nuseed | 2015 | Spec. Oil | - | | MR | R | Different |
| Pioneer 44T02 TT | Pioneer Brand | 2016 | Hybrid | Mid-fast | EM | R-MR | R | ABD |
| SF Ignite TT | Seed Force | 2017 | Hybrid | Mid-slow | M-ML | MR | R | BF |
| SF Turbine TT | Seed Force | 2016 | Hybrid | Mid | EM | MR-MS | R-MR | BF |
| CLEARFIELD | | | | | | | | |
| Banker CL | Heritage Seeds | 2012 | Hybrid | Mid-fast | M | MR-MS | R | A |
| Hyola 575CL | Advanta Seeds | 2010 | Hybrid | - | M | R | - | BF |
| Pioneer 43Y92 (CL) | Pioneer Brand | 2017 | Hybrid | Mid-fast | E | R-MR | R | B |
| Pioneer 44Y90 (CL) | Pioneer Brand | 2016 | Hybrid | Mid-fast | EM | R-MR | R | B |
| Pioneer 45Y91 (CL) | Pioneer Brand | 2016 | Hybrid | Mid | M | MR | R | B |
| Pioneer 45Y93 (CL) | Pioneer Brand | 2018 | Hybrid | - | M | R-MR | - | BC |
| Saintly CL | Heritage Seeds | 2017 | Hybrid | - | M | MR | R | B |
| Victory V7002CL | Cargill | 2016 | Spec. Oil | Slow | ML | MR | R | ABF |
| CONVENTIONAL | | | | | | | | |
| AV Garnet | Nuseed | 2007 | OP | Mid | M | MS | MR | A |
| Nuseed Diamond | Nuseed | 2013 | Hybrid | Fast | E | MR | R | ABF |
| Nuseed Quartz | Nuseed | 2017 | Hybrid | Mid | M | R | R | ABD |
| Victory® V3002 | Cargill/ AWB | 2012 | Spec. Oil | - | M | MR | R | ABF |

[^]Type: OP = Open Pollinated Spec. Oil = High Stability Specialty Oil^{**} Phenology = time to start of flowering in crops established early (before 20 April). Data source GRDC Optimised Canola Profitability Project.

Maturity: E= early, M= mid, L = Late. Data source canola breeding companies

Blackleg rating key: R = resistant, MR = moderately resistant, MS = moderately susceptible, S= susceptible. Data source GRDC Blackleg Management Guide

Jockey® seed dressing contains fluquinconazole

Blackleg resistance group refers to the combinations of blackleg resistance genes carried by each variety. Data source GRDC Blackleg Management Guide

*** Hyola 580CT is tolerant to both Triazine and Imidazolinone herbicide chemistries

CANOLA

CONVENTIONAL CANOLA

AV-GARNET

Mid-early to mid to maturing. Medium height. Widely adapted. Blackleg resistance rating of MS (resistance group A). Tested in NVT trials 2006-2018. Bred by DPI Victoria. Marketed by Nuseed Pty Ltd.

NUSEED DIAMOND

Early maturing hybrid. Very fast to flower. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of MR (resistance group ABF). Tested in NVT trials in 2012-18. Bred and marketed by Nuseed Pty Ltd.

NUSEED QUARTZ

Mid maturing hybrid. Potential replacement for AV Garnet. Medium height. Blackleg resistance rating of R (resistance group ABD). Tested in NVT trials 2016-18. Bred and marketed by Nuseed Pty Ltd.

VICTORY V3002

Early-mid maturing conventional specialty (high stability oil) hybrid. Blackleg resistance rating of MR (resistance group ABF). Tested in NVT trials in 2011-2018. Bred by Cargill and DPI Victoria. Marketed by AWB under contract.

HERBICIDE TOLERANT

Notes on newly released Clearfield (imidazolinone tolerant) varieties

PIONEER 45Y93 (CL)

An early flowering (similar to 44Y90CL), mid maturing hybrid variety. Medium – tall plant height. A blackleg rating of R-MR (resistance group BC). Tested in NVT trials in 2017-18. Marketed by Pioneer Brand Seeds.

PHEONIX CL

A new winter graze and grain dual purpose hybrid variety. AGF Seeds indicate high biomass with excellent yield and oil content. Suited to early sowing and spring sowing in high rainfall areas. Blackleg resistance rating of R-MR (resistance group B). Not tested in NVT trials. Marketed by AGF Seeds.

Notes on recently released Clearfield (imidazolinone tolerant) varieties

BANKER CL

Mid maturing hybrid. Medium plant height. Suited to medium

rainfall areas. Blackleg resistance rating MR-MS (resistance group A). Tested in NVT trials 2014-18, marketed by Heritage Seeds.

HYOLA® 575CL

Mid-Early maturing CL hybrid. Fast to flower from early sowing. Medium plant height. Suited to medium to high rainfall areas. Blackleg resistance rating of R (resistance group BF). Tested in SA NVT trials in 2010-18. Bred by Pacific Seeds and marketed by Advanta Seeds.

HYOLA® 970CL

Long season, winter graze and grain dual purpose hybrid. Advanta Seeds indicate high-very high biomass, good grain yield and oil content. Suited to sowing in early-mid autumn and spring sowing in very high rainfall zones. Blackleg resistance rating of R (resistance group H). Not tested in NVT trials. Marketed by Advanta Seeds.

PIONEER 43Y92 (CL)

Early maturing hybrid. High oil content. Medium plant height. Blackleg resistance rating of R-MR (resistance group B). Suited to low - medium rainfall areas and short season growing zones. Tested in NVT trials 2016-18. Marketed by Pioneer Brand Seeds.

PIONEER 44Y90 (CL)

An early-mid maturing hybrid. High oil content. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of R-MR (resistance group B). Tested in NVT trials in 2015-18. Marketed by Pioneer Brand Seeds.

PIONEER 45Y91 (CL)

A mid maturing hybrid variety. Medium-tall plant height. Suited to medium-high rainfall areas. A blackleg rating of MR (resistance group B). Tested in NVT trials in 2015-18. Marketed by Pioneer Brand Seeds.

SAINTLY CL

Mid maturity hybrid slightly earlier than Banker, High oil content, medium plant height. Blackleg rating MR (resistance group B). Tested in NVT 2016-18. Marketed by Heritage Seeds.

SF EDIMAX CL

Long season winter dual-purpose grain and graze hybrid. Seed Force indicates high biomass with excellent yield and oil content. Suited to early sowing and spring sowing in high rainfall areas. Blackleg resistance rating of R-MR (resistance group C). Not tested in NVT trials. Marketed by Seed Force.

CANOLA

TABLE 2. LOWER EYRE PENINSULA mid-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield.

| Variety | Year | 2013 | 2014 | 2015 | 2016 |
|--------------------|-----------------|------|-----------|------|------|
| | mean yield t/ha | 1.71 | 1.88 | 2.07 | 2.64 |
| | No. Trials | 2 | 2 | 2 | 1 |
| TRIAZINE TOLERANT | | | | | |
| Hyola 350TT | 1 | - | - | - | 107 |
| Hyola 650TT | 6 | 103 | 102 | 106 | 99 |
| Hyola 559TT | 5 | 106 | - | 101 | 98 |
| Pioneer 44T02 TT | 2 | - | - | 96 | - |
| DG 560TT | 1 | - | - | - | 93 |
| ATR Bonito | 5 | 93 | - | 97 | 89 |
| ATR Wahoo | 7 | 87 | 88 | 103 | 93 |
| ATR Mako | 5 | - | 98 | 97 | 77 |
| ATR Stingray | 4 | 88 | 90 | - | - |
| CLEARFIELD | | | | | |
| | mean yield t/ha | 1.71 | No result | 2.06 | 2.64 |
| Variety | No. Trials | 2 | | 2 | 1 |
| Banker CL | 3 | - | | 113 | 114 |
| Pioneer 44Y90 (CL) | 3 | - | | 114 | 112 |
| Pioneer 45Y91 (CL) | 1 | - | | - | 110 |
| Pioneer 43Y92 (CL) | 1 | - | | - | 109 |
| Saintly CL | 3 | - | | 108 | 101 |
| Pioneer 45Y88 (CL) | 4 | 101 | | 106 | 105 |
| Hyola 575CL | 5 | 104 | | 95 | 84 |
| CONVENTIONAL | | | | | |
| | mean yield t/ha | 1.71 | 1.87 | 2.07 | 2.64 |
| Variety | No. Trials | 2 | 2 | 2 | 1 |
| Nuseed Quartz | 1 | - | - | - | 111 |
| Nuseed Diamond | 7 | 107 | 108 | 98 | 100 |
| Victory V3002 | 7 | 98 | 96 | 97 | 79 |
| AV Garnet | 7 | 87 | 87 | 101 | 99 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

Unseasonal conditions in 2017 resulted in no NVT canola trials being planted on LEP.

CANOLA

Notes on newly released Triazine tolerant (TT) and Clearfield (imidazolinone tolerant) variety

HYOLA® 580CT

A new class of herbicide tolerance. Hyola 580CT carries both tolerance to both triazine and Clearfield herbicide chemistries. It is a mid maturing hybrid. Hyola® 580CT is thermal responsive and when sown in Mid-April will commence flowering at a similar time to other varieties with mid-fast phenology. Medium plant height. Suited to low-medium through to high rainfall areas. Blackleg resistance rating R-MR, (resistance groups BC). Tested in NVT trials in 2017-18. Bred and marketed by Advanta Seeds.

Notes on newly released Triazine tolerant (TT) varieties

HYOLA® 550TT

Mid-early maturing TT hybrid. Advanta suggests increased oil content and yield on Hyola® 559TT. Medium plant height. Suited to medium-high rainfall areas. Blackleg resistance rating R (Provisional), (resistance groups ABD Provisional). Tested in NVT trials for the first time in 2018. Bred and marketed by Advanta Seeds.

INVIGOR® T 3510

Early maturing triazine tolerant hybrid. Blackleg rating yet to be determined. Tested in NVT trials in for the first time in 2018. Marketed by BASF (formerly Bayer).

PIONEER 45T03 (TT)

A mid maturing triazine tolerant hybrid. Medium plant height. Suited to medium-high rainfall areas. Blackleg rating still to be determined. Tested in NVT trials in for the first time in 2018. Marketed by Pioneer Brand Seeds.

SF SPARK TT

Early maturing triazine tolerant hybrid. Blackleg resistance R (resistance groups ABDF). Entered in NVT trials for the first time in 2018. Marketed by Seed Force.

Notes on recently released Triazine tolerant (TT) varieties

ATR BONITO

Early-mid season maturing open pollinated variety. Short-medium height. Suited to low-medium rainfall areas. Blackleg resistance rating of MS (resistance group A). Tested in NVT trials 2012-18. Marketed by Nuseed (EPR \$5.00/t ex GST).

ATR GEM

Early-mid maturity variety open pollinated. Medium plant height. Blackleg resistance rating of MS (resistance group A).

Gem has been superseded now and is no longer tested in NVT trials. Tested in NVT trials 2011-16. Marketed by Nuseed Pty Ltd.

ATR MAKO

Early-mid maturity triazine tolerant open pollinated variety. Medium (slightly taller than Gem) plant height. Suited to medium – high rainfall areas. Blackleg resistance rating of MR (resistance group A). Tested in NVT trials 2013-18. Marketed by Nuseed Pty Ltd (EPR \$5.00/t ex GST).

ATR-STINGRAY

Early maturing open pollinated variety. Fast to flowering. Short height. Blackleg resistance rating of MR (resistance group C). Tested in NVT trials 2011-18. Bred by Nuseed Pty Ltd and DPI Victoria. Marketed by Nuseed Pty Ltd.

ATR WAHOO

Mid maturity open pollinated variety. Medium plant height. Blackleg rating of MS (resistance group A). Suited to medium – high rainfall areas. Tested in NVT trials 2012-17. Marketed by Nuseed (EPR \$5.00/t ex GST).

DG 560TT

A mid maturity Triazine Tolerant hybrid. Medium to tall plant height. Suited to medium rainfall areas. Blackleg resistance of MR (resistance group BF). Tested in NVT in 2015-18. Limited quantity of seed available for 2019 planting. Marketed by Landmark and Seednet.

DG 670TT

A mid-late maturity Triazine Tolerant hybrid. Medium to tall plant height. Suited to medium–high rainfall areas. Blackleg resistance of MR (resistance group BF). Tested in NVT in 2016-18. Marketed by Landmark and Seednet.

HYOLA® 350TT

Early maturing TT hybrid. Medium plant height. Blackleg resistance rating of R (resistance groups ABDF). Tested in NVT trials in 2016-18. Bred and marketed by Advanta Seeds.

HYOLA® 559TT

Mid-early maturing TT hybrid. Medium plant height. Suited to low-medium through to high rainfall areas. Blackleg resistance rating of R-MR, (resistance groups ABD). Tested in NVT trials in 2012-18. Bred and marketed by Advanta Seeds.

HYOLA® 650TT

Mid to mid-late maturing TT hybrid. Medium-tall plant height. Suited to medium –high rainfall areas. Blackleg resistance rating of R (resistance groups ABD). Tested in NVT trials in 2013-18. Marketed by Advanta Seeds.

HYTTECH TROPHY

An early to mid-maturity hybrid canola. Medium –tall plant height. Nuseed indicates a blackleg rating from internal trials of R-MR, with the resistance group yet to be determined. In NVT for the first time in 2017, release for 2018 season. HyTTech Trophy is marketed with an EPR of \$10/tonne, but a reduced seed price compared to other hybrid varieties. Bred and marketed by Nuseed.

IN VIGOR T 4510

Mid-season Triazine Tolerant hybrid variety. Medium plant height. Suited to medium rainfall areas. Blackleg resistance

rating of MR-MS (resistance group BF). Tested in NVT trials 2016-18. Marketed by BASF.

MONOLA® 314TT

Early maturing specialty oil open pollinated variety. Medium planted height. No current blackleg rating (resistance group unknown). Tested in NVT trials in 2013-15. Bred and marketed by Nuseed Pty Ltd. A premium payment will apply to Monola 314TT. Must be delivered to Glencore Grain at Tarlee and Coomandook.

TABLE 3. UPPER EYRE PENINSULA early-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield

| TRIAZINE TOLERANT | | | | | |
|--------------------------|-----------------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 |
| | mean yield t/ha | 1.16 | 1.28 | 1.55 | 1.32 |
| | No. Trials | 1 | 2 | 2 | 2 |
| InVigorT 4510 | 2 | - | - | - | 109 |
| Hyola 559TT | 7 | 115 | 111 | 104 | 104 |
| Pioneer 44T02 TT | 4 | - | - | 103 | 108 |
| ATR Stingray | 7 | 97 | 101 | 102 | 96 |
| ATR Bonito | 7 | 91 | 95 | 100 | 94 |
| CLEARFIELD | | | | | |
| Variety | mean yield t/ha | 1.16 | 1.28 | 1.55 | 1.33 |
| | No. Trials | 1 | 2 | 2 | 2 |
| | | | | | |
| Saintly CL | 2 | - | - | 110 | - |
| Pioneer 44Y90 (CL) | 4 | - | - | 113 | 108 |
| Banker CL | 4 | - | - | 92 | 114 |
| Pioneer 43Y92 (CL) | 2 | - | - | - | 105 |
| Hyola 575CL | 6 | - | 110 | 107 | 93 |
| CONVENTIONAL | | | | | |
| Variety | mean yield t/ha | 1.16 | 0.89 | 1.49 | 1.68 |
| | No. Trials | 1 | 1 | 1 | 1 |
| | | | | | |
| Nuseed Diamond | 3 | - | 140 | 121 | 106 |
| Nuseed Quartz | 1 | - | - | - | 109 |
| Victory V3002 | 2 | - | - | 106 | 89 |
| AV Garnet | 4 | 89 | 82 | 92 | 93 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

Unseasonal conditions in 2017 resulted in no NVT canola trials being planted on UEP.

CANOLA

TABLE 4. MID NORTH mid-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield

| TRIAZINE TOLERANT | | | | | | |
|--------------------------|-----------------|------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 2.35 | 2.34 | 1.76 | 2.8 | 2.34 |
| | No. Trials | 3 | 3 | 3 | 3 | 3 |
| HyTtec Trophy | 3 | - | - | - | - | 115 |
| InVigor T 4510 | 6 | - | - | - | 112 | 108 |
| SF Ignite TT | 5 | - | - | - | 110 | 106 |
| DG 670TT | 5 | - | - | - | 109 | 105 |
| SF Turbine TT | 9 | - | - | 107 | 107 | 104 |
| Hyola 350TT | 2 | - | - | - | 106 | 105 |
| Pioneer 44T02 TT | 6 | - | - | 106 | 108 | 102 |
| Hyola 559TT | 15 | 103 | 104 | 106 | 101 | 103 |
| Hyola 650TT | 12 | 104 | 103 | 99 | 100 | 103 |
| DG 560TT | 8 | - | - | 103 | 97 | 100 |
| Hyola 580CT | 1 | - | - | - | - | 97 |
| ATR Mako | 11 | - | 98 | 99 | 86 | 99 |
| ATR Bonito | 14 | 92 | 95 | 98 | 92 | 97 |
| ATR Stingray | 11 | 91 | 91 | 95 | 99 | 93 |
| ATR Wahoo | 10 | 93 | 91 | 87 | 91 | 95 |
| Monola 314TT | 8 | 81 | 84 | 82 | - | - |
| Monola 515TT | 10 | - | 85 | 73 | 81 | 83 |
| CLEARFIELD | | | | | | |
| Variety | mean yield t/ha | 2.35 | 2.35 | 1.76 | 2.79 | 2.35 |
| | No. Trials | 3 | 3 | 3 | 3 | 3 |
| | No. Trials | 3 | 3 | 3 | 3 | 3 |
| Saintly CL | 9 | - | - | 127 | 108 | 114 |
| Pioneer 44Y90 (CL) | 9 | - | - | 122 | 113 | 114 |
| Pioneer 45Y93 CL | 3 | - | - | - | - | 116 |
| Pioneer 43Y92 (CL) | 5 | - | - | - | 112 | 113 |
| Banker CL | 11 | - | 108 | 115 | 112 | 110 |
| Pioneer 45Y91 (CL) | 8 | - | 107 | - | 110 | 109 |
| VICTORY V7002CL | 2 | - | - | - | - | 107 |
| Hyola 575CL | 15 | 101 | 101 | 94 | 90 | 98 |
| CONVENTIONAL | | | | | | |
| Variety | mean yield t/ha | 2.25 | 2.35 | 1.8 | 2.92 | 1.97 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| Nuseed Quartz | 2 | - | - | - | 118 | 119 |
| Nuseed Diamond | 4 | - | 111 | 112 | 108 | 112 |
| Victory V3002 | 4 | 96 | 92 | 94 | 83 | - |
| AV Garnet | 5 | 95 | 84 | 87 | 88 | 85 |

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

MONOLA® 515TT

A mid to late maturing specialty oil open pollinated variety. Blackleg rating of MR (resistance group unknown). Tested in NVT trials in 2014-17. Bred and marketed by Nuseed Pty Ltd. A premium payment will apply to Monola 515TT. Must be delivered to Glencore Grain at Tarlee and Coomandook.

PIONEER 44T02 (TT)

An early-mid maturing hybrid variety. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of R-MR (resistance group ABD). Tested in NVT trials in 2015-18. Marketed by Pioneer Brand Seeds.

SF IGNITE TT

Mid to mid-late maturing hybrid. Suited to medium to high rainfall zones. Medium plant height. Suited to medium-high rainfall areas. Blackleg resistance rating of MR (resistance group BF). Tested in NVT 2016-18. Marketed by Seed Force.

SF TURBINE TT

Early-Mid maturing hybrid. Medium plant height. Suited to medium rainfall areas. Blackleg resistance rating of MR-MS (resistance group BF). Tested in NVT 2015-18. Marketed by Seed Force. ■

TABLE 5. YORKE PENINSULA early-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield

| TRIAZINE TOLERANT | | | | | | |
|--------------------------|-----------------|------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 1.99 | 2.15 | 1.68 | 2.69 | 2.75 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| HyTtec Trophy | 1 | - | - | - | - | 110 |
| Hyola 559TT | 4 | 112 | 110 | 105 | 110 | - |
| Pioneer 44T02 TT | 3 | - | - | 109 | 110 | 106 |
| InVigor T4510 | 2 | - | - | - | 109 | 106 |
| SF Turbine TT | 3 | - | - | 99 | 112 | 104 |
| Hyola 350TT | 1 | - | - | - | - | 102 |
| DG 560TT | 3 | - | - | 105 | 97 | 101 |
| ATR Stingray | 5 | 96 | 97 | 101 | 93 | 98 |
| ATR Mako | 2 | - | 98 | 96 | - | - |
| ATR Bonito | 5 | 92 | 93 | 96 | 89 | 96 |
| Monola 314TT | 1 | 86 | - | - | - | - |
| Monola 515TT | 2 | - | 81 | 74 | - | - |
| CLEARFIELD | | | | | | |
| Variety | mean yield t/ha | 1.99 | 2.15 | 1.68 | 2.69 | 2.75 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| | | | | | | |
| Pioneer 44Y90 (CL) | 3 | - | - | 123 | 111 | 109 |
| Saintly CL | 2 | - | - | 120 | - | 107 |
| Banker CL | 3 | - | - | 104 | 114 | 107 |
| Pioneer 43Y92 (CL) | 2 | - | - | - | 107 | 107 |
| VICTORY V7002CL | 1 | - | - | - | - | 101 |
| Hyola 575CL | 5 | 108 | 104 | 100 | 95 | 97 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

CANOLA

TABLE 6. YORKE PENINSULA mid-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield.

| TRIAZINE TOLERANT | | | | | | |
|--------------------|-----------------|------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 2.13 | 2.49 | 2.42 | 2.75 | 3.1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| HyTec Trophy | 1 | - | - | - | - | 110 |
| InVigor T 4510 | 2 | - | - | - | 112 | 106 |
| SF Ignite TT | 2 | - | - | - | 107 | 106 |
| DG 670TT | 2 | - | - | - | 106 | 106 |
| Pioneer 44T02 TT | 3 | - | - | 104 | 110 | 101 |
| Hyola 559TT | 5 | 106 | 106 | 104 | 105 | 102 |
| Hyola 650TT | 4 | - | 106 | 104 | 103 | 104 |
| SF Turbine TT | 3 | - | - | 102 | 107 | 102 |
| Hyola 350TT | 1 | - | - | - | - | 102 |
| Hyola 580CT | 1 | - | - | - | - | 100 |
| DG 560TT | 3 | - | - | 101 | 99 | 98 |
| ATR Mako | 4 | - | 95 | 101 | 92 | 98 |
| ATR Bonito | 4 | 91 | 89 | 96 | 91 | - |
| ATR Stingray | 5 | 88 | 84 | 91 | 91 | 94 |
| Monola 314TT | 1 | 87 | - | - | - | - |
| ATR Wahoo | 1 | 82 | - | - | - | - |
| Monola 515TT | 3 | - | 77 | 87 | 73 | - |
| CLEARFIELD | | | | | | |
| Variety | mean yield t/ha | 2.13 | 2.49 | 2.42 | 2.75 | 3.1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| Pioneer 43Y92 (CL) | 1 | - | - | - | 121 | - |
| Saintly CL | 3 | - | - | 111 | 119 | 105 |
| Banker CL | 4 | - | 112 | 107 | 116 | 107 |
| Pioneer 45Y93 CL | 1 | - | - | - | - | 110 |
| Pioneer 45Y91 (CL) | 3 | - | 111 | - | 114 | 105 |
| Pioneer 44Y90 (CL) | 2 | - | - | 111 | - | 108 |
| Hyola 575CL | 5 | 108 | 103 | 102 | 95 | 100 |
| VICTORY V7002CL | 1 | - | - | - | - | 98 |
| CONVENTIONAL | | | | | | |
| Variety | mean yield t/ha | 2.13 | 2.49 | 2.42 | 2.75 | 3.1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| Nuseed Quartz | 2 | - | - | - | 121 | 111 |
| Nuseed Diamond | 4 | - | 104 | 104 | 109 | 99 |
| Victory V3002 | 4 | 97 | 95 | 100 | 90 | - |
| AV Garnet | 5 | 84 | 87 | 92 | 87 | 98 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

CANOLA

TABLE 7. MURRAY MALLEE early-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield.

| TRIAZINE TOLERANT | | | | |
|--------------------|-----------------|------|------|------|
| Variety | Year | 2015 | 2016 | 2017 |
| | mean yield t/ha | 0.48 | 1.44 | 1.31 |
| | No. Trials | 1 | 1 | 1 |
| HyTtec Trophy | 1 | - | - | 118 |
| InVigor T 4510 | 2 | - | 117 | 110 |
| Pioneer 44T02 TT | 3 | 113 | 110 | 108 |
| SF Turbine TT | 1 | - | - | 107 |
| Monola 416TT | 1 | 103 | - | - |
| ATR Stingray | 2 | 108 | 95 | - |
| Hyola 559TT | 2 | 100 | 101 | - |
| Hyola 350TT | 1 | - | - | 99 |
| ATR Bonito | 3 | 102 | 93 | 94 |
| Monola 314TT | 1 | 88 | - | - |
| Monola 515TT | 1 | 57 | - | - |
| CLEARFIELD | | | | |
| Variety | mean yield t/ha | 0.48 | 1.44 | 1.31 |
| | No. Trials | 1 | 1 | 1 |
| Saintly CL | 2 | 139 | - | 107 |
| Pioneer 44Y90 (CL) | 3 | 140 | 105 | 108 |
| Banker CL | 3 | 103 | 130 | 115 |
| Pioneer 43Y92 (CL) | 2 | - | 99 | 105 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

NVT canola trials were not conducted in the SA Mallee Region prior to 2015

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TABLE 8. SOUTH EAST early-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield.

| TRIAZINE TOLERANT | | | | | | |
|--------------------|-----------------|------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 1.93 | 0.36 | 0.66 | 2.38 | 1.73 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| HyTtec Trophy | 1 | - | - | - | - | 119 |
| Hyola 559TT | 4 | 114 | 116 | 121 | 101 | - |
| Pioneer 44T02 TT | 3 | - | - | 124 | 107 | 107 |
| InVigor T 4510 | 2 | - | - | - | 110 | 105 |
| SF Turbine TT | 3 | - | - | 109 | 103 | 107 |
| DG 560TT | 3 | - | - | 102 | 103 | 98 |
| Hyola 350TT | 1 | - | - | - | - | 99 |
| ATR Stingray | 5 | 95 | 109 | 95 | 99 | 96 |
| ATR Bonito | 5 | 91 | 96 | 83 | 96 | 93 |
| ATR Mako | 2 | - | 88 | 94 | - | - |
| ATR Wahoo | 1 | 88 | - | - | - | - |
| Monola 314TT | 3 | 83 | 75 | 52 | - | - |
| Monola 515TT | 2 | - | 24 | 41 | - | - |
| CLEARFIELD | | | | | | |
| Variety | mean yield t/ha | 1.93 | 0.36 | 0.66 | 2.38 | 1.73 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| Pioneer 44Y90 (CL) | 3 | - | - | 150 | 109 | 109 |
| Saintly CL | 2 | - | - | 137 | - | 105 |
| Banker CL | 3 | - | - | 108 | 113 | 106 |
| Pioneer 43Y92 (CL) | 2 | - | - | - | 107 | 107 |
| Hyola 575CL | 5 | 109 | 119 | 103 | 93 | 99 |
| VICTORY V7002CL | 1 | - | - | - | - | 99 |
| CONVENTIONAL | | | | | | |
| Variety | mean yield t/ha | 1.93 | 0.36 | 0.66 | 2.38 | 1.73 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| Nuseed Diamond | 5 | 104 | 214 | 146 | 108 | 100 |
| Nuseed Quartz | 2 | - | - | - | 110 | 112 |
| Victory V3002 | 2 | - | - | 88 | 88 | - |
| AV Garnet | 5 | 93 | 55 | 69 | 92 | 94 |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

CANOLA

TABLE 9. SOUTH EAST mid-season canola yield performance. Long term predicted yield expressed as a percentage of mean yield.

| TRIAZINE TOLERANT | | | | | | |
|--------------------|-----------------|------|------|------|------|------|
| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
| | mean yield t/ha | 2.6 | 1.23 | 0.98 | 2.7 | 3.21 |
| | No. Trials | 2 | 3 | 3 | 1 | 2 |
| HyTtec Trophy | 2 | - | - | - | - | 117 |
| InVigorT 4510 | 3 | - | - | - | 112 | 111 |
| SF Ignite TT | 3 | - | - | - | 109 | 112 |
| DG 670TT | 3 | - | - | - | 109 | 111 |
| SF Turbine TT | 3 | - | - | 112 | 107 | 102 |
| Hyola 350TT | 2 | - | - | - | 107 | 105 |
| Hyola 559TT | 11 | 101 | 106 | 105 | 102 | 101 |
| Pioneer 44T02 TT | 5 | - | - | 113 | 107 | 89 |
| DG 560TT | 4 | - | - | 104 | 98 | 100 |
| Hyola 580CT | 1 | - | - | - | - | 99 |
| Hyola 650TT | 9 | 107 | 94 | 92 | 100 | 105 |
| ATR Bonito | 10 | 91 | 91 | 97 | 93 | 104 |
| ATR Mako | 8 | - | 88 | 92 | 89 | 107 |
| ATR Stingray | 2 | 90 | - | - | - | - |
| ATR Wahoo | 10 | 99 | 75 | 80 | 91 | 108 |
| Monola 314TT | 8 | 80 | 82 | 84 | - | - |
| Monola 515TT | 8 | - | 71 | 66 | 80 | 88 |
| CLEARFIELD | | | | | | |
| Variety | mean yield t/ha | 2.6 | 1.24 | 0.98 | 2.7 | 3.21 |
| | No. Trials | 2 | 3 | 3 | 1 | 2 |
| | | | | | | |
| Pioneer 45Y93 CL | 2 | - | - | - | - | 119 |
| Saintly CL | 6 | - | - | 132 | 112 | 113 |
| Pioneer 44Y90 (CL) | 6 | - | - | 125 | 115 | 113 |
| VICTORYV7002CL | 2 | - | - | - | - | 116 |
| Banker CL | 7 | - | 113 | 117 | 113 | 110 |
| Pioneer 45Y91 (CL) | 3 | - | 115 | - | - | 107 |
| Pioneer 43Y92 (CL) | 2 | - | - | - | 114 | 106 |
| Hyola 575CL | 11 | 103 | 90 | 84 | 91 | 97 |
| CONVENTIONAL | | | | | | |
| Variety | mean yield t/ha | 2.6 | 1.22 | 1 | 2.7 | 3.21 |
| | No. Trials | 2 | 3 | 3 | 1 | 2 |
| | | | | | | |
| Nuseed Diamond | 10 | 92 | 121 | 125 | 106 | 102 |
| Nuseed Quartz | 3 | - | - | - | 113 | 110 |
| AV Garnet | 11 | 102 | 76 | 77 | 93 | 102 |
| Victory V3002 | 9 | 97 | 83 | 83 | 88 | - |

NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.

Data source: SARDI/GRDC, NVT 2013-2017 MET data analysis by National Statistics Program.

Faba bean variety sowing guide 2019

By Amanda Pearce and Rohan Kimber, SARDI and Jeff Paull, University of Adelaide

Two new faba bean varieties were released in the spring of 2018, PBA Bendoc and PBA Marne.

PBA Bendoc is the first faba bean variety with a high level of tolerance to some Group B herbicides. The Group B herbicide tolerance will not only increase the options for control of broad leaf weeds within crop, but also enable the variety to be grown where residues persist from application to a previous crop. Note that permits, product label rates, plant-back periods and all label directions for use must be adhered to.

PBA Bendoc has similar yield compared to the other major faba bean varieties grown in southern Australia and is resistant to both pathotypes of ascochyta blight. Seed is small/medium in size and suited to the Middle East markets. Seed is available from the commercial partner Seednet.

PBA Marne is an early flowering, high yielding faba bean that has shown adaption to the lower rainfall and short season areas in southern Australia where yield is generally greater than current cultivars. PBA Marne offers potential to expand faba bean production into areas currently considered marginal and to improve reliability in established areas during below average rainfall seasons. Seed is light brown and medium in size and suitable for co-mingling with the current faba bean varieties for export to the major food markets in the Middle East. Seed is available from the commercial partner Seednet.

The yields of newer varieties PBA Zahra and PBA Samira have averaged approximately 5-10 % more than current varieties in most regions. In 2017, yields of PBA Zahra were on average across all National Variety sites up to 5 % greater than other varieties. PBA Samira and PBA Bendoc on average had similar yields, which were greater than other current varieties.

Faba beans are cross-pollinated by bees. Seed crops should be isolated from other varieties by at least 200 m to minimise the risk of cross-pollination and maintain genetic purity of the variety. This is particularly important for specific traits such as disease resistance and seed quality.

VARIETIES AND MARKET PREFERENCES

Australian faba beans are preferred by the Middle East human consumption market, although competition for market share

TABLE 1. Most adapted faba bean varieties for each rainfall zone.

| Rainfall zone (average annual rainfall) | | |
|---|------------|------------|
| Low | Medium | High |
| < 375 mm | 375-500 mm | > 500 mm |
| PBA Marne | PBA Zahra | PBA Zahra |
| PBA Bendoc | PBA Samira | PBA Samira |
| Farah | PBA Bendoc | PBA Rana |
| Fiesta VF | PBA Marne | Nura |
| Nura | Nura | PBA Bendoc |
| PBA Samira | Farah | PBA Marne |
| PBA Zahra | Fiesta VF | Fiesta VF |

from France and the United Kingdom occurs. To access the export human food markets Australian beans must be of a high quality, free from mechanical damage, weathering and disease staining and storage problems. Faba beans darken over time while in storage and seed can become unsuitable for the export market after about 9 months.

Farah, Nura and Fiesta VF varieties are well accepted in the Middle East. Seed of PBA Samira, PBA Bendoc and PBA Marne is of similar size and acceptance is expected by the same markets.

Market signals indicate that small seeded faba bean varieties, such as the old Fiord and Ascot varieties, are no longer desired in the Middle East. Mixing smaller seeded varieties into the accepted larger "Fiesta grade" will downgrade the overall quality of the product.

The medium seed size "Fiesta grade" is expected to remain the dominant quality type as it is currently well accepted in the Middle East market and is easier to manage for on-farm operations.

PBA Rana seed is larger than other varieties and considered to be of high quality by the major Egyptian market, representing

BEANS

TABLE 2. Agronomic and disease characteristics of faba and broad bean varieties. Source: Pulse Breeding Australia trials program 2012-2017

| Variety | Plant height | Flower time | Maturity | Lodging resistance | Ascochyta blight* | | Chocolate spot | Cercospora | Rust | PSbMV seed staining |
|-------------|--------------|-------------|-----------|--------------------|-------------------|-------------|----------------|------------|-------|---------------------|
| | | | | | Pathotype 1 | Pathotype 2 | | | | |
| FABA BEAN | | | | | | | | | | |
| PBA Bendoc | Medium | Mid | Early-Mid | MS | MR/R | MR/R | S | S | S | S |
| PBA Marne | Medium/Short | Early | Early-Mid | MR | MR/R | MS/MR | S | S | MR | MR |
| Fiesta VF | Medium | Early-Mid | Early-Mid | MS | MS | S | S | S | S | S |
| Farah | Medium | Early-Mid | Early-Mid | MS | MR/R | S | S | S | S | S |
| Nura | Short | Mid | Early-Mid | MR | MR/R | MR/R | MS | S | MS | VS |
| PBA Rana | Medium/Tall | Mid | Mid | MR | R | MS/MR | MS | S | MS | MR |
| PBA Samira | Medium | Mid | Early-Mid | MR | R | R | MS | S | MS | S |
| PBA Zahra | Medium/Tall | Mid | Mid | MR | R | MS/MR | MS | S | MS | S |
| BROAD BEAN | | | | | | | | | | |
| Aquadulce | Tall | Mid | Late | MS | MS | MS | MS | S | MS | S |
| PBA Kareema | Tall | Mid | Late | MS | MR | MR | MS | S | MS-MR | S |

Key: R=resistant, MR-moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible

* Ascochyta blight ratings for pathotype 1 which is widely distributed throughout the Southern Region, and pathotype 2, which was identified in the mid-north of South Australia in 2013 and has been observed in other regions more recently.

a different grain category for faba bean production and marketing in Australia. PBA Zahra should be suitable to co-mingle with PBA Rana for a medium-large bean category for export market to the major food markets in the Middle East.

Product that does not meet export standards or is surplus to demand is consumed domestically in stockfeed rations, often at lower prices. Sound beans are also finding a place in many integrated cropping and grazing enterprises as a means of finishing lambs on farm. Strong demand by graziers for feed beans can occur in dry conditions.

VARIETIES AND DISEASE MANAGEMENT

In growing regions or seasonal conditions that favour chocolate spot development, all varieties require a protective fungicide spray before canopy closure, when the crop is at the early flowering stage.

Additional applications will be required if wet conditions continue, particularly when disease symptoms are evident, soil moisture is high and dense canopy growth retains moisture levels within the canopy. Chocolate spot typically develops during early spring as temperatures increase; however it can infect crops earlier, so faba beans should be monitored from later winter.

A shift in virulence for ascochyta blight found in the mid-north of SA has seen the disease rating for ascochyta blight separated into pathotype 1 (widely distributed in the southern region) and pathotype 2 (identified in the mid-north of SA in 2013 and has been observed in other regions more recently).

Nura, PBA Bendoc and PBA Samira are the only varieties resistant to both pathotypes. Farah, PBA Marne, PBA Rana and PBA Zahra are only resistant to the most prevalent form of ascochyta blight. Resistant varieties allow growers to be more reactive to ascochyta blight than in susceptible varieties and disease management strategies can be based on monitoring levels in high risk situations.

Gowers growing Fiesta VF (MS to pathotype 1 and S to pathotype 2) must maintain disease control in crop, until after flowering is finished to ensure seed staining is minimised. Similarly, this management strategy must be adopted for Farah crops in regions where pathotype 2 is present.

In varieties that are partially resistant to ascochyta blight pathotype 2, such as PBA Marne, PBA Rana and PBA Zahra, management in those crops (mid-north of SA) will need close monitoring of disease levels and protective fungicides are recommended during podding to prevent seed staining.

Rust can be a problem in faba beans, causing significant yield loss. The disease can survive over summer on volunteer bean plants and become a problem the following season. Faba bean crops need to be monitored to reduce the impact of rust on production.

Farah, Fiesta VF and PBA Bendoc are susceptible to rust, often displaying more pronounced symptoms than other varieties. The chance of rust infection will be higher for early sown crops, or where beans are sown adjacent to the previous year's bean stubbles.

Where these situations occur, control using suitable fungicides may be required before flowering. Given good conditions

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for crop production and disease development, fungicide applications to control rust may be necessary at the same time as chocolate spot is being targeted.

Cercospora leaf spot continues to be widely reported in faba beans. The disease is soil borne and typically occurs in paddocks with a history of faba beans in the rotation, particularly where they have been grown in close rotation (less than 4-6 years) or within close proximity of these paddocks. Early control (5-8 weeks post sowing) with carbendazim or tebuconazole is most effective in preventing disease establishment and consequent yield loss from *Cercospora*. All current faba bean varieties are susceptible, thus early preventative control measures are best practice.

The 'Australian Pulse Bulletin – Faba Bean Integrated Disease Management', published by Pulse Australia, contains the latest information on disease management in faba beans, and can be found at: <http://www.pulseaus.com.au/growing-pulses/bmp/faba-and-broad-bean/idm-strategies>

HARVEST

In high biomass production situations lodging can become an issue. Conversely, crops with short canopies can cause problems with low harvest height, particularly in varieties that produce bottom pods close to the ground.

Physical damage of bean seed has resulted in marketing downgrades in recent years, and needs to be managed. Bud worm needs early monitoring and control, even in seasons with below average rainfall. Growers should harvest beans when they have a high moisture content (12-14%) to avoid breakage and handle the beans carefully when shifting them.

Crop topping of faba beans can make them more vulnerable to seed staining, particularly if rain falls soon after application. Crop topping too early or using products or rates that cause crops to dry down quickly can exacerbate the issue. Maturity of current faba bean varieties are not as well suited to crop topping as the industry would like, particularly in better seasons, hence all grain may not be mature when the ryegrass is ready to top.

NOTES ON FABA BEAN VARIETIES

PBA BENDOC ^(b)

PBA Bendoc was developed by the University of Adelaide, in collaboration with SARDI. Tolerance to imidazolinone herbicides was developed by conventional mutation breeding techniques in Nura. A herbicide tolerant selection was crossed with PBA Samira and PBA Bendoc was derived from the progeny of this cross. It has been selected for tolerance to imidazolinone herbicides applied post-emergence when plants are at up to the 5 node growth stage. Note that permits, product label rates, plant back periods and all label directions for use must be adhered to.

Generally, PBA Bendoc yields comparably to conventional varieties with no obvious yield penalty associated with herbicide tolerance. PBA Bendoc is similar in flowering time and maturity

TABLE 3. LOWER EYRE PENINSULA faba bean yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2016 |
|------------|-----------------|------|------|
| | mean yield t/ha | 1.86 | 4.57 |
| | No. Trials | 1 | 1 |
| PBA Marne | 2 | 118 | 104 |
| PBA Samira | 2 | 96 | 100 |
| PBA Bendoc | 1 | - | 98 |
| PBA Zahra | 2 | 90 | 102 |
| Nura | 2 | 99 | 93 |
| PBA Rana | 2 | 101 | 90 |
| Farah | 2 | 90 | 96 |
| Fiesta VF | 2 | 91 | 95 |

* In 2014, 2015 and 2017 no results were achieved in the Lower Eyre Peninsula PBA faba bean breeding trials due to unseasonal conditions affecting trial performance

and similar resistance to both pathotypes of ascochyta blight as Nura and PBA Samira. It is susceptible to chocolate spot and this will need to be managed in higher rainfall and high biomass situations. PBA Bendoc produces small/medium sized, light brown seeds that are comparable in size to Nura. PBA Bendoc seed should be suitable to be co-mingled with these other varieties for the Middle East market. PBA Bendoc is licensed to Seednet (EPR \$3.90/t ex GST).

FARAH ^(b)

Farah was selected directly from Fiesta VF and is identical in many respects, except its MR/R to ascochyta blight pathotype 1 and tends to have more uniform seed size and colour. Where pathotype 2 of ascochyta blight has developed Farah will exhibit a susceptible reaction to ascochyta blight, comparable to Fiesta VF. Farah's yields are similar to Fiesta VF and slightly higher than Nura in most regions of southern Australia. The major advantage of Farah over Fiesta VF is the increased likelihood of achieving market standards for freedom from seed staining and a likely reduction in fungicide sprays required for controlling ascochyta blight. Farah is licensed to Heritage Seeds (EPR \$3.00/t ex GST).

FIESTA VF

Fiesta VF seed is buff coloured and larger than Fiord. Fiesta VF has good seedling vigour, is of medium height and is early to mid flowering. It is classed as susceptible to chocolate spot, although it is less susceptible than Fiord. Fiesta VF is MS to ascochyta blight pathotype 1 and S to pathotype 2, so a

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TABLE 4. MID NORTH faba bean yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.74 | 2.10 | 2.09 | 4.30 | 2.49 |
| | No. Trials | 5 | 4 | 4 | 5 | 3 |
| PBA Marne | 21 | 113 | 106 | 107 | 106 | 92 |
| PBA Zahra | 21 | 94 | 105 | 102 | 103 | 107 |
| PBA Samira | 21 | 95 | 98 | 99 | 98 | 103 |
| Farah | 21 | 93 | 100 | 100 | 91 | 98 |
| Fiesta VF | 21 | 93 | 97 | 98 | 92 | 99 |
| Nura | 21 | 89 | 93 | 95 | 90 | 98 |
| PBA Bendoc | 8 | - | - | - | 89 | 96 |
| PBA Rana | 21 | 89 | 79 | 83 | 88 | 101 |

proactive disease management strategy is recommended to achieve clean seed and ensure market standards are met. Fiesta VF is no longer protected by PBR, and no end point royalty applies.

PBA MARNE ^(b)

PBA Marne, was developed by the PBA Faba bean breeding program led by University of Adelaide. It is the result of a complex cross between four parents of diverse origins. PBA Marne is an early flowering faba bean variety that is well suited to lower rainfall or short season environments of southern Australia. It is the earliest flowering variety, with maturity similar to PBA Samira. It is medium short in height. The overall disease resistance profile of PBA Marne is improved compared to Fiesta VF and Farah, being MR/R to ascochyta blight pathotype 1 and MS/MR to pathotype 2 and MR to rust. It is susceptible to chocolate spot and cercospora. PBA Marne produces medium sized seeds that are comparable in size to PBA Samira. The overall colour of seed is similar to other major bean varieties. PBA Marne seed can be co-mingled with these other varieties for the Middle East market. PBA Marne is licensed to Seednet (EPR \$3.50/t ex GST).

NURA ^(b)

Nura is a medium-sized faba bean with resistance to both strains of ascochyta blight (pathotype 1 & 2) and moderate susceptibility to rust. Nura is moderately susceptible to chocolate spot, especially in situations when sown early and where disease pressure is high. Nura is susceptible to Cercospora leaf spot, similar to Farah and Fiesta VF. It is generally shorter than Fiesta VF and Farah meaning it is less likely to lodge. However, since its bottom pods are closer to the ground, harvest can be more difficult in lower rainfall districts or when sown late. In most areas long-term yields of Nura tend to be slightly lower than Farah, although this is improved

when Nura is sown early. It has good seed appearance, light buff in colour, with minimal seed staining and discolouration. Flowering time of Nura is generally around 7 days later than Farah, although has similar maturity. Seed is available from Seednet (EPR \$3.00/t ex GST).

PBA RANA ^(b)

PBA has good vigour and stem strength. It has mid flowering (similar to Nura) and mid maturity (later than Nura and Farah). PBA Rana is well adapted to high rainfall areas with longer growing seasons.

PBA Rana has good resistance to ascochyta blight pathotype 1 and MS/MR to pathotype 2. This variety is moderately susceptible to chocolate spot. It has demonstrated very useful resistance to rust (MS). PBA Rana produces large, plump, light brown seeds and is suited to meeting Egyptian market requirements for that grade. PBA Rana represents a unique category for faba bean marketing. As PBA Rana is three quarters Manifest in its breeding, it should establish itself into areas where Manifest was grown before ascochyta blight saw its demise. PBA Rana is licensed to Seednet (EPR \$3.50/t ex GST).

PBA SAMIRA ^(b)

PBA Samira is a high yielding faba bean variety for southern Australia. It is widely adapted and is responsive to high yielding situations. It has mid flowering, 5-10 days later than Fiesta VF and Farah, but matures at the same time these varieties. PBA Samira is resistant to ascochyta blight pathotype 1 and pathotype 2. It is moderately susceptible to chocolate spot and rust, and susceptible to Cercospora leaf spot. Seed of PBA Samira is slightly larger than Fiesta VF, Farah and Nura, but the overall seed colour is similar for all varieties. PBA Samira can be co-mingled with these other varieties for the Middle East market. PBA Samira is licensed to Seednet (EPR \$3.50/t ex GST).

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TABLE 5. YORKE PENINSULA faba bean yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 3.67 | 3.03 | 2.39 | 4.54 | 3.84 |
| | No. Trials | 2 | 2 | 2 | 2 | 2 |
| PBA Marne | 10 | 106 | 110 | 109 | 104 | 97 |
| PBA Bendoc | 4 | - | - | - | 106 | 100 |
| PBA Zahra | 10 | 97 | 101 | 101 | 103 | 108 |
| Farah | 10 | 99 | 98 | 98 | 101 | 98 |
| PBA Samira | 10 | 95 | 97 | 98 | 98 | 101 |
| Fiesta VF | 10 | 98 | 96 | 96 | 99 | 98 |
| Nura | 10 | 88 | 95 | 95 | 100 | 100 |
| PBA Rana | 10 | 87 | 81 | 84 | 89 | 95 |

TABLE 6. MURRAY MALLEE faba bean yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 |
|------------|-----------------|------|------|------|------|
| | mean yield t/ha | 1.26 | 0.93 | 0.86 | 3.68 |
| | No. Trials | 1 | 1 | 1 | 1 |
| PBA Marne | 4 | 111 | 127 | 119 | 102 |
| PBA Bendoc | 1 | - | - | - | 106 |
| PBA Samira | 4 | 104 | 95 | 95 | 103 |
| Nura | 4 | 105 | 96 | 88 | 98 |
| Farah | 4 | 98 | 98 | 94 | 95 |
| Fiesta VF | 4 | 97 | 93 | 94 | 95 |
| PBA Zahra | 4 | 94 | 92 | 82 | 109 |
| PBA Rana | 4 | 101 | 74 | 96 | 88 |

* In 2017 no result was achieved in the Murray Mallee region due to unseasonal conditions affecting trial performance.

PBA ZAHRA [Ⓓ]

PBA Zahra has shown wide adaption throughout southern Australia and is very responsive to high yielding situations. PBA Zahra seed is uniform large size and colour and should be suitable to co-mingle with PBA Rana for a medium-large faba bean category for the Egyptian market. PBA Zahra is mid flowering, similar to Nura, PBA Rana and PBA Samira and mid maturity similar to PBA Rana. It is a medium/tall plant similar to PBA Rana and taller than other varieties. It is resistant to the old strain of ascochyta blight (pathotype 1) and MS/MR to pathotype 2. PBA Zahra is rated as moderately susceptible to chocolate spot and rust. It is susceptible to Cercospora leaf spot. PBA Zahra is licensed to Seednet (EPR \$3.50/t ex GST).

NOTES ON BROAD BEAN VARIETIES

AQUADULCE

Aquadulce is a tall broad bean variety, with late flowering and maturity, suited to areas with at least 500 mm average annual rainfall, such as the Lower South-East of SA. It is rated MS for chocolate spot, but can succumb under high disease pressure and rainfall situations. Aquadulce is more tolerant of waterlogging than most faba bean varieties and tolerates soils with iron and manganese deficiencies. The large seed size of Aquadulce means it must be considered a specialty bean as it has different marketing opportunities to faba beans. It

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TABLE 7. SOUTH EAST faba bean and broad bean yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 3.02 | 2.19 | 1.63 | 4.86 | 3.33 |
| | No. Trials | 4 | 5 | 4 | 5 | 4 |
| PBA Zahra | 22 | 117 | 103 | 101 | 108 | 107 |
| PBA Samira | 22 | 110 | 100 | 100 | 104 | 103 |
| PBA Bendoc | 9 | - | - | - | 98 | 104 |
| Fiesta VF | 20 | 98 | 102 | 102 | 96 | 98 |
| Farah | 22 | 94 | 102 | 104 | 95 | 98 |
| PBA Rana | 22 | 105 | 91 | 85 | 96 | 91 |
| PBA Marne | 22 | 78 | 94 | 99 | 95 | 97 |
| Nura | 22 | 95 | 89 | 88 | 95 | 95 |
| BROAD BEANS | | | | | | |
| Aquadulce | 8 | 106 | 94 | 86 | 96 | 83 |
| PBA Kareema | 8 | 106 | 96 | 89 | 99 | 91 |

commands a price premium over faba beans, dependent on grading and seed size.

PBA KAREEMA ^(b)

PBA Kareema was selected from Aquadulce and has similar plant type and adaptation to this variety, but larger and more uniform seed and no "evergreens". It is well adapted to the very high rainfall, broad bean districts in the Lower South-East of SA. It has significantly improved resistance to ascochyta blight (MR) and better rust resistance (MR) than Aquadulce and is slightly less susceptible to chocolate spot than other faba

bean varieties. Like Aquadulce, PBA Kareema is more tolerant of waterlogging than most varieties of faba bean, and is more tolerant of iron and manganese deficiencies. Trials in the South-East of SA have shown PBA Kareema yields to be similar to, or slightly less than, Aquadulce. PBA Kareema is no longer protected by PBR, and no end point royalty applies. ■

For further information: Variety Management Packages (VMP) for all varieties, (except Aquadulce), are available on the Pulse Australia website: <http://www.pulseaus.com.au/growing-pulses/bmp/faba-and-broad-bean>

Lupin variety sowing guide 2019

By Amanda Pearce, SARDI

Lupin variety choice for South Australian growers will remain the same in 2019, with no new varieties released in 2018.

PBA Bateman was released in 2017 for planting in South Australia in 2018. It is the last of the PBA varieties to be released. AGT are now managing the lupin breeding program for Australian growers.

PBA Bateman was not evaluated in 2017 NVT lupin trials. Between 2014 - 2016 it was on average the highest yielding lupin variety across the state. In 2016 PBA Bateman and PBA Jurien (another newer lupin variety) out-yielded Mandelup by 11 % when averaged across NVT trial sites in SA.

Narrow-leafed lupins (*Lupinus angustifolius*) are well suited to acidic and sandy soils. They continue to be grown in suitable areas as a key component of the farming system.

Recent improvements in grain pricing for lupins and a possible shift away from a heavy reliance on wheat/canola rotations is expected to see the area grown to lupins increase in coming seasons. There is also growing interest in developing the lupin crop for human consumption.

DOMESTIC MARKETING

For producers wanting to sell lupin grain into Victorian and New South Wales markets they must satisfy anthracnose freedom, market access and transporting protocols. Anthracnose grain tests are the most common means of identifying anthracnose freedom for marketing.

GRAZING OF LUPIN STUBBLES

Lupin stubbles can be a high value feed source for livestock, however growers have lost stock to lupinosis. This livestock health problem occurs as a result of toxins being produced from the phomopsis fungus that develops in the lupin stem as the plant matures.

Current varieties have levels of resistance that slows the development of the phomopsis fungus. However, when significant rains occur while the crop matures and afterwards, fungal development can still occur, regardless of the resistance level of the plant.

Care must be taken in grazing lupin stubbles and it may be advisable not to graze some paddocks at all should wet conditions prevail at or after harvest.

Lupin paddocks should be grazed at the first opportunity after harvest and stock should have access to a good quality water supply. Older animals are less affected by lupinosis than young animals. Producers should note; bulky crops, crop topping and tight lupin crop rotations aid the development of the fungus and can increase the risk of lupinosis occurring.

LUPIN AGRONOMY

A common problem reported by SA growers is the poor emergence and establishment of lupin crops. This obviously effects crop establishment and early vigour, but it also

TABLE 1. Most adapted narrow-leafed lupin varieties for each rainfall zone.

| Rainfall zone (average annual rainfall) | | |
|---|-------------|-------------|
| Low | Medium | High |
| < 375 mm | 375-500 mm | > 500 mm |
| PBA Bateman | PBA Bateman | PBA Bateman |
| PBA Jurien | PBA Jurien | PBA Gunyidi |
| PBA Gunyidi | PBA Gunyidi | PBA Barlock |
| Mandelup | PBA Barlock | Jenabillup |
| PBA Barlock | Mandelup | PBA Jurien |

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TABLE 2. Agronomic features of narrow-leaved lupin varieties.

| Variety | Flowering | Height | Lodging | Pod shatter | Anthrachnose | Brown spot | Grey Leaf Spot | CMV (seed) | Phomopsis stem | Phomopsis pod | BYMV |
|-------------|-----------|--------|---------|-------------|--------------|------------|----------------|------------|----------------|---------------|------|
| Jenabillup | Mid | Tall | MSMR | MS | S | MRMS | R | MS | MS | MR | MR |
| Mandelup | Vearly | Tall | MS | MS | MR | MS | R | MS | R | MRMS | S |
| PBA Barlock | Mid | Med | MR | MRMS | R | MS | R | MR | MR | R | MS |
| PBA Bateman | Early | Tall | MSMR | MRMS | MR | MS | R | MRMS | MR | MR | MR |
| PBA Gunyidi | Early | Med | MR | MR | MR | MS | S | MS | R | MR | MS |
| PBA Jurien | Early | Tall | MS | MRMS | R | MS | R | MS | R | MRMS | MR |

R = Resistant; MR = Moderately resistant; MS = Moderately susceptible; S = Susceptible.

Source: Agriculture and Food, DPIRD Western Australia and PBA Lupin Breeding Program, South Perth, WA, 2013-2016

enhances any effects of pre-emergent herbicides. Growers are encouraged to seek germination tests on sowing seed so that seeding rates can be increased to compensate for poor germination rates or alternative seed sourced.

Manganese deficiency has been a problem for a number of growers in recent seasons. Lupin plants have a high demand for manganese during seed development and maturity.

Manganese deficiency can have a negative influence on seed development and cause seed to split or shrivel in pods. Deficient plants can be slow to ripen, remaining green for longer and causing difficulty at harvest. Manganese deficiency can be overcome by applying manganese. Timing is important and manganese should be applied at mid-flowering of the first lateral, by which time growth of the first pods on the main stem should be 2 - 2.5 cm long.

NOTES ON CURRENT NARROW-LEAFED LUPIN VARIETIES

PBA BARLOCK ^(b)

PBA Barlock was released in WA in spring 2013. It is a high yielding variety, which can provide a yield improvement in regions of SA. PBA Barlock has improved metribuzin tolerance over the varieties Tanjil and Wonga, allowing growers to use metribuzin for weed control. PBA Barlock is MR to lodging in high rainfall regions, and shows improved pod shatter resistance compared to Mandelup, MRMS. It is R to anthracnose and MR to phomopsis on stem. PBA Barlock is commercialised by Seednet (EPR \$2.50/t ex GST).

PBA BATEMAN ^(b)

PBA Bateman was released in the eastern states in the spring of 2017. It is a high yielding variety, which can provide a yield improvement in all regions of SA. It is MR to anthracnose, similar to PBA Gunyidi and Mandelup. It is MRMS to CMV seed transmission, increased from PBA Jurien, PBA Gunyidi,

Jenabillup and Mandelup. PBA Bateman has similar agronomic features when compared to PBA Jurien. PBA Bateman shows similar tolerance to metribuzin as PBA Jurien, PBA Barlock and PBA Gunyidi. Seed is medium in size similar to Mandelup. PBA Bateman is commercialised by Seednet, growers should contact Seednet partners for supply of seed (EPR \$2.60/t ex GST).

PBA GUNYIDI ^(b)

PBA Gunyidi was released in WA in September 2011 as a potential Mandelup replacement with improved resistance to pod shattering. This feature may enable growers to harvest later without incurring significant losses. PBA Gunyidi is MR to anthracnose and R to phomopsis on stem. It flowers and matures slightly later than Mandelup. It is R to metribuzin herbicide, but is less tolerant to Eclipse® and this herbicide should be used with care. PBA Gunyidi is commercialised by Seednet (EPR \$2.50/t ex GST).

JENABILLUP ^(b)

Jenabillup has been extensively trialled in SA trials, where it typically has an advantage over Mandelup in regions with a longer growing season. In these regions its extended flowering window can assist with increased yield. Jenabillup flowers slightly later and for a longer period than Mandelup, making it less suitable to crop topping. Jenabillup does not have tolerance to metribuzin herbicide and has an S anthracnose rating. Jenabillup is commercialised by Seednet (EPR \$2.30/t ex GST).

PBA JURIEEN ^(b)

PBA Jurien was released in WA in spring 2015. It can provide a yield improvement in regions of SA. It is R to anthracnose, phomopsis on stem and grey spot. Although rated R to anthracnose seed dressings are still recommended to reduce the risk of soil borne disease. It is tolerant to metribuzin, superior to PBA Barlock. PBA Jurien has similar agronomic characteristics to PBA Gunyidi, flowering slightly earlier than PBA Barlock. It is similar to Mandelup in height and is MS to

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TABLE 3. LOWER EYRE PENINSULA lupin yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013–2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 1.81 | 1.82 | 1.53 | 2.32 | 1.11 |
| | No. Trials | 3 | 2 | 1 | 1 | 1 |
| PBA Bateman | 3 | - | 105 | 108 | 115 | - |
| PBA Gunyidi | 8 | 111 | 103 | 102 | 107 | 97 |
| PBA Jurien | 7 | 107 | 105 | 102 | 107 | 99 |
| PBA Barlock | 8 | 103 | 102 | 98 | 105 | 96 |
| Jenabillup | 8 | 102 | 96 | 96 | 103 | 102 |
| Mandelup | 8 | 97 | 101 | 104 | 96 | 103 |
| Wonga | 8 | 89 | 95 | 92 | 95 | 91 |
| Jindalee | 8 | 83 | 86 | 88 | 85 | 87 |

TABLE 4. MID NORTH field lupin yield performance. Long term predicted yield expressed as a percentage of mean yield. (NVT data, 2013–2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.68 | 1.58 | 1.22 | 2.83 | 1.98 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| PBA Bateman | 2 | - | - | 112 | 117 | - |
| PBA Gunyidi | 5 | 103 | 101 | 105 | 114 | 96 |
| PBA Jurien | 5 | 103 | 105 | 99 | 110 | 93 |
| Mandelup | 5 | 101 | 91 | 111 | 101 | 101 |
| PBA Barlock | 5 | 100 | 106 | 92 | 104 | 93 |
| Jenabillup | 5 | 103 | 104 | 95 | 90 | 97 |
| Wonga | 5 | 89 | 98 | 87 | 88 | 92 |
| Jindalee | 5 | 82 | 85 | 89 | 76 | 90 |

lodging in high rainfall regions. PBA Jurien has medium to large seed, similar to Mandelup and the alkaloid content is similar to PBA Gunyidi. PBA Jurien is commercialised by Seednet, growers should contact Seednet partners for supply of seed (EPR \$2.50/t ex GST).

MANDELUP ^(b)

Mandelup is widely adapted to SA conditions and as such is established as a leading variety. Mandelup is a tall variety, with

good early vigour and very early flowering and maturity, making it well-suited to low/medium rainfall districts in SA while still yielding well in higher rainfall areas. Its early maturity makes it suitable for crop topping, with careful attention to correct timing.

Mandelup is MR to anthracnose. It is R to phomopsis on stem. It can suffer pod loss/partial pod shattering with delayed harvest and seed quality can suffer if wet conditions occur during harvest. Mandelup seed is available in SA through Heritage Seeds Pty Ltd (EPR \$2.30/t ex GST). ■

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TABLE 5. MURRAY MALLEE lupin yield performance. Long term predicted yield expressed as a percentage of mean yield. (NVT data, 2013-2017)

| Variety | Year | 2014 | 2015 | 2016 |
|-------------|-----------------|------|------|------|
| | mean yield t/ha | 1.29 | 0.91 | 2.82 |
| | No. Trials | 1 | 1 | 1 |
| PBA Bateman | 2 | - | 113 | 109 |
| Mandelup | 3 | 104 | 107 | 109 |
| PBA Gunyidi | 3 | 100 | 100 | 106 |
| PBA Jurien | 3 | 104 | 90 | 101 |
| PBA Barlock | 3 | 101 | 87 | 98 |
| Jenabillup | 3 | 92 | 96 | 95 |
| Wonga | 3 | 91 | 85 | 90 |
| Jindalee | 3 | 73 | 90 | 72 |

* In 2017 no result was achieved in the Murray Mallee region due to unseasonal conditions affecting trial performance.

TABLE 6. SOUTH EAST lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.90 | 1.05 | 0.72 | 3.12 | 1.94 |
| | No. Trials | 3 | 2 | 2 | 3 | 2 |
| PBA Bateman | 5 | - | - | 103 | 107 | - |
| PBA Gunyidi | 12 | 100 | 104 | 100 | 103 | 97 |
| PBA Barlock | 12 | 97 | 99 | 97 | 104 | 95 |
| Jenabillup | 12 | 99 | 104 | 96 | 96 | 97 |
| Mandelup | 12 | 96 | 99 | 99 | 96 | 102 |
| PBA Jurien | 12 | 91 | 101 | 94 | 105 | 94 |
| Wonga | 12 | 98 | 94 | 94 | 94 | 93 |
| Jindalee | 12 | 87 | 95 | 78 | 83 | 81 |

Oats variety sowing guide 2019

By Pamela Zwer, Sue Hoppo, Peter McCormack, Mark Hill, Peter Wheeler, KerryLee McMurray and Michelle Williams, SARDI

The oat variety descriptions in this publication serve as a guide to select oat varieties for specific end uses with disease resistance, agronomic traits, and yield potential suited to diverse south eastern Australian farming systems.

Varieties adapted to low, medium, and high rainfall regions and categorised by grain and hay end-use are shown in Table 1. Select the group of varieties suited to your rainfall region and end use. Consult Tables 2 to 7 to refine the list to one or two varieties. Consult Tables 2 and 3 for hay and grain production comparisons, Table 4 for agronomic features, Table 5 for disease resistance, Table 6 for grain quality and Table 7 for hay quality. Certain varieties are preferred for particular end-uses, so check with hay processors and millers prior to variety selection.

IS CEREAL CYST OR STEM NEMATODE A PRODUCTION CONSTRAINT?

Cereal cyst nematode (CCN) and stem nematode (SN) are major soil-borne diseases limiting the yield of oats in certain areas of southern Australia. Due to the significant effect of CCN and SN on varietal performance, soil testing is recommended to assess if either of these nematodes will be a significant problem. The PreDicta™ B Root Disease Testing Service (RDTs) provides a diagnostic service to assess the levels of both nematodes prior to sowing. This is available through your local accredited agronomist or contact Alan Mackay (SARDI Plant and Soil Health ph. 8303 9375) for your local accredited agronomist.

Varieties contained in Table 1 provide options for different end uses. Table 5 should then be used in conjunction with this table to determine if the variety of choice has both resistance and tolerance to CCN if it is a problem or resistance and tolerance to SN if it is a problem. Varieties grown where CCN or SN is present should be resistant to the particular nematode which is a problem so that multiplication of the nematode is limited. The variety should also be tolerant so that it yields well in the presence of the nematode. Yield penalties of up to 80% can occur if an intolerant variety is sown in a paddock where CCN or SN is a problem.

There are ten varieties resistant to CCN listed in Table 5 and eight of these are also tolerant: Wombat, Tammar, Mulgara, Tungoo, Kangaroo, Wintaroo, Wallaroo and Potoroo are all varieties with both CCN resistance and tolerance. The remaining two resistant varieties, Yallara and Brusher are

intolerant of CCN. There are eight varieties tolerant to stem nematode. These are Wombat, Tammar, Mulgara, Tungoo, Wintaroo, Glider, Quoll and Echidna. All of these are rated as resistant or moderately resistant to SN except Echidna which is rated as moderately susceptible. Bannister, Kangaroo, Potoroo and Wallaroo are intermediate in their reaction to SN. In cold wet seasonal conditions these varieties may suffer more yield loss than in warmer, drier winter conditions.

IS LEAF DISEASE A PRODUCTION CONSTRAINT?

Resistance to leaf diseases is important in most environments. However, even though varieties are listed as resistant to stem and leaf rust, changes in rust pathotypes can occur. Recently a stem rust pathotype moved into the southern region of South Australia from northern NSW causing all stem rust resistance to be ineffective in the presence of this pathotype. Table 5 indicates a range of resistance reactions for stem rust depending on whether the new pathotype of stem rust is present or not. Monitoring of disease levels is essential and application of fungicide may still be required depending on seasonal conditions. Table 1 should be used to determine the variety options available for a particular end use. Next, Table 5 should be used to further refine your choice. For example, if a variety for oat hay is required in a high rainfall environment, Forester, Tammar, Tungoo, Glider and Kangaroo are suitable (Table 1). Table 3 indicates that Kangaroo is the highest yielding for hay in this environment. However, using Table 5 Forester, Tammar, Tungoo, and Glider have better resistance to both stem and leaf rust. These varieties also vary in their level of resistance to septoria, barley yellow dwarf virus (BYDV), bacterial blight and red leather leaf which may be also be important. Table 4 should then be used to determine if the variety selected matures at the time required.

IS MILLING QUALITY REQUIRED?

The probability of a variety meeting the classification criteria for milling grade is an important consideration when selecting a variety for milling end-use. This is greatly influenced by seasonal conditions. Premium milling varieties such as Yallara, Mitika, Possum, Wombat, Bannister, Williams and Kowari, will reach the classification criteria for milling grade more often than other

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TABLE 1. Oat varieties listed according to annual rainfall. Use Tables 2, 3, 4, 5, 6 and 7 to further refine your choice within each category.

| End use | Annual Rainfall (mm) | | |
|----------------------------|----------------------|-----------|-----------|
| | <375 | 375-500 | >500 |
| MILLING GRAIN | Kowari | Kowari | Kowari |
| | Mitika | Mitika | Mitika |
| | Yallara | Yallara | Yallara |
| | Wombat | Wombat | Wombat |
| | Bannister | Possum | Possum |
| | Durack | Bannister | Bannister |
| | | Williams | Williams |
| | | Durack | |
| FEED GRAIN - SHEEP, CATTLE | Kowari | Kowari | Kowari |
| | Mitika | Mitika | Mitika |
| | Yallara | Yallara | Yallara |
| | Wintaroo | Wintaroo | Wintaroo |
| | Mulgara | Mulgara | Mulgara |
| | Wombat | Wombat | Wombat |
| | Echidna | Echidna | Echidna |
| | Wallaroo | | |
| FEED GRAIN - PIGS, POULTRY | - | Numbat | Numbat |
| OAT HAY | Brusher | Wintaroo | Forester |
| | Mulgara | Mulgara | Tammar |
| | Wintaroo | Tammar | Tungoo |
| | Wallaroo | Tungoo | Glider |
| | Durack | Kangaroo | Kangaroo |
| | | Brusher | Brusher |
| | | Durack | Mulgara |
| | | | Wintaroo |
| HAY AND LEGUME MIXES | Brusher | Wintaroo | Forester |
| | Mulgara | Tammar | Tammar |
| | Wintaroo | Tungoo | Tungoo |
| | Yallara | Kangaroo | Glider |
| | Wallaroo | Brusher | Kangaroo |
| | | Potoroo | |

varieties such as Echidna (Table 6). Although some varieties are not considered milling class, they may reach milling grade criteria, but would not be accepted for milling. It is imperative that you check with your miller about the quality standards and varieties that are accepted for milling before you sow a grain crop for this end use.

To select a variety for milling grain in medium to high rainfall zones you have the choice of Kowari, Mitika, Yallara, Wombat, Possum, Bannister and Williams (Table 1). Table 2 shows the relative yield and Table 6 the relative grain quality for each of these varieties. Using this information, choose a variety that suits your end use based on whether yield or quality is a priority. Table 4 should also be used to determine if the variety selected matures at the time required and Table 5 should be used to determine if the variety selected has the desired disease resistance. For example, if CCN is a problem you have a choice of Wombat.

IF EXPORT HAY QUALITY IS REQUIRED

Hay quality is essential to meet export hay standards and is greatly influenced by seasonal and nutritional conditions. However, some varieties are more likely to produce hay of a higher quality than others. It is imperative that you check with your hay processor about the quality standards required to make export grade quality hay before you sow a hay crop. Use Table 7 to refine your choice after first ensuring that the criteria in Tables 1, 4 and 5 are met for your situation.

OATS FOR GRAZING

This guide contains no guidelines for oats suited to grazing plus feed grain production and repeated grazing from early sowing. A more comprehensive guide for grazing varieties is contained in the Winter Crop Variety Sowing Guide produced annually by NSW DPI. Please contact the National Oat Breeding or New Variety Agronomy Groups for information on how to obtain a copy of this publication.

NOTES ON RECENTLY RELEASED VARIETIES

Fact sheets or pamphlets describing all varieties released by the South Australian based National Oat Breeding Program are available from Primary Industries and Resources (PIRSA), the South Australian Research and Development Institute (SARDI), New Variety Agronomy Group, the relevant commercial partner for the variety or the SARDI website (www.pir.sa.gov.au/research). The herbicide tolerance of different oat varieties as well as yield and quality information for grain varieties is available on the NVT website www.nvtonline.com.au.

MILLING VARIETIES

KOWARI

Kowari, released in September, 2017, is a new milling oat variety with dwarf stature measuring 65 to 70 cm. It is slightly

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TABLE 2. Five year (2013-2017) average grain yield (t/ha) of oat varieties tested in grain trials.

| | Region | | | | | | |
|----------------------------|----------|----------|-----------------|-----------|------------|---------------|------------------------|
| | Lower EP | Upper EP | Yorke Peninsula | Mid North | South East | Murray Mallee | Average for all states |
| SEMI-DWARF (HUSKED) | | | | | | | |
| Bannister | 2.9 | 2.2 | 4.4 | 4.4 | 4.2 | 1.7 | 4.1 |
| Kowari | 3.4 | 1.8 | 4.2 | 4.1 | 4.0 | 1.6 | 3.8 |
| Mitika | 3.2 | 1.8 | 4.1 | 4.0 | 3.8 | 1.5 | 3.7 |
| Possum | 3.0 | 1.9 | 3.9 | 4.0 | 3.9 | 1.3 | 3.7 |
| Potoroo | 2.4 | 2.0 | 4.1 | 4.1 | 4.0 | 1.7 | 3.9 |
| Wombat | 2.7 | 2.3 | 4.0 | 4.1 | 3.9 | 1.3 | 3.8 |
| SEMI-DWARF (NAKED) | | | | | | | |
| Numbat | 2.1 | 1.3 | 2.7 | 3.0 | 2.9 | 1.5 | 2.8 |
| TALL (HUSKED) | | | | | | | |
| Durack | 2.6 | 1.5 | 3.3 | 3.6 | 3.6 | 1.4 | 3.4 |
| Williams | 3.0 | 2.1 | 4.0 | 4.2 | 4.0 | 1.7 | 4.0 |
| Yallara | 1.3 | 1.5 | 2.9 | 3.4 | 3.5 | 1.3 | 3.4 |
| No. trials | 1 | 1 | 5 | 18 | 15 | 5 | 163 |

taller than Mitika. It has a maturity similar to Mitika, but is 2 to 8 days earlier to head than Yallara, 8 to 10 days earlier than Bannister and 3 to 10 days earlier than Williams. Kowari is 4 to 8 days later to head than Durack.

Kowari is a cross between Mitika and WAOAT2099 and was tested as the breeder's line 03198-18. It has similar grain yield to Mitika and Kojonup, but lower than Bannister and Williams.

The grain quality is excellent. Kowari has slightly lower hectolitre weight and similar 1000 grain weight when compared to Mitika. It combines high Beta-glucan with low screenings. Kowari has high protein and slightly higher groat percent compared to Mitika. The trait of interest for this variety is improved Beta-glucan content. Heritage is the commercial partner (EPR \$2.50 ex GST).

DURACK ^(b)

Durack is an extremely early, moderately tall variety similar in height to Carrolup and Yallara, measuring between 80 and 90 cm. Check out this new variety as it is a minimum of one week earlier than any other variety released from the program.

Durack has good lodging and shattering resistance and good early vigour. It is susceptible to very susceptible for stem rust in South Australia & Victoria so a fungicide application will be mandatory if grown in areas where stem rust is a problem. Durack is rated resistant to susceptible for leaf rust depending on which pathotype of the rust is present. Again a fungicide may be required in leaf rust prone areas. Durack is moderately susceptible to septoria, moderately resistant to susceptible for bacterial blight, moderately susceptible to red leather leaf and

intolerant to stem nematode. Durack is however resistant and moderately intolerant to moderately tolerant to CCN.

Grain yield is similar to the tall varieties Carrolup and Yallara and an improvement compared to tall varieties bred for hay. Grain quality for this line is excellent with high protein levels.

Hay yield averaged over low, medium, and high rainfall sites is lower than other longer season varieties and care will need to be taken to cut this very early maturing variety at the correct growth stage. Monitoring the crop will be the key to achieving the highest hay quality (EPR \$2.30 ex GST).

WILLIAMS ^(b)

Williams is a tall milling variety commercialised by Heritage and released in Western Australia in 2013. Williams, formerly known as the breeding line WA2332, is a high yielding early to midseason variety with similar maturity compared to Yallara. It is three to seven days later maturing than Mitika. Williams is 15 cm taller than Mitika, 5 cm taller than Bannister, and 15 cm shorter than Yallara.

Although classified as MS for septoria, Williams has the highest level of septoria resistance compared to all other current oat varieties. It is resistant to leaf rust and depending on the stem rust pathotype present can range from moderately resistant to susceptible. Williams is resistant to bacterial blight and moderately resistant to moderately susceptible for BYDV. It is susceptible and intolerant to CCN. Williams has similar grain yield to Bannister with slightly inferior grain quality. Screenings are similar to Wombat and can be high, especially in the low rainfall regions. Williams has high Beta-glucan levels.

TABLE 3. Thirteen year (2005-2017) average hay and ten year (2008-2017) average grain production of oat varieties tested in hay trials.

| | Hay yield (t/ha) | | | Grain yield (t/ha) | | |
|---|------------------|------------|--------|--------------------|------------|--------|
| | Rainfall zone | | | Rainfall zone | | |
| | <375mm | 375-500 mm | >500mm | <375mm | 375-500 mm | >500mm |
| TALL (HUSKED) - EARLY TO MID SEASON MATURITY | | | | | | |
| Brusher | 7.3 | 9.4 | 12.1 | 1.9 | 2.8 | 2.9 |
| Durack | 6.5 | 8.2 | 10.9 | 2.4 | 3.4 | 3.6 |
| Mulgara | 7.2 | 9.2 | 12.1 | 2.2 | 3.0 | 3.1 |
| Wallaroo | 7.0 | 9.1 | 11.8 | 2.0 | 2.8 | 2.9 |
| Wintaroo | 7.6 | 9.8 | 12.8 | 2.2 | 3.0 | 3.0 |
| Yallara | 7.1 | 9.2 | 12.0 | 2.4 | 3.3 | 3.4 |
| TALL (HUSKED) - MID LATE TO VERY LATE MATURITY | | | | | | |
| Forester | na | 9.1 | 12.1 | 1.4 | 1.9 | 2.0 |
| Glider | na | 8.9 | 11.8 | 1.8 | 2.4 | 2.5 |
| Kangaroo | na | 9.1 | 12.2 | 2.2 | 2.7 | 2.8 |
| Tammar | na | 9.2 | 12.4 | 2.0 | 2.8 | 3.0 |
| Tungoo | na | 9.2 | 12.4 | 1.8 | 2.4 | 2.6 |
| No. trials | 13 | 24 | 56 | 19 | 30 | 57 |

Williams averages slightly lower hay yield compared to other hay varieties. Hay quality is similar to Wintaroo with slightly lower water soluble carbohydrates and slightly higher crude protein (EPR \$2.30 ex GST).

BANNISTER

Bannister is a dwarf milling variety with high grain yield released for Western Australia in 2012. Bannister is suited to eastern Australia as well as Western Australia. It is adapted to low, medium, and high rainfall zones of Southern Australia. It is 13 cm taller than Mitika and heads about 3 to 4 days later than Mitika. Seednet is the commercial partner. Bannister is resistant to leaf rust and moderately resistant to bacterial blight. It is susceptible and intolerant to CCN. Bannister has slightly lower hectolitre weight and slightly higher screenings compared to Mitika. It is similar to Mitika for groat percent quality (EPR \$2.30 ex GST).

WOMBAT

Wombat is a dwarf milling variety commercialised by Seednet. It is similar in height to Possum and slightly taller than Mitika. It is a midseason variety flowering about six days later than Mitika.

Wombat is the first dwarf milling variety with CCN resistance and tolerance. It is also moderately tolerant and moderately resistant to stem nematode. It has improved BYDV resistance compared to other dwarf varieties and improved bacterial blight resistance compared to other dwarf varieties except Mitika.

Wombat has high hectolitre weight and low screenings compared to the feed variety Potoroo, which was the first dwarf variety with CCN resistance and tolerance. It also has high groat percent, slightly higher than Mitika. Wombat can have slightly higher screenings than Mitika, Yallara and Possum depending on seasonal conditions. Wombat will develop leaf reddening symptoms similar to Mitika and Possum post flowering. This does not affect grain yield or quality (EPR \$2.00 ex GST).

MITIKA

Mitika is an early maturing dwarf milling oat developed by SARDI and now commercialised by Heritage Seeds. It is resistant to leaf rust and moderately resistant to stem rust and bacterial blight. However, Mitika is susceptible to CCN, BYDV, septoria and red leather leaf and intolerant to CCN and stem nematode. Mitika is a milling quality oat with high hectolitre and grain weight, low screenings percent and moderately high groat percent. It is also a high feed value oat with low hull lignin and high grain digestibility. Mitika averages higher levels of Beta-glucan than Possum, Yallara and Euro. It is recommended for all rainfall zones where CCN or stem nematode is not a problem (EPR \$2.00 ex GST).

YALLARA

Yallara is a medium-tall milling oat variety developed by SARDI and commercialised by Seednet. Yallara is a backcross line

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using Euro as the recurrent parent and a North Dakota line as the source of rust resistance. It is moderately resistant to stem rust and resistant to leaf rust. Long term yield of this variety is a 2% improvement compared to Euro. However, yield increases of between 40 and 100% have been recorded for varieties with stem rust resistance similar to Yallara in years where stem rust is yield limiting. Yallara is slightly taller than Euro and 2 days earlier to head. It has premium oat quality and averages higher hectolitre weight and groat percent and lower screenings percent than Euro, Mitika, Possum and Wombat. Yallara is an improvement compared to Euro for bacterial blight resistance. Like Euro, Yallara is resistant to CCN but intolerant, moderately susceptible to septoria and red leather leaf and intolerant to stem nematode. Yallara is recommended to replace Euro in all areas but particularly where stem and leaf rust can be yield limiting. In addition, Yallara has bright grain and high grain digestibility making it suitable for the horse racing industry. Based on herbicide tolerance trials conducted by the SARDI New Variety Agronomy Group, Yallara is particularly sensitive to applications of Banvel-M®. For more information about the herbicide tolerance of Yallara go to www.nvtonline.com.au (EPR \$2.00 ex GST).

HAY VARIETIES

FORESTER [Ⓛ]

Forester is a very late hay variety adapted to high rainfall and irrigated cropping regions. It is seven to 10 days later than Glider, three days later than Riel, two days later than Targa, and three weeks later than Wintaroo. Forester has excellent early vigour and is an improvement compared to Glider. It has excellent lodging and shattering resistance.

Forester has an excellent foliar disease resistance spectrum. It is moderately susceptible to CCN. It has good hay colour, but like all late hay varieties may not resist hot dry winds as well as earlier varieties. Forester has excellent hay quality and is an improvement compared to Glider, Tammar, Targa, and Vasse, but similar to Riel.

Seed of Forester is available from AGF Seeds (EPR \$2.00 ex GST).

TAMMAR [Ⓛ]

Tammar is a late tall hay oat variety later in cutting time than Kangaroo and Tungoo but not as late as Glider. It is available to growers through AEXCO Pty Ltd.

Tammar has excellent hay colour and resists brown leaf at hay cutting. Hay yields are slightly lower than Wintaroo and similar to Tungoo and Kangaroo. Grain yield is better than Kangaroo, Tungoo, Glider and Riel. Hay quality is better than Kangaroo and similar to Tungoo and Wintaroo. Hay digestibility and ADF are better than Tungoo and Wintaroo. Tammar is moderately resistant and moderately tolerant to CCN and resistant and moderately tolerant to SN. Tammar has an excellent foliar disease resistance profile and is an improvement compared to Tungoo for stem rust resistance. Tammar is similar in height to Kangaroo, Tungoo and Wintaroo and has better lodging resistance than Tungoo, Wintaroo, Glider and Riel. Tammar has

better early vigour than Tungoo and Glider. Tammar has grain quality similar to Tungoo and Kangaroo with slightly smaller grain weight and slightly more screenings. It has improved grain quality compared to Glider, Riel and Vasse.

Tammar is recommended for medium and high rainfall zones and gives a slightly later option for cutting time than Tungoo and Kangaroo (EPR \$2.00 ex GST).

MULGARA [Ⓛ]

Mulgara is a tall mid season hay oat similar in heading time and height to Wintaroo. It is available to growers through AEXCO Pty Ltd.

Mulgara is an improvement compared to Wintaroo for resistance to stem rust and bacterial blight. It is also an improvement compared to Wintaroo for lodging and shattering resistance and early vigour. Hay yield is an improvement compared to Brusher but is slightly lower than Wintaroo. Hay quality is similar to Wintaroo. Mulgara has excellent hay colour and resists brown leaf at hay cutting. Grain yield and quality is similar to Wintaroo with lower screenings, higher protein and groat percent. Mulgara has high grain hull lignin.

Mulgara is recommended to replace Wintaroo in areas with stem nematode due to its higher level of resistance. In tests conducted over six years, Mulgara averaged 70 nematodes per plant compared to Wintaroo's 1065. It is also recommended to replace Wintaroo where improved lodging resistance, stem rust, or bacterial blight resistance is required.

The seed size of Mulgara is larger than other hay varieties and similar to Swan. Care should be taken to sow this variety at the correct seed density (EPR \$2.00 ex GST).

TUNGOO [Ⓛ]

Tungoo is a medium tall mid to late season hay variety similar in heading date to Kangaroo. Seed of this line is available to growers through AEXCO Pty Ltd.

Tungoo has an excellent disease resistance profile and resists leaf browning from hot dry winds. It combines resistance and moderate tolerance to CCN and SN. Levels of stem nematode resistance are similar to Glider and an improvement compared to Wintaroo. Tested over six years, Tungoo averaged 24 nematodes per plant compared to Wintaroo's 1065. Tungoo is also resistant to leaf rust and red leather leaf, moderately resistant to BYDV, septoria, and bacterial blight and moderately susceptible to stem rust.

Hay yield is similar to Kangaroo but grain yield and quality is similar to Glider. Hay digestibility is similar to Wintaroo (better than Kangaroo), although it tends to be higher in NDF and lower in WSC than Wintaroo but an improvement compared to Kangaroo. Early vigour is an improvement compared to Glider, but not as good as Kangaroo. It has moderately low hull lignin (EPR \$2.00 ex GST).

BRUSHER [Ⓛ]

Brusher is an early-mid season tall oat developed by SARDI and commercialised by AEXCO Pty Ltd in 2003. It is two to four days

TABLE 4. Agronomic features of varieties.

| Variety | Early vigour | Plant height | Heading | Maturity | Shattering resistance | Standing ability |
|----------------------------|--------------|--------------|---------|----------|-----------------------|------------------|
| SEMI-DWARF (HUSKED) | | | | | | |
| Bannister | G | D | EM | EM | R | R |
| Echidna | G | D | EM | EM | R | R |
| Kowari | G | D | E | E | R | R |
| Mitika | G | D | E | E | R | R |
| Possum | G | D | EM | EM | R | R |
| Potoroo | G | TD | E | E | MR | MR |
| Wombat | G | D | M | M | R | R |
| SEMI-DWARF (NAKED) | | | | | | |
| Numbat | MG | D | EM | EM | MR | R |
| TALL (HUSKED) | | | | | | |
| Brusher | G | T | E | EM | MS | MR |
| Durack | G | MT | VE | VE | MS | MR |
| Forester | VG | MT | VL | VL | R | R |
| Glider | P | MT | L | L | MS | MR |
| Kangaroo | MG | MT | ML | ML | MS | R |
| Mulgara | G | T | EM | EM | MR | MR |
| Tammar | M | MT | LM | LM | MS | R |
| Tungoo | MP | MT | ML | ML | MS | MS |
| Wallaroo | G | MT | E | E | MS | MS |
| Williams | G | ST | EM | EM | R | R |
| Wintaroo | MG | T | M | EM | MS | MR-MS |
| Yallara | VG | MT | EM | EM | MR | R |

Value for trait: Early vigour: VG=very good, G=good, MG = moderately good, M=moderate, P=poor, MP = moderately poor

Plant height: D = dwarf, TD = tall dwarf, T = tall, ST = short tall, MT = moderate tall

Heading and maturity: VE = very early, E = early, EM = early mid, M= mid season, ML = mid late season, LM = late mid season, L= late, VL=very late

Shattering and standing ability: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible,

earlier to head than Wintaroo and this suits it well to low rainfall areas. Although Brusher has inferior hay yield when compared to Wintaroo it is recommended to replace this variety where improved resistance to stem and leaf rust or improved hay quality is desired.

Grain yield and grain quality is similar to Wintaroo, Wallaroo and Kangaroo with higher grain protein. Brusher is moderately susceptible to stem rust, BYDV, septoria, red leather leaf and bacterial blight. It is resistant to leaf rust, resistant but moderately intolerant of cereal cyst nematode and intolerant of stem nematode.

When there is a high CCN population in a paddock with favourable seasonal conditions, Brusher will have significantly lower hay yield than tolerant varieties. Brusher is moderately low in grain lignin (EPR \$2.00 ex GST).

NOTES ON INTERSTATE VARIETIES

Many of the varieties released interstate are evaluated in a limited number of trials in southern Australia. More information is available from the SARDI National Oat Breeding Program and should be sought before attempting to grow these varieties. ■

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TABLE 5. Disease resistance of oat varieties - field reactions.

Colour key: Green is a good choice, yellow use caution and red either do not use or develop a management package if this disease is yield limiting in your environment

| | Rust | | Barley | CCN | | Stem nematode | | | | Red |
|---------------------|-------------------|-------|--------------------------|------------|-----------|---------------|-----------|----------|--------|------|
| | | | yellow | | | | | | | |
| Variety | stem ¹ | leaf | dwarf virus ² | resistance | tolerance | resistance | tolerance | Septoria | blight | leaf |
| SEMI-DWARF (HUSKED) | | | | | | | | | | |
| Bannister | MR-S | R | MS | R | MI | - | MI | - | MR-S | MS |
| Echidna | S | S | MS | S | I | MS | MT | S | S | MS |
| Kowari | MR-S | R | MS | S | - | - | I | S | MR | MS |
| Mitika | MR-S | MS | S | VS | I | S | I | S | MR | S |
| Possum | MS-S | MS | MS-S | VS | I | S | I | MS | S | MS |
| Potoroo | S | S | MS | R | T | S | MI | S | VS | S-VS |
| Wombat | MS-S | MS | MS | R | MT | MR | MT | MS | MS | MS |
| SEMI-DWARF (NAKED) | | | | | | | | | | |
| Numbat | MR-S | R | S | S | I | S | I | MR | S | MS |
| TALL (HUSKED) | | | | | | | | | | |
| Brusher | MS-S | MR-MS | MS | R | MI | MS | I | MS | MR-MS | MS |
| Durack | S-VS | R-S | MS | R | MI-MT | - | I | MS | MR-S | MS |
| Forester | R-S | MR-MS | MR-S | MS | MI | S | I | MR | MS-S | R-MR |
| Glider | MR-S | R | S-MR | MS | I | R | T | R | R | R |
| Kangaroo | MS-S | MS | MR-S | R | MT | MS | MI | MR-MS | MR-MS | MS |
| Mulgara | MS-S | MR | MS | R | MT | R | MT | MS | MR | MS |
| Tammar | MR-S | MR | MS | MR | MT | R | MT | MR | MR | R-MS |
| Tungoo | MS-S | MR | MR-MS | R | MT | R | MT | MR | MR | R |
| Wallaroo | S | S | MS | R | MT | MS | MI | S | S | MS |
| Williams | MR-S | R | MR-MS | S | I | - | I | - | R | MS |
| Wintaroo | S | MS | MS | R | MT | MR | MT | MR-MS | MR | MS |
| Yallara | MR-S | R | MS | R | I | S | I | MS | MR-MS | MS |

¹Disease reactions to stem rust will vary with pathotype, ²Disease reactions to BYDV may vary with the strain of the virus

Key to symbols used: VS = very susceptible, S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant,

VI = very intolerant, I = intolerant, MI = moderately intolerant, MT = moderately tolerant, T = tolerant, VT = very tolerant.

TABLE 6. Grain quality comparisons.

| Variety | Hectolitre Weight (kg/hl) | Screenings <2mm | 1000 Grain weight (g) | Kernel (%) | Probability of reaching milling grade | Protein (%) | Oil(fat) (%) | Hull lignin content |
|----------------------------|---------------------------|-----------------|-----------------------|------------|---------------------------------------|-------------|--------------|---------------------|
| SEMI-DWARF (HUSKED) | | | | | | | | |
| Bannister | MH | ML | MH | MH | H | M | MH | H |
| Echidna | M | H | M | ML | L | M | M | MH |
| Kowari | MH | L | H | H | H | MH | M | L |
| Mitika | H | L | H | MH | H | MH | M | L |
| Possum | MH | L | MH | MH | H | MH | ML | H |
| Potoroo | L | H | M | ML | - | M | MH | H |
| Wombat | H | M | MH | H | H | MH | M | H |
| SEMI-DWARF (NAKED) | | | | | | | | |
| Numbat | VH | H | L | - | - | H | VH | - |
| TALL (HUSKED) | | | | | | | | |
| Brusher | M | M | MH | M | - | MH | M | L |
| Durack | H | L | H | MH | H | MH | MH | H |
| Forester | L | M | L | L | - | M | M | H |
| Glider | L | M | M | ML | - | MH | ML | L |
| Kangaroo | M | ML | MH | ML | - | M | M | H |
| Mulgara | M | M | MH | MH | - | MH | M | H |
| Tammar | L | H | L | ML | - | MH | M | SEG |
| Tungoo | L | H | L | ML | - | MH | M | L |
| Wallaroo | M | M | M | MH | - | M | MH | L |
| Williams | MH | M | M | M | MH | M | M | MH |
| Wintaroo | M | M | MH | MH | - | M | M | L |
| Yallara | H | L | H | H | VH | MH | L | H |

Value for trait: L = low, ML = moderately low, M = medium, MH = moderately high, H = high, VH = very high, - not applicable

TABLE 7. Hay quality comparisons.

| Variety | Digestible dry matter (%dm) | Crude protein (%dm basis) | Neutral detergent fibre (%dm basis) | Water soluble carbohydrate (%dm basis) | Stem diameter |
|----------------------|-----------------------------|---------------------------|-------------------------------------|--|---------------|
| TALL (HUSKED) | | | | | |
| Brusher | MH | M | M | MH | M |
| Durack | M | M | M | M | M |
| Forester | MH | M | ML | MH | MH |
| Glider | M | M | M | M | M |
| Kangaroo | ML | MH | MH | ML | ML |
| Mulgara | M | M | M | M | M |
| Tammar | M | MH | M | M | ML |
| Tungoo | M | MH | M-MH | M | M |
| Wallaroo | M | M | M | M | L |
| Wintaroo | M | M | M | M | M |
| Yallara | MH | M | ML | H | ML |

Value for trait: L = low, ML = moderately low, M = medium, MH = moderately high, H = high.

Vetch variety sowing guide 2019

By Stuart Nagel and Gregg Kirby, SARDI

Vetch is a multi-purpose crop grown mostly as a disease break crop in rotation with cereals in a wide range of soil types from light sands to heavier clay soils. Common Vetch varieties (Languedoc, Blanchefleur, Morava®, Rasina®, Volga®, Timok® and Cummins) versatility allows cropping for grain or hay production, early grazing as green pasture or for dry grazing, hay production or green manure.

Grain vetches have been grown in lower to mid-rainfall cereal areas of southern Australia, and their grain yields have been similar to pea yields in these areas. Note that vetch grain is not used for human consumption and can be use up to 20% in pig rations.

Grain from Morava, Rasina, Volga and Timok can be used without limit to feed all ruminants and as up to 20% in the diet of pigs. These 4 varieties possess toxin in grain <0.65% compare with Blanchefleur 0.95% and Languedoc 1.65%.

Forage vetches are used for hay, green manure or mid to late winter feed for grazing. They are purple vetch (*V. benghalensis*) variety Popany, or Woolly pod vetches (*V. villosa* ssp. - varieties Namoi, Capello®, Haymaker® and RM4®. Forage vetches can grow successfully in areas of 400 to 650mm of annual rainfall. Grain from woolly pod vetch varieties CAN NOT be use to feed any livestock.

Vetch is valued for its benefits to subsequent cereal and oil

seed crops in the rotation, these benefits are usually greater than from other pulses particularly in lower rainfall areas. On sandy soils vetches provide better soil protection than peas and provide better stubble retention in the soil.

Morava, Rasina, Volga and Timok are resistant to rust and are the preferred varieties for grain in areas prone to rust infections. Disease management is critical when growing a vetch crop regardless of the end use, where possible disease resistant varieties should be planted as a preference. Care must be taken when growing rust susceptible varieties as grazing or feeding hay/silage from rust infected plants may induce abortions in pregnant livestock.

So while it is usually not economically viable to use fungicides for rust on vetch it may be necessary where rust susceptible varieties are to be used as feed.

Ascochyta blight occurs in earlier stages of the vetch crop and can reduce grain and dry matter production, but not like a heavy infestation of Botrytis grey mould (BGM) can in cool/wet growing seasons with high amounts of vegetative growth.

There is little difference between vetch varieties in their resistance to BGM; varieties like Morava, which produce greater levels of vegetative growth and denser canopies, will be more prone to this disease in higher rainfall areas.

Table 1: contains adaptation information for vetch varieties

TABLE 1. Vetch grain variety rainfall zones (mm).

| <350 | 350-400 | 400-450 | 450-600 | >600 |
|---------|--------------|--------------|---------|--------|
| Rasina | Rasina | Morava | Morava | Morava |
| Cummins | Blanchefleur | Rasina | Rasina | Timok |
| Volga | Cummins | Blanchefleur | Timok | |
| Timok | Morava | Cummins | | |
| | Volga | Volga | | |
| | Timok | Timok | | |

TABLE 2. Vetch hay/silage/grazing and green manuring variety selection

| <350 | 350-400 | 400-450 | 450-600 | >600 |
|--------------|--------------|----------|----------|----------|
| Rasina | Rasina | Morava | Morava | Capello |
| Blanchefleur | Morava | Rasina | Popany | Haymaker |
| Cummins | Cummins | Popany | Capello | Morava |
| Morava | Popany | Capello | Haymaker | Popany |
| Volga | Blanchefleur | Haymaker | Timok | Timok |
| Timok | Volga | Volga | RM4 | RM4 |
| RM4 | Timok | Timok | | |
| | RM4 | RM4 | | |

VETCH

TABLE 3. Characteristics of selected vetch varieties

| Variety | Maturity | Yield potential | | Flower colour | % of pod shattering | % of hard seeds | Disease reaction* | | |
|---|-----------|-----------------|------------|---------------|---------------------|-----------------|-------------------|----------|----------|
| | | Grain | Dry matter | | | | Rust | Asochyta | Botrytis |
| COMMON VETCH VARIETIES (<i>Vicia sativa</i>) | | | | | | | | | |
| Blanchefleur | Mid | High | Mod | White | 5-10 | 5-10 | VS | MS | S |
| Cummins | Mid-early | High | Mod | White | 5-10 | 5-15 | VS | MS | S |
| Morava | Late | High | High | Purple | 0 | 0 | R | S | VS |
| Rasina | Early-mid | High | Mod | Purple | 0-2 | 0 | R | MS | S |
| Volga | Early | V. high | High | Purple | 0-2 | 2-5 | R | MS | S |
| Timok | Mid | High | V. high | Purple | 0-2 | 0-2 | R | MS | S |
| PURPLE VETCH (<i>Vicia. benghalensis</i>) | | | | | | | | | |
| Popany | Very late | Low | High | Purple | 20-30 | 5-10 | R | S | VS |
| Woolly pod vetches (<i>Vicia villosa</i> subsp.) | | | | | | | | | |
| Haymaker | Late | Low | Very high | Purple | 5-10 | 20-30 | R | S | VS |
| Capello | Late | Low | Very high | Purple | 5-10 | 15-20 | R | S | VS |
| RM4 | Mid | Moderate | Very high | Purple | 2-5 | 2-5 | R | MR | VS |

grown for grain and hay in different rainfall zones.

Table 2: contains information for selection of common and woolly pod vetch varieties for hay/silage, grazing and green manuring.

Table 3: provides information on the most important selection/recommended criteria for planting for grain and hay, disease resistance, maturity, shattering resistance and hard seed percentage for each variety.

Table 4: displays yield results for grain and dry matter production of common vetches varieties tested between 2011-14 in SA by ANVBP.

Table 5: provides dry matter yield for woolly pod and purple vetch varieties tested between 2011-14 in SA by ANVBP.

Table 6: provides recommendations of seeding rates for vetch production of grain, hay/silage, grazing and green manuring.

When selecting a vetch variety growers also need to consider their individual farm and paddock situation and most importantly the end use targeting for the crop and to make this selection on all the available information.

NOTES ON VARIETIES

COMMON VETCH (*VICIA SATIVA*)

LANGUEDOC

Languedoc is an early flowering and maturing variety recommended for low rainfall areas although its can lodge severely making harvest difficult under certain conditions. Languedoc generally exceeds Blanchefleur's grain yield in areas

with less than 350mm rainfall. Its hard seed content is generally around 5-10% and it is highly susceptible to rust. Languedoc grains possess 1.0-1.6% of anti-nutritional level (BCN).

BLANCHEFLEUR

Prior to the release of Morava, Blanchefleur had been the preferred grain variety in areas above 350mm rainfall in SA. Blanchefleur has mid maturity, white flowers and reddish brown/mottled seed with orange cotyledons. Blanchefleur is very susceptible to rust.

It is well suited to medium to high rainfall areas where rust is not a regular problem. Both vetch and lentils are on the prescribed grain list of AQIS due to the vetch-lentil substitution issue, this has meant export markets of orange cotyledon varieties like. Blanchefleur are limited to small bird seed markets in Europe and seed for grazing and green manure crops only. Blanchefleur grains possess 0.9-1.6% of anti-nutritional level (BCN).

CUMMINS

A mid to early maturing, white flowering variety selected from Languedoc. It is well adapted to medium to low rainfall areas where it generally yields higher than Blanchefleur. Cummins is susceptible to rust and moderate susceptible to Ascochyta blight. Cummins possess similar % of BCN to Blanchefleur.

MOROVA

Morava is a rust resistant late flowering vetch variety with 100% soft seeds, develop in 1998 by SARDI's Australian National Vetch Breeding Program (ANVBP), led by R. Matic and assist

VETCH

TABLE 4. 2010-14 grain and dry matter yield for common vetch varieties,

| (5 sites * 5yrs) | | | | |
|------------------|--------------------|-------------------|-------------------------|-------------|
| Variety | Grain yield (t/ha) | % of Blanchefleur | Dry matter yield (t/ha) | % of Morava |
| Blanchefleur | 2.15 | 100 | 4.03 (2009-13) | 80 |
| Rasina | 2.37 | 110 | 4.7 (2009-13) | 93 |
| Morava | 2.16 | 100 | 5.06 | 100 |
| Volga | 2.75 | 128 | 5.51 | 109 |
| Timok | 2.48 | 115 | 5.26 | 104 |
| Mean yield | 2.38 | | 4.91 | |

by I. Pearce. Grain yield is superior to other vetches in the high rainfall areas and to Blanchefleur, Languedoc and Cummins in all other areas in the presence of rust. It is larger seeded and more resistant to shattering than other vetch varieties.

The BCN levels of Morava are 0.65%, which is 50% lower than Blanchefleur and Languedoc. Morava produces higher herbage yields than all other common vetch varieties.

Morava is later flowering and maturing than Blanchefleur and grain yield will be reduced in environments with dry finishes. Morava is susceptible to Ascochyta blight and very susceptible to Botrytis, because Morava produces very high biomass in wet/cool zones.

Morava is a PBR variety and can be sourced from Heritage Seeds.

RASINA

Rasina is soft seeded vetch from the ANVBP, developed in 2006 by R. Matic and assist by S. Nagel and G. Kirby. Rasina replaces Languedoc, Blanchefleur and Cummins in low to medium rainfall areas for grain production.

Rasina is 5-10 days earlier than Blanchefleur and 10 to 15 days earlier than Morava. A significant advantage over Languedoc, Blanchefleur and Cummins is Rasina's resistance to rust and is slightly more tolerant to ascochyta blight and Botrytis.

However, Rasina is not expected to replace Morava in higher rainfall districts or for hay production. The level of anti-nutritional factors is 0.6 to 0.8 compared to 0.9 to 1.6 in Blanchefleur and Languedoc, respectively. Rasina possesses a distinctive uniform dark brown speckled seed coat with dark beige cotyledons. Rasina is a PBR variety and can be sourced from Heritage Seeds.

VOLGA

Volga developed in 2012 by SARDI's Australian National Vetch Breeding Program (ANVBP), led by R. Matic and assist by S. Nagel and G. Kirby.

Volga is high yielding grain/seed variety for low and mid rainfall areas. It is particularly suited to shorter season areas where the growing season finishes sharply.

Volga has good initial establishment, is rust resistant, and earlier flowering and maturing than Blanchefleur and Rasina. It

TABLE 5: 2010-14 Woolly pod vetch varieties

| Variety | Dry matter (t/ha) | % of Capello |
|-----------------------------|-------------------|--------------|
| Capello | 6.23 | 100.0 |
| Haymaker | 6.26 (2009-12) | 100.4 |
| RM 4 | 6.71 | 107.7 |
| Mean yield | 6.4 | |
| PURPLE VETCH VARIETY | | |
| Popany | 5.28 (2009-12) | 84.75 |

will improve the reliability of vetch and economic production in crop rotations especially in low and mid rainfall areas, 330 to 380mm per year. Earlier maturing equates to earlier nodule development.

Volga has high grain and herbage yields and is well adapted to all areas where vetch is currently grown. Volga is well suited to situations where the season finishes sharply (dry September & October, a common issue in many low to mid rainfall areas) because of its early flowering and maturing characteristics.

It can be successfully grown in many Australian soil types; from non-wetting sand to heavy clay loam with pH 5.8 – 9.4, like other common vetch varieties. Volga is moderately susceptible to ascochyta blight, whereas Morava is susceptible. The early maturity of Volga may limit yield potential relative to longer growing season varieties like Morava in high rainfall areas.

Toxin levels in the grain are around 0.54% lower compared to Morava at 0.65% and Blanchefleur 0.95%. Volga seed size is very similar to Morava seeds (100seeds weight 7.82g). See data in following tables.

Volga is a PBR variety and can be sourced from Heritage Seeds.

Timok developed in 2012 by SARDI's Australian National Vetch Breeding Program (ANVBP), led by R. Matic and assist by S. Nagel and G. Kirby.

TIMOK

Timok was bred to complement Morava in mid/high rainfall areas for grain/seed and especially for hay/silage production. Timok yielded more grain than Rasina, Morava and Blanchefleur by 9%, 18% and 21%, respectively over five years at five sites in SA.

Timok has better initial establishment than Morava, and will improve the reliability of vetch and economic production in crop rotations especially in mid and high rainfall areas, 350-450 mm/yr. Morava will still be the preferable variety for hay/silage in rainfall areas with greater than 450mm per year.

Timok is high yielding, highly rust resistant common vetch variety, moderately susceptible to ascochyta blight, susceptible to botrytis, has good early establishment, and is a soft seeded variety.

Timok matures between Rasina and Morava (100-105 days from seeding to full flowering). Timok is very well adapted for grain production in rainfall areas >380mm/yr, and dry matter

TABLE 6. Plant density and recommended seeding rates for vetch.

| End use | Common vetch varieties | | Woolly pod vetch varieties | | Purple vetch variety* | |
|--------------|-----------------------------------|---------------------|-----------------------------------|---------------------|-----------------------------------|---------------------|
| | Plants density (plants per sq.m.) | Sowing rate (kg/ha) | Plants density (plants per sq.m.) | Sowing rate (kg/ha) | Plants density (plants per sq.m.) | Sowing rate (kg/ha) |
| Grain | 40-60 | 40-50 | 40-50 | 25-40 | 40-50 | 25-40 |
| Hay/silage | 50-70 | 50-60 | 50-60 | 30-45 | 50-60 | 30-45 |
| Grazing | 50-70 | 50-60 | 50-60 | 30-45 | 50-60 | 30-45 |
| Green manure | 60-70 | 55-65 | 60-70 | 45-50 | 50-60 | 30-45 |

* in Australia only Popany existing as Purple vetch variety

production is similar to Morava in high rainfall regions (>400mm), but 19% higher than Morava in low to medium rainfall regions (330-380mm). Timok is multipurpose variety--can be used for grain, hay/silage, grazing or green/brown manure.

Toxin levels in the grain are around 0.57%. Seed weight is 6.88g per 100 seeds, similar size to Rasina 6.92g/100seeds. See data in following tables.

Timok is a PBR variety and can be sourced from Pasture Genetics.

Herbicide tolerance; no differences between these varieties to registered herbicides to control broad leaf weeds. Also, no differences between varieties to registered herbicides for grass weed control.

PURPLE VETCH (*VICIA BENGHALENSIS*)

POPANY

Popany (*V. benghalensis*) is purple vetch. Grain yield is significantly lower than yields from common vetch varieties. But, seeds are smaller than seeds from common vetch varieties therefore the seeding rate are lower at approximately 30-35kg/ha.

Grain from this variety can be used as a bird feed in mix with other recommended grains. Popany is a late maturity variety, >125 days from seeding to podding. It is a good variety in mid to high rainfall areas for hay/silage. Popany, possesses 5-10% hard seeds. This variety is resistant to rust but susceptible to ascochyta and chocolate spot. Seed coat is black with distinctive white hilum.

WOOLLY POD VETCHES

CAPELLO AND HAYMAKER

(*Vicia villosa* subsp. *dasycarpa*). These woolly pod vetches are lower in grain yield compared with common vetches, but are much higher in dry matter production than common vetch varieties in rainfall areas >450mm/yr. Grain from these varieties cannot be used to feed any livestock.

Also, these varieties can only be grazed from the 10-node stage to podding stage. It is not recommended that grazing occur earlier and also once plants begin to develop seeds in pods. These two varieties are very good for hay/silage production in areas >400mm of rainfall annually.

Haymaker and Capello are selected soft seed varieties from Namoi. In last few years these two varieties have become prone to hard/dormant seeds. Both varieties are owned by Heritage Seeds.

RM4

RM4 (*Vicia villosa* subsp. *eriocarpa*) was selected by Australian National Vetch Breeding Program lead by Rade Matic and assisted by Stuart Nagel and Gregg Kirby.

RM 4 is high producer of dry matter, has very good early establishment, moderately resistant to ascochyta blight, and susceptible to botrytis, soft seed variety (>94%); emerged in 15-20days on the field; earlier in maturity by 10-15 days than Haymaker or Capello, significantly higher in dry matter production in mid/low rainfall areas (<380mm/yr) than Haymaker or Capello. Also, this variety is suitable for higher rainfall areas >400-650mm/yr.

RM4 is multipurpose variety- that can be used for hay/silage, grazing, green/brown manure or for seeds.

RM 4 can be successfully grown, like other woolly pod varieties in many Australian soil types, like other vetches is excellent for soil fertility/structure and nitrogen fixation, graze from 10 nodes up to finish flowering, for hay/silage, cut in full flowering for the best balance of feed value. RM 4 performs better in grain productions than other woolly pod varieties when season finishes sharply.

Herbicide tolerance: RM 4 was not sensitive to any herbicides recommended/registered for use in woolly pod vetch varieties.

Insect pests: RM 4 is susceptible in early growth stages to red-legged earth mite and lucerne flea, like other woolly pod vetch varieties. Also, RM 4 is susceptible to blue green and cowpea aphids from early growth through to pod maturity, as well as to native budworm during pod formation and filling.

Grain from this variety, like other woolly pod vetches, cannot be used to feed any livestock. RM4 is a PBR variety and can be sourced from Heritage Seeds. ■

Lentil variety sowing guide 2019

By Sarah Day, Penny Roberts, Jenny Davidson, SARDI and Laura James, DEDJTR Victoria

PBA Hallmark XT (tested as CIPAL1422) is a new lentil release with similar herbicide tolerance characteristics to PBA Hurricane XT. It is a medium red lentil, making it a different size market class to PBA Hurricane XT. PBA Hallmark XT is widely adapted to a range of growing environments, with a 5-6% yield advantage over PBA Hurricane XT when grown in the Mid-North, Yorke Peninsula, Murray Mallee, and South East regions. PBA Hallmark XT is a mid flowering variety with mid maturity, although slightly later maturity than PBA Hurricane XT. It has a high resistance rating for botrytis grey mould (R/MR) and MR/MS rating for ascochyta blight (AB) in South Australia. Currently this strain of AB has not been detected in Victoria, where PBA Hallmark XT is rated MR for foliar AB. PBA Hallmark XT will be available to growers for the 2019 season. The high yielding large red lentil, PBA Jumbo2 is broadly adapted across all lentil production zones. In the lower yielding environments PBA Bolt, a medium red lentil, can still be the highest yielding lentil in variety trials. PBA Greenfield, a medium green lentil, is the highest yielding Australian green lentil variety with broad adaptation.

PBA Hurricane XT is now rated as MR/MS to foliar AB in South Australia due to infection in commercial crops during 2015-2018. It does not require fungicide sprays if no disease is visible. Growers are urged to monitor crops regularly for disease and podding sprays may be required if disease is present during the growing season in this variety. The rapid and dominant uptake of PBA Hurricane XT, particularly on the Yorke Peninsula, has threatened the longevity of the AB resistance in this cultivar. As with PBA Hallmark XT, this strain of AB has not been detected in Victoria where PBA Hurricane XT is listed MR for foliar AB. It is important to diversify variety selections within a year and across rotations, alongside agronomic and disease management practices to maintain the sustainability of the system and reduce the risk of crop failures.

Botrytis grey mould (BGM) continues to be a major disease limitation to SA lentil production and a foliar fungicide spray at the canopy closure stage in all varieties is recommended in conducive seasons and disease prone areas. This is particularly important in varieties with low levels of resistance such as PBA Hurricane XT, but also in varieties with improved resistance to BGM such as PBA Jumbo2, although follow up sprays may not be needed in the latter. Early sowing is not recommended for varieties rated susceptible or moderately susceptible to BGM in disease prone areas.

Price differences can occur between varieties across seasons, however growers need to produce high quality seed in all varieties to secure markets and achieve the highest prices. On farm storage can assist in attaining the highest price for grain in some seasons and allow lentils with poor quality issues or contaminants to be stored until appropriate cleaning and marketing can occur.

Timely harvesting is recommended in lentils to minimise seed discolouration and weather damage and also to reduce the risk of yield loss from shattering.

SELECTION CRITERIA

Information on the most important selection criteria, grain yield, disease resistance, maturity, lodging resistance, shattering and seed type for each variety can be found in Tables 2-3. When selecting a variety, growers also need to consider their individual farm and paddock situation and the access and availability of the likely target markets and make their selection on all available information.

NOTES ON SELECTED VARIETIES

SMALL RED LENTILS

PBA HURRICANE XT ⁽¹⁾

PBA Hurricane XT was the second lentil variety to be released with improved tolerance to the herbicides imazethapyr and flumetsulam, plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. However, it is important to note that product label rates, plant-back periods and directions for use must still be adhered to. It is a mid-flowering, mid maturing variety with small red seed and a grey seed coat, although the seed size is slightly larger than Nipper and PBA Herald XT. PBA Hurricane XT has a MR/MS rating for foliar AB in South Australia with moderately severe lesions identified in crops, particularly around Maitland and Mallala. This cultivar may require a podding spray to prevent seed and pod infection, when crops are infected. PBA Hurricane XT has a MR/MS rating for BGM and in disease prone areas a strategic fungicide programme for BGM will be required and early sowing should

LENTILS

TABLE 1. Lentil variety sowing guide 2019

| Seed type | Rainfall zones (mm) | | | |
|---------------------------------|---------------------|-------------------|-------------------|-------------------|
| | Below 400 | 400-450 | 450-500 | Above 500 |
| SMALL RED | | | | |
| | Nipper# | Nipper | Nipper | Nipper |
| | PBA Hurricane XT+ | PBA Hurricane XT+ | PBA Hurricane XT+ | PBA Hurricane XT+ |
| | PBA Herald XT+# | PBA Herald XT+ | PBA Herald XT+ | PBA Herald XT+ |
| MEDIUM RED | | | | |
| | PBA Bolt | PBA Bolt | PBA Blitz~ | PBA Hallmark XT+ |
| | PBA Flash | PBA Flash | PBA Hallmark XT+ | PBA Ace |
| | PBA Ace | PBA Hallmark XT+ | PBA Flash | PBA Blitz~ |
| | Nugget | PBA Ace | PBA Ace | PBA Flash |
| | PBA Hallmark XT+ | PBA Blitz~ | PBA Bolt | PBA Bolt |
| | PBA Blitz~ | Nugget | Nugget | Nugget |
| LARGE RED | | | | |
| | PBA Jumbo2 | PBA Jumbo2 | PBA Jumbo2 | PBA Jumbo2 |
| | PBA Jumbo | PBA Jumbo | PBA Jumbo | PBA Jumbo |
| | Aldinga | Aldinga | Aldinga | Aldinga |
| MEDIUM & LARGE GREEN | | | | |
| | PBA Greenfield | PBA Greenfield | PBA Greenfield | PBA Greenfield |
| | PBA Giant | PBA Giant | PBA Giant | PBA Giant |
| | Boomer | Boomer | Boomer | Boomer |

= not well suited to low rainfall areas or dry seasonal conditions due to low biomass type, must be sown early in these situations

~ = variety best suited to crop-topping + = herbicide tolerant variety

be avoided. Plant height and early vigour are improved over Nipper and PBA Herald XT, improving weed competition and harvestability. Like PBA Herald XT and Nipper, PBA Hurricane XT has been found to be more sensitive to Group C herbicides such as metribuzin and simazine than other lentil varieties. However, label rates of these herbicides have been used on most evaluation trials. It is important to be cautious when applying these herbicides on variable soil types, especially if weather conditions conducive to crop damage are forecast. PBA Hurricane XT is the highest yielding small red lentil and is commercialised by PB Seeds (EPR \$5.00/t ex GST).

PBA HERALD XT [Ⓛ]

PBA Herald XT was the first lentil variety with improved tolerance to the herbicides imazethapyr and flumetsulam, plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. However it is important to note that product label rates, plant-back periods and directions for use must still be adhered to. It is a mid to late flowering and maturing variety with yields lower than PBA Hurricane XT. It has high levels of disease resistance to both AB (R) and BGM (R/MR), however

disease monitoring and a fungicide application for BGM prior to canopy closure is still recommended. PBA Herald XT is more sensitive than most other varieties to group C herbicides such as metribuzin and simazine and caution is urged with the application of these products particularly on variable soil types. As a natural part of its genetic make-up PBA Herald XT has very low levels (0.1% or less) of seed with a black seed coat, which is classified at receipt point with seeds of a contrasting colour limited at 1%. PBA Herald XT is commercialised by PB Seeds (EPR \$5.00/t ex GST).

NIPPER [Ⓛ]

Nipper is rated R/MR to BGM and MR/MS to foliar AB infection. However, in areas with reduced plantings of Nipper, the virulent ascochyta strain has recently become infrequent. Crops should be monitored for presence of AB and strategic vegetative and podding sprays for AB are recommended in this variety in disease prone areas. Nipper has a small seed size similar to PBA Herald XT. Nipper, like PBA Herald XT, flowers later than Nugget but often matures earlier. Nipper is more sensitive to metribuzin than most other varieties and caution is required to

LENTILS

TABLE 2. Characteristics of selected lentil varieties.

| TABLE 27 Characteristics of selected PBA varieties | | | | | | | | | | | | | | |
|--|------------------|-------------------|------------------------------|-----------------|----------|--------------|----------------|---------------|--------------------|----------|-------------|---------------------|------------------|-------|
| Variety | Seed coat colour | Coty-lodon colour | Seed size relative to Nugget | Market category | Vigour | Plant height | Flowering time | Maturity time | Lodging resistance | Pod drop | Shatter-ing | Botrytis grey mould | Ascochyta blight | |
| | | | | | | | | | | | | | Foliage | Seed |
| SMALL RED | | | | | | | | | | | | | | |
| Nipper | Grey | Red | 75-80 | SRP | Poor/Mod | Short | Mid/Late | Mid | MR | MR | MR | R/MR | MR/MS | MR |
| PBA Herald XT | Grey | Red | 75 | SR | Poor/Mod | Short | Mid/Late | Mid/Late | MR | MR | R | R/MR | R | R |
| PBA Hurricane XT | Grey | Red | 85 | SRP | Moderate | Medium | Mid | Mid | MR | MR | R | MR/MS | MR/MS* | MR |
| MEDIUM RED | | | | | | | | | | | | | | |
| Nugget | Grey | Red | 100 | MRS | Moderate | Medium | Mid | Mid/Late | MS | MR | R | MR/MS | MR/MS | MR/MS |
| PBA Ace | Grey | Red | 100 | MRS | Good | Medium | Mid | Mid | MR/MS | R | MR/MS | MR/MS | R | R |
| PBA Blitz | Grey | Red | 115-120 | MRS | Mod/Good | Med/Tall | Early | Early | MR/MS | MR | MR | MR | MR | MR/MS |
| PBA Bolt | Grey | Red | 100 | MRS | Mod/Good | Medium | Early/Mid | Early/Mid | R | R | R | S | MR | R/MR |
| PBA Hallmark XT | Grey | Red | 105 | MRS | Mod/Good | Medium | Mid | Mid | MR | MR | R | R/MR | MR/MS* | MR |
| PBA Flash | Green | Red | 100-110 | MRS | Moderate | Medium | Early/Mid | Early/Mid | MR | MR | MR | MR/MS | MS | MS |
| LARGE RED | | | | | | | | | | | | | | |
| PBA Jumbo | Grey | Red | 120 | LRS | Moderate | Medium | Mid | Mid | S | MR | MR | MS | MR/MS | S |
| PBA Jumbo2 | Grey | Red | 120 | LRS | Mod/Good | Med/Tall | Mid | Mid | MR/MS | MR | R | R/MR | R | R |
| MEDIUM AND LARGE GREEN | | | | | | | | | | | | | | |
| Boomer | Green | Yellow | 150 | LG | Good | Tall | Mid | Mid/Late | S | R | S | MR/MS | MR | MR/MS |
| PBA Greenfield | Green | Yellow | 130 | LG | Good | Tall | Mid | Mid/Late | MS | R | MR | MR | MR/MS | MR/MS |
| PBA Giant | Green | Yellow | 170 | LG | Good | Tall | Mid | Mid/Late | MS | R | MR/MS | MS | MR | MS |

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, I = intolerant, MI = moderately intolerant,

Market category: MRS = medium red split, SRP = small red premium round (football), SR = small red round (football), LRS = large red split, LG = large green.

* = PBA Hallmark XT and PBA Hurricane XT are rated as MR/MS for foliar AB in South Australia. The virulent strain has not been detected in Victoria and so in that state these cultivars are MR to foliar AB.

Disease data sourced from NVT Online.

Agronomic data sourced from PBA Lentil Breeding Program

avoid application when conditions are conducive to damage. Nipper is licensed to Seednet (EPR \$5.00/t ex GST).

MEDIUM RED LENTILS

PBA ACE ^(b)

PBA Ace is a vigorous growing, mid flowering and mid maturing variety with high yield potential and broad adaptation. It provides an alternative to Nugget in all regions. PBA Ace has resistance to AB and is rated MR/MS to BGM. PBA Ace is one of the highest yielding medium red lentils in long term trials in all regions of SA and Victoria, but due to its later maturity than PBA Bolt, PBA Blitz and PBA Flash is likely to be better suited to areas where mid maturing varieties are favoured. PBA Ace can be prone to lodging under conditions of high biomass production often making BGM difficult to control. When grown in favourable environments particularly when sown early a small

reduction in seeding rate may be beneficial in this variety to reduce biomass and lodging. A small level of shattering has been observed under some conditions in PBA Ace at maturity but it is unlikely to cause significant yield loss. PBA Ace has a grey seed coat colour and is licensed to PB Seeds (EPR \$5.00/t ex GST).

PBA BLITZ ^(b)

PBA Blitz is suited to all current lentil growing areas, with particular adaptation to shorter-season areas, where its combination of early flowering, early maturity, moderate disease resistance and medium seed size will improve lentil reliability and economics of production. PBA Blitz is the earliest maturing lentil variety and the best option where crop topping and/or delayed sowing are practised. It has a good level of early vigour and an erect plant type. PBA Blitz is a medium sized red lentil (larger than PBA Flash and Nugget) with a grey coloured seed

LENTILS

TABLE 3. LOWER EYRE PENINSULA lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.29 | 1.22 | 1.09 | 2.29 | 2.14 |
| | No. Trials | 1 | 1 | 1 | 1 | 1 |
| PBA Flash | 5 | 104 | 104 | 108 | 107 | 103 |
| PBA Jumbo2 | 5 | 103 | 106 | 102 | 102 | 100 |
| PBA Hurricane XT | 5 | 99 | 101 | 96 | 99 | 101 |
| Nugget | 5 | 101 | 95 | 96 | 97 | 106 |
| PBA Bolt | 5 | 97 | 101 | 100 | 95 | 101 |
| PBA Jumbo | 3 | 99 | 90 | 100 | - | - |
| PBA Hallmark XT | 4 | - | 101 | 89 | 90 | 100 |
| PBA Ace | 4 | 100 | 103 | 89 | 85 | - |
| Nipper | 5 | 98 | 86 | 92 | 101 | 94 |
| PBA Blitz | 5 | 92 | 81 | 107 | 93 | 79 |
| PBA Herald XT | 3 | 91 | 81 | 78 | - | - |

coat. PBA Blitz has a low level of “pale coat Blitz” seeds which still have red cotyledons and are a natural part of the genetic make-up of the variety. These do not affect the splitting or cooking characteristics of the variety. These “pale coat Blitz” seeds are classified at receipt point as seeds of contrasting colour with a limit of 1% allowed. PBA Blitz is commercialised by PB Seeds (EPR \$5.00/t ex GST).

PBA BOLT ^(b)

PBA Bolt is an early-mid flowering and maturing lentil with excellent lodging resistance at maturity and high yield in drought years and dry areas. It provides an alternative to PBA Flash in all areas, particularly in areas where AB, harvestability and drought tolerance are major issues. PBA Bolt has improved tolerance to boron and salt over most other commercial varieties. PBA Bolt has moderate resistance to AB but is susceptible to BGM and this disease will need to be carefully managed in disease prone areas. PBA Bolt has a grey seed coat colour and is licensed to PB Seeds (EPR \$5.00/t ex GST).

PBA HALLMARK XT ^(b)

PBA Hallmark XT was the third lentil variety to be released with improved tolerance to the herbicides imazethapyr and flumetsulam, plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. However, it is important to note that product label rates, plant-back periods and directions for use must still be adhered to. PBA Hallmark XT builds on PBA Herald XT and PBA Hurricane XT, with higher grain yields and a different size market class. It is a mid-flowering, mid maturing variety with medium red seed and a grey seed coat. The seed size is slightly larger than PBA Ace and PBA Bolt

but less than PBA Flash and PBA Blitz. PBA Hallmark XT has a high resistance rating for botrytis grey mould (R/MR) and MR/MS rating for foliar ascochyta blight in South Australia. Fungicide sprays at podding may be required if crops are infected. Vigour and plant height are slightly improved over PBA Hurricane XT and equivalent to PBA Bolt. PBA Hallmark XT has similar lodging resistance to PBA Hurricane XT, and can still lodge under high biomass conditions. Like PBA Herald XT, PBA Hurricane XT and Nipper, PBA Hallmark XT has been found to be more sensitive to Group C herbicides, such as metribuzin and simazine, than other lentil varieties in preliminary evaluations. However, label rates of these herbicides have been used on most evaluation trials. It is important to be cautious when applying these herbicides on variable soil types, especially if weather conditions conducive to crop damage are forecast. PBA Hallmark XT is a high yielding medium red lentil with improved herbicide tolerance and is commercialised by PB Seeds (EPR \$5.40/t ex GST).

PBA FLASH ^(b)

PBA Flash is a red lentil with a green seed coat and medium seed size. It has been well suited to shorter seasons and lower yielding lentil growing areas where its early to mid flowering and maturity improves reliability of yield. It is rated moderately susceptible to AB and requires strategic foliar fungicide sprays prior to flowering and at podding in disease prone areas. Earlier maturity makes PBA Flash better suited to crop topping than Nugget and PBA Ace, although caution is still required with this practice due to seasonal variation in weed and crop maturity. PBA Flash is MR/MS to BGM, and has improved tolerance to both boron and salt over all varieties except for PBA Bolt. PBA Flash is commercialised by PB Seeds (EPR \$5.00/t ex GST).

LENTILS

TABLE 4. MID NORTH lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.74 | 1.74 | 1.73 | 2.47 | 1.73 |
| | No. Trials | 4 | 3 | 4 | 4 | 4 |
| PBA Jumbo2 | 19 | 109 | 108 | 108 | 127 | 110 |
| PBA Greenfield | 12 | 98 | 103 | 98 | 123 | 105 |
| PBA Ace | 17 | 97 | 109 | 101 | 102 | 106 |
| PBA Hallmark XT | 16 | 96 | 99 | 102 | 115 | 98 |
| PBA Blitz | 19 | 108 | 107 | 102 | 94 | 101 |
| PBA Flash | 19 | 105 | 105 | 102 | 88 | 104 |
| PBA Jumbo | 14 | 102 | 106 | 96 | 91 | 104 |
| PBA Bolt | 19 | 100 | 107 | 106 | 81 | 100 |
| PBA Hurricane XT | 19 | 95 | 94 | 98 | 99 | 95 |
| PBA Giant | 9 | 92 | 107 | 95 | 85 | - |
| Nugget | 19 | 94 | 96 | 91 | 86 | 97 |
| Nipper | 19 | 88 | 75 | 79 | 106 | 86 |
| PBA Herald XT | 15 | 79 | 75 | 77 | 100 | 81 |

LARGE RED LENTILS

PBA JUMBO2 ^(b)

PBA Jumbo2 is the highest yielding red lentil available for South Australia. PBA Jumbo2 was released as a direct replacement for PBA Jumbo, although grain size is almost the only similarity. It has improved agronomic characteristics over PBA Jumbo, including greater early vigour, improved lodging, shattering and disease resistance. It is rated R for AB and R/MR for BGM, however disease monitoring and a fungicide application prior to canopy closure is still recommended for the latter. It has a seed size and shape similar to PBA Jumbo (20% larger than Nugget) and a grey seed coat. As with other large seeded varieties, PBA Jumbo2 is well suited to the post-harvest removal of small broadleaf weeds seeds. PBA Jumbo2 is licensed to PB Seeds (EPR \$5.00/t ex GST).

PBA JUMBO ^(b)

PBA Jumbo is a high yielding large seeded red lentil. PBA Jumbo is moderately susceptible to BGM and this disease will need to be managed in disease prone areas. It is rated MR/MS to AB and this will also need to be managed in conditions conducive to disease. PBA Jumbo has moderate early vigour and is moderately susceptible to lodging. It has a seed size 20% larger than Nugget, similar seed shape to Nugget, has a grey seed coat and is well suited to the post-harvest removal of small broadleaf weeds seeds. PBA Jumbo is commercialised by PB Seeds (EPR \$5.00/t ex GST).

MEDIUM AND LARGE GREEN LENTILS

PBA GIANT ^(b)

PBA Giant is the largest seeded Australian green lentil available. It is a broadly adapted variety with similar yield to Boomer but improved shattering resistance and produces a slightly larger and more consistent seed size. Although shattering resistance is improved over that of Boomer, it is rated MR/MS for this trait and timely harvest is important to prevent seed loss. PBA Giant has moderate resistance to AB but is rated moderately susceptible to BGM, and therefore monitoring and timely application of fungicides will be important to ensure the control of disease. As pods are susceptible to AB infection a strategic fungicide application at podding may also be required to minimise seed staining and maximise seed quality. The large seed size can provide opportunity for removal of small broadleaf weed seeds from the harvested sample. PBA Giant is commercialised by PB Seeds (EPR \$5.00/t ex GST).

PBA GREENFIELD ^(b)

PBA Greenfield is the highest yielding Australian green lentil variety. It is a medium sized green lentil with broad adaptation and good early vigour. It is rated MR/MS for AB, and is moderately resistant to BGM. PBA Greenfield is mid flowering and like the other green lentils has a mid to late maturity timing. PBA Greenfield has improved shattering resistance (MR) over both Boomer and PBA Giant. However, timely harvest is still important to produce good coloured seed for ease of marketing. This may also be aided by strategic fungicide

LENTILS

TABLE 5. YORKE PENINSULA lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.95 | 2.15 | 1.53 | 3.45 | 2.60 |
| | No. Trials | 5 | 5 | 5 | 5 | 5 |
| PBA Jumbo2 | 25 | 114 | 110 | 109 | 125 | 110 |
| PBA Blitz | 25 | 108 | 105 | 108 | 109 | 100 |
| PBA Greenfield | 14 | 102 | 104 | 100 | 112 | 106 |
| PBA Jumbo | 19 | 102 | 104 | 102 | 95 | 105 |
| PBA Flash | 25 | 103 | 104 | 104 | 93 | 104 |
| PBA Ace | 22 | 93 | 106 | 101 | 90 | 108 |
| PBA Hallmark XT | 22 | 95 | 98 | 99 | 106 | 98 |
| PBA Bolt | 25 | 91 | 103 | 104 | 82 | 100 |
| PBA Hurricane XT | 25 | 94 | 94 | 95 | 96 | 95 |
| Nugget | 25 | 93 | 96 | 93 | 84 | 98 |
| PBA Giant | 12 | 85 | 100 | 99 | 81 | - |
| Nipper | 25 | 98 | 82 | 82 | 105 | 86 |
| PBA Herald XT | 19 | 82 | 78 | 78 | 91 | 81 |

TABLE 6. MURRAY MALLEE lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 |
|------------------|-----------------|------|------|------|
| | mean yield t/ha | 1.33 | 0.99 | 0.70 |
| | No. Trials | 1 | 1 | 1 |
| PBA Bolt | 3 | 113 | 100 | 125 |
| PBA Jumbo2 | 3 | 104 | 116 | 103 |
| PBA Hallmark XT | 2 | - | 110 | 105 |
| PBA Flash | 3 | 106 | 99 | 104 |
| PBA Blitz | 3 | 112 | 79 | 111 |
| PBA Hurricane XT | 3 | 96 | 100 | 102 |
| PBA Ace | 3 | 95 | 115 | 80 |
| PBA Jumbo | 3 | 95 | 90 | 74 |
| Nugget | 3 | 88 | 92 | 73 |
| Nipper | 3 | 70 | 78 | 50 |
| PBA Herald XT | 3 | 68 | 78 | 51 |

* In 2016 and 2017 no result was achieved in the Murray Mallee region due to unseasonal conditions affecting trial performance.

LENTILS

TABLE 7. SOUTH EAST lentil yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2013-2017)

| Variety | Year | 2013 | 2014 | 2015 | 2016 |
|------------------|-----------------|------|------|------|------|
| | mean yield t/ha | 1.89 | 0.64 | 0.93 | 2.74 |
| | No. Trials | 1 | 1 | 1 | 1 |
| PBA Jumbo2 | 4 | 113 | 115 | 107 | 102 |
| PBA Hallmark XT | 3 | - | 134 | 100 | 89 |
| PBA Bolt | 4 | 110 | 112 | 102 | 102 |
| PBA Ace | 4 | 117 | 103 | 92 | 103 |
| PBA Hurricane XT | 4 | 103 | 114 | 99 | 95 |
| PBA Flash | 4 | 99 | 84 | 102 | 111 |
| PBA Greenfield | 2 | - | 99 | 92 | - |
| Nugget | 4 | 89 | 71 | 89 | 103 |
| PBA Blitz | 4 | 76 | 71 | 100 | 97 |
| PBA Giant | 2 | - | 81 | 83 | - |
| PBA Herald XT | 3 | 72 | 83 | 79 | - |
| PBA Jumbo | 3 | 84 | 56 | 91 | - |
| Nipper | 4 | 64 | 63 | 85 | 88 |

* 2017 no result was achieved in the South East region due to unseasonal conditions affecting trial performance.

applications during podding to minimise seed staining from AB. PBA Greenfield is commercialised by PB Seeds (EPR \$5.00/t ex GST).

BOOMER [Ⓓ]

Boomer was the first large seeded green lentil released as an Australian adapted variety for all lentil growing areas. Boomer has good early vigour and can produce large amounts of biomass making it prone to lodging under favourable growing

conditions. It is rated moderately resistant to foliar AB and MR/MS to BGM. Boomer is rated MR/MS to pod infection from AB, and therefore this must be managed with strategic fungicides during podding to avoid disease staining on the seed coat.

Boomer is rated susceptible to shattering at maturity, and therefore delayed harvest can result in grain loss and also a reduction of its green seed colour resulting in downgrading in this variety.

Boomer is licensed to Seednet (EPR \$5.00/t ex GST). ■

Chickpea variety sowing guide 2019

By Sarah Day, Penny Roberts and Jenny Davidson, SARDI and Kristy Hobson, NSW DPI

All current commercial chickpea varieties are rated as either susceptible or moderately susceptible to ascochyta blight (AB) infection. This follows observations of severe AB on previously resistant chickpea varieties in 2015, 2016 and 2017 across South Australia and Victoria.

Chickpea growers need to carefully consider their risk to AB infection along with the ability to effectively control the disease prior to choosing to grow this crop in southern Australia. This will be the case in both high and low rainfall regions, as severe disease outbreaks can still occur in the latter in all current variety options during wet seasons such as 2016.

All chickpea crops will need to be regularly monitored for AB infection. Moderately susceptible varieties will require 3 to 4 strategic fungicide sprays ahead of rain events offering 2 to 3 weeks protection, starting at 6 to 8 weeks post sowing. Susceptible varieties will require regular fungicide sprays every 2-3 weeks throughout the growing season in front of rainfall events.

As the pods of all commercial varieties are susceptible to AB they will also require fungicide sprays during pod set ahead of rain fronts to protect the pods from seed staining and seed abortion.

It is imperative that all chickpea seed is treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. The disease will also survive on stubble and organic matter for a number of years so growers must observe a minimum of a three year rotation between chickpeas in the same paddock, and avoid planting adjacent to last year's chickpea stubble.

Kabuli and desi chickpea variety options for southern region growers remain the same in 2019 with no new varieties released in 2018 suitable for southern chickpea growing regions. With a combination of high yields, medium seed size and broad adaptation, PBA Monarch continues to be good alternative to small seeded kabuli varieties Genesis™ 090 and Genesis™ 079, and the large seeded kabuli variety Genesis™ Kalkee.

However, PBA Monarch is rated susceptible to AB, compared to a rating of moderately susceptible in the other three varieties, making it a higher AB risk alternative.

SELECTION CRITERIA

The list of suggested varieties for 2019 is shown in Table 1. A range of chickpea types are now available offering growers

the opportunity to exploit particular management and or market opportunities, providing AB can be managed effectively. Information on key selection criteria and yield for each variety can be found in Tables 2, 3 and 4. When selecting a chickpea type and variety to grow, growers need to make their decision on the basis of AB resistance, yield, price and marketability. Other agronomic traits such as maturity, cold tolerance, root lesion nematode susceptibility and lodging resistance also need to be considered.

CHICKPEA TYPES

DESI TYPES

Larger seeds are preferred for desi types, regardless of whether they are used for splitting or whole seed use. There has been an increasing use of large whole seeded desi types in a range of food preparations in the sub-continent and a small premium has been available for types fitting this use. They are therefore more likely to achieve the higher prices of the benchmark northern region varieties (eg PBA HatTrick).

SMALL KABULI TYPES

Bulk markets for the small kabuli, Genesis™ 090, have been developed in recent years and generally have attracted a higher price than the desi types. However, growers need to be aware that these bulk markets have been over supplied in the past by a number of overseas countries and that they may have to hold seed from time to time as the marketing opportunities are not always available or they may be limited in terms of size and price. Seed size is small, 6-8mm, so will not attract the higher prices of the larger seeded kabuli types (e.g. PBA Monarch, Genesis™ Kalkee). Further premiums may be obtained by grading and selling the seed on size. Genesis™ 079 produces predominantly 6-7mm seed for the bulk small kabuli markets and generally attracts a price at the bottom end of the Genesis™ 090 range.

MEDIUM-LARGE KABULI TYPES

PBA Monarch, Almaz, and Genesis™ Kalkee produce predominantly 8 to 10mm seed for traditional larger seeded kabuli markets where larger seed size is imperative to attract premium prices. Uniformity of seed size is also important in these markets and may be difficult to achieve in the large types

CHICKPEAS

TABLE 1 Chickpea variety sowing guide 2019.

| Seed type | Rainfall zones (mm) | | | |
|---------------------|---------------------|------------------|------------------|------------------|
| | Below 400 | 400-450 | 450-500 | Above 500 |
| Desi | PBA Slasher | PBA Slasher | PBA Slasher | PBA Slasher |
| | PBA Striker | PBA Striker | PBA Maiden* | PBA Maiden* |
| | PBA Maiden* | PBA Maiden* | PBA Striker | Neelam |
| | Neelam | Neelam | Neelam | Ambar |
| | Ambar | Ambar | Ambar | |
| Small kabuli | GenesisTM 090 | GenesisTM 090 | GenesisTM 090 | GenesisTM 090 |
| | GenesisTM 079 | GenesisTM 079 | GenesisTM 079 | |
| Medium/large kabuli | PBA Monarch | GenesisTM Kalkee | GenesisTM Kalkee | GenesisTM Kalkee |
| | | PBA Monarch | PBA Monarch | PBA Monarch |
| | | Almaz | Almaz | Almaz |

* = high quality seed type

e.g. Genesis™ Kalkee due to its relative poor adaptation to dry finishing conditions. The medium sized type PBA Monarch is likely to produce more uniform sized seed under these conditions.

NOTES ON SELECTED DESI CHICKPEA VARIETIES

AMBAR ^(b)

Ambar is an early flowering and maturing desi type chickpea. It is rated as susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings.

Ambar has had similar but generally lower yields than PBA Slasher in southern Australia. It produces a short to medium canopy that can be difficult to harvest in some seasons and it has a seed size smaller than PBA Slasher and PBA Striker but light in colour. Seed is licensed to Heritage Seeds.

NEELAM ^(b)

Neelam is a mid flowering and maturing desi type chickpea. It is rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings.

Neelam has similar yields to PBA Slasher but lower yields than PBA Striker in South Australia and produces seed smaller than both these varieties. Neelam has a medium to tall plant height, taller than other southern region desi varieties. Seed is licensed to Heritage Seeds.

PBA MAIDEN ^(b)

PBA Maiden is rated as susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. PBA Maiden is a large seeded high quality desi chickpea for the medium to low rainfall environments of southern Australia. It is broadly adapted to these regions and has shown similar yields to PBA Slasher. PBA Maiden has a semi-spreading plant type and height similar to PBA Slasher. It has a seed size greater than current southern desi varieties (approximately 30% larger than PBA Slasher) with a yellow-tan seed coat. This variety is targeted for whole seed markets where its large, angular shaped and bright yellow-tan coloured seed coat are well suited to the specific requirements of these markets. Growers are advised to investigate delivery and marketing options for PBA Maiden prior to growing this variety, due to its unique and favourable seed characteristics. Larger uniform seed size is more likely in medium rainfall regions. Seed is licensed to Seednet.

PBA SLASHER ^(b)

PBA Slasher is rated as susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. PBA Slasher is high yielding in all chickpea growing areas of South Australia, providing AB can be managed. It has a semi-spreading plant type with mid flowering and mid maturity. PBA Slasher is suitable for both the split and whole seed markets. Seed is licensed to Seednet.

PBA STRIKER ^(b)

PBA Striker is susceptible to AB and will require regular



CHICKPEAS

TABLE 2 Agronomic features of chickpea varieties

| Variety | Seed size g/100 seeds | Kabuli main seed size (mm) | Seed colour | Market type suitability | Early vigour | Flowering | Maturity | Plant height | Ascochyta blight ** | | Lodging resistance maturity | Pratylenchus neglectus | | Pratylenchus thornei | |
|-----------------|-----------------------------|----------------------------------|-------------|----------------------------|-----------------|-----------|----------|-----------------|---------------------|------|-----------------------------------|------------------------|-----------|----------------------|-----------|
| | | | | | | | | | Foliage | Seed | | Resistance | Tolerance | Resistance | Tolerance |
| DESITYPE | | | | | | | | | | | | | | | |
| Ambar | 16 | | light brown | split & whole | | early | early | short-medium | S | S | MR | MRMS | | | |
| Neelam | 17 | | brown | split & whole | | mid | mid | medium-tall | MS | S | MR | MRMS | | MS | |
| PBA Maiden | 21-24 | | yellow-tan | premium whole | moderate | early-mid | mid | short-medium | S | S | MS | MRMS | | MRMS | |
| PBA Slasher | 17-19 | | light brown | split & whole | poor/mod | mid | mid | short-medium | S | S | MS | MRMS | | MRMS | |
| PBA Striker | 20-22 | | light brown | split & whole | good | early | early | short-medium | S | S | MS | MRMS | | | |
| KABULI TYPE | | | | | | | | | | | | | | | |
| Almaz | 36-42 | 8-9 | cream | 8-9mm | poor | mid | mid-late | medium-tall | MS | S | MR | MRMS | | VS | T |
| Genesis™ 079 | 24-28 | 6-7 | cream | 6-7mm | moderate | early | early | short | S | S | MR | MRMS | | MS | |
| Genesis™ 090 | 26-35 | 7-8 | cream | 6-8mm | good | mid | mid | medium | MS | S | MR | MRMS | | MS | T |
| Genesis™ Kalkee | 40-46 | 8-9 | cream | 8-10mm | good | mid-late | late | tall | MS | S | R | MRMS | | MS | |
| PBA Monarch | 37-43 | 8-9 | cream | 8-9mm | poor/mod | early | early | medium | S | S | MS | MRMS | | MS | |

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, T = tolerant, MI = moderately intolerant, I = intolerant, NA = not available due to no data.

** = AB disease ratings for southern region only

Disease data sourced from NVT Online.

Agronomic data sourced from PBA Chickpea Breeding Program

CHICKPEAS

TABLE 3 MID NORTH desi and kabuli chickpea yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2012-2016)

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.27 | 1.84 | 1.53 | 2.31 | 0.97 |
| Variety | No. Trials | 2 | 2 | 2 | 1 | 1 |
| DESI | | | | | | |
| Neelam | 8 | 113 | 103 | 104 | 120 | 105 |
| PBA Striker | 8 | 109 | 108 | 111 | 97 | 107 |
| Genesis 079 [#] | 8 | 109 | 108 | 106 | 102 | 106 |
| PBA Slasher | 8 | 111 | 103 | 104 | 108 | 106 |
| Genesis 090 [#] | 8 | 105 | 103 | 104 | 112 | 102 |
| Ambar | 8 | 110 | 101 | 100 | 106 | 105 |
| PBA Maiden | 8 | 100 | 102 | 106 | 97 | 101 |
| KABULI | | | | | | |
| | mean yield t/ha | 3.47 | 2.06 | 2.39 | 1.38 | 2.96 |
| Variety | No. Trials | 2 | 2 | 2 | 1 | 1 |
| Genesis 090 [#] | 8 | 105 | 103 | 101 | 107 | 105 |
| Genesis 079 [#] | 8 | 106 | 107 | 97 | 77 | 104 |
| Almaz | 8 | 95 | 94 | 98 | 111 | 101 |
| PBA Monarch | 8 | 98 | 105 | 100 | 81 | 96 |
| Genesis Kalkee | 8 | 90 | 97 | 98 | 96 | 96 |

NVT Trials are not designed to allow comparison of varieties between desi and kabuli chickpeas where they are not evaluated in the same trial. Desi and Kabuli chickpeas trials in the Mid North occur at different locations.

vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. PBA Striker is a high yielding desi chickpea with good early vigour. It is an early flowering and maturing variety and will provide a high yielding alternative to all chickpea varieties in the medium to low rainfall environments of southern Australia, providing AB can be managed. PBA Striker has a similar plant type to PBA Slasher but has a larger seed size. Seed of PBA Striker is light in colour and has good milling characteristics. Due to its early maturity and AB susceptibility, PBA Striker is not recommended for high rainfall and long growing season districts. Seed is licensed to Seednet.

NOTES ON SELECTED KABULI CHICKPEA VARIETIES

ALMAZ ^(b)

Almaz is a medium to large seeded kabuli type. It is moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to

prevent seed transmission of AB on to the emerging seedlings. Almaz is a mid flowering and mid to late maturing variety and is lower yielding than GenesisTM 090 in southern Australia. Seed is licensed to Seednet.

GENESISTM 079

GenesisTM 079 is a high yielding small seeded kabuli type. It is rated as susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every 2-3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. GenesisTM 079 has a short plant type and is an early flowering and maturing variety that produces small seed (6-7 mm), smaller than GenesisTM 090. It has produced high and consistent yields in medium and low rainfall districts of SA. For seed distribution contact PB Seeds.

GENESISTM 090

GenesisTM 090 is a small to medium seeded kabuli (7-8 mm). The AB rating for GenesisTM 090 is moderately susceptible and crops will require 3 to 4 strategic fungicide sprays during

CHICKPEAS

TABLE 4. YORKE PENINSULA desi and kabuli chickpea yield performance. Long term predicted yield expressed as a percentage of mean yield. (SARDI, PBA & NVT data, 2012-2016).

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.72 | 2.17 | 1.43 | 2.32 | 2.28 |
| Variety | No. Trials | 2 | 2 | 2 | 2 | 2 |
| Neelam | 10 | 111 | 101 | 103 | 125 | 111 |
| PBA Slasher | 10 | 110 | 103 | 104 | 110 | 106 |
| Genesis 090 [#] | 10 | 104 | 100 | 103 | 114 | 106 |
| Ambar | 10 | 109 | 101 | 100 | 109 | 105 |
| PBA Striker | 10 | 108 | 108 | 111 | 88 | 102 |
| Genesis 079 [#] | 10 | 107 | 107 | 108 | 87 | 102 |
| PBA Maiden | 10 | 100 | 102 | 105 | 97 | 100 |
| DESI | | | | | | |
| | mean yield t/ha | 2.72 | 2.17 | 1.43 | 2.32 | 2.28 |
| Variety | No. Trials | 2 | 2 | 2 | 2 | 2 |
| Genesis 090 [#] | 10 | 104 | 100 | 103 | 114 | 106 |
| Genesis 079 [#] | 10 | 107 | 107 | 108 | 87 | 102 |
| Almaz | 10 | 95 | 94 | 91 | 109 | 98 |
| PBA Monarch | 10 | 95 | 105 | 107 | 81 | 98 |
| Genesis Kalkee | 10 | 85 | 95 | 94 | 93 | 94 |

NVT Trials are not designed to allow comparison of varieties between desi and kabuli chickpeas where they are not evaluated in the same trial.

the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. Genesis™ 090 has medium height with erect branches and yields similar to PBA Monarch but lower than PBA Slasher and PBA Striker. For seed distribution contact PB Seeds.

GENESIS™ KALKEE

Genesis™ Kalkee is a medium to large seeded kabuli type, with mid to late flowering and late maturity timings. It is rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection.

All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. It has the largest seed size of all commercial kabuli types and is more able to meet the size requirements of premium high valued markets. However, yield is inferior to the small kabuli types and PBA Monarch, but generally similar to Almaz in South Australia. For seed distribution contact PB Seeds.

PBA MONARCH ^(b)

PBA Monarch is a high yielding medium sized kabuli chickpea with adaptation to all kabuli growing areas of Australia. The AB rating for PBA Monarch is susceptible and crops will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. It is particularly well suited to the shorter seasoned medium rainfall environments of south eastern Australia due to improved adaptation through earlier flowering and maturity compared to Genesis™ 090, Almaz and Genesis™ Kalkee. It is adapted to the traditional kabuli chickpea growing regions and has shown a consistent and significant yield advantage over all current medium and large seeded kabuli varieties, providing AB can be managed. It has similar yields and larger seed size than Genesis™ 090 although is higher yielding than this variety in low yielding (< 1 t/ha) situations. In shorter growing seasons, PBA Monarch may have larger and more consistent seed size than other medium sized varieties due to its earlier pod filling timing. Seed is licensed to Seednet. ■

Field pea variety sowing guide 2019

By Sarah Day, Penny Roberts, Jenny Davidson (SARDI) & Gary Rosewarne (DEDJTR) Victoria

The field pea variety options for the southern region growers remain the same in 2019 with no new varieties release in 2018. In the dun pea types PBA Butler, a new release in 2017, provides a high yielding 'Kaspa type' field pea with improved resistance to bacterial blight and downy mildew over Kaspa. PBA Butler is broadly adapted across all field pea production zones. In the lower yielding environments PBA Percy, a dimpled dun type, can still be the highest yielding dun type in field pea variety trials.

White and blue peas are not being accepted in the bulk dun segregation, and growers are advised to secure markets before deciding to grow these pea types. PBA Pearl, a white pea, is broadly adapted and the highest yielding field pea in long term evaluation trials in all areas of South Australia.

The disease forecasting model 'Blackspot Manager' predicted high blackspot risk levels in many regions of SA for the 2018 season due to the release of blackspot spores from 2017 stubbles when crops were establishing. The dry season reduced the infection potential of these spores and disease was negligible in most crops. Delayed sowing is recommended in high blackspot risk years in high rainfall long season regions until a reduced risk prediction occurs is possible. However, if the risk does not reduce and delayed sowing is not a viable option, growers are advised to select another paddock or break crop to sow.

If peas are still the preferred crop of choice, growers should select paddocks not previously sown to field peas, or paddocks with at least four years break from field peas and with a low history of blackspot disease infection.

They should also not sow field peas in close vicinity to last year's field pea stubble and in areas where a yield of at least 2 t/ha is achievable they can consider using a fungicide strategy of P-Pickle T seed dressing combined with two foliar fungicide sprays (4-10 weeks post sowing and at early flowering).

In situations where delayed sowing occurs for blackspot management, a number of recently released, earlier flowering and maturing varieties will provide improved yield stability over later flowering types such as Kaspa. Predictions of blackspot spore release times in each pea growing district can be obtained through 'Blackspot Manager' via the internet (www.agric.wa.gov.au/cropdiseases) or a free SMS service (to subscribe email Jenny Davidson: jenny.davidson@sa.gov.au).

SELECTION CRITERIA

The list of suggested varieties is shown in Table 1 and is based on performance within different rainfall zones. Information on the most important agronomic characteristics and grain yield for each variety can be found in Tables 2 and 3. When selecting a variety, farmers need to make their selection on all the available information, including their individual farm and paddock situation, the access and availability of the target markets, and storage and handling facilities.

Due to white and blue peas not being accepted in the bulk dun segregation growers need to also consider the different quality types within field pea (Table 1) and where they can be delivered before deciding whether to grow these types.

NOTES ON SELECTED VARIETIES

DUN TYPES

Dun peas are segregated from white and blue peas due to the different quality market specifications. Some pea markets in India and Sri Lanka prefer Australian dun peas due to their distinct 'nutty' taste. 'Kaspa seed type' grain is also preferred over dimpled grain (such as Parafield and PBA Oura) in these markets due to its round shape and lack of dimples allowing easier seed coat removal and greater split returns. It is important to check segregation plans for local delivery points as some will segregate the 'kaspa seed type' from the dimpled dun type.

KASPA SEED TYPE

PBA BUTLER

PBA Butler is a 'Kaspa type' field pea with high yields and improved resistance to bacterial blight over Kaspa. It is mid to late flowering, early to mid maturing and offers the same agronomic benefits of lodging and shattering resistance as Kaspa. PBA Butler has a medium seed size with a yellow split and a uniform tan seed coat colour that is similar to Kaspa. It has a semi-leafless plant type with vigorous plant growth and is rated MS to blackspot and the 'Kaspa strain' of downy mildew. PBA Butler has wide adaptation across southern Australia and

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TABLE 1 Pea variety sowing guide 2019

| Seed type | Rainfall zone (mm) | | | |
|--------------------|--------------------|--------------|--------------|--------------|
| | Below 350 | 350-425 | 425-500 | Above 500 |
| Dun – "Kaspa type" | PBA Wharton | PBA Butler^ | PBA Butler^ | PBA Butler^ |
| | PBA Twilight | PBA Wharton | PBA Wharton | PBA Wharton |
| | PBA Gunyah | PBA Twilight | PBA Gunyah | Kaspa |
| | Kaspa | PBA Gunyah | Kaspa | PBA Gunyah |
| | | Kaspa | PBA Twilight | PBA Twilight |
| Dun – Other | PBA Oura^ | PBA Oura^ | PBA Oura^ | PBA Oura^ |
| | PBA Percy^ | PBA Percy^ | PBA Percy^ | PBA Percy^ |
| | PBA Coogee* | PBA Coogee* | PBA Coogee* | PBA Coogee* |
| | Parafield | Parafield | Parafield | Parafield |
| White | PBA Pearl | PBA Pearl | PBA Pearl | PBA Pearl |
| Blue | Excell | Excell | Excell | Excell |
| | Maki | Maki | Maki | Maki |

* Green manure/forage option

** Green manure/forage ONLY

^ Preferred varieties where bacterial blight is a production constraint

performs particularly well in medium to long growing seasons in SA and may reduce yield losses in regions where bacterial blight is a major disease. Seed is available from the commercial partner Seednet (EPR \$2.70 GST ex).

PBA WHARTON ^(b)

PBA Wharton is a 'Kaspa seed type' dun pea offering improved powdery mildew and virus resistances (Bean Leaf Roll and Pea Seed Borne Mosaic viruses). It provides the same agronomic benefits as Kaspa (eg lodging and shattering resistance), and will provide a reliable alternative in those areas where powdery mildew and viruses are regular problems. PBA Wharton is early to mid flowering and early maturing, making it well suited to the practices of crop topping and delayed sowing for blackspot management. Seed is licensed to Seednet (EPR \$2.60 GST ex).

PBA GUNYAH ^(b)

PBA Gunyah is a 'Kaspa seed type' field pea with earlier and longer flowering than Kaspa and higher yield in shorter season environments and drier seasons (yield potential below 2.25 t/ha) than this variety. It is early to mid flowering and early maturing, making it more suitable than Kaspa to the practice of crop topping. It is better suited to delayed sowing than Kaspa for disease management. Its disease resistance profile is similar to Kaspa and therefore not well suited to bacterial blight prone environments. Despite being susceptible to powdery mildew it is likely that PBA Gunyah will incur less yield loss from this disease than Kaspa due to its earlier maturity. PBA Gunyah is licensed to Seednet (EPR \$2.50 GST ex).

PBA TWILIGHT ^(b)

PBA Twilight is a 'Kaspa seed type' with similar attributes to PBA Gunyah. It has a shorter flowering period and is earlier in maturity than PBA Gunyah making it well suited to the low rainfall and very short season field pea growing environments. Widespread evaluation over a number of years shows that it is higher yielding than Kaspa when yield potential is below 1.5 t/ha.

Its disease resistance profile is similar to Kaspa and therefore not well suited to bacterial blight prone environments. Despite being susceptible to powdery mildew it is likely that PBA Twilight will incur less yield loss from this disease than Kaspa due to its earlier maturity. PBA Twilight is licensed to Seednet (EPR \$2.50 GST ex).

KASPA ^(b)

Kaspa is a semi-leafless, late flowering variety with resistance to shattering, good early season vigour and moderate resistance to lodging. Kaspa is susceptible to powdery mildew, blackspot and the "Kaspa strain" of downy mildew. The seed of Kaspa is distinct from traditional dun types (e.g. Parafield) in that it is red brown in colour and almost spherical in shape. Kaspa needs to be considered carefully before use as an option in low rainfall areas or areas prone to early periods of high temperature and drought stress due to its late and condensed flowering period. Kaspa also should be considered carefully in areas prone to frequent severe vegetative frosts due to potential for yield loss to bacterial blight. Kaspa is under contract to Seednet (EPR \$2.0 GST ex).



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TABLE 2 Variety characteristics of selected pea varieties

| Variety | Seed type | Seed size | Plant habit | Plant height | Early vigour | Flower colour | Flowering time | Maturity time | Pod shattering, at maturity | Lodging resistance at maturity | Downy mildew | Blackspot | Powdery mildew | Bacterial blight (pv syringae) | Pea Seedborne Mosaic Virus (PSbMV) | Bean Leaf Roll Virus (BLRV) |
|--------------|-----------|-----------|-------------|--------------|--------------|---------------|----------------|---------------|-----------------------------|--------------------------------|--------------|-----------|----------------|--------------------------------|------------------------------------|-----------------------------|
| Excell | Blue | Me | SL | Me-T | High | W | E-M | L | S: NSP | Good | MR | S | S | S | | |
| Kaspa | Dun (K) | Me | SL | Me-T | High | Pi | L | M | R: SP | Fair-Good | MR | S | S | S | S | S |
| Maki | Blue | | SL | Sh | Mod | W | E | E | S: NSP | Poor-Fair | S | S | R | S | | |
| Parafield | Dun | Me-Lg | C | T | High | P | M | M | MR: NSP | Poor | S | S | S | MS | | |
| PBA Butler | Dun (K) | Me | SL | Me-T | High | Pi | M-L | E-M | R: SP | Fair-good | S | MS | S | MR/MS | S | S |
| PBA Coogee | Dun | Lg | C | T | High | P | M | M | MR: NSP | Poor | - | - | R | MS | | |
| PBA Gunyah | Dun (K) | Me | SL | Me-T | High | Pi | E-M | E | R: SP | Fair-Good | R | S | S | S | S | S |
| PBA Oura | Dun | Me | SL | Me-T | High | P | E | E | MR: NSP | Fair-Good | MR | MR/MS | S | MR/MS | S | R |
| PBA Pearl | White | Me-Lg | SL | Me-T | High | W | E-M | E | MR: NSP | Good | MS | S | S | MS | S | R |
| PBA Percy | Dun | Me-Lg | C | T | High | P | E | E | MR: NSP | Poor | S | S | S | MR | S | S |
| PBA Twilight | Dun (K) | Me | SL | Me-T | High | Pi | E | E | R: SP | Fair-Good | R | S | S | S | S | |
| PBA Wharton | Dun (K) | Me | SL | Me-T | High | Pi | E-M | E | R: SP | Fair-Good | R | S | R | S | R | R |

K = Kaspa type, Sm = small, Me = medium, Lg = large, C = conventional, SL = semi-leafless, P = purple, W = white, Pi = pink, T = tall, Sh = short, E = early, M = mid, L = late

H = high, M = moderate, L = low, S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant, SP = sugar pod, NSP = non-sugar pod

Disease data sourced from NVT Online.

Agronomic data sourced from PBA Field Pea Breeding Program

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TABLE 3. LOWER EYRE PENINSULA field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 1.87 | 2.03 | 1.45 | 2.56 | 1.68 |
| Variety | No. Trials | 2 | 2 | 2 | 2 | 2 |
| PBA Pearl | 10 | 132 | 109 | 113 | 121 | 101 |
| PBA Butler | 10 | 124 | 106 | 107 | 112 | 101 |
| PBA Oura | 10 | 106 | 102 | 104 | 115 | 100 |
| PBA Percy | 10 | 102 | 97 | 100 | 127 | 98 |
| PBA Gunyah | 10 | 88 | 97 | 96 | 103 | 100 |
| PBA Wharton | 10 | 86 | 97 | 96 | 106 | 98 |
| Kaspa | 10 | 92 | 88 | 88 | 93 | 93 |
| Parafield | 8 | 93 | - | 79 | 102 | 80 |
| PBA Twilight | 6 | 76 | 92 | 91 | - | - |

TABLE 4. UPPER EYRE PENINSULA field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|-----------|------|------|-----------|
| | mean yield t/ha | 0.85 | | 1.65 | 2.88 | |
| Variety | No. Trials | 1 | | 2 | 1 | |
| PBA Butler | 3 | 123 | No result | 108 | 103 | No result |
| PBA Gunyah | 3 | 110 | | 104 | 99 | |
| Kaspa | 4 | 111 | | 100 | 90 | |
| PBA Percy | 3 | 111 | | 101 | 87 | |
| PBA Pearl | 4 | 105 | | 99 | 96 | |
| PBA Twilight | 3 | 100 | | 100 | 96 | |
| PBA Oura | 4 | 95 | | 97 | 94 | |
| PBA Wharton | 4 | 83 | | 99 | 101 | |
| Sturt | 3 | 90 | | 93 | 85 | |
| Parafield | 1 | 79 | | - | - | |

TRADITIONAL DIMPLED DUN SEED TYPE**PBA OURA ^(b)**

PBA Oura is a high yielding early to mid flowering semi-dwarf dun variety with high yields and improved resistance (MR/MS) to bacterial blight (pv syringae) over Kaspa, PBA Gunyah, PBA Twilight and PBA Wharton. This line has broad adaptation and high yield potential in short growing seasons. It produces non sugar-type pods, but is not prone to shattering and has fair to good lodging resistance at maturity. PBA Oura seed is dimpled and not a 'kaspa seed type'. PBA Oura has improved resistance (MR/MS) to the 'Kaspa' strain of downy mildew and improved

tolerance to metribuzin herbicide compared to Kaspa. Seed is licensed to Seednet (EPR \$2.60 GST ex).

PBA PERCY ^(b)

PBA Percy is an early flowering conventional dun variety with improved resistance (MR) to bacterial blight (pv syringae) over all other varieties making it a good option in areas prone to this disease. Its early flowering and early maturity make it well suited to delayed sowing for disease management and the agronomic practice of crop-topping. It produces non sugar-type pods, but is not prone to shattering (similar to PBA Oura). PBA Percy seed is dimpled and not a 'kaspa seed type'. PBA Percy

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generally produces yields similar to PBA Oura but in low rainfall environments can be the highest yielding dun variety in trials. Seed is licensed to Seednet (EPR \$2.60 GST ex).

PBA COOGEE ^(b)

PBA Coogee is a mid flowering and mid maturing conventional dun pea suitable for either grain or forage production. It has higher grain yield and similar biomass production to Morgan, and grain yield between Parafield and Kaspa.

Flowering and pod set is generally slightly later than both Parafield and Kaspa. PBA Coogee is resistant to powdery mildew and has improved tolerance to soil boron and salinity compared to other varieties. Seed is licensed to Seednet (EPR \$2.60 GST ex)..

WHITE TYPES

White peas cannot be delivered to bulk export markets with dun peas. Some high quality specialised white peas may fit into specific premium value markets for split peas. Higher prices may be achieved if supplying specific niche markets, but these markets may be small. Small seeded white peas are likely to only suit domestic stock feed markets. Growers are advised to secure markets before deciding to grow these pea types.

PBA PEARL ^(b)

PBA Pearl is a semi-leafless white pea variety which is broadly adapted and the highest yielding field pea in long term evaluation trials in all areas of SA. It has an erect growth habit,

TABLE 5. MID NORTH field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.82 | 1.85 | 1.14 | 3.54 | 2.03 |
| Variety | No. Trials | 5 | 7 | 5 | 5 | 4 |
| PBA Pearl | 26 | 106 | 116 | 109 | 109 | 105 |
| PBA Oura | 26 | 99 | 116 | 102 | 102 | 101 |
| PBA Butler | 21 | 109 | 97 | 105 | 113 | 102 |
| Sturt | 10 | 99 | 109 | 108 | 101 | - |
| PBA Percy | 21 | 98 | 113 | 96 | 108 | 95 |
| PBA Wharton | 26 | 96 | 111 | 105 | 98 | 102 |
| PBA Gunyah | 24 | 99 | 96 | 94 | 102 | 96 |
| PBA Twilight | 20 | 94 | 98 | 91 | 96 | 94 |
| Parafield | 12 | 85 | 95 | 97 | 90 | 85 |
| Kaspa | 26 | 96 | 82 | 90 | 98 | 90 |

TABLE 6. YORKE PENINSULA field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 2.44 | 2.39 | 1.24 | 4.04 | 3.53 |
| Variety | No. Trials | 3 | 5 | 4 | 3 | 2 |
| PBA Butler | 14 | 117 | 102 | 111 | 119 | 108 |
| PBA Pearl | 17 | 112 | 103 | 104 | 115 | 100 |
| PBA Gunyah | 16 | 96 | 98 | 101 | 101 | 97 |
| PBA Oura | 17 | 95 | 100 | 97 | 103 | 93 |
| Sturt | 4 | 105 | 91 | 90 | 110 | - |
| PBA Percy | 14 | 93 | 94 | 97 | 111 | 87 |
| Kaspa | 17 | 102 | 89 | 94 | 102 | 94 |
| PBA Wharton | 17 | 81 | 100 | 96 | 93 | 96 |
| PBA Twilight | 12 | 86 | 96 | 95 | 93 | - |
| Parafield | 10 | 84 | 73 | 71 | 98 | 77 |

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often with excellent lodging resistance at maturity. It is early to mid flowering and produces non sugar-type pods but is not prone to shattering (similar to PBA Oura). It has a favourable disease resistance profile, with good resistance to Bean Leaf Roll virus, but moderate susceptibility to bacterial blight. Seed is available through Seednet and growers are advised to secure markets before deciding to grow white peas as they cannot be delivered to bulk dun or Kaspera type export markets (EPR \$2.70 GST ex)..

BLUE TYPES (GREEN COTYLEDONS)

Some blue pea varieties are for specific premium value markets which are usually only small. Quality is paramount in these markets used predominantly for canning and snack food. Important parameters include damage by insects, bleaching of seed coat and consistency of seed colour.

Two blue field pea varieties, Excell and Maki, have been available to growers in the past. Maki is best suited to the north-eastern field pea growing areas of northern Australia, and limited testing has occurred in southern Australia. Both varieties are outclassed for yield and agronomic adaptation by the newer dun and white pea releases in the southern region of Australia and they have a relatively poor disease resistance profile, as shown in Table 2. ■

The yield results presented in these tables are multi environment trial (MET) data shown on a yearly regional group mean and an overall performance mean for the region.

All yields are expressed as a percentage of mean yield from NVT data 2013 – 2017 inclusive, along with number of observations in adjacent columns. Further results can be found on the NVT website (www.nvtonline.com.au).

TABLE 7. MURRAY MALLEE field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 1.58 | 1.2 | 1.13 | 2.85 | 1.08 |
| Variety | No. Trials | 1 | 1 | 1 | 1 | 1 |
| PBA Pearl | 5 | 108 | 127 | 108 | 111 | 111 |
| PBA Oura | 5 | 103 | 118 | 110 | 98 | 104 |
| PBA Butler | 5 | 105 | 103 | 92 | 113 | 101 |
| PBA Percy | 5 | 103 | 111 | 100 | 95 | 91 |
| PBA Wharton | 5 | 94 | 107 | 109 | 89 | 99 |
| PBA Twilight | 3 | 97 | 89 | 98 | - | - |
| PBA Gunyah | 5 | 99 | 90 | 95 | 96 | 92 |
| Kaspera | 5 | 95 | 76 | 78 | 95 | 79 |
| Parafield | 4 | 84 | - | 74 | 77 | 61 |

TABLE 8. SOUTH EAST field pea yield performance. Long term predicted yield expressed as a percentage of mean yield.

| | Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|-----------------|------|------|------|------|------|
| | mean yield t/ha | 4.26 | 1.09 | 1.19 | 3.99 | 3.07 |
| Variety | No. Trials | 1 | 1 | 1 | 1 | 1 |
| PBA Butler | 5 | 102 | 101 | 105 | 103 | 119 |
| PBA Pearl | 5 | 97 | 77 | 105 | 104 | 117 |
| PBA Wharton | 5 | 105 | 109 | 104 | 86 | 89 |
| PBA Twilight | 3 | 97 | 104 | 93 | - | - |
| PBA Gunyah | 5 | 98 | 106 | 96 | 91 | 95 |
| PBA Oura | 5 | 96 | 83 | 100 | 94 | 100 |
| Kaspera | 5 | 93 | 93 | 86 | 89 | 93 |
| PBA Percy | 5 | 92 | 78 | 93 | 78 | 99 |
| Parafield | 4 | 89 | - | 77 | 61 | 77 |

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