

2022 SOUTH AUSTRALIAN CROP SOWING GUIDE



GRDC
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CORPORATION

SOUTH AUSTRALIA
OCTOBER 2021



**ARE YOU GROWING THE BEST
VARIETY FOR YOUR SITUATION?**

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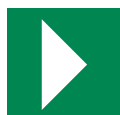
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TABLE OF CONTENTS



This guide can be downloaded to your computer or tablet at:
www.grdc.com.au/NVT-south-australian-crop-sowing-guide
Remember to update it each November.

INTRODUCTION	5
WHEAT	7
BARLEY	27
OAT	37
CANOLA	47
FABA BEAN	61
LENTIL	69
FIELD PEA	77
CHICKPEA	85
LUPIN	91
VETCH	95
NOTES	101

THE SOUTH AUSTRALIAN CROP SOWING GUIDE

The *2022 South Australian Crop Sowing Guide* outlines information on current varieties of the major winter crops suitable to be grown in South Australia to assist growers in making decisions on variety selection for the upcoming season.

This edition has been compiled by officers within the South Australian Research and Development Institute (SARDI) and collaborating researchers.

It is proudly sponsored by the South Australian Grain Industry Trust (SAGIT) in association with the Department of Primary Industries and Regions (PIRSA) and the Grains Research and Development Corporation (GRDC).

The SARDI Crop Sciences Division officers acknowledge the sponsorship of this guide by SAGIT and GRDC, the contributions of agronomy, pathology and vetch breeding research staff in SA, as well as collaborators around Australia in producing the results published in this edition.

Editor: Phil Davies, SARDI, Crop Sciences



SA grain growers funding research solutions

The South Australian Grain Industry Trust annually invests more than \$1.8 million in a range of areas crucial to advancing the SA grain industry, including grain growing, farming systems, soil management, harvesting, storage, processing and marketing, and for dissemination of technical information to growers.

In 2021, SAGIT is investing in these new projects:

- Boosting profitability and efficiency of SA's trade in containerised grain, Australian Export Grains Innovation Centre
- Acid soils, ripping and lentil production improvement, Elders Rural Services
- Lentil varieties for low rainfall and sandy soil environments, Global Grain Genetics
- Variety selection and weed management options for genetically modified canola, Hart Field-Site Group
- Frost Learning Centre for farmers, advisers and researchers, Mid North High Rainfall Zone Group
- Pasture legume choices, establishment and persistence for the Murray Plains, Murray Plains Farmers
- A practical approach to sub-surface acidity in the Mid North, Precision Agriculture
- Developing criteria for soil and plant aluminium and manganese toxicity in South Australia, PIRSA
- 2022 Farm Gross Margin Guide for SA, Rural Solutions SA
- Improving management of Group A resistant barley grass in current farming systems, SARDI/University of Adelaide
- Grower crop root health workshops, SARDI/University of Adelaide
- Measuring and managing yield loss caused by Phoma root in lentil and faba bean, SARDI/University of Adelaide
- Extension support for SA Drought Hub Internship Program, SARDI/University of Adelaide
- Investigating aluminium speciation in wheat roots in alkaline soil, SARDI/University of Adelaide
- Evaluating super high oleic acid safflower in sodic and saline soils, SARDI/University of Adelaide
- Characterising the optimal flowering period for the Murray Plains, SARDI/University of Adelaide
- Eyre Peninsula Farming Systems Summary 2021-2023, SARDI
- The implications of green hydrogen for SA grain growers, SANTFA
- Improving crop safety and broadleaf weed control with herbicides in lentil, Trengove Consulting
- Improved management of variable phosphorus requirement and strategies for highly responsive soils, Trengove Consulting
- Faba bean nutrient omission trial, Thomas Elders Institute
- Understanding and managing fertiliser toxicity in pulses in SA, University of Adelaide
- Revealing the basis for head loss in barley, University of Adelaide
- Developing a DGT methodology to assess bioavailability of herbicide residues, University of South Australia
- Lower Eyre Peninsula Ag Expo 2021, AIR EP
- Maximising performance of post-emergent herbicides workshops on upper Eyre Peninsula, AIR EP

SAGIT is also supporting these ongoing projects:

- Promoting secondary and tertiary student engagement in crop production, AgXtra
- Optimising P nutrition in pulses to maximise N fixation and yield, Agronomy Solutions
- Eyre Peninsula internship in applied grains research, AIR EP
- Regional internship in applied grains research, Hart Field-Site Group
- Long-term cropping systems trial, Hart Field-Site Group
- Taking South Australian canola profitability to the next level, EPAG Research
- MacKillop Farm Management Group annual trial results book, MacKillop Farm Management Group
- Deep ripping to enhance production on Mallee sandy soils, Mallee Sustainable Farming
- Revealing invertebrate species and conditions causing seedling damage in field settings, SARDI/University of Adelaide
- SA Crop Variety Sowing Guide, SARDI
- Improving productivity of oats, SARDI
- Improving the early management of dry sown cereal crops, SARDI
- SANTFA Conference 2021-2023, SANTFA
- Pre-emptive flame retardant as a new tool for SA grain growers, SANTFA
- Management of fungicide resistant wheat powdery mildew, Trengove Consulting
- Enhancing grain production and quality traits for bread wheat, University of Adelaide
- A genetic, environmental and functional investigation of late maturity alpha-amylase (LMA) and its implications for wheat breeding, University of Adelaide
- Development of a dual-purpose common vetch variety for arid South Australia, University of Adelaide
- Upper North barley time of sowing; frost / heat stress effects, Upper North Farming Systems
- Comparative effects of agricultural pesticides on SA soil microbial functions, University of South Australia
- Supporting premier PA events: Precision Ag expos and symposia, Society of Precision Agriculture Australia

INTRODUCTION

NATIONAL VARIETY TRIALS (NVT)

The variety trial results presented in this guide are sourced from the NVT program and the National Vetch Breeding Program.

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

Conducted to a set of predetermined protocols, variety trials 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. NVT 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 growers prepared to contribute sites and who often assist with the management of trials on their property.

NVT HARVEST REPORTS

The NVT Harvest Reports are a valuable extension to the South Australian Crop Sowing Guide and will include the latest 2021 yield reports and disease reactions. The NVT Harvest Reports will be released soon after results are released in early 2022 and will be available on the NVT website (<https://nvt.grdc.com.au/harvest-reports>).

PLANT BREEDER'S RIGHTS (PBR)

Varieties subject to Plant Breeder's Rights at the time of printing are annotated with the symbol (b). 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 Breeder's Rights Act 1994*. Intentional infringement of a PBR attracts a penalty of \$85,000 for individuals. The penalty for corporations is up to five times greater.

END POINT ROYALTIES (EPRS)

EPRs payable for 2021-22 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 2022-23 harvest will become available early in 2022 on the Variety Central website.

SELECTION CRITERIA

When selecting a variety, growers need to make their selection based on the available information, including yield, crop quality attributes, disease and pest resistance, individual farm and paddock situation, the access and availability of target markets, and storage and handling facilities.

COMPROMISED TRIALS

It is important to note, trials in the NVT are sometimes subject to seasonal or management issues. Trials that do not meet the quality requirement for publication through the NVT reporting tools are published within the *NVT Quarantine Trial Report*. Quarantine reports include trials which have been compromised and should not be used to make variety selection decisions. These trials may have been affected by frost, drought, animals or spray drift. The purpose of the NVT is to allow growers to make informed variety selections and compromised trials can be misleading and result in poor variety selection. Long-term yield tables in each chapter will clearly state whether there is data missing as a result of compromised trials.

INTERPRETING LONG-TERM YIELD DATA

The long-term yield data presented in this guide is an output of NVT Long Term Multi Environment Trial (MET) analysis. Trials are conducted in all cropping regions of South Australia (for example, Lower Eyre Peninsula, Mid North, Murray Mallee) 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 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 based on 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 yields 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 datasets and make more refined, relevant and robust predictions about the relative performance of each variety across different locations and seasons. Growers can now use this more detailed data to better understand a variety's performance over several years, rather than just a single averaged value.

Growers can further interrogate the data online to better understand the performance of varieties under a range of situations using the NVT Long Term Yield Reporter 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 guides or quick reference summaries, such as the *2022 South Australian Crop 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 2022 South Australian Crop Sowing Guide, we present results in year groupings and only for varieties present in trials. The NVT Long Term Yield Reporter tool is designed to run on all web browsing platforms on computers, tablets and phones, and is available online at <https://app.nvtonline.com.au>.

LEGEND: MEAN VARIETY YIELD PERFORMANCE



Long-term mean yield illustrated by colour gradient from lowest (red) to highest (green).

DISEASE RATING COLOUR RANGE

R	RMR	MR	MRMS	MS	MSS	S	SVS	VS
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R = resistant, RMR = resistant to moderately resistant, MR = moderately resistant, MRMS = moderately resistant to moderately susceptible, MS = moderately susceptible, MSS = moderately susceptible to susceptible, S = susceptible, SVS = susceptible to very susceptible, VS = very susceptible.

WHEAT

By Rhiannon Schilling, Melissa McCallum, Courtney Peirce,
Hugh Wallwork and Tara Garrard, SARDI

Since publication of the 2021 sowing guide, Calibre[®], LongReach Bale[®], LongReach Dual[®] and Valiant[®] CL Plus have been released. The guide continues to include the introduction of selected winter wheats and feed wheats.

Information on the most important selection criteria – grain yield, quality, maturity classification and disease resistance – for each variety can be found in this guide, with a summary in Table 1. While the varieties listed are considered likely to provide the best return within each quality grade, growers need to consider their individual farm and paddock situations and make their selections based on all available information.

USEFUL RESOURCES

For an overview of wheat production in Australia go to the Australian Export Grains Innovation Centre (AEGIC) website: <https://www.aegic.org.au>.

Information about Australian wheat classifications can be found on the Wheat Quality Australia website: <https://wheatquality.com.au>.

Information about the Australian wheat trade and Grain Trade Australia receival standards can be found on the GTA website: <http://www.graintrade.org.au>.

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. Domestic flour millers purchase a small proportion of South Australian wheat either from marketers or directly from growers. Domestic flour millers may have different quality requirements to export markets due to different end products and processes used. For further information, contact Laucke Flour Mills on 03 5431 5201.

Table 1: Wheat varieties suitable for planting in South Australia.

Variety and current maximum grade	Maturity classification	Suitability and significant features
AUSTRALIAN HARD (AH)		
Ballista ^{db}	Q – M	All districts but particularly Mallee environments.
Beckom ^{db}	M	Low to medium-rainfall districts.
Calibre ^{db}	Q – M	All districts, widely adapted.
Catapult ^{db}	M – S	All districts broad adaptation, wheat-on-wheat option, development pattern suited to late April to early May sowing, but limited evaluation in SA from this sowing date.
Emu Rock ^{db}	VQ – Q	Low to medium-rainfall districts.
Grenade CL Plus ^{db}	Q – M	All districts, imidazolinone tolerant.
Hammer CL Plus ^{db}	Q – M	All districts, imidazolinone tolerant.
Illabo ^{db}	Q (+W)	Mid-winter wheat, very early sowing (pre-20 April) and grazing opportunity in medium to high-rainfall zones.
LongReach Arrow ^{db}	M	All districts, similar yields to Mace ^{db} with shorter plant height, wheat-on-wheat option.
LongReach Cobra ^{db}	Q – M	Medium to high-rainfall districts.
LongReach Dual ^{db}	M – S	Awnless spring wheat, long coleoptile
LongReach Scout ^{db}	M	All districts, avoid wheat stubbles due to yellow leaf spot susceptibility. Now outclassed.
RockStar ^{db}	M – S	All districts broad adaptation, wheat-on-wheat option, maturity suited to late April to early May sowing, but limited evaluation in SA from this sow date.
Scepter ^{db}	M	All districts broad adaptation, wheat-on-wheat option except that it is susceptible to Septoria tritici blotch and powdery mildew.
Valiant CL Plus ^{db}	M – S	All districts, imidazolinone tolerant. Slower development pattern suited to late April to early May sowing, but limited evaluation.
Vixen ^{db}	Q	All districts, fast development, similar yields to Scepter ^{db} , wheat-on-wheat option except that it is susceptible to Septoria tritici blotch and very susceptible to powdery mildew.
AUSTRALIAN PREMIUM WHITE (APW)		
Ascot ^{db}	M	Medium to high-rainfall districts.
Denison ^{db}	S	Development pattern suited to late April to early May sowing, but limited evaluation in SA from this sowing date.
Chief CL Plus ^{db}	M	All districts, imidazolinone tolerant, wheat-on-wheat option except that it is very susceptible to powdery mildew.
Cutlass ^{db}	M – S	All districts and early sowing situations.
LongReach Bale ^{db}	S	Awnless slow wheat suited to pre-25 April sowing, long coleoptile.
LongReach Nighthawk ^{db}	VS	Slow spring wheat, suited to pre-20 April emergence. Limited evaluation in NVT.
LongReach Trojan ^{db}	M – S	Medium to high-rainfall districts.
Sheriff CL Plus ^{db}	M – S	All districts, imidazolinone tolerant. Development speed similar to LongReach Trojan ^{db} , suited to wheat-on-wheat except that it is susceptible to Septoria tritici blotch and very susceptible to powdery mildew.
AUSTRALIAN STANDARD WHITE (ASW)		
DS Bennett ^{db}	M (+W)	Slow winter wheat, very early sowing and grazing opportunity in medium to higher-rainfall zones, awnless hay option.
Razor CL Plus ^{db}	Q – M	All districts, imidazolinone tolerant, slightly higher yielding than Mace ^{db} .
SOFT		
LongReach Impala ^{db}	M	Soft wheat-producing districts.
LongReach Orion ^{db}		Soft wheat-producing districts. Awnless hay option.
UNCLASSIFIED AND FEED		
Anapurna	M – S (+W)	Slow red winter wheat, very early sowing and grazing opportunity in medium to high-rainfall zones.
Longsword ^{db}	Q (+W)	Fast winter wheat, very early to May sowing and grazing opportunity in all districts.
Manning ^{db}	S (+W)	High-rainfall winter wheat suited to long-season districts, especially the South-East region.
RGT Accroc	M – S (+W)	Slow red winter wheat, very early sowing and grazing opportunity in medium to high-rainfall zones.
RGT Calabro	S (+W)	Slow red winter wheat, very early sowing and grazing opportunity in medium to high-rainfall zones.
RGT Zanzibar	VS	Medium to high-rainfall districts, more evaluation needed. Highly susceptible to stem rust.
DURUM		
Bitalli ^{db}	Q – M	All durum districts.
DBA Artemis ^{db}	M – S	All durum districts.
DBA Spes ^{db}	M	All durum districts.
DBA Vittaroi ^{db}	Q – M	All durum districts.
DBA-Aurora ^{db}	M	All durum districts.
Saintly ^{db}	Q – M	All durum districts, and potential for hay production (awnless).
Westcourt ^{db}	M	All durum districts.

Maturity: VQ = very quick, Q = quick, M = mid, S = slow, VS = very slow, (+W) = winter wheat

MATURITY CLASSIFICATIONS

Maturity classifications and terminology have been assigned using the industry guidelines provided by Australian Crop Breeders Ltd (<http://www.australiancropbreeders.com.au>). Table 2 shows the maturity description and associated boundary varieties.

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 periods 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 quick to mid-developing wheat varieties are suited to early May to mid-May sowing. An increasing number of varieties in the mid to slow range that may offer potential for late April to early May sowing are being evaluated to assess their suitability. Winter varieties are suited for dual-purpose use from mid-March and April germination dates, and are suited for grain only at sowing dates before 20 April. More information on early sowing winter varieties is available at <https://grdc.com.au/resources-and-publications/all-publications/publications/2020/ten-tips-for-early-sown-wheat>.

Extensive statewide evaluation within NVT over coming seasons will provide more confidence in varieties that may have specific adaptation requirements.

Table 2: Maturity description and quick and slow boundary varieties for Australian wheat varieties assigned by Australian Crop Breeders Ltd.

Maturity description	Quick wheat boundary	Slow wheat boundary
Very Quick Spring	N/A	Axe ^{db}
Very Quick – Quick Spring	> Axe ^{db}	Vixen ^{db}
Quick Spring	> Vixen ^{db}	Corack ^{db} /LongReach Mustang ^{db}
Quick – Mid Spring	> Corack ^{db} /LongReach Mustang ^{db}	Mace ^{db} /Suntop ^{db}
Mid Spring	> Mace ^{db} /Suntop ^{db}	LongReach Reliant ^{db} /Sheriff CL Plus ^{db} /LongReach Trojan ^{db}
Mid – Slow Spring	> LongReach Reliant ^{db} /Sheriff CL Plus ^{db} /LongReach Trojan ^{db}	Yitpi ^{db} /EGA Gregory ^{db}
Slow Spring	> Yitpi ^{db} /EGA Gregory ^{db}	Sunzell
Slow – Very Slow Spring	> Sunzell	Sunmax ^{db}
Very Slow Spring	> Sunmax ^{db}	N/A
Quick Winter	N/A	Illabo ^{db}
Mid Winter	> Illabo ^{db}	RGT Accroc
Slow Winter	> RGT Accroc	N/A

For further information go to <http://www.australiancropbreeders.com.au>.

DISEASE

Growers should note that several 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 prevention strategies. Where varieties do not meet minimum disease resistance standards for rust, as set by the industry, they are listed with a cautioning note.

The status of selected wheat varieties is shown in Table 3 and durum wheat in Table 15. The full SARDI Cereal Variety 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.

An updated version with 2021 data will be available from mid-February 2022.

Table 3: Disease responses of selected wheat varieties and reaction to common disorders.

Variety	Rust			Septoria tritici blotch	Yellow leaf spot	Powdery mildew	Black point	CCN	Root lesion nematode		Common root rot	Crown rot
	Stem	Stripe	Leaf						<i>P. neglectus</i>	<i>P. thornei</i>		
Anapurna	MSS	R	MS	MRMS	MRMS	MR	–	MRMS	MS	MS _p	MSS	SVSp
Ascot ^{db}	MRMS	MSS	RMR	S	MRMS	SVS	MS	MRMS	S	S	MS	MSS
Ballista ^{db}	RMR	S	S	SVS	MSS	SVS	–	MRMS	S	MS	MS	SVSp
Beckom ^{db}	MRMS	MRMS	MSS	S	MSS	MSS	MRMS	R	S	MSS	MSS	S
Calibre ^{db}	RMR	MS	MSS	S	MS	S	–	–	–	–	–	–
Catapult ^{db}	MR	MRMS	S	MSS	MRMS	S	MSS	R	S	MS	MS	MSSp
Chief CL Plus ^{db}	RMR	S	MR	MSS	MRMS	SVS	MS	MS	MRMS	MSS	MS	MSS
Cutlass ^{db}	R	MS	R	MSS	MSS	MSS	MS	MR	MSS	MSS	MS	S
Denison ^{db}	MS	MS	S	MSS	MRMS	SVS	–	MSS	S	S	MS	SVSp
DS Bennett ^{db}	MRMS	S	S	MSS	MRMS	R	S	MSS	S	S	S	VS
Emu Rock ^{db}	MS	S	SVS	SVS	MRMS	MSS	MS	S	MSS	S	MS	MSS
Grenade CL Plus ^{db}	MR	MRMS	S	S	S	MS	MSS	MR	MSS	S	MS	S
Hammer CL Plus ^{db}	MR	MRMS	S	MSS	MRMS	MSS	–	MRMS	MS	S	MSS	MSSp
Illabo ^{db}	MRMS	RMR	S	MSS	MS	R	MS	MS	S	MSS	MSS	S
Kiora ^{db}	MR	RMR	MR/S	MSS	MSS	MS	MS	MSS	S	MRMS	MS	S
Kord CL Plus ^{db}	MR	MR	S	S	MSS	MS	MRMS	MR	MSS	MSS	MRMS	S
LG Cobalt ^{db}	S	RMR	MSS	S	MSS	MSS	MRMS	MSS	S	S	MSS	S
LongReach Arrow ^{db}	S	SVS	SVS	S	MRMS	SVS	MRMS	MS	MRMS	MS	MS	MSS
LongReach Cobra ^{db}	RMR	MSS	MR/S	MSS	MS	MSS	MSS	MS	MSS	MSS	MS	S
LongReach Impala ^{db}	MR	MR	SVS	VS	MSS	R	MS	MSS	SVS	S	MSS	MSS
LongReach Nighthawk ^{db}	RMR	MR	MSS	MSS	MRMS	SVS	MS	MS	MSS	MS	MSS	MSS
LongReach Orion ^{db}	MR	MSS	R	MRMS	MSS	SVS	S	MS	MS	S	MSS	S
LongReach Trojan ^{db}	MRMS	SVS	MR/MS	MS	MSS	S	MS	MS	MS	MSS	MS	MS
Longsword ^{db}	MR	MR/S	MR/S	MSS	MRMS	MS	MRMS	MRMS	MRMS	MRMS	MS	MSS
Mace ^{db}	MRMS	SVS	MSS	S	MRMS	MSS	MRMS	MRMS	MS	MS	MS	S
Manning ^{db}	MR	RMR	MSS	MRMS	MRMS	MS	SVS	S	MSS	S	SVS	VS
Razor CL Plus ^{db}	MR	MS	S	SVS	MSS	MSS	MS	MR	S	MS	MSS	S
RGT Accroc	MS	R	SVS	MRMS	MRMS	MRMS	MRMS	S	S	MSS	S	SVS
RGT Calabro	MS	RMR	MSS	MRMS	MRMS	MR	MS	S	S	MS _p	MSS	SVS
RGT Zanzibar	VS	RMR	SVS	S	MS	MRMS	MRMS	MSS	S	MS _p	S	S
RockStar ^{db}	MR	MRMS	S	MSS	MRMS	SVS	MSS	MSS	MRMS	MS	MSS	S
Scepter ^{db}	MRMS	MSS	MSS	S	MRMS	SVS	MS	MRMS	S	MSS	MS	MSS
Scout ^{db}	MR	MRMS	MSS	S	SVS	MS	S	R	S	MSS	S	S
Sheriff CL Plus ^{db}	MS	MSS	SVS	S	MRMS	SVS	MRMS	MS	MRMS	MRMS	MS	S
SQP Revenue ^{db}	RMR	R	VS	MSS	MS	R	MS	S	S	S	SVS	S
Valiant CL Plus ^{db}	RMR	MRMS/S	MSS	MSS	MRMS	SVS	–	–	–	–	–	–
Vixen ^{db}	MRMS	MRMS	SVS	S	MRMS	SVS	MS	MSS	MRMS	MS	MS	S
Wyalkatchem ^{db}	MSS	S	S	S	MR	SVS	MS	S	MRMS	MS	MS	S
Yitpi ^{db}	S	MRMS	S	MSS	SVS	MS	MS	MR	MSS	S	MS	S

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, – = variety yet to be fully evaluated, _p = provisional ratings.

The second score after a / is the response to a rare strain not known to be present in SA. 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 Tara Garrard: tara.garrard@sa.gov.au

WHEAT VARIETY NOTES

ASCOT[®]

Ascot[®] is an APW-quality, mid-maturing variety suited to medium to high-rainfall zones. It is the first wheat variety to be bred and launched by BASF. Released in 2020 (tested as BSWDH10-215), seed is available and marketed by Seednet. EPR \$3.50 ex-GST.

BALLISTA[®]

Ballista[®] is an AH-quality, quick to mid-maturing variety, slightly quicker than Mace[®]. It has high and stable yield across a range of environmental conditions and has CCN resistance similar to Scepter[®] and Mace[®]. Released in 2020 (tested as RAC2598), bred and marketed by AGT, Ballista[®] is eligible for AGT Seed Sharing™. EPR \$3.50 ex-GST.

BECKOM[®]

Beckom[®] is a mid-maturing AH wheat suited to the medium to high-yield potential environments of SA. It is resistant to CCN and shows moderate resistance (MRMS) to stripe rust, but is susceptible to leaf rust, Septoria tritici blotch and powdery mildew. Beckom[®] has a tendency for small grain size, especially in tight-finishing seasons. Seed is available from AGT Affiliates and Seed Sharing™. EPR \$3.25 ex-GST.

NEW – CALIBRE[®]

Calibre[®] is a new variety released by AGT in spring 2021, with seed available for the 2022 season. It is a quick to mid-maturing variety similar to Mace[®] with an AH classification. Calibre[®] is largely derived from Scepter[®] with improved coleoptile length and good sprouting tolerance. Seed is available from AGT Affiliates.

CATAPULT[®]

Catapult[®] was released in 2019 by AGT as a variety for late April/early May sowing. It offers wide adaptation and has a mid to slow maturity suited for earlier planting opportunities in late April to early May. Yield evaluation from earlier sowing is limited in SA and more evaluation is required. Initial data suggests Catapult[®] produces grain with high test weights and low screenings. It is suitable for wheat-on-wheat situations with appropriate yellow leaf spot resistance. Seed is available from AGT Affiliates, retailers or through Seed Sharing™. EPR \$3.25 ex-GST.

CHIEF CL PLUS[®]

Chief CL Plus[®] is a mid-maturing imidazolinone herbicide tolerant (Clearfield® Plus) APW wheat, derived from Wyalkatchem[®] and released in 2016 by InterGrain. It is rated as moderately resistant (MR) to leaf rust, RMR for stem rust and MRMS for yellow leaf spot, but is very susceptible to powdery mildew (SVS) and stripe rust (S). The long-term results show grain yields similar to Wyalkatchem[®] in many districts. Seed is available for 2022 planting from local resellers or InterGrain Seedclub Members. EPR \$4.25 ex-GST.

CUTLASS[®]

Cutlass[®] has an APW classification in SA and was released by AGT in 2015. It is a mid to slow-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 to susceptible (MSS) to yellow leaf spot. It is lower yielding than fast to mid-developing cultivars from May sowing dates. Cutlass[®] has a unique flowering behaviour and commercial and agronomy data suggests it has an application for early sowing and frost risk management where Yitpi[®] has been successful. Seed is available from AGT Affiliates, retailers or through Seed Sharing™. EPR \$3.00 ex-GST.

DENISON[®]

Denison[®] is an APW-quality, slow-maturing variety suited to mid to late April sowing. It has short stature with good lodging resistance. Released in 2020 (tested as WAGT734), it was bred and marketed by AGT and is eligible for AGT Seed Sharing™. EPR \$3.40 ex-GST.

EMU ROCK[®]

Emu Rock[®] is a very quick to quick maturing AH-quality variety for mid to late sowings in a broad range of environments across southern Australia. It is susceptible to CCN, Septoria tritici blotch (SVS), leaf rust, strip rust and powdery mildew, but has moderate resistance (MRMS) to yellow leaf spot. Across NVT in SA, Emu Rock[®] has shown yields aligned with Wyalkatchem[®]. Seed is available from InterGrain and is approved for grower-to-grower trade. EPR \$3.50 ex-GST.

GRENAD CL PLUS[Ⓢ]

Grenade CL Plus[Ⓢ] is an imidazolinone herbicide tolerant (Clearfield® Plus) AH variety. It is quick to mid-maturing with moderate resistance to CCN, stem rust (MR) and stripe rust (MRMS). However, it is susceptible to leaf rust and yellow leaf spot. Seed is available from AGT Affiliates. EPR \$3.80 ex-GST.

HAMMER CL PLUS[Ⓢ]

Hammer CL Plus[Ⓢ] is an imidazolinone herbicide tolerant (Clearfield® Plus) AH variety with two-gene tolerance to label rates of Intervix® herbicide. It is closely related to Mace[Ⓢ] with similar quick to mid-maturity and adaptability. Hammer CL Plus[Ⓢ] has CCN and yellow leaf spot resistance. Released in 2020 (tested as OAGT0016), it was bred and is marketed by AGT and it is not eligible for AGT Seed Sharing™. EPR \$4.25 ex-GST.

KORD CL PLUS[Ⓢ]

Kord CL Plus[Ⓢ] carries two genes for Clearfield® resistance and is derived from Gladius[Ⓢ] with mid-maturity and susceptibility to pre-harvest sprouting, but is MR to CCN. It has an AH classification and has yielded similar to Gladius[Ⓢ] in all districts. Seed is available from AGT Affiliates. EPR \$3.55 ex-GST.

LONGREACH ARROW[Ⓢ]

LongReach Arrow[Ⓢ] is an AH-quality wheat from LongReach Plant Breeders released in 2016. It is mid-maturing and develops at a similar speed to Scepter[Ⓢ]. For SA NVT, LongReach Arrow[Ⓢ] yields were similar to Mace[Ⓢ] in the lower to medium-yielding environments and had a small improvement over Mace[Ⓢ] in the higher-yielding environments. It is susceptible to Septoria tritici blotch, CCN, stripe, stem and leaf rust, but is moderately resistant to yellow leaf spot. LongReach 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 ex-GST.

NEW – LONGREACH BALE[Ⓢ]

LongReach Bale[Ⓢ] was released in spring 2021 from LongReach Plant Breeders (tested as LPB18-7946). It is a slow-maturity awnless variety with a long coleoptile length. LongReach Bale[Ⓢ] also has an APW classification. Maturing later than Yitpi[Ⓢ], its awnless qualities and delayed flowering allow it to be delivered as grain or cut for hay. Evaluation in NVT is limited. Seed is available for the 2022 season through grower-to-grower trade.

LONGREACH COBRA[Ⓢ]

LongReach Cobra[Ⓢ] was released as a quick to mid-maturing Westonia derivative with AH quality and high yield potential, particularly in the medium to higher-rainfall districts of SA. It has good resistance to stem rust but is rated MSS to stripe rust and some susceptibility to leaf rust has been observed. It is MSS to Septoria tritici blotch and MS to CCN and yellow leaf spot. LongReach 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 ex-GST.

NEW – LONGREACH DUAL[Ⓢ]

LongReach Dual[Ⓢ] was released in spring 2021 from LongReach Plant Breeders (tested as LPB18-7982). It is a mid to slow variety flowering between LongReach Trojan[Ⓢ] and Yitpi[Ⓢ]. LongReach Dual[Ⓢ] is a long coleoptile variety with an AH classification. It is awnless and can be cut for hay or delivered as grain, offering options in frost-prone areas. Evaluation through NVT is limited. Seed is available for the 2022 season through LongReach seed network.

LONGREACH NIGHTHAWK[Ⓢ]

LongReach Nighthawk[Ⓢ] is a very slow-maturity spring wheat developed for early germination opportunities before 25 April. It is suited to early planting or grazing opportunities similar to winter wheat in the higher-rainfall zones. Early sowing agronomy data suggests LongReach Nighthawk[Ⓢ] has similar or higher yields than winter wheats when established in mid-April. It has good resistance to stem and stripe rust but is MSS to leaf rust and Septoria tritici blotch and SVS to powdery mildew. More evaluation is needed. Seed is available from Pacific Seeds. EPR \$4.25 ex-GST.

LongReach Trojan[Ⓢ]

LongReach Trojan[Ⓢ] is a mid to slow-maturing APW-quality variety with high yield potential, particularly in medium to high-rainfall districts. It is well suited to main season sowing in high production zones and slightly earlier sowing in medium-rainfall zones. It is SVS to stripe rust, MRMS to stem and leaf rust and MS for Septoria tritici blotch. LongReach Trojan[Ⓢ] is rated S for powdery mildew and is MS for CCN. It has large grain size with low screenings, high test weight and good black point resistance. Seed is available from Pacific Seeds and is approved for grower-to-grower trade. EPR \$4.00 ex-GST.

MACE[®]

Mace[®] has quick to mid-maturity and an AH classification. It is SVS to stripe rust and S to Septoria tritici blotch, but is better (MSS) with powdery mildew than similar varieties. 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™. EPR \$3.00 ex-GST.

RAZOR CL PLUS[®]

Razor CL Plus[®] is a quick to mid-maturity, imidazolinone herbicide tolerant (Clearfield® Plus) ASW wheat released by AGT. Its long-term NVT performance suggests it yields similar to Mace[®] and has stable yields across most regions. Razor CL Plus[®] is rated SVS for Septoria tritici blotch, S to leaf rust and MS to stripe rust, but MR to CCN. Seed is available from AGT Affiliates. EPR \$3.30 ex-GST.

ROCKSTAR[®]

RockStar[®] was released in 2019 by InterGrain. It offers wide adaptation but has a mid to slow maturity that may be suited for earlier planting opportunities in late April to early May. Yield performance from May to June sowing dates in 2018 suggests that RockStar[®] yields similar or slightly less than Scepter[®]. Yield evaluation from earlier sowing is limited in SA and more evaluation is required. RockStar[®] is rated MRMS to stripe rust and yellow leaf spot, SVS to powdery mildew, S to leaf rust, and MSS to Septoria. It is available for planting in 2022 from local resellers and Seedclub members. EPR \$3.50 ex-GST.

SCEPTER[®]

Scepter[®] is a mid-maturing AH wheat in SA. It was released by AGT in 2015 and is now the most widely grown wheat variety in SA. It is largely derived from Mace[®] with many similar characteristics, although it has improved grain yield and stripe rust resistance and is more susceptible to powdery mildew. Scepter[®] is rated MRMS to stem rust, MSS to leaf rust and MRMS to CCN and yellow leaf spot. It shows wide adaptation and is suitable for wheat-on-wheat application except where Septoria tritici blotch and powdery mildew are likely to be a problem. Seed is available from AGT Affiliates, retailers or through Seed Sharing™. EPR \$3.25 ex-GST.

SHERIFF CL PLUS[®]

Sheriff CL Plus[®] is an imidazolinone herbicide tolerant (Clearfield® Plus) APW wheat released by InterGrain in 2018. It is a mid to slow-maturing variety and is similar to LongReach Trojan[®] in developmental speed and can be sown slightly earlier than the other Clearfield® Plus varieties. Its long-term NVT performance suggests it yields similarly to Mace[®] and has stable yields across most regions. Sheriff CL Plus[®] is rated SVS to leaf rust and powdery mildew, MS to stem rust, MSS to stripe rust, S to Septoria tritici blotch, MRMS to yellow leaf spot and MS to CCN. Seed is available for planting in 2022 from local resellers or InterGrain Seedclub Members. EPR \$4.25 ex-GST.

NEW – VALIANT CL PLUS[®]

Valiant CL Plus[®] is an imidazolinone herbicide tolerant (Clearfield® Plus) AH wheat released by InterGrain in 2021 (tested as IGW4502). It is a mid to slow-maturing wheat, providing the phenology fit for sowing in April. Valiant CL Plus[®] has had limited evaluation in NVT to date but is SVS to powdery mildew, similar to Chief CL Plus[®]. Seed is available for planting in 2022 from local resellers or InterGrain Seedclub Members. EPR \$4.35 ex-GST.

VIXEN[®]

Vixen[®] is a quick-maturity variety that develops slightly quicker than Mace[®]. It was released by InterGrain in 2018 and has an AH classification in SA. Long-term data suggests performance is slightly above Scepter[®]. The variety's development speed is suited to mid-May to later sowings. Vixen[®] is rated SVS to powdery mildew and leaf rust, MRMS to stem and stripe rust, S to Septoria tritici blotch, MRMS to yellow leaf spot, and MSS to CCN. Vixen[®] seed is approved for grower-to-grower trading and is available through local resellers or InterGrain Seedclub Members. EPR \$3.50 ex-GST.

INTRO

WHEAT

BARLEY

OAT

CANOLA

FABA BEAN

LENTIL

FIELD PEA

CHICKPEA

LUPIN

VETCH

NOTES

SOFT WHEATS

LONGREACH IMPALA[®]

LongReach Impala[®] is a mid-maturity soft biscuit (ASF1) wheat targeted to eastern Australia. It is susceptible to CCN, has good stem and stripe rust resistance, but is very susceptible to Septoria tritici blotch and leaf rust. LongReach Impala[®] produces large grain with low screening losses and is MRMS to black point. Seed is available from Pacific Seeds. EPR \$3.50 ex-GST.

LONGREACH ORION[®]

LongReach Orion[®] is a mid to slow-maturing soft biscuit (ASF1) wheat targeted to eastern Australia. It is susceptible to CCN and yellow leaf spot but has good stem and leaf rust resistance and is MSS to stripe rust. LongReach Orion[®] is S to black point and susceptible to sprouting. Seed is available from Pacific Seeds and is approved for grower-to-grower trade. EPR \$3.00 ex-GST.

Table 4: Mid North main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	5.67	3.31	2.67	2.91	5.14
Variety	Classification	No. trials	3	3	2	4	4
MILLING WHEATS							
Ascot [®]	APW	8	–	–	–	100	105
Ballista [®]	AH	8	–	–	–	113	111
Beckom [®]	AH	12	106	103	104	105	–
Calibre [®]	AH	4	–	–	–	–	110
Catapult [®]	AH	10	–	–	106	106	105
Corack [®]	APW	16	96	109	108	107	100
Cutlass [®]	APW	16	102	96	96	95	99
Denison [®]	APW	4	–	–	–	–	105
Emu Rock [®]	AH	16	96	101	104	104	102
LongReach Arrow [®]	AH	12	102	104	105	104	–
LongReach Cobra [®]	AH	16	104	100	95	97	105
LongReach Impala [®]	ASFT	9	95	91	90	89	91
LongReach Orion [®]	ASFT	4	–	86	86	85	90
LongReach Scout [®]	AH	16	105	98	98	100	105
LongReach Trojan [®]	APW	16	108	101	97	99	102
Mace [®]	AH	16	98	106	108	107	100
RockStar [®]	AH	10	–	–	108	109	109
Scepter [®]	AH	16	106	109	113	112	105
Vixen [®]	AH	13	–	114	115	118	113
Wyalkatchem [®]	APW	16	97	101	103	102	101
CLEARFIELD[®] PLUS							
Chief CL Plus [®]	APW	16	95	100	103	100	98
Grenade CL Plus [®]	AH	16	93	95	97	96	96
Hammer CL Plus [®]	AH	4	–	–	–	–	96
Kord CL Plus [®]	AH	16	91	95	96	94	91
Razor CL Plus [®]	ASW	13	–	107	109	109	105
Sheriff CL Plus [®]	APW	13	103	–	104	103	104
FEED WHEATS							
RGT Zanzibar	FEED	16	105	91	86	88	100

– denotes no data available.

FEED AND UNCLASSIFIED WHEATS

RGT ZANZIBAR

RGT Zanzibar is a very slow-maturing red spring wheat with feed grain quality, suited to the medium-high rainfall zone. It has good standability. However, it is very susceptible to stem rust, making it high risk should stem rust occur and so should be grown with caution. Seed is available from Seed Force Broadacre Commercial Partners. EPR \$4.00 ex-GST.

YIELD PERFORMANCE EXPERIMENTS FROM 2016–20

The yield results presented 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 for 2016 to 2020 inclusive. Further results can be found on the NVT website (<https://nvt.grdc.com.au>).

Table 5: Yorke Peninsula main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	6.11	4.55	4.08	3.19	3.62
Variety	Classification	No. trials	3	3	3	4	3
MILLING WHEATS							
Ascot ^{db}	APW	7	–	–	–	103	101
Ballista ^{db}	AH	7	–	–	–	116	111
Beckom ^{db}	AH	13	105	103	108	108	–
Calibre ^{db}	AH	3	–	–	–	–	111
Catapult ^{db}	AH	10	–	–	108	109	108
Cutlass ^{db}	APW	16	101	101	102	98	102
Denison ^{db}	APW	3	–	–	–	–	104
Emu Rock ^{db}	AH	16	96	96	100	102	98
LongReach Arrow ^{db}	AH	13	101	102	105	103	–
LongReach Cobra ^{db}	AH	16	109	99	100	98	103
LongReach Scout ^{db}	AH	16	108	98	102	105	101
LongReach Trojan ^{db}	APW	16	110	105	103	101	104
Mace ^{db}	AH	16	95	103	101	102	102
RockStar ^{db}	AH	9	–	–	111	114	112
Scepter ^{db}	AH	16	102	109	108	111	110
Vixen ^{db}	AH	16	110	109	108	115	111
Wyalkatchem ^{db}	APW	16	95	99	103	100	103
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	16	89	100	102	96	104
Grenade CL Plus ^{db}	AH	16	92	93	97	96	94
Hammer CL Plus ^{db}	AH	3	–	–	–	–	98
Kord CL Plus ^{db}	AH	16	90	95	93	92	91
Razor CL Plus ^{db}	ASW	13	–	102	103	106	104
Sheriff CL Plus ^{db}	APW	13	102	–	105	104	106

– denotes no data available.

Table 6: Murray Mallee main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	4.11	3.43	1.56	1.33	3.09
Variety	Classification	No. trials	6	1	5	6	6
MILLING WHEATS							
Ballista ^{db}	AH	12	–	–	–	114	114
Beckom ^{db}	AH	18	107	105	104	105	–
Calibre ^{db}	AH	6	–	–	–	–	114
Catapult ^{db}	AH	17	–	–	107	111	109
Cutlass ^{db}	APW	24	102	105	98	106	101
Emu Rock ^{db}	AH	24	96	93	101	93	98
LongReach Arrow ^{db}	AH	18	104	103	101	97	–
LongReach Cobra ^{db}	AH	12	103	96	95	–	–
LongReach Scout ^{db}	AH	24	103	95	101	102	103
LongReach Trojan ^{db}	APW	24	107	107	101	107	105
Mace ^{db}	AH	24	100	105	104	99	101
RockStar ^{db}	AH	17	–	–	110	116	113
Scepter ^{db}	AH	24	108	115	111	112	110
Vixen ^{db}	AH	24	111	107	112	102	110
Wyalkatchem ^{db}	APW	24	99	101	100	97	99
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	24	98	107	98	98	98
Grenade CL Plus ^{db}	AH	24	93	93	97	96	95
Hammer CL Plus ^{db}	AH	12	–	–	–	104	100
Kord CL Plus ^{db}	AH	24	91	95	96	97	93
Razor CL Plus ^{db}	ASW	18	–	102	105	98	103
Sheriff CL Plus ^{db}	APW	23	105	–	103	105	104

– denotes no data available.

Table 7: Lower Eyre Peninsula main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	4.91	2.95	3.75	5.98	4.03
Variety	Classification	No. trials	2	3	3	1	3
MILLING WHEATS							
Ascot ^{db}	APW	4	–	–	–	108	100
Ballista ^{db}	AH	4	–	–	–	111	114
Beckom ^{db}	AH	9	110	106	106	110	–
Calibre ^{db}	AH	3	–	–	–	–	113
Catapult ^{db}	AH	7	–	–	108	103	108
Corack ^{db}	APW	12	102	106	104	106	110
Cutlass ^{db}	APW	12	98	100	101	95	100
Emu Rock ^{db}	AH	12	100	97	97	107	98
LongReach Arrow ^{db}	AH	9	108	104	105	112	–
LongReach Cobra ^{db}	AH	12	106	96	99	110	106
LongReach Scout ^{db}	AH	12	105	97	98	106	98
LongReach Trojan ^{db}	APW	12	105	104	104	99	106
Mace ^{db}	AH	12	102	107	105	102	106
RockStar ^{db}	AH	7	–	–	111	108	112
Scepter ^{db}	AH	12	110	115	112	104	112
Vixen ^{db}	AH	10	–	114	111	121	118
Wyalkatchem ^{db}	APW	12	101	102	102	104	104
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	12	97	104	104	99	106
Grenade CL Plus ^{db}	AH	12	92	93	94	95	91
Hammer CL Plus ^{db}	AH	3	–	–	–	–	97
Kord CL Plus ^{db}	AH	12	87	94	94	88	88
Razor CL Plus ^{db}	ASW	10	–	106	104	110	107
Sheriff CL Plus ^{db}	APW	9	106	–	105	104	107

– denotes no data available.

Table 8: Upper Eyre Peninsula main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	2.39	1.17	1.33	1.30	1.48
Variety	Classification	No. trials	7	6	6	7	6
MILLING WHEATS							
Ballista ^{db}	AH	13	–	–	–	118	115
Beckom ^{db}	AH	26	109	104	104	105	–
Calibre ^{db}	AH	6	–	–	–	–	118
Catapult ^{db}	AH	19	–	–	106	105	113
Corack ^{db}	APW	32	101	100	101	90	101
Cutlass ^{db}	APW	19	–	108	–	109	111
Emu Rock ^{db}	AH	32	100	98	97	111	103
LongReach Arrow ^{db}	AH	26	105	101	104	100	–
LongReach Cobra ^{db}	AH	19	102	96	96	–	–
LongReach Scout ^{db}	AH	32	105	99	94	112	103
LongReach Trojan ^{db}	APW	32	103	103	102	95	97
Mace ^{db}	AH	32	99	103	107	101	104
RockStar ^{db}	AH	19	–	–	108	112	117
Scepter ^{db}	AH	32	107	110	112	107	116
Vixen ^{db}	AH	25	–	108	107	122	111
Wyalkatchem ^{db}	APW	32	102	100	103	98	105
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	32	99	101	108	85	103
Grenade CL Plus ^{db}	AH	32	97	96	95	100	101
Hammer CL Plus ^{db}	AH	13	–	–	–	102	105
Kord CL Plus ^{db}	AH	32	92	96	97	93	96
Razor CL Plus ^{db}	ASW	32	103	103	104	110	107
Sheriff CL Plus ^{db}	APW	32	105	103	105	100	107

– denotes no data available.

Table 9: South East main season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	5.62	4.17	5.03	6.73	5.11
Variety	Classification	No. trials	3	1	3	2	1
MILLING WHEATS							
Ascot ^{db}	APW	2	–	–	–	109	–
Ballista ^{db}	AH	3	–	–	–	114	110
Beckom ^{db}	AH	10	106	104	106	108	106
Calibre ^{db}	AH	1	–	–	–	–	108
Catapult ^{db}	AH	6	–	–	105	106	104
Cutlass ^{db}	APW	10	102	94	101	101	100
Denison ^{db}	APW	1	–	–	–	–	104
Emu Rock ^{db}	AH	10	94	102	97	96	99
LongReach Arrow ^{db}	AH	9	103	107	105	106	–
LongReach Cobra ^{db}	AH	10	109	106	106	112	107
LongReach Scout ^{db}	AH	10	104	98	102	107	102
LongReach Trojan ^{db}	APW	10	111	102	107	111	105
Mace ^{db}	AH	10	97	107	100	97	101
RockStar ^{db}	AH	6	–	–	109	112	108
Scepter ^{db}	AH	10	103	108	106	103	105
Vixen ^{db}	AH	9	110	–	111	114	112
Wyalkatchem ^{db}	APW	10	97	102	99	97	100
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	10	94	101	98	93	99
Grenade CL Plus ^{db}	AH	10	90	92	92	90	93
Hammer CL Plus ^{db}	AH	1	–	–	–	–	96
Kord CL Plus ^{db}	AH	10	90	92	91	87	91
Razor CL Plus ^{db}	ASW	7	–	109	102	101	103
Sheriff CL Plus ^{db}	APW	9	103	–	104	104	104
FEED WHEATS							
LongReach Beaufort ^{db}	FEED	6	–	–	104	110	103
RGT Zanzibar	FEED	10	109	93	103	110	102

– denotes no data available.

GRAIN QUALITY FROM 2016 TO 2020

Grain quality for individual varieties varies between years. However, the trends across sites for a single year tend to be more consistent for a variety. Long-term results highlight trends in variety performance and consistency. Tables 10 and 18 summarise the variation in test weight. Test weight is expressed as the mean test weight from NVT data 2016 to 2020 inclusive.

Table 19 summarises the variation in screening percentages in durum varieties. Screenings are expressed as the mean percentage of grain less than 2mm in size from NVT data 2016 to 2020 inclusive. Further results can be found on the NVT website at <https://nvt.grdc.com.au>.

Table 10: South Australian wheat test weight performance. NVT data 2016–2020.

			Test weight (kg/hectolitre)				
		Year	2016	2017	2018	2019	2020
Variety	Classification	No. trials	24	17	19	22	23
MILLING WHEATS							
Ascot ^{db}	APW	21	—	—	—	82.88	81.17
Ballista ^{db}	AH	45	—	—	—	81.58	80.90
Catapult ^{db}	AH	64	—	—	81.12	82.72	82.18
Cutlass ^{db}	APW	105	82.30	79.91	81.39	82.42	82.06
Denison ^{db}	APW	8	—	—	—	—	82.01
Emu Rock ^{db}	AH	105	82.87	79.09	79.71	81.91	81.47
LongReach Scout ^{db}	AH	105	84.68	81.44	82.23	83.39	82.96
LongReach Trojan ^{db}	APW	105	83.90	80.74	81.39	83.30	82.78
Mace ^{db}	AH	105	82.38	79.32	80.98	82.08	81.36
RockStar ^{db}	AH	63	—	—	80.00	81.74	81.81
Scepter ^{db}	AH	105	83.52	79.70	80.86	82.97	82.01
Vixen ^{db}	AH	93	82.17	78.60	78.91	81.31	80.49
Yitpi ^{db}	AH	105	82.59	79.99	81.31	82.26	81.10
CLEARFIELD® PLUS							
Chief CL Plus ^{db}	APW	105	82.35	78.61	80.10	81.16	81.51
Grenade CL Plus ^{db}	AH	104	82.18	79.71	79.93	82.16	80.92
Hammer CL Plus ^{db}	AH	35	—	—	—	81.53	81.28
Razor CL Plus ^{db}	ASW	89	83.27	80.02	80.78	82.87	81.98
Sheriff CL Plus ^{db}	APW	94	83.36	79.53	80.77	81.96	81.86
Valiant CL Plus ^{db}	AH	11	—	—	—	—	82.34

– denotes no data available.

WINTER WHEAT VARIETY NOTES

Winter wheats may facilitate early germination opportunities before 20 April in frost-prone environments. Winter wheats have an obligate requirement for cold (vernalisation) in order to flower. While limited yield data is provided in this guide, the winter cultivars Longsword[®], Illabo[®], RGT Accroc, DS Bennett[®], RGT Calabro and Anapurna are all commercially available in 2021 and are being trialled in early sown NVT and a series of agronomy trials across SA as part of GRDC's Management of Early Sown Wheat project.

DS BENNETT[®]

DS Bennett[®] was released in 2018 and has an ASW classification in SA. It is a mid to slow-maturity 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 EGA Wedgetail[®]. DS Bennett[®] is rated S to leaf rust and stripe rust, MRMS to stem rust, and MSS to Septoria and CCN. DS Bennett[®] may also be a higher risk for black point. Seed is available from Seednet partners. EPR \$4.25 ex-GST.

ILLABO[®]

Illabo[®] was released in 2018 by AGT and has an AH classification in SA. It is a quick to mid-maturity winter wheat that has been developed for mid to long-season growing areas. It is suited to early planting or grazing opportunities similar to EGA Wedgetail[®] in the medium-high rainfall zones. Illabo[®] has shown a yield improvement compared with EGA Wedgetail[®]. It is rated S to leaf rust, MRMS to stem and RMR to stripe rust, MSS to Septoria, and MS to CCN. Seed is available from AGT Affiliates, retailers or through Seed Sharing[™]. EPR \$3.50 ex-GST.

FEED WINTER WHEATS

ANAPURNA

Anapurna is a mid to slow-maturity imported European variety introduced by AGT, suited to long growing season, high-rainfall areas. Best suited to early planting or grazing opportunities in high-rainfall environments, Anapurna has a long vegetative growth phase and similar maturity to RGT Accroc. Anapurna is a dual-purpose winter wheat suited for grazing and grain production. EPR \$3.20 ex-GST.

LONGSWORD[®]

Longsword[®] is classified as a feed wheat in SA. It is a quick winter wheat, meaning once its vernalisation requirement is met it is relatively fast to flower and is quicker to flower than EGA Wedgetail[®]. Longsword[®] has a broad sowing window but will be most suited to April plantings. It has not been widely tested in early sowing NVT, however data from agronomic trials shows it is the highest yielding winter wheat in the low-rainfall zones. Longsword[®] is rated MR to stem rust, MSS to Septoria and MRMS to CCN. Seed is available from AGT Affiliates, retailers or through Seed Sharing[™]. EPR \$2.75 ex-GST.

MANNING[®]

Manning[®] was released in 2013 as a very late-flowering, white-grained feed wheat for high-rainfall zones in south-east Australia. It is a slow-maturity, 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 ex-GST.

RGT ACCROC

RGT Accroc is a mid to slow-maturity red winter wheat, feed grain quality, suited to the high-rainfall zone and for sowing late February to early April for early grazing. Maturity is three to five days earlier than SF Adagio. RGT Accroc is rated SVS 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 ex-GST.

RGT CALABRO

RGT Calabro is a slow-maturing, red feed grain quality, awned winter wheat with potential for high yields and suited to high-rainfall zones. It is suitable for sowing late February to early March for early grazing. Contact Seed Force for agent. EPR \$4.00 ex-GST.

Table 11: South East early season wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2016	2017	2018	2019	2020
		Mean yield t/ha	5.60	5.85	7.58	8.05	6.31
Variety	Classification	No. trials	1	1	1	1	1
MILLING WHEATS							
Ascot ^{db}	APW	1	–	–	–	–	105
Beckom ^{db}	AH	5	100	103	97	100	107
Catapult ^{db}	AH	3	–	–	102	102	106
Cutlass ^{db}	APW	5	98	100	103	94	99
Denison ^{db}	APW	2	–	–	–	101	104
DS Bennett ^{db}	ASW	5	115	107	115	112	104
DS Pascal ^{db}	APW	5	105	104	100	109	107
Illabo ^{db}	AH	5	102	105	101	108	109
LongReach Nighthawk ^{db}	APW	3	–	–	102	104	104
LongReach Trojan ^{db}	APW	5	101	103	97	102	106
RockStar ^{db}	AH	2	–	–	–	113	117
CLEARFIELD® PLUS							
Elmore CL Plus ^{db}	AH	5	94	96	97	93	94
Sheriff CL Plus ^{db}	APW	2	–	–	–	101	106
FEED WHEATS							
LongReach Beaufort ^{db}	FEED	5	117	113	113	117	117
Longsword ^{db}	FEED	5	95	102	96	99	107
Manning ^{db}	FEED	5	118	106	114	120	102
RGT Accroc	FEED	5	124	115	123	125	114
RGT Calabro	FEED	5	122	113	119	126	113
RGT Cesario ^{db}	FEED	1	–	–	–	–	113
RGT Zanzibar	FEED	5	113	113	113	115	118
SF Adagio	FEED	4	118	110	114	122	–

– denotes no data available. Please note these data are generated only from the Conmurra site in the South East.

Table 12: Upper Eyre Peninsula early season wheat yield performance. NVT data 2017 and 2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2017	2018	2019	2020
		Mean yield t/ha	1.40	0.00	0.00	2.00
Variety	Classification	No. trials	1	0	0	1
MILLING WHEATS						
Cutlass [Ⓛ]	APW	2	105	–	–	101
Denison [Ⓛ]	APW	1	–	–	–	106
DS Bennett [Ⓛ]	ASW	2	119	–	–	114
DS Pascal [Ⓛ]	APW	2	104	–	–	103
Illabo [Ⓛ]	AH	2	114	–	–	109
LongReach Nighthawk [Ⓛ]	APW	1	–	–	–	108
LongReach Trojan [Ⓛ]	APW	2	97	–	–	96
RockStar [Ⓛ]	AH	1	–	–	–	98
Sheriff CL Plus [Ⓛ]	APW	1	–	–	–	93
FEED WHEATS						
Longsword [Ⓛ]	FEED	2	119	–	–	111

– denotes no data available.

Table 13: Murray Mallee early season wheat yield performance. NVT data 2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2020
		Mean yield t/ha	3.70
Variety	Classification	No. trials	1
MILLING WHEATS			
Catapult [Ⓛ]	AH	1	115
Cutlass [Ⓛ]	APW	1	114
Denison [Ⓛ]	APW	1	123
DS Bennett [Ⓛ]	ASW	1	125
DS Pascal [Ⓛ]	APW	1	107
Illabo [Ⓛ]	AH	1	119
LongReach Nighthawk [Ⓛ]	APW	1	102
LongReach Trojan [Ⓛ]	AH	1	104
RockStar [Ⓛ]	AH	1	128
Sheriff CL Plus [Ⓛ]	APW	1	104
FEED WHEATS			
Longsword [Ⓛ]	FEED	1	108

Table 14: South East long season wheat yield performance. NVT data 2020.

Long-term yield expressed as a percentage of mean yield.

		Year	2020
		Mean yield t/ha	6.16
Variety	Classification	No. trials	1
MILLING WHEATS			
Denison [Ⓛ]	APW	1	100
DS Bennett [Ⓛ]	ASW	1	106
Illabo [Ⓛ]	AH	1	104
LongReach Nighthawk [Ⓛ]	APW	1	100
FEED WHEATS			
Anapurna	FEED	1	112
Brennan	FEED	1	89
Einstein	FEED	1	105
Naparoo [Ⓛ]	FEED	1	71
LongReach Beaufort [Ⓛ]	FEED	1	123
Longsword [Ⓛ]	FEED	1	101
Manning [Ⓛ]	FEED	1	110
RGT Accroc	FEED	1	119
RGT Calabro	FEED	1	119
RGT Zanzibar	FEED	1	117
SQP Revenue [Ⓛ]	FEED	1	111

DURUM WHEAT VARIETY NOTES

The development speed of different durum varieties was compared with Scepter[®] and LongReach Trojan[®] in time of sowing trials across a range of dates in May and two locations, Loxton and Tarlee in South Australia in the 2018 season (SAGIT-funded project S518). From these trials, most of the durum varieties were characterised as quick to mid or mid-developing speed within the range of Scepter[®] and LongReach Trojan[®], and therefore suited to early to mid-May sowing in South Australia. At present there are no released durum varieties suited for earlier planting.

BITALLI[®]

Bitalli[®] is a quick to mid-maturity wheat, slightly slower than Saintly[®]. It is widely adapted and yielded higher than DBA-Aurora[®] in the Mid North and Yorke Peninsula. Bitalli[®] offers good physical grain characteristics including low screenings and good test weights. It is MR to stem and leaf rust and MS to stripe rust, while also being MRMS to both yellow leaf spot and Septoria tritici blotch. Bitalli[®] is eligible for Australian Premium Durum (ADR) classification in SA. It was released by AGT in 2019 with seed available through AGT Affiliates, retailers or Seed Sharing™. EPR \$3.50 ex-GST.

DBA ARTEMIS[®]

DBA Artemis[®] is mid to slow-maturity, slightly slower than DBA-Aurora[®] with a similar disease profile. It is RMR to leaf rust, MR to stem rust and either MR or MS to stripe rust, depending on the prevalent rust strain. It is also MRMS to both yellow leaf spot and Septoria tritici blotch. Grain size and screenings are comparable with DBA-Aurora[®] and DBA Spes[®]. DBA Artemis[®] is eligible for ADR grade in SA. It was released by Durum Breeding Australia's Southern Node (University of Adelaide) in 2019 with seed available from Southern Australia Durum Growers Association. EPR \$3.00 ex-GST.

DBA SPES[®]

DBA Spes[®] is mid-maturity and is RMR to stem rust, R to leaf rust and MS to stripe rust. It is also MRMS to both yellow leaf spot and Septoria tritici blotch. It has good grain size and lower screenings consistent with other durum varieties available. DBA Spes[®] is eligible for ADR grade in SA. It was released from Durum Breeding Australia's Southern Node (University of Adelaide) in 2018 with seed available from Southern Australia Durum Growers Association. EPR \$3.00 ex-GST.

DBA VITTARO[®]

DBA Vittaro[®] is a quick to mid-maturity variety, developing at a similar speed to Saintly[®]. It is MR to stem rust, RMR to leaf rust, MS to stripe rust and MRMS to yellow leaf spot. DBA Vittaro[®] has good grain size and low screening levels consistent with other durum varieties. It is shorter in stature than DBA-Aurora[®] with good straw strength and tolerance to lodging. DBA Vittaro[®] is eligible for ADR grade in SA. It was released from Durum Breeding Australia's Northern Node (Tamworth, NSW DPI) in 2017 with seed available from Seednet. EPR \$3.30 ex-GST.

DBA-AURORA[®]

DBA-Aurora[®] is mid-maturity. It is RMR to stem rust and R to leaf rust, MS to stripe rust and MRMS to yellow leaf spot. DBA-Aurora[®] has grain size and screening levels similar to other varieties available. It has shown good early vigour and grass weed competitiveness. It was released in 2014 from Durum Breeding Australia's Southern Node (University of Adelaide) and is eligible for ADR grade in SA. Seed is available from Southern Australia Durum Growers Association. EPR \$3.00 ex-GST.

SAINTLY[®]

Saintly[®] is an awnless, quick to mid-maturing variety and has performed very well in dry finishing conditions in SA. It has slightly less stem and leaf rust resistance compared with Hyperno[®]. Saintly[®] is eligible for ADR grade in SA. EPR \$3.00 ex-GST.

WESTCOURT[®]

Westcourt[®] is a mid-maturing wheat. It is RMR to stem and leaf rust, MR to stripe rust, MRMS to yellow leaf spot and MS to Septoria tritici blotch. It has good physical grain quality characteristics with low screenings. Westcourt[®] is eligible for ADR grade in SA. It was released by AGT in 2019 with seed available through AGT Affiliates, retailers or Seed Sharing™. EPR \$3.50 ex-GST.

Table 15: Disease responses of durum wheat varieties and reaction to common disorders.

Variety	Rust			Septoria tritici blotch	Yellow leaf spot	Powdery mildew	Black point	CCN
	Stem	Stripe	Leaf					
Bitalli ^{db}	MR	MS	MR	MRMS	MRMS	S	MS	MS
DBA Artemis ^{db}	MR	MR/MS	RMR	MRMS	MRMS	S	MS	MS
DBA-Aurora ^{db}	RMR	MR	R	MR/S	MRMS	MSS	MS	MSS
DBA Spes ^{db}	RMR	MS	R	MRMS	MRMS	MSS	MS	MRMS
DBA Vittaroi ^{db}	MR	MS	RMR	MS/S	MRMS	MRMS	MSS	S
Saintly ^{db}	MR	MS	MRMS	S	MRMS	MSS	MS	MS
Westcourt ^{db}	RMR	MR	RMR	MS	MRMS	S	MSS	MSS

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

Ratings separated by / denotes different responses to different pathotypes.

Black point is not a disease but is a physiological response to certain humid conditions.

Information on disease reactions was supplied by the Field Crop Pathology Unit (SARDI). Contact Dr Tara Garrard: tara.garrard@sa.gov.au

Table 16: Mid North durum wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	5.71	3.59	1.83	3.03	5.00
Variety	No. trials	2	2	2	3	3
Bitalli ^{db}	10	–	107	115	111	107
DBA Artemis ^{db}	12	105	101	106	101	107
DBA Spes ^{db}	12	104	102	107	101	107
DBA Vittaroi ^{db}	10	–	108	112	104	106
DBA-Aurora ^{db}	12	105	105	112	103	110
Saintly ^{db}	12	93	111	112	105	100
Westcourt ^{db}	8	–	–	101	107	99

– denotes no data available.

Table 17: Yorke Peninsula durum wheat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	5.83	3.71	4.34	2.69	3.67
Variety	No. trials	3	3	2	3	2
Bitalli ^{db}	10	–	109	111	116	106
DBA Artemis ^{db}	13	107	104	103	103	106
DBA Spes ^{db}	13	105	104	103	103	106
DBA Vittaroi ^{db}	10	–	103	106	106	102
DBA-Aurora ^{db}	13	106	106	106	106	107
Saintly ^{db}	13	88	99	105	107	94
Westcourt ^{db}	7	–	–	105	109	103

– denotes no data available.

Table 18: South Australian durum wheat test weight performance. NVT data 2016–2020.

		Test weight (kg/hectolitre)				
	Year	2016	2017	2018	2019	2020
Variety	No. trials	5	5	4	6	5
Bitalli [Ⓛ]	20	–	78.7	78.7	82.0	82.8
DBA Artemis [Ⓛ]	25	81.5	76.7	77.5	81.2	81.0
DBA Spes [Ⓛ]	25	81.7	76.5	77.1	80.4	80.8
DBA Vittaroi [Ⓛ]	20	–	77.9	77.7	81.4	82.8
DBA-Aurora [Ⓛ]	25	81.9	77.0	77.2	81.0	81.2
Saintly [Ⓛ]	25	81.9	78.8	77.6	82.3	81.7
Westcourt [Ⓛ]	15	–	–	79.1	82.6	82.6

– denotes no data available.

Table 19: South Australian durum wheat screenings performance. NVT data 2016–2020.

		Screenings (%)				
	Year	2016	2017	2018	2019	2020
Variety	No. trials	5	5	4	6	5
Bitalli [Ⓛ]	20	–	2.57	3.90	2.82	0.93
DBA Artemis [Ⓛ]	25	0.23	4.31	4.54	2.94	1.91
DBA Spes [Ⓛ]	25	0.27	3.90	5.01	3.41	1.29
DBA Vittaroi [Ⓛ]	20	–	2.39	3.84	1.67	0.67
DBA-Aurora [Ⓛ]	25	0.29	4.13	3.06	2.97	1.51
Saintly [Ⓛ]	25	0.55	1.95	5.33	2.03	1.44
Westcourt [Ⓛ]	15	–	–	4.24	1.00	0.51

– denotes no data available.

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BARLEY

By Rhiannon Schilling, Melissa McCallum, Courtney Peirce,
Tara Garrard and Hugh Wallwork, SARDI

This guide provides data and guidance on the barley varieties most suitable for sowing in South Australia in 2022 (Table 1). Since publication of the 2021 sowing guide, Commodus^{db} CL, Cyclops^{db} and Minotaur^{db} have been released, with a suite of potential varieties undergoing malt accreditation.

The decision to grow a malting, food or feed variety may depend on one or more factors, such as:

- market demand and malting varietal storage segregations in bulk storage facilities;
- the difference in payments between malting and feed grades compared with yield differences;
- the likelihood of producing a malting-grade barley within malt receival specifications; and
- disease resistance and agronomic considerations.

Table 1: Suitable barley varieties for planting in South Australia.

Listed according to current (2020-21) quality classification grade, in alphabetical order within classification.

Variety	Max. grade	Maturity classification	Suitability and significant features
LG Alestar ^{db}	Malting	Q-M	Targeted for medium to high-rainfall zones.
Commander ^{db}	Malting	Q-M	All areas, except areas prone to net form net blotch. Risk of lodging in high-yielding environments.
Compass ^{db}	Malting	VQ	All areas, at risk with some strains of leaf rust and lodging in high-yielding environments.
La Trobe ^{db}	Malting	VQ	All areas, note modest early vigour and weed competitiveness especially in light soils.
Leabrook ^{db}	Malting	VQ	All areas, similar plant characteristics as Compass ^{db} , at risk with some strains of leaf rust and lodging in high-yielding environments.
Maximus ^{db} CL	Malting	VQ	All areas, imidazolinone tolerant.
RGT Planet ^{db}	Malting	Q	All areas. Note lower test weights and higher small grain screenings under hot dry finishes and susceptibility to spot form and net form of net blotch.
Schooner	Malting	Q	All areas except leaf rust-prone areas. Now agronomically outclassed, declining industry demand, however has renewed interest in the craft market.
Scope CL ^{db}	Malting	Q	All areas except where leaf rust and CCN are a problem. Imidazolinone tolerant.
Spartacus CL ^{db}	Malting	VQ	All areas, imidazolinone tolerant. Similar competitive characteristics as Hindmarsh ^{db} .
Westminster ^{db}	Malting	Q-M	Higher-rainfall and longer-season areas, segregations available in South East region.
Beast ^{db}	Feed	Q	Targeted for lower-rainfall zones, Mallee environments, being evaluated for malt accreditation.
Buff ^{db}	Feed	Q	Broadly adapted and suited to acid soils.
Commodus ^{db} CL	Feed	Q-M	Imidazolinone tolerant. Similar plant characteristics as Compass ^{db} . Being evaluated for malt accreditation.
Cyclops ^{db}	Feed	Q-M	Broadly adapted. Being evaluated for malt accreditation.
Fathom ^{db}	Feed	Q	All areas, noting susceptibility to net form net blotch.
Laperouse ^{db}	Feed	Q	Being evaluated for malt accreditation.
Minotaur ^{db}	Feed	M-S	Medium to high-rainfall areas. Being evaluated for malt accreditation.
Oxford	Feed	M	Medium to high-rainfall areas (>400mm). Early sowing.
Rosalind ^{db}	Feed	VQ	All areas, broadly adapted.

Maturity: VQ = very quick, Q = quick, M = mid, S = slow, VS = very slow.

Table 2: Released varieties undergoing malt evaluation and expected timeline.

Variety	Year 0	Stage 1	Stage 2	Target decision date
Beast [®]	2020 (accepted)	2021	–	2023
Buff [®]	2018 (accepted)	2019 (passed)	2021	2022
Commodus [®] CL	2021 (accepted)	2021	–	2023
Cyclops [®]	2021 (accepted)	2021	–	2023
Laperouse [®]	2019 (accepted)	2020/21 (passed)	2021/22	2023
Minotaur [®]	2021 (accepted)	2021	–	2023

Source: Barley Australia

MARKETING

Growers need to consider which varietal option will lead to the greatest profitability. The relative difference in the price premium paid for malt versus feed may counteract the yield difference between malt, 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.

Differential pricing will be a continuing trend among malt and food varieties. Growers need to consider market premiums and discounts as well as agronomic performance to maximise profitability. Newer food and malt varieties are offering good yield potential. Varieties accredited and 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 to discuss market demand before sowing a malting variety. Malting barley is grown, stored and sold on a variety-specific basis and it is important to find out if the variety chosen can be stored and marketed in your area. The Barley Australia preferred list is updated annually as a guide to industry and can be found 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 accreditation of a new variety does not mean it will be a preferred variety. Preferred varieties are listed once market demand is established.

Table 2 lists some of the varieties under malt barley evaluation by the Malting and Brewing Industry Barley Technical Committee (MBIBTC) in conjunction with Pilot Brewing Australia 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).

Imidazolinone herbicide-tolerant barley varieties (Commodus[®] CL, Spartacus CL[®], Scope CL[®], Maximus[®] CL) may incur market access restrictions in some important export destinations. Information will be updated regularly at:

- www.barleyaustralia.com.au/ba-industry-updates; and
- www.barleyaustralia.com.au.

Information includes:

- list of preferred malting barley varieties (<https://www.barleyaustralia.com.au/varieties/preferred-malting-varieties>); and
- updated status of malting barley evaluation (<https://www.barleyaustralia.com.au/varieties/varieties-under-malting-evaluation>).

DISEASE

Net form net blotch remains a significant disease threat to barley production across South Australia and growers should not grow barley-on-barley or plant highly susceptible varieties unless a vigilant fungicide strategy is planned.

Seed dressings that have activity on powdery mildew should be applied to all susceptible varieties. 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 3 shows disease ratings for barley varieties suited to South Australia.

Table 3: Disease reactions of selected barley varieties.

Variety	Cereal cyst nematode		Leaf rust	Net form net blotch	Spot form net blotch	Leaf scald	Powdery mildew	Black point	Root lesion nematode		Common root rot	Crown rot
	Resistance	Tolerance							<i>P. neglectus</i>	<i>P. thornei</i>		
LG Alestar [Ⓛ]	–	T	R-MS	MR-S	MSS	MS-SVS	R	MRMS	MR	MR	MSS	S
Beast [Ⓛ]	–	T	MR-SVS	MR-S	MRMS	MS-SVS	MSS	MSS	MRMS	MR	S	Sp
Buff [Ⓛ]	–	T	SVS	MRMS	S	R-SVS	S	MRMS	MRMS	MRMS	MSS	S
Commander [Ⓛ]	R	T	MS-S	S-VS	MSS	MSS-SVS	MRMS	MSS	MRMS	MRMS	MSS	S
Commodus [Ⓛ] CL	–	T	MS-SVS	MR-MS	MR-S	MR-SVS	MS	MSS	MSS	S	S	–
Compass [Ⓛ]	R	T	SVS	MR-S	MR-MSS	MR-SVS	MRMS	MSS	MRMS	MR	MS	S
Cyclops [Ⓛ]	–	T	S-VS	R-MS	MS-S	R-S	MS	MS	S	MS	S	–
Fathom [Ⓛ]	R	T	MRMS-S	MSS-VS	RMR	R-S	MRMS	MSS	MRMS	MR	MSS	S
La Trobe [Ⓛ]	R	T	MRMS-S	MR-S	MSS	R-VS	MSS	MSS	MRMS	MRMS	S	SVS
Laperouse [Ⓛ]	S	T	MRMS-SVS	MR-MRMS	MRMS	MSS-SVS	MSS	MSS	MR	MR	MSS	S
Leabrook [Ⓛ]	R	T	MS-SVS	MR-MS	MRMS	R-SVS	MSS	MSS	MR	RMR	MS	S
Maximus [Ⓛ] CL	R	T	MS-S	MR-MS	MRMS-MS	R-S	MS	MSS	MRMS	MR	S	S
Minotaur [Ⓛ]	–	T	MS-SVS	MR-S	S	S-SVS	SVS	MS	MSS	MR	MSS	–
Oxford	S	T	R-MS	MR-VS	S	MS-SVS	MS	MR	MR	MR	MSS	S
RGT Planet [Ⓛ]	R	T	MR-MS	MR-S	SVS	R-MSS	R	MRMS	MRMS	MR	MSS	S
Rosalind [Ⓛ]	R	T	MR-MS	R-MRMS	MSS	MR-S	MS	MSS	MRMS	MR	S	MSS
Schooner	VS	T	SVS	R-MS	MS	MSS	SVS	MS	MS	MRMS	S	S
Scope CL [Ⓛ]	S	T	MS-SVS	R-MR	MSS	MRMS-SVS	RMR	MS	MRMS	MRMS	MS	S
Spartacus CL [Ⓛ]	R	T	MR-S	S-SVS	S	R-SVS	MS	MSS	MRMS	MRMS	MSS	S
Westminster [Ⓛ]	–	T	R-MRMS	R-S	S	R-S	R	MRMS	MRMS	MS	MSS	MSS

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, – variety yet to be fully evaluated, p = provisional ratings.

Ratings separated by / denotes different responses to different pathotypes.

Ratings provided are primarily from 2020 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 Tara Garrard on 0459 899 321.

VARIETY NOTES

The yield performance by region of barley varieties included in the SA NVT is shown in Tables 4 to 9.

LG ALESTAR[Ⓛ]

LG Alestar[Ⓛ] achieved malt accreditation in 2021. It is a quick to mid-maturity variety similar to Commander[Ⓛ] and is targeted for the medium to high-rainfall regions of SA. LG Alestar[Ⓛ] has demonstrated a yield improvement compared with Westminster[Ⓛ]. Seed is available through Elders and selected seed partners. EPR \$3.00 ex-GST.

BEAST[Ⓛ]

Beast[Ⓛ] is a very quick-maturing variety suited to medium to low-rainfall environments and performs well in stressed growing conditions. It is similar in plant type to Compass[Ⓛ], offering useful early vigour and weed competitiveness, but care should be taken in lodging-susceptible conditions. It was released in 2020 (tested as AGTB0113) and marketed by AGT. Beast[Ⓛ] has been accepted for Barley Australia malt accreditation, but insufficient grain was available to begin stage 1. The earliest possible time an accreditation decision can be made is 2023. Seed is available through AGT Affiliates and is eligible for AGT Seed Sharing™. EPR \$4.00 ex-GST.

BUFF[Ⓛ]

Buff[Ⓛ] is a quick-maturing variety suited to acid soils, with good early vigour and an erect plant type. It is undergoing Barley Australia malt accreditation, passing stage 2 evaluation in 2021. An accreditation decision is expected in 2022. Buff[Ⓛ] was bred by InterGrain and released in 2018 (tested as IGB 1506). Seed is available through InterGrain Seedclub Members. EPR \$3.50 ex-GST.

COMMANDER[Ⓛ]

Commander[Ⓛ] is a malting-quality variety released by the University of Adelaide in 2008 and suitable for domestic, Chinese and South-East Asian export brewing markets. Commander[Ⓛ] has quick to mid-season maturity and across many seasons has demonstrated wide adaptation and very high yield relative to other malting varieties, particularly in seasons with favourable spring finishes. It 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 with 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 ex-GST.

NEW – COMMODUS[®] CL

Commodus[®] CL is an imidazolinone-tolerant barley released in 2021 by InterGrain (tested as IGB1908). It is closely related to Compass[®], being similar agronomically, with the addition of the herbicide tolerance. Suited to the low-medium rainfall environments, Commodus[®] CL has a similar head loss and lodging risk to Compass[®]. Commodus[®] CL has been accepted for Barley Australia malt accreditation, starting stage 1 in 2021 with the earliest possible time an accreditation decision can be made in 2023. Seed is available through InterGrain Seedclub Members. EPR \$4.25 ex-GST.

COMPASS[®]

Compass[®] was developed by the University of Adelaide as a very quick-maturing accredited malting 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 is prone to lodging in high-yielding environments. Compass[®] is now susceptible (SVS) to a new strain of leaf rust in SA. It 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 ex-GST.

NEW – CYCLOPS[®]

Cyclops[®] is a new variety released by AGT in spring 2021, with seed available for the 2022 season. It is a quick-maturing variety with a speed similar to Spartacus CL[®] and is suited to a range of environments. It has an erect Hindmarsh[®] plant type and therefore is less susceptible to lodging. Cyclops[®] has been accepted for Barley Australia malt accreditation with the earliest possible accreditation decision in 2023. Seed is available through AGT Affiliates.

FATHOM[®]

Fathom[®] is a quick-maturing feed variety developed using wild barley to improve stress tolerance and water use efficiency. It 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. It has shown susceptibility to net form net blotch, scald and leaf rust. Seed is available from Seednet. EPR \$2.00 ex-GST.

LAPEROUSE[®]

Laperouse[®] is a quick-maturing variety with a medium plant height. It was accepted into Barley Australia malt accreditation in 2019, with an earliest possible decision in 2023. Laperouse[®] is susceptible to CCN, MR-MRMS to net form net blotch, and MS-SVS to leaf rust. It was released in 2020 (tested as WI4952) and bred by University of Adelaide and SECOBRA Recherchers. It is marketed by Seednet. EPR \$3.80 ex-GST.

LA TROBE[®]

La Trobe[®] is a malting-accredited variety released by InterGrain in 2014. It has very quick maturity and semi-dwarf growth habit, with plant architecture very similar to Hindmarsh[®]. Its yield and agronomic performance in SA NVT since 2013 has also been very similar to Hindmarsh[®], with a slightly higher yield. La Trobe[®] is resistant to CCN but susceptible to spot form net blotch and rated MR-S to net form net blotch. It shows variable resistance to leaf rust and leaf scald. La Trobe[®] seed is approved for grower-to-grower trading and seed is available through InterGrain Seedclub Members. EPR \$4.00 ex-GST.

LEABROOK[®]

Leabrook[®] achieved malt accreditation in 2021 and has been developed by the University of Adelaide as a very quick maturity variety. Leabrook[®] is closely related to Compass[®], but NVT results suggest it is higher yielding. It has a similar growth habit to Compass[®] and similar flowering behaviour with typical May sowing. Leabrook[®] has similar straw strength to Compass[®] and will be prone to lodging in high-yielding environments. Leabrook[®] is MS-SVS to leaf rust in SA. It 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 ex-GST.

MAXIMUS[®] CL

Maximus[®] CL achieved malt accreditation in 2021 and is a very quick-maturing imidazolinone-tolerant barley. It is resistant to CCN, MR-MS to net form net blotch and has improved grain size compared with Spartacus CL[®]. It has a short coleoptile length and it is recommended that sowing depth be considered carefully. Released in 2020 (tested as IGB1705T), Maximus[®] CL is marketed by InterGrain. Seed is available through InterGrain Seedclub Members. EPR \$4.25 ex-GST.

NEW – MINOTAUR[®]

Minotaur[®] is a new variety released by AGT in spring 2021, with seed available for the 2022 season. It is a mid to slow-maturing variety slightly slower than RGT Planet[®] and best suited to medium-high rainfall environments. Minotaur[®] has been accepted for Barley Australia malt accreditation with the earliest possible accreditation decision in 2023. Seed is available through AGT Affiliates.

OXFORD

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

RGT PLANET[®]

RGT Planet[®] is an accredited malt variety in Australia. It is a quick-maturing variety that has shown the highest potential yield compared with other 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 small grain screening under suboptimal grain-fill conditions. Seed is available via Seed Force broadacre commercial partners. EPR \$4.00 ex-GST.

ROSALIND[®]

Rosalind[®] is a very quick-maturing feed 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. It has resistance to CCN, net form net blotch, leaf rust, and variable resistance to leaf scald, but susceptibility to spot form net blotch and moderate susceptibility to powdery mildew. Rosalind[®] seed is approved for grower-to-grower trading and seed is available through InterGrain Seedclub Members.
EPR \$3.50 ex-GST.

SCOPE CL[®]

Scope CL[®] is a tall, malting-quality, quick-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 CL[®] has registration for use with an appropriate BASF Clearfield[®] herbicide. This herbicide tolerance makes Scope CL[®] an attractive option for brome and other grass control, particularly in Mallee-type soils. Seed is available through Seednet.
EPR \$3.50 ex-GST.

SPARTACUS CL[®]

Spartacus CL[®] is a malting-accredited, imidazolinone-tolerant barley developed by InterGrain and released in 2016. It is very quick maturing with a similar plant type and flowering behaviour to Hindmarsh[®] and La Trobe[®]. It is susceptible to net and spot form net blotch. Seed is available from local resellers and InterGrain Seedclub Members. EPR \$4.25 ex-GST.

WESTMINSTER[®]

Westminster[®] is a quick to mid-maturing variety with medium to tall stiff straw. Malting accreditation was completed in March 2013. Westminster[®] has now shown 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 south-east of SA and higher-rainfall environments. Contact GrainSearch for details on obtaining seed for 2022.
EPR \$3.00 ex-GST.

YIELD PERFORMANCE EXPERIMENTS FROM 2016 TO 2020

The yield results presented 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 2016 to 2020 inclusive. Further results can be found on the NVT website (<https://nvt.grdc.com.au>).

Table 4: Lower Eyre Peninsula barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	5.00	3.24	5.98	1.17	3.42
	No. trials	3	3	2	1	3
MALTING						
LG Alestar ^{db}	12	96	95	99	75	95
Commander ^{db}	12	99	100	97	98	94
Compass ^{db}	12	98	110	101	140	87
La Trobe ^{db}	12	100	105	102	132	101
Leabrook ^{db}	12	103	112	104	131	95
Maximus ^{db} CL	6	–	–	105	130	117
RGT Planet ^{db}	12	109	105	109	78	108
Scope CL ^{db}	9	94	94	94	103	–
Spartacus CL ^{db}	12	101	104	102	135	112
Westminster ^{db}	9	92	90	–	–	93
FEED						
Fathom ^{db}	12	104	103	102	137	98
Oxford	9	103	95	100	47	–
Rosalind ^{db}	12	107	111	109	121	114
PENDING MALT ACCREDITATION						
Beast ^{db}	4	–	–	–	150	99
Buff ^{db}	6	–	–	99	121	93
Commodus ^{db} CL	3	–	–	–	–	88
Cyclops ^{db}	3	–	–	–	–	122
Laperouse ^{db}	6	–	–	104	116	119
Minotaur ^{db}	3	–	–	–	–	125

– denotes no data available.

Table 5: Upper Eyre Peninsula barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.01	2.13	2.17	2.55	2.21
	No. trials	4	2	4	4	3
MALTING						
LG Alestar ^{db}	17	94	92	86	88	90
Commander ^{db}	17	100	100	103	101	101
Compass ^{db}	17	101	118	121	117	117
La Trobe ^{db}	17	100	111	110	110	109
Leabrook ^{db}	17	104	115	119	117	117
Maximus ^{db} CL	11	–	–	112	114	114
RGT Planet ^{db}	17	109	94	94	99	99
Scope CL ^{db}	17	96	99	99	96	96
Spartacus CL ^{db}	17	100	110	111	111	109
FEED						
Fathom ^{db}	17	109	109	116	114	110
Rosalind ^{db}	17	106	110	110	113	112
PENDING MALT ACCREDITATION						
Beast ^{db}	7	–	–	–	123	122
Buff ^{db}	11	–	–	108	106	102
Commodus ^{db} CL	3	–	–	–	–	116
Cyclops ^{db}	3	–	–	–	–	117
Laperouse ^{db}	11	–	–	112	113	113
Minotaur ^{db}	3	–	–	–	–	110

– denotes no data available.

Table 6: Mid North barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	6.68	4.93	2.53	3.67	5.12
	No. trials	3	3	2	3	4
MALTING						
LG Alestar [Ⓛ]	15	103	96	84	88	100
Commander [Ⓛ]	15	96	99	100	97	98
Compass [Ⓛ]	15	91	105	122	115	95
La Trobe [Ⓛ]	15	96	103	115	113	97
Leabrook [Ⓛ]	15	96	107	121	115	100
Maximus [Ⓛ] CL	9	–	–	116	115	98
RGT Planet [Ⓛ]	15	119	107	96	101	115
Scope CL [Ⓛ]	11	94	96	97	95	–
Spartacus CL [Ⓛ]	15	94	102	116	115	96
Westminster [Ⓛ]	10	97	92	–	–	95
FEED						
Explorer	11	107	100	88	91	–
Fathom [Ⓛ]	15	102	106	121	117	100
Oxford	8	–	96	75	81	–
Rosalind [Ⓛ]	15	105	108	116	116	106
PENDING MALT ACCREDITATION						
Beast [Ⓛ]	7	–	–	–	121	97
Buff [Ⓛ]	9	–	–	111	108	100
Commodus [Ⓛ] CL	4	–	–	–	–	95
Cyclops [Ⓛ]	4	–	–	–	–	109
Laperouse [Ⓛ]	12	–	104	114	111	102
Minotaur [Ⓛ]	4	–	–	–	–	111

– denotes no data available.

Table 7: Yorke Peninsula barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	6.37	4.73	5.09	3.77	3.91
	No. trials	5	5	3	3	4
MALTING						
LG Alestar ^{db}	20	100	99	98	96	98
Commander ^{db}	20	98	99	97	98	100
Compass ^{db}	20	95	101	101	105	95
La Trobe ^{db}	20	98	100	103	105	96
Leabrook ^{db}	20	100	103	103	107	101
Maximus ^{db} CL	10	–	–	101	104	102
RGT Planet ^{db}	20	114	110	110	106	111
Scope CL ^{db}	16	95	97	96	97	–
Spartacus CL ^{db}	20	96	98	102	104	98
Westminster ^{db}	14	95	95	–	–	94
FEED						
Explorer	13	103	103	101	–	–
Fathom ^{db}	20	104	104	106	109	99
Oxford	11	–	98	96	92	–
Rosalind ^{db}	20	105	105	108	108	106
PENDING MALT ACCREDITATION						
Beast ^{db}	7	–	–	–	107	99
Buff ^{db}	10	–	–	104	105	97
Commodus ^{db} CL	4	–	–	–	–	96
Cyclops ^{db}	4	–	–	–	–	112
Laperouse ^{db}	10	–	–	100	102	109
Minotaur ^{db}	4	–	–	–	–	114

– denotes no data available.

Table 8: Murray Mallee barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	5.54	3.65	2.00	2.77	3.86
	No. trials	2	2	2	2	4
MALTING						
LG Alestar ^{db}	4	–	–	–	–	94
Commander ^{db}	12	96	100	101	100	99
Compass ^{db}	12	98	104	109	115	110
La Trobe ^{db}	12	101	101	103	109	106
Leabrook ^{db}	12	103	107	111	116	113
Maximus ^{db} CL	8	–	–	103	111	106
RGT Planet ^{db}	12	116	106	106	104	110
Scope CL ^{db}	12	93	94	96	95	94
Spartacus CL ^{db}	12	97	102	101	109	103
FEED						
Fathom ^{db}	12	99	102	106	113	109
Oxford	8	102	100	93	85	–
Rosalind ^{db}	12	109	108	108	114	112
PENDING MALT ACCREDITATION						
Beast ^{db}	6	–	–	–	120	113
Buff ^{db}	8	–	–	102	105	103
Commodus ^{db} CL	4	–	–	–	–	109
Cyclops ^{db}	4	–	–	–	–	114
Laperouse ^{db}	8	–	–	105	110	106
Minotaur ^{db}	4	–	–	–	–	111

– denotes no data available.

Table 9: South East barley yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	6.12	5.34	5.34	5.55	6.37
	No. trials	2	2	2	2	1
MALTING						
LG Alestar [Ⓛ]	5	–	–	97	96	100
Commander [Ⓛ]	9	97	98	101	95	97
Compass [Ⓛ]	9	90	98	103	102	99
La Trobe [Ⓛ]	9	96	100	100	107	100
Leabrook [Ⓛ]	9	96	102	106	105	103
Maximus [Ⓛ] CL	5	–	–	102	109	99
RGT Planet [Ⓛ]	9	114	109	106	109	114
Scope CL [Ⓛ]	8	95	93	95	93	–
Spartacus CL [Ⓛ]	9	97	101	99	108	97
Westminster [Ⓛ]	9	96	94	94	91	95
FEED						
Explorer	8	100	101	100	99	–
Fathom [Ⓛ]	9	103	101	102	107	102
Oxford	8	107	104	101	95	–
Rosalind [Ⓛ]	9	104	108	106	113	107
PENDING MALT ACCREDITATION						
Beast [Ⓛ]	3	–	–	–	106	99
Buff [Ⓛ]	5	–	–	100	102	101
Commodus [Ⓛ] CL	1	–	–	–	–	98
Cyclops [Ⓛ]	1	–	–	–	–	108
Laperouse [Ⓛ]	5	–	–	106	105	100
Minotaur [Ⓛ]	1	–	–	–	–	108

– denotes no data available.

GRAIN QUALITY FROM 2016 TO 2020

Grain quality for individual varieties varies between years. However, the trends across sites for a single year tend to be more consistent for a variety. Long-term results highlight trends in variety performance and consistency. Table 10 highlights the variation in test weight. Test weight is expressed as the mean test weight from NVT data 2016 to 2020 inclusive. It shows that La Trobe[Ⓛ], Maximus[Ⓛ] CL, Scope CL[Ⓛ], Spartacus CL[Ⓛ] and Laperouse[Ⓛ] have consistent test weights across growing seasons.

Table 11 highlights the variation in retention percentages. Retention is expressed as the mean percentage of grain greater than 2.5mm in size from NVT data 2016 to 2020 inclusive. It shows that Compass[Ⓛ], Leabrook[Ⓛ], Beast[Ⓛ] and Laperouse[Ⓛ] have consistent retention >2.5mm across growing seasons. Further results can be found on the NVT website at <https://nvt.grdc.com.au>.

Table 10: South Australian barley test weight performance. NVT data 2016–2020.

Variety	Year	Test weight (kg/hectolitre)				
		2016	2017	2018	2019	2020
	No. trials	19	16	16	15	20
MALTING						
LG Alestar ^{db}	86	70.0	66.7	68.0	69.8	69.7
Commander ^{db}	86	70.6	67.1	67.2	69.7	68.4
Compass ^{db}	86	69.6	66.4	67.1	69.8	67.9
La Trobe ^{db}	85	71.7	69.0	68.8	71.2	69.1
Leabrook ^{db}	86	69.1	66.0	67.0	69.5	68.1
Maximus ^{db} CL	51	–	–	70.0	72.0	70.3
RGT Planet ^{db}	86	68.1	65.2	66.9	68.9	68.5
Scope CL ^{db}	73	69.8	67.9	68.5	70.1	70.1
Spartacus CL ^{db}	86	71.6	69.2	69.1	71.5	69.2
FEED						
Fathom ^{db}	85	69.9	67.1	66.9	68.9	68.6
Rosalind ^{db}	86	70.3	67.4	67.6	70.6	68.8
PENDING MALT ACCREDITATION						
Beast ^{db}	34	–	–	–	70.5	68.8
Buff ^{db}	50	–	–	67.2	70.0	67.8
Commodus ^{db} CL	19	–	–	–	–	68.6
Laperouse ^{db}	54	–	70.0	68.2	71.0	69.6

– denotes no data available.

Table 11: South Australian barley retention performance. NVT data 2016–2020.

Variety	Year	Retention >2.5mm (%)				
		2016	2017	2018	2019	2020
	No. trials	19	16	16	15	20
MALTING						
LG Alestar ^{db}	86	92.6	72.8	77.0	68.3	85.1
Commander ^{db}	86	92.7	83.3	83.8	76.7	88.5
Compass ^{db}	86	95.9	88.0	86.2	85.2	89.8
La Trobe ^{db}	85	90.2	73.6	72.3	71.0	74.0
Leabrook ^{db}	86	95.7	89.6	88.8	87.5	92.1
Maximus ^{db} CL	51	–	–	84.9	80.7	87.1
RGT Planet ^{db}	86	89.5	72.1	72.0	63.8	82.4
Scope CL ^{db}	73	87.2	72.9	72.2	64.6	69.5
Spartacus CL ^{db}	86	91.1	80.5	79.3	77.1	79.0
FEED						
Fathom ^{db}	85	95.4	86.0	83.1	83.1	87.3
Rosalind ^{db}	86	92.1	77.3	74.5	74.5	81.2
PENDING MALT ACCREDITATION						
Beast ^{db}	34	–	–	–	91.4	92.0
Buff ^{db}	50	–	–	79.0	74.6	82.1
Commodus ^{db} CL	19	–	–	–	–	88.3
Laperouse ^{db}	54	–	84.7	85.1	83.0	88.7

– denotes no data available.

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OAT

By Sue Hoppo and Pamela Zwer, SARDI,
and Allan Rattey, InterGrain

The information in this section provides guidance on the oat varieties most suitable for sowing for specific end-uses in south-eastern Australian farming systems. Information includes disease resistance, agronomic traits and yield potential.

HOW TO USE THE OAT VARIETY SOWING GUIDE

- 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 10 to refine the list to one or two varieties.
- Consult Tables 2 to 6 for hay and grain production comparisons, Table 7 for agronomic features, Table 8 for disease resistance, Table 9 for grain quality and Table 10 for hay quality.
- Certain varieties are preferred for particular end-uses, so check with hay processors and millers before 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 whether either nematode will be a problem. The PREDICTA® B service provides a diagnostic test to assess nematode levels before sowing. This is available through your local accredited agronomist.

Varieties in Table 1 provide options for different end-uses. Table 8 should then be used in conjunction with Table 1 to determine whether the variety of choice has resistance and/or tolerance to CCN and SN if these nematodes are problematic.

Varieties grown where CCN or SN is present should be resistant to the particular nematode so its multiplication 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 per cent can occur if an intolerant variety is sown in a paddock where CCN or SN is present.

Eight varieties resistant or moderately resistant to CCN are listed in Table 8 and four of these are also tolerant. Tammar[®], Mulgara[®], Tungoo[®] and Wintaroo[®] are all varieties with both CCN resistance and tolerance. The remaining four resistant varieties – Yallara[®], Brusher[®], Durack[®] and Bannister[®] – are intolerant of CCN. There are four varieties tolerant to stem nematode – Tammar[®], Mulgara[®], Tungoo[®] and Wintaroo[®] – that are also rated as resistant or moderately resistant to SN. Bannister[®] is intolerant to SN and in cold, wet, seasonal conditions may suffer greater 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. There are stem rust pathotypes in South Australia that can make stem rust resistance ineffective. Table 8 indicates a range of resistance reactions for stem rust depending on the virulence of the pathotype present. Monitoring disease levels is essential and fungicide application may be required depending on seasonal conditions.

Table 1 should be used to determine the variety options available for a particular end-use. Next, Table 6 should be used to further refine your choice. For example, if an oaten hay variety is required in a high-rainfall environment, Forester[®], Tammar[®], Tungoo[®], Koorabup[®], Brusher[®], Mulgara[®] and Wintaroo[®] are suitable (Table 1). Table 6 indicates that Wintaroo[®] is the highest-yielding hay variety in this environment. However, Table 8 indicates that all

other varieties 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 also be important. Table 7 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. This is greatly influenced by seasonal conditions. Premium milling varieties such as Yallara[®], Mitika[®], Bilby[®], Kowari[®], Bannister[®] and Durack[®] will reach the classification criteria for milling grade more often than other varieties (Table 9). Although some other 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 Bilby[®], Kowari[®], Mitika[®], Yallara[®], Bannister[®], Williams[®] or Durack[®] (Table 1). Tables 2 to 5 show the relative yield and Table 9 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 7 should also be used to determine whether the variety selected matures at the time required. Table 8 should be used to determine if the variety selected has the desired disease resistance.

IS EXPORT HAY QUALITY REQUIRED?

Hay quality is essential to meet export standards and is greatly influenced by seasonal and nutritional conditions. However, some varieties are more likely to produce higher-quality hay than others. It is imperative that you check with your hay processor about the quality standards required to make export-grade hay before you sow a crop. Use Table 10 to refine your choice after first ensuring that the criteria in Tables 1, 7 and 8 are met for your situation.

OATS FOR GRAZING

This guide contains no guidelines for oats suited to grazing or 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.

NOTES ON RECENTLY RELEASED VARIETIES

Fact sheets or pamphlets describing all varieties released by the former National Oat Breeding Program are available from the Department of Primary Industries and Regions website (www.pir.sa.gov.au/research) or from the relevant commercial partner for the variety. 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

BILBY[®]

Bilby[®], released in September 2019 by SARDI, is a dwarf, early to mid-season potential milling oat. Its height is similar to Mitika[®] and it is three days later to head. Bilby[®] has excellent grain yield similar to Williams[®] and Bannister[®] in SA, but with improved grain quality compared with these two varieties.

Bilby[®] has lower screenings, higher groat per cent and higher protein content compared with Williams[®] and Bannister[®]. It has lower hectolitre weight and slightly higher screenings compared with Mitika[®] and Kowari[®]. Protein is similar to Mitika[®] and Kowari[®] and grain size is similar to Mitika[®] and bigger than Kowari[®], Bannister[®] and Williams[®]. Bilby[®] has high β -glucan and lower oil than other dwarf varieties with bright grain. Bilby[®] has improved barley yellow dwarf virus resistance compared with other dwarf varieties. It is a cross between two breeder's lines and was tested as 06204-16. Barenbrug is the commercial partner.

KOWARI[®]

Kowari[®] is a dwarf, early maturing milling oat variety released by SARDI and slightly taller than Mitika[®]. It has a maturity similar to Mitika[®]. It is a cross between Mitika[®] and WAOAT2099 and has similar grain yield to Mitika[®], but lower than Bannister[®] and Williams[®].

The grain quality is excellent. Kowari[®] has slightly lower hectolitre weight and grain weight when compared with Mitika[®]. It combines high β -glucan with low screenings. Kowari[®] has high protein and slightly higher groat per cent compared with Mitika[®]. The trait of interest for this variety is improved β -glucan content. Barenbrug is the commercial partner.

DURACK[Ⓛ]

Durack[Ⓛ] is an extremely early, moderately tall variety similar in height to Carrolup and Yallara[Ⓛ]. 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 stem rust in South Australia and 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 is present. Again, a fungicide may be required in leaf rust-prone areas.

Grain yield for this variety is similar to the tall varieties Carrolup and Yallara[Ⓛ] and an improvement compared with tall varieties bred for hay. Grain quality is excellent with high protein levels. Hay yield averaged over low, medium and high-rainfall sites is lower than other longer-season varieties. Be careful 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.

WILLIAMS[Ⓛ]

Williams[Ⓛ] is a tall milling variety commercialised by Barenbrug and released in Western Australia. It is also suited to eastern Australia because of its improved disease resistance profile. Williams[Ⓛ] is a high-yielding early to mid-season variety with similar maturity to Yallara[Ⓛ] and 15 centimetres shorter. It is three to seven days later maturing than Mitika[Ⓛ] and 15cm taller.

Williams[Ⓛ] has similar grain yield to Bannister[Ⓛ] with slightly inferior grain quality. Screenings can be high, especially in low-rainfall regions. Williams[Ⓛ] has high β -glucan levels. It averages slightly lower hay yield compared with other hay varieties. Hay quality is similar to Wintaroo[Ⓛ] with slightly lower water-soluble carbohydrates and slightly higher crude protein.

BANNISTER[Ⓛ]

Bannister[Ⓛ] is a dwarf milling variety commercialised by Seednet and released in Western Australia but also suited to eastern Australia because of its improved disease resistance profile. It is high yielding and 13cm taller than Mitika[Ⓛ], heading about three to four days later than this variety. Bannister[Ⓛ] has slightly lower hectolitre weight, slightly higher screenings and slightly lower groat per cent compared with Mitika[Ⓛ].

MITIKA[Ⓛ]

Mitika[Ⓛ] is an early maturing dwarf milling oat developed by SARDI and commercialised by Barenbrug. It has high hectolitre and grain weight, low screenings per cent and moderately high groat per cent. It is also a high feed value oat with low hull lignin and high grain digestibility. It is recommended for all rainfall zones where CCN or stem nematode is not a problem.

YALLARA[Ⓛ]

Yallara[Ⓛ] is a medium-tall milling oat variety developed by SARDI and commercialised by Seednet. It is a backcross line 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. Yallara[Ⓛ] is a premium quality oat with the flexibility to cut for hay with fine stems and good hay quality. 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 Agronomy Group, Yallara[Ⓛ] is particularly sensitive to applications of Banvel[®] M. For more information about its herbicide tolerance go to nvt.grdc.com.au.

HAY VARIETIES

KOORABUP[Ⓛ]

Koorabup[Ⓛ] is a mid to tall hay variety with early to mid-season maturity, developed for the WA market. It is similar in height to Yallara[Ⓛ], two to four days later in maturity and has similar grain yield and stem diameter. Hay yield is slightly higher than Carrolup, but lower than Yallara[Ⓛ] and Brusher[Ⓛ]. It has improved disease and grain quality compared with other hay varieties and combines improved Septoria resistance with good bacterial blight resistance. It has excellent hay colour and hay quality and is similar to Wintaroo[Ⓛ] across all traits except water-soluble carbohydrates, which average slightly lower in Victoria and WA. Grain quality is similar to Yallara[Ⓛ] but with a lower groat per cent. It has low oil and bright grain. This line is a cross between two WA advanced breeding lines and is commercialised by AEXCO Pty Ltd.

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[®] has improved resistance to stem rust, lodging and shattering compared with Wintaroo[®] and also has improved early vigour. Hay yield is an improvement compared with 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 are similar to Wintaroo[®] with lower screenings, higher protein and groat per cent. Mulgara[®] has high grain hull lignin.

Mulgara[®] is recommended to replace Wintaroo[®] in areas with stem nematode due to its higher level of resistance. It is also recommended to replace Wintaroo[®] where improved lodging resistance or stem rust resistance is required. Mulgara[®]'s seed size is larger than other hay varieties described in this sowing guide. Care should be taken to sow at the correct seed density.

FORESTER[®]

Forester[®] is a very late hay variety adapted to high-rainfall and irrigated cropping regions. It is three weeks later to head compared with Wintaroo[®]. Forester[®] has excellent early vigour and lodging and shattering resistance. It has an excellent foliar disease resistance spectrum with 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 seed is available from AGF Seeds.

TAMMAR[®]

Tammar[®] is a late, tall hay variety, later in cutting time than Kangaroo and Tungoo[®], but not as late as Forester[®]. 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 and Tungoo[®]. Hay quality is better than Kangaroo and similar to Tungoo[®] and Wintaroo[®]. Tammar[®] has an excellent foliar disease resistance profile and is an improvement compared with Tungoo[®] for stem rust resistance.

Tammar[®] is similar in height to Kangaroo, Tungoo[®] and Wintaroo[®] and has better lodging resistance than Tungoo[®] and Wintaroo[®] and better early vigour than Tungoo[®]. Tammar[®] has grain quality similar to Tungoo[®] and Kangaroo with slightly smaller grain weight and slightly more screenings.

Tammar[®] is recommended for medium and high-rainfall zones and gives a slightly later option for cutting time than Tungoo[®] and Kangaroo.

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 stem nematode.

Hay yield is similar to Kangaroo with lower grain yield and quality. Hay digestibility is similar to Wintaroo[®] (better than Kangaroo), although it tends to be higher in neutral detergent fibre and lower in water-soluble carbohydrates than Wintaroo[®]. It is an improvement compared with Kangaroo. Early vigour is not as good as Kangaroo. It has moderately low hull lignin.

BRUSHER[®]

Brusher[®] is an early to mid-season tall oat developed by SARDI and commercialised by AEXCO Pty Ltd. It is two to four days earlier to head than Wintaroo[®], which makes it well suited to low-rainfall areas. Although Brusher[®] has inferior hay yield when compared with 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 are similar to Wintaroo[®], Wallaroo and Kangaroo with higher grain protein. Brusher[®] is moderately low in grain lignin.

KINGBALE[®]

Kingbale[®] is a mid-flowering imidazolinone-tolerant oaten hay variety with improved tolerance to soil residual imidazolinone herbicides. It is an ideal variety for use where there are imidazolinone residue concerns from previous crops. Kingbale[®] is a tall variety with good early vigour and is suitable for planting in the major hay growing regions of Australia. Preliminary data shows that Kingbale[®] has a similar disease and agronomic profile to Wintaroo[®] and indicates that it is resistant to CCN, although rust (likely susceptible) will require proactive management. Yield information is limited. Kingbale[®] is a single-gene, imidazolinone-tolerant variety. The original breeding work was undertaken by Grains Innovation Australia (GIA) and the line is being commercialised by InterGrain. Contact InterGrain for seed availability.

Table 1: Oat varieties listed according to annual rainfall.

Use Tables 1–9 to further refine your choice within each category.

End-use	Rainfall zone (average annual rainfall)		
	<375mm	375–500mm	>500mm
Milling grain	Bilby ^{db}	Bilby ^{db}	Bilby ^{db}
	Kowari ^{db}	Kowari ^{db}	Kowari ^{db}
	Mitika ^{db}	Mitika ^{db}	Mitika ^{db}
	Yallara ^{db}	Yallara ^{db}	Yallara ^{db}
	Bannister ^{db}	Bannister ^{db}	Bannister ^{db}
	Durack ^{db}	Williams ^{db}	Williams ^{db}
		Durack ^{db}	–
Feed grain – sheep, cattle	Kowari ^{db}	Kowari ^{db}	Kowari ^{db}
	Mitika ^{db}	Mitika ^{db}	Mitika ^{db}
	Yallara ^{db}	Yallara ^{db}	Yallara ^{db}
	Wintaroo ^{db}	Wintaroo ^{db}	Wintaroo ^{db}
	Mulgara ^{db}	Mulgara ^{db}	Mulgara ^{db}
	Wallaroo	–	–
Feed grain – pigs, poultry	–	Numbat	Numbat
Oat hay	Koorabup ^{db}	Koorabup ^{db}	Forester ^{db}
	Brusher ^{db}	Wintaroo ^{db}	Tammar ^{db}
	Mulgara ^{db}	Mulgara ^{db}	Tungoo ^{db}
	Wintaroo ^{db}	Tammar ^{db}	Koorabup ^{db}
	Durack ^{db}	Tungoo ^{db}	Brusher ^{db}
	Yallara ^{db}	Brusher ^{db}	Mulgara ^{db}
	–	Durack ^{db}	Wintaroo ^{db}
Hay and legume mixes	Brusher ^{db}	Wintaroo ^{db}	Forester ^{db}
	Koorabup ^{db}	Mulgara ^{db}	Tammar ^{db}
	Mulgara ^{db}	Tungoo ^{db}	Tungoo ^{db}
	Yallara ^{db}	Brusher ^{db}	Williams ^{db}
	Durack ^{db}	Koorabup ^{db}	–

INTRO

WHEAT

BARLEY

OAT

CANOLA

FABA BEAN

LENTIL

FIELD PEA

CHICKPEA

LUPIN

VETCH

NOTES

Table 2: Mid North oat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	5.04	4.15	2.71	3.01	3.42
	No. trials	4	4	2	4	1
GRAIN VARIETIES						
Bannister ^{db}	15	117	109	107	110	114
Bilby ^{db}	15	111	107	102	109	105
Durack ^{db}	15	90	93	94	92	83
Kowari ^{db}	15	105	104	98	105	97
Mitika ^{db}	15	100	101	96	100	92
Williams ^{db}	15	116	104	105	102	101
Yallara ^{db}	15	78	87	97	87	96
HAY VARIETIES						
Koorabup ^{db}	12	80	86	98	83	90

Table 3: Yorke Peninsula oat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.87	3.64	3.1	2.18	0.79
	No. trials	1	1	1	1	1
GRAIN VARIETIES						
Bannister ^{db}	5	134	105	111	103	112
Bilby ^{db}	5	118	104	110	113	115
Durack ^{db}	5	77	93	88	97	92
Kowari ^{db}	5	108	99	104	109	109
Mitika ^{db}	5	104	95	99	100	101
Williams ^{db}	5	125	101	97	97	105
Yallara ^{db}	5	62	97	88	84	76
HAY VARIETIES						
Koorabup ^{db}	5	68	93	80	75	71

Table 4: South East oat yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.80	4.60	3.08	4.46	4.86
	No. trials	3	3	3	3	2
GRAIN VARIETIES						
Bannister ^{db}	14	120	116	110	109	120
Bilby ^{db}	14	115	107	102	108	109
Carrolup	6	83	90	98	86	–
Durack ^{db}	14	88	88	92	93	83
Kowari ^{db}	14	110	100	97	104	100
Mitika ^{db}	14	105	95	95	100	96
Williams ^{db}	14	113	118	112	102	115
Yallara ^{db}	14	71	85	96	88	84
HAY VARIETIES						
Koorabup ^{db}	13	72	88	98	85	84

– denotes no data available.

Table 5: Murray Mallee oat yield performance. NVT data for 2016, 2017, 2019, and 2020.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2018 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.98	1.55	0.00	0.65	2.75
	No. trials	1	1	0	1	1
GRAIN VARIETIES						
Bannister ^{db}	4	103	108	–	91	107
Bilby ^{db}	4	101	111	–	102	101
Durack ^{db}	4	100	92	–	104	90
Kowari ^{db}	4	100	106	–	102	94
Mitika ^{db}	4	99	101	–	98	91
Williams ^{db}	4	109	97	–	85	103
Yallara ^{db}	4	96	86	–	105	103
HAY VARIETIES						
Koorabup ^{db}	4	99	80	–	95	99

– denotes no data available.

Table 6: Six-year (2014–19) average hay and grain production of oat varieties tested in hay trials.

Variety	Hay yield t/ha			Grain yield t/ha		
	Rainfall zone			Rainfall zone		
	<375mm	375–500mm	>500mm	<375mm	375–500mm	>500mm
SEMI-DWARF (HUSKED)						
Bannister ^{db}	6.5	8.8	11.0	2.8	3.3	4.3
TALL (HUSKED) – EARLY TO MID-SEASON MATURITY						
Brusher ^{db}	6.9	9.1	11.3	2.0	2.3	2.6
Durack ^{db}	6.3	8.6	10.8	2.4	2.9	3.3
Koorabup ^{db}	6.3	8.9	11.0	2.3	2.6	3.4
Mulgara ^{db}	6.7	9.0	11.2	2.1	2.3	3.1
Williams ^{db}	6.1	8.9	10.9	2.8	3.2	4.4
Wintaroo ^{db}	6.9	9.4	11.5	2.1	2.3	3.2
Yallara ^{db}	6.8	9.1	11.4	2.4	2.8	3.5
TALL (HUSKED) – MID LATE TO VERY LATE MATURITY						
Forester ^{db}	NA ¹	9.1	11.0	NA ²	NA ²	NA ²
Tammar ^{db}	NA ¹	8.7	10.8	1.9	2.1	3.1
Tungoo ^{db}	NA ¹	9.1	11.2	1.8	2.0	2.9
No. trials	11	21	10	26	31	21

¹ Not recommended for low-rainfall areas.² Data not available.**Table 7: Agronomic features of oat varieties.**

Variety	Early vigour	Plant height	Heading	Maturity	Shattering resistance	Standing ability
SEMI-DWARF (HUSKED)						
Bannister ^{db}	G	D	EM	EM	R	R
Bilby ^{db}	G	D	EM	EM	R	R
Kowari ^{db}	G	D	E	E	R	R
Mitika ^{db}	G	D	E	E	R	R
SEMI-DWARF (NAKED)						
Numbat	MG	D	EM	EM	MR	R
TALL (HUSKED)						
Brusher ^{db}	G	T	E	EM	MS	MS
Durack ^{db}	G	MT	VE	VE	MS	MR
Forester ^{db}	VG	MT	VL	VL	R	R
Kangaroo	MG	MT	ML	ML	MS	R
Koorabup ^{db}	M	MT	E-EM	EM	MS	MR
Mulgara ^{db}	G	T	EM	EM	MS	MR
Tammar ^{db}	M	MT	LM	LM	MS	R
Tungoo ^{db}	MP	MT	ML	ML	MS	MS
Williams ^{db}	G	ST	EM	EM	R	R
Wintaroo ^{db}	MG	T	M	EM	MS	MS
Yallara ^{db}	VG	MT	EM	EM	MR	R

Early vigour: VG = very good, G = good, MG = moderately good, M = moderate, P = poor, MP = moderately poor.**Plant height:** D = dwarf, TD = tall dwarf, ST = short tall, MT = moderate tall, T = 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.

Table 8: Disease resistance of oat varieties – field reactions.

Colour key: Green is a good choice, yellow use caution and brown shades either do not use or develop a management package if this disease is yield limiting in your environment. Uncoloured ratings indicate variable disease response depending on the prevailing pathogen strain.

Variety	Rust		Barley yellow dwarf virus ²	CCN	Stem nematode		Septoria	Bacterial blight	Red leather leaf ¹
	Stem ¹	Leaf		Resistance	Resistance	Tolerance			
SEMI-DWARF (HUSKED)									
Bannister [Ⓓ]	S	MSS	MS	MR	MS	lp	S	S	MS-SVS
Bilby [Ⓓ]	S	MS-S	MSS	VS	S	Mlp	S	S	MR-S
Kowari [Ⓓ]	S	S	MSS	VS	S	Mlp	S	S	MR-S
Mitika [Ⓓ]	S	S	S	VS	S	Mlp	S	S	R-SVS
TALL (HUSKED)									
Brusher [Ⓓ]	MS-S	MS-S	MS	R	S	Mlp	MS	MS	MR-MS
Durack [Ⓓ]	S	MS	MSS	RMR	S	MTp	MS	S	MS
Forester [Ⓓ]	R-S	MR-MS	MR-S	MS	S	I	MR	MR	MR
Koorabup [Ⓓ]	S	MSS	MS	S	S	lp	MR	MR	SVS
Mulgara [Ⓓ]	MS	MR-MS	MS	R	R	MT	MS	MS	MS-S
Tammar [Ⓓ]	MR-S	MR-MS	MS	MR	R	T	MR	MR	MR-VS
Tungoo [Ⓓ]	MS-S	MS	MR-MS	R	R	T	MR	MR	RMR
Williams [Ⓓ]	S	MRMS	MS	S	S	Mlp	MRMS	MR-MS	MR-MS
Wintaroo [Ⓓ]	S	S	MR-MS	R	MRMS	MTp	MRMS	MR-MS	MR-S
Yallara [Ⓓ]	S	S	MS	R	MS	Mlp	MS	MS	SVS

¹ Disease reactions to stem rust and red leather leaf will vary with pathotype. ² Disease 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. p = provisional ratings.

Table 9: 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 ^{db}	MH	ML	MH	MH	H	M	MH	H
Bilby ^{db}	MH	ML	H	H	H	MH	ML	H
Kowari ^{db}	MH	L	H	H	H	MH	M	L
Mitika ^{db}	H	L	H	MH	H	MH	M	L
SEMI-DWARF (NAKED)								
Numbat	VH	H	L	–	–	H	VH	–
TALL (HUSKED)								
Brusher ^{db}	M	M	MH	M	–	MH	M	L
Durack ^{db}	H	L	H	MH	H	MH	MH	H
Forester ^{db}	L	M	L	L	–	M	M	H
Koorabup ^{db}	H	L	H	ML	–	MH	L	H
Mulgara ^{db}	M	M	MH	MH	–	MH	M	H
Tammar ^{db}	L	H	L	ML	–	MH	M	SEG
Tungoo ^{db}	L	H	L	ML	–	MH	M	L
Williams ^{db}	MH	M	M	M	MH	M	M	MH
Wintaroo ^{db}	M	M	MH	MH	–	M	M	L
Yallara ^{db}	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, SEG = segregating.

Table 10: Hay quality comparisons.

Variety	Digestible dry matter (%dm)	Crude protein (%dm basis)	Neutral detergent fibre (%dm basis)	Water-soluble carbohydrate (%dm basis)	Stem diameter
SEMI-DWARF (HUSKED)					
Bannister ^{db}	H	H	ML	MH	M
TALL (HUSKED)					
Brusher ^{db}	MH	M	M	MH	M
Durack ^{db}	M	M	M	M	M
Forester ^{db}	MH	M	L	MH	MH
Koorabup ^{db}	MH	M	M	M	M
Mulgara ^{db}	M	M	M	M	M
Tammar ^{db}	M	MH	M	M	ML
Tungoo ^{db}	M	MH	M-MH	M	M
Williams ^{db}	M	H	M	M	MH
Wintaroo ^{db}	M	M	M	M	M
Yallara ^{db}	MH	M	ML	H	ML

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

CANOLA

By Andrew Ware, EPAG Research

Since the publication of the 2021 guide several new canola varieties have been released and will be available for planting in 2022. These include AFP Cutubury[®], ATR Bluefin, DG Bidgee TT[®], DG Murray TT[®], RGT Capacity[™] TT, InVigor[®] LT 4530P, Nuseed Emu TF, Pioneer[®] 44Y30 RR, Hyola[®] Battalion XC, Hyola[®] Equinox CL, Hyola[®] Feast CL and RGT Nizza CL. There may be more releases in the months ahead, with seed possibly available for 2022, but these could not be confirmed at the time of writing.

The marketing companies responsible for each of the varieties in this section have advised that they are planning to have seed available for planting in 2022. However, not all varieties marketed have been tested in NVT in 2021. Some older varieties have not been evaluated in NVT for several years, but seed remains available.

VARIETAL SELECTION

Canola variety selection should consider paddock, farm or locality-specific factors such as maturity, herbicide tolerance, presence of herbicide residue, blackleg resistance, relative yield, oil content and early vigour.

- A persistent weed species may dictate the need for a herbicide-tolerant production system (for example, triazine tolerant, imidazolinone tolerant or glyphosate tolerant). A triazine-tolerant variety will incur a yield and oil penalty when grown where it is not warranted.
- Blackleg is potentially a destructive disease in canola. Its management through varietal selection, fungicides and cultural practices is important to maximise yield potential. Varietal blackleg resistance and/or fungicide use should be considered, particularly when rotations are close.
- Recent research has found early seeding of canola has the potential to maximise water use efficiency. If canola is planted earlier than the traditional window of late April to early May, it is important to consider matching the variety's flowering time with the early seeding date. This will help to maximise biomass and minimise the frost and heat risk. Therefore, fast-flowering varieties should not be planted in medium and high-rainfall areas in early to mid-April.

CONVENTIONAL VARIETIES

Conventional varieties (varieties with no herbicide tolerance) are no longer evaluated in NVT in South Australia. Where there is yield data for a region in 2020, this has been reported.

NUSEED DIAMOND

Early maturing hybrid. Very fast to flower. Medium plant height. Suited to low-medium -rainfall areas. Blackleg resistance rating MR (resistance group ABF). Tested in NVT 2012–20. Bred and marketed by Nuseed Pty Ltd.

NUSEED QUARTZ

Mid-maturing conventional hybrid. Replacement for AV-Garnet[®]. Medium height. Blackleg resistance rating R (resistance group ABD). Tested in NVT 2016–20. Bred and marketed by Nuseed Pty Ltd.

TRIAZINE-TOLERANT VARIETIES

NEW – AFP CUTUBURY[®]

An early to mid-maturing, open-pollinated variety. AFP Cutubury[®] has tolerance to Group 2 (Group B) herbicide, which allows it to be planted into soil with Group 2 residue. Medium plant height. Suited to low to medium-rainfall areas. Blackleg resistance rating and resistance group to be determined. Tested in NVT in 2020-21. Bred by Agronomy for Profit Seeds. EPR \$4.00/t ex-GST.

NEW – ATR BLUEFIN

An early maturity, open-pollinated TT variety. Blackleg resistance rating (provisional) MR (resistance group (provisional) AB). Medium height. Improved early vigour on ATR Stingray[®]. NVT tested 2020-21. For low to medium-rainfall areas. Bred and marketed by Nuseed. EPR \$5.00/t ex-GST.

ATR BONITO[®]

Early-mid season maturing open-pollinated variety. Short-medium height. Suited to low to medium-rainfall areas. Blackleg resistance rating MS (resistance group A). Tested in NVT 2012–21. Marketed by Nuseed. EPR \$5.00/t ex-GST.

ATR MAKO[®]

Early-mid maturity, TT, open-pollinated variety. Medium plant height. Suited to medium to high-rainfall areas. Blackleg resistance rating MR-MS (resistance group A). Tested in NVT 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 MR-MS (resistance group C). Tested in NVT 2011–21. 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 to high-rainfall areas. Tested in NVT 2012–21. Marketed by Nuseed. EPR \$5.00/t ex-GST.

DG 670TT

A mid-late maturity TT hybrid. Medium to tall plant height. Suited to medium to high-rainfall areas. Blackleg resistance MR-MS (resistance group BF). Tested in NVT 2016–21. Marketed by Nutrien Ag Solutions and Seednet.

NEW – DG BIDGEE TT[®]

An early-mid maturity, open-pollinated, TT variety. Suited to low to medium-rainfall areas. Blackleg resistance of MR (resistance group H). Tested in NVT 2021. Marketed by Nutrien Ag Solutions and Seednet. EPR \$5.00/t ex-GST.

NEW – DG MURRAY TT[®]

A mid maturity, open-pollinated, TT variety. Suited to medium to high-rainfall areas. Blackleg resistance R-MR (resistance group H). Tested in NVT 2020-21. Marketed by Nutrien Ag Solutions and Seednet. EPR \$5.00/t ex-GST.

HYOLA[®] BLAZER TT

Mid-early maturing TT hybrid. Medium to short plant height. High oil percentage. Blackleg resistance rating R (resistance group ADF). Suited to medium-low to very high-rainfall zones. Tested in NVT 2019–21. Bred and marketed by Pacific Seeds.

HYTTEC[®] TRIDENT

An early maturity hybrid canola. Medium-tall plant height. Blackleg rating R (resistance group AD). Tested in NVT 2017–21. Suited to low-rainfall areas. Bred and marketed by Nuseed. EPR \$10.00/t ex-GST.

HYTTEC[®] TRIFECTA

A mid-maturity hybrid canola. Medium-tall plant height. Provisional blackleg resistance rating R (resistance group ABD). Tested in NVT 2019–21. Suited to the medium to high-rainfall areas. Bred and marketed by Nuseed. EPR \$10.00 ex-GST.

HYTTEC® TROPHY

An early to mid-maturity hybrid canola. Medium-tall plant height. Blackleg rating R-MR (resistance group AD). Tested in NVT 2017–21. Suited to low to medium-rainfall areas. Bred and marketed by Nuseed. EPR \$10.00/t ex-GST.

INVIGOR® T 4510

Early-mid season TT hybrid variety. Medium plant height. Suited to early medium-rainfall areas. Blackleg resistance rating MR-MS (resistance group BF). Tested in NVT 2016–21. Marketed by BASF.

INVIGOR® T 6010

Mid-late season TT hybrid variety. Medium plant height. Suited to medium to high-rainfall areas. Blackleg resistance rating MS (resistance group BC). Tested in NVT 2019–21. Marketed by BASF.

PIONEER® 45T03 TT

A mid-maturing TT hybrid. Medium plant height. Suited to medium to high-rainfall areas. Blackleg resistance rating MR (resistance group ABD). Tested in NVT 2018–20. Marketed by Pioneer Brand Seeds.

NEW – RGT CAPACITY™ TT

An early-mid maturing hybrid, similar flowering to SF Turbine TT. Suited to low to medium-rainfall areas. Medium plant height. Blackleg resistance rating MS (resistance group B). Tested in NVT 2019–21. Marketed by Seed Force. EPR \$10.00/t ex-GST.

SF DYNATRON TT™

Mid-maturing hybrid TT variety. Suited to medium to high-rainfall areas. Medium-tall height with a high oil content. Blackleg rating MS (resistance group BC). NVT tested 2019–21. Marketed by Seed Force exclusively to Nutrien Ag Solutions. EPR \$10.00/t ex-GST.

SF IGNITE TT

Mid-maturing hybrid. Suited to medium to high-rainfall zones. Medium plant height. Blackleg resistance rating MR-MS (resistance group BF). Tested in NVT 2016–21. Marketed by Seed Force. EPR \$10.00/t ex-GST.

SF SPARK TT

Early maturing hybrid. Suited to low to medium-rainfall areas. Medium plant height. Blackleg rating MR (resistance group ABDS). Tested in NVT 2018–21. Marketed by Seed Force. EPR \$10.00/t ex-GST.

DISCONTINUED TT VARIETIES

Hyola® 350TT, Hyola® 559TT, InVigor® T 3510, Pioneer® 44T02 TT, SF Turbine TT, Monola® H421TT and Monola® 420TT. There are no delivery points for Monola® in SA.

DUAL TRIAZINE AND GLYPHOSATE-TOLERANT VARIETIES**BASF 3000 TR**

Early maturing Roundup Ready®/TT hybrid suited to low to medium-rainfall zones. Blackleg rating MS-S (resistance group B). Tested in NVT 2015–19. Marketed by BASF.

DUAL TRIAZINE AND LIBERTYLINK®-TOLERANT VARIETIES**NEW – INVIGOR LT 4530P**

Early-mid maturing TT and LibertyLink® hybrid variety. Blackleg resistance MR (resistance group BF). Suited to medium to high-rainfall areas. PodGuard® technology makes it suited to later windrowing timings or direct harvest. Tested in NVT 2020-21. Bred and marketed by BASF.

DUAL TRIAZINE AND IMIDAZOLINONE-TOLERANT VARIETIES**HYOLA® ENFORCER CT**

Carries tolerance to both triazine and Clearfield® herbicide chemistries. Mid-early maturity. Medium plant height. Blackleg resistance rating R (resistance group ADF). Also designed for imidazolinone soil residues. Tested in NVT 2019–21. Bred and marketed by Pacific Seeds.

GLYPHOSATE-TOLERANT HYBRID VARIETIES

Glyphosate-tolerant varieties were tested in NVT in South Australia for the first time in 2021. Therefore, no yield data is available yet for the South Australian environment. Both Roundup Ready® and TruFlex® varieties are tolerant to applications of Roundup® herbicide. The difference in the varieties relates to the amount and timing of herbicide that the crop is able to tolerate. Roundup Ready® varieties must not be sprayed after the crop has reached the true six-leaf stage, whereas the TruFlex® varieties can be sprayed up to the first flower stage.

DG 408RR

Early to mid-maturing Roundup Ready® hybrid variety suited to low to medium-rainfall zones. Medium plant height with good adaptability. Blackleg rating MS (resistance group AC). NVT tested 2016–18. Released 2017. Marketed by Nutrien Ag Solutions and Seednet.

HYOLA® 410XX

Mid-early TruFlex® hybrid canola. Medium to medium-tall plant height. Suited to low to medium-high rainfall zones. Blackleg resistance rating R-MR (resistance group ABD). NVT tested 2018–21. Bred and marketed by Pacific Seeds.

INVIGOR® R 3520

Early maturing Roundup Ready® hybrid variety. Suited to early season areas or later planting. Medium plant height. Blackleg rating MR (resistance group unknown). NVT tested 2016–21. Released 2017. Bred and marketed by BASF.

INVIGOR® R 4022P

Early-mid maturing TruFlex® hybrid suited to medium-rainfall zones. PodGuard® technology makes it suited to later windrowing timings or direct harvest. Blackleg rating MR-MS (resistance group ABC). NVT tested 2019–21. Bred and marketed by BASF.

INVIGOR® R 4520P

Early-mid maturing TruFlex® hybrid variety (slightly later than InVigor® R 4022P). PodGuard® technology makes it suited to later windrowing timings or direct harvest. Blackleg rating MS (resistance group B). NVT tested 2019–21. Bred and marketed by BASF.

INVIGOR® R 5520P

Mid-maturing Roundup Ready® hybrid variety suited to medium to high-rainfall areas. PodGuard® technology makes it suitable for flexible windrow timing or direct heading with reduced harvest losses. Medium height. Blackleg rating MR (resistance group ABC). NVT tested 2015–20. Bred and marketed by BASF.

NUSEED GT-42

Roundup Ready® early-mid maturing variety. Medium height. Blackleg rating R (2019 rating) (resistance group ABDF). NVT tested 2014–18. Marketed by Nuseed.

NUSEED GT-53

Mid-maturing Roundup Ready® hybrid variety. Medium-tall height. Blackleg rating R (resistance group ABDF). NVT tested 2014–21. Marketed by Nuseed.

NUSEED CONDOR TF

Mid-maturing TruFlex® hybrid. Blackleg rating R (resistance group ABD). Tall height. NVT tested 2019–21. Bred and marketed by Nuseed.

NEW – NUSEED EMU TF

Early maturing TruFlex® hybrid. Suited to low to medium-rainfall areas. Medium plant height. Provisional blackleg rating MR (provisional resistance group ABD). NVT tested 2019–21. Bred and marketed by Nuseed.

NUSEED RAPTOR TF

Early-mid maturing TruFlex® hybrid. Blackleg rating R (resistance group AD). Medium height. NVT tested 2018–21. Bred and marketed by Nuseed.

PIONEER® 44Y27 RR

Early to early-mid season Roundup Ready® hybrid variety, ideally suited to low to medium-rainfall zones. Blackleg rating MR (resistance group B). NVT tested 2016–21. Marketed by Pioneer Brand Seeds.

NEW – PIONEER® 44Y30 RR

Early-mid season Roundup Ready® hybrid variety with a wide area of adaptation. Blackleg rating MR (resistance group AB). NVT tested 2020–21. Marketed by Pioneer Brand Seeds.

PIONEER® 45Y28 RR

Mid-maturing Roundup Ready® hybrid variety. Suited to medium to high-rainfall zones and irrigation. Blackleg rating unknown (resistance group BC). Medium-tall height. NVT tested 2018–21. Marketed by Pioneer Brand Seeds.

DISCONTINUED GLYPHOSATE-TOLERANT VARIETIES

Hyola® 404RR, Pioneer® 43Y23 RR,
Pioneer® 43Y29 RR.

DUAL IMIDAZOLINONE AND GLYPHOSATE-TOLERANT VARIETIES

NEW – HYOLA® BATTALION XC

Dual-herbicide-tolerant, early maturity, TruFlex® + Clearfield® (imidazolinone) hybrid canola. Medium plant height. Suited to low to medium-high rainfall zones. Blackleg resistance rating R (resistance group ADF). Suited to areas with imidazolinone residue. NVT tested 2020-21. Bred and marketed by Pacific Seeds.

HYOLA® GARRISON XC

Dual-herbicide-tolerant, mid-early, TruFlex® + Clearfield® (imidazolinone) hybrid canola. Medium to medium-tall plant height. Suited to medium-low to high-rainfall zones. Blackleg resistance rating R (resistance group ADF). Suited to areas with imidazolinone residue. NVT tested 2019–21. Bred and marketed by Pacific Seeds.

IMIDAZOLINONE-TOLERANT VARIETIES

NEW – HYOLA® EQUINOX CL

Mid-maturing CL hybrid. Medium-low to high-rainfall zones. Blackleg resistance rating R (resistance group ADF). Tested in NVT 2020-21. Bred and marketed by Pacific Seeds.

PIONEER® 43Y92 CL

Early maturing hybrid. Medium plant height. Suited to low to medium-rainfall areas and short-season growing zones. Blackleg resistance rating R-MR (resistance group B). Tested in NVT 2016–20. Marketed by Pioneer Brand Seeds.

PIONEER® 44Y94 CL

An early-mid maturing hybrid. Blackleg resistance rating R-MR (resistance group BC). Tested in NVT 2019–21. Marketed by Pioneer Brand Seeds.

PIONEER® 45Y93 CL

A mid-maturing hybrid suited to early planting and high to medium-rainfall zones. Medium-tall plant height. Blackleg rating R-MR (resistance group BC). Tested in NVT 2017–20. Marketed by Pioneer Brand Seeds.

NEW – PIONEER® 45Y95 CL

A mid-maturing hybrid variety, best suited to medium to high-rainfall zones and irrigation. Medium-tall plant height. Provisional blackleg rating R-MR (resistance group C). Tested in NVT 2020-21. Marketed by Pioneer Brand Seeds.

VICTORY® V75-03CL

Mid-maturing specialty (high oleic, low linoleic oil) hybrid. Medium plant height. Blackleg rating MR (resistance group AB). Tested in NVT 2017–21. Bred by Cargill. Marketed by AWB under contract.

DISCONTINUED IMIDAZOLINONE-TOLERANT VARIETIES

Pioneer® 44Y90 CL, Pioneer® 45Y91 CL, Saintly CL, Banker CL.

WINTER-TYPE IMIDAZOLINONE-TOLERANT VARIETIES

Several winter-type canola varieties are available. They have a high vernalisation (cold) requirement, which means they are capable of producing high quantities of biomass before they start flowering and can make use of extended growing seasons. This enables them to be grazed over a relatively large window, often with little damage to grain yield. These varieties are not evaluated in NVT, but they 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 use spring, summer or early autumn rainfall events.

HYOLA® 970CL

Long season, winter graze-and-grain dual-purpose Clearfield® hybrid. Pacific Seeds indicates high to very high biomass dry matter production, good grain yield and oil content. Suited to sowing in autumn (February to April) and spring (early to late October) in medium-high through to very high-rainfall zones. Blackleg resistance rating R (resistance group H). Not tested in NVT. Marketed by Pacific Seeds.

NEW – HYOLA® FEAST CL

Long season, winter graze-and-grain dual-purpose Clearfield® hybrid. Pacific Seeds indicates high to very high biomass dry matter production, good grain yield and oil content. Will mature seven days earlier than Hyola® 970CL. Suited to sowing in autumn (February to April) and spring (early to late October) in medium-high through to very high-rainfall zones. Blackleg resistance rating R (resistance group H). Not tested in NVT. Marketed by Pacific Seeds.

PHOENIX CL

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

NEW – RGT NIZZA CL

Early winter, dual-purpose graze-and-grain hybrid. Approximately seven to 10 days earlier to flower than Hyola® 970CL. Seed Force indicates very high biomass with excellent yield and oil content. Suited to early sowing and spring sowing in high-rainfall areas. Blackleg resistance rating R (resistance group B). Not tested in NVT. Marketed by Seed Force. EPR \$12.00/t ex-GST.

DISCONTINUED WINTER TYPE

SF Edimax CL.

Table 1: Agronomic and disease information for current canola varieties.

Variety	Herbicide tolerance	Type	Harvest maturity [†]	Blackleg rating				Blackleg group	EPR (\$/t)	Release	Seed access
				Bare seed	Jockey [®]	ILeVO [®]	Saltro [®]				
Nuseed Diamond	Conv	Hybrid	Early	MR	R	R	R	ABF	–	2013	Nuseed
Nuseed Quartz	Conv	Hybrid	Mid	R	–	–	–	ABD	–	2017	Nuseed
AFP Cutubury [®]	TT**	OP	Early–mid	–	–	–	–	–	4	2020	Agronomy for Profit
ATR Bluefin	TT	OP	Early	MR _p	–	–	–	AB _p	5	2021	Nuseed
ATR Bonito [®]	TT	OP	Early–mid	MS	MRMS	R	R	A	5	2013	Nuseed
ATR Mako [®]	TT	OP	Early–mid	MRMS	RMR	R	R	A	5	2015	Nuseed
ATR Stingray [®]	TT	OP	Early	MRMS	RMR	R	R	C	–	2011	Nuseed
ATR Wahoo [®]	TT	OP	Mid–late	MS	–	–	–	A	5	2013	Nuseed
DG 670TT	TT	Hybrid	Mid–late	MRMS	–	–	–	BF	–	2017	Nutrien
DG Bidgee TT [®]	TT	OP	Early–mid	R _p	–	–	–	H _p	5	2021	Nutrien
DG Murray TT [®]	TT	OP	Mid–late	R _p	–	–	–	H _p	5	2021	Nutrien
Hyola [®] Blazer TT	TT	Hybrid	Early–mid	R	–	–	R	ADF	–	2020	Pacific Seeds
HyT Tec [®] Trident	TT	Hybrid	Early	R	–	–	R	AD	10	2019	Nuseed
HyT Tec [®] Trifecta	TT	Hybrid	Mid	R	–	–	R	ABD	10	2020	Nuseed
HyT Tec [®] Trophy	TT	Hybrid	Early–mid	RMR	R	R	R	AD	10	2017	Nuseed
InVigor [®] T 4510	TT	Hybrid	Early–mid	MRMS	R	R	R	BF	–	2016	BASF
InVigor [®] T 6010	TT	Hybrid	Mid–late	MS	–	R	R	BC	–	2020	BASF
Pioneer [®] 45T03 TT	TT	Hybrid	Mid	MR	R	R	–	ABD	–	2018	Pioneer
RGT Capacity [™] TT	TT	Hybrid	Early–mid	MS	–	–	R	B	10	2021	Seed Force
SF Dynatron TT [™]	TT	Hybrid	Mid	MS	MR	R	R	BC	10	2020	Nutrien & CRT
SF Ignite TT	TT	Hybrid	Mid	MRMS	R	R	R	BF	10	2017	Seed Force
SF Spark TT	TT	Hybrid	Early	MR	RMR	R	R	ABDS	10	2018	Seed Force
BASF 3000 TR	TT+ GT (RR)	Hybrid	Early	MSS	MRMS	RMR	RMR	B	–	2016	BASF
InVigor [®] LT 4530P	TT + LL	Hybrid	Early–mid	TBC	–	TBC	–	BF	–	2021	BASF
Hyola [®] Enforcer CT	TT + CL	hybrid	Mid	R	–	–	R	ADF	–	2020	Pacific Seeds
DG 408RR	GT (RR)	Hybrid	Early–mid	MS	–	–	–	AC	–	2017	Nutrien
Hyola [®] 410XX	GT (TF)	Hybrid	Early–mid	RMR	–	–	R	ABD	–	2018	Pacific Seeds
InVigor [®] R 3520	GT (RR)	Hybrid	Early	MR	–	–	–	Different	–	2017	BASF
InVigor [®] R 4022P	GT (TF)	Hybrid	Early–mid	MRMS	–	R	R	ABC	–	2019	BASF
InVigor [®] R 4520P	GT (TF)	Hybrid	Early–mid	MS	–	R	R	B	–	2020	BASF
InVigor [®] R 5520P	GT (RR)	Hybrid	Mid	MR	–	R	–	ABC	–	2016	BASF
Nuseed GT-42	GT (RR)	Hybrid	Early–mid	R	–	–	–	ABDF	–	2016	Nuseed
Nuseed GT-53	GT (RR)	Hybrid	Mid	R	–	–	–	ABDF	–	2016	Nuseed
Nuseed Condor TF	GT (TF)	Hybrid	Mid	R	–	–	R	ABD	–	2020	Nuseed
Nuseed Emu TF	GT (TF)	Hybrid	Early	MR _p	–	–	–	ABD _p	–	2021	Nuseed
Nuseed Raptor TF	GT (TF)	Hybrid	Early–mid	R	–	–	R	AD	–	2019	Nuseed
Pioneer [®] 44Y27 RR	GT (RR)	Hybrid	Early–mid	MR	R	R	R	B	–	2017	Pioneer
Pioneer [®] 44Y30 RR	GT (RR)	Hybrid	Early–mid	RMR	–	–	–	AB	–	2021	Pioneer
Pioneer [®] 45Y28 RR	GT (RR)	Hybrid	Mid	MR	R	R	R	BC	–	2018	Pioneer
Hyola [®] Battalion XC	GT (TF) + CL	Hybrid	Early–mid	R	–	–	–	ADF	–	2021	Pacific Seeds
Hyola [®] Garrison XC	GT (TF) + CL	Hybrid	Mid	R	–	–	R	ADF	–	2020	Pacific Seeds
Hyola [®] Equinox CL	CL	Hybrid	Mid	R	–	–	–	–	–	2021	Pacific Seeds
Pioneer [®] 43Y92 CL	CL	Hybrid	Early	RMR	R	R	R	B	–	2017	Pioneer
Pioneer [®] 44Y94 CL	CL	Hybrid	Early–mid	RMR	R	R	–	BC	–	2020	Pioneer
Pioneer [®] 45Y93 CL	CL	Hybrid	Mid	RMR	R	R	R	BC	–	2018	Pioneer
Pioneer [®] 45Y95 CL	CL	Hybrid	Mid	RMR	–	–	–	C	–	2021	Pioneer
VICTORY [®] V75-03CL	CL (spec oil)	Hybrid	Mid	MR	R	R	R	AB	–	2019	AWB
Hyola [®] 970CL	CL	Hybrid	Winter	R	–	–	R	H	–	2018	Pacific Seeds
Hyola [®] Feast CL	CL	Hybrid	Winter	R	–	–	R	H	–	2020	Pacific Seeds
Phoenix CL	CL	Hybrid	Winter	R	–	–	–	B	–	2018	AGF Seeds
RGT Nizza CL	CL	Hybrid	Winter	R	–	–	–	B	12	2020	AGF Seeds

TT = triazine tolerant, GT = glyphosate tolerant, TF = TruFlex[®], RR = Roundup Ready[®], LL = LibertyLink[®] (glufosinate tolerant), CL = Clearfield[®] (imidazolinone tolerant), p = provisional ratings, ** = tolerant to Group B (Group 2) herbicide residue, † information provided by seed companies, winter = late.

Blackleg resistance rating key: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

Table 2: Lower Eyre Peninsula mid-season canola yield performance. NVT data 2016, 2018, 2019 and 2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.52	0.00	1.20	2.27	1.83
	No. trials	1	0	1	1	2
ATR Bonito ^{db}	2	93	Not sown	95	–	–
ATR Gem ^{db}	1	89		–	–	–
ATR Mako ^{db}	2	87		94	–	–
ATR Wahoo ^{db}	3	99		100	99	–
DG 670TT	4	–		108	111	110
DG Murray TT ^{db}	2	–		–	–	89
Hyola® Blazer TT	2	–		–	–	120
Hyola® Enforcer CT	3	–		–	109	107
HyTTec® Trifecta	4	–		118	123	121
HyTTec® Trophy	4	–		113	117	117
InVigor® T 4510	4	–		109	113	121
InVigor® T 6010	3	–		–	116	120
Pioneer® 45T03 TT	4	–		101	101	101
SF Ignite TT	3	–		110	113	109
SF Spark TT	4	–		103	103	102
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	2.59	0.00	1.50	2.60	1.88
	No. trials	1	0	1	1	2
Hyola® Equinox CL	2	–	Not sown	–	–	99
Pioneer® 43Y92 CL	1	108		–	–	–
Pioneer® 44Y94 CL	3	–		–	114	118
Pioneer® 45Y93 CL	4	–		109	112	111
Pioneer® 45Y95 CL	2	–		110	116	–
CONVENTIONAL						
Variety	Mean yield t/ha	2.78	0.00	1.49	2.53	1.66
	No. trials	1	0	1	1	1
Nuseed Diamond	4	102	Not sown	99	102	114
Nuseed Quartz	4	114		107	109	111

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

Table 3: Mid North mid-season canola yield performance. NVT data for 2016–2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.74	2.15	1.27	1.40	2.40
	No. trials	3	3	1	3	2
ATR Bonito ^{db}	8	94	93	91	–	98
ATR Gem ^{db}	3	88	–	–	–	–
ATR Mako ^{db}	6	89	93	92	–	–
ATR Stingray ^{db}	5	92	91	89	–	–
ATR Wahoo ^{db}	4	94	94	–	–	96
DG 670TT	11	110	107	104	107	108
Hyola® Blazer TT	2	–	–	–	–	117
Hyola® Enforcer CT	5	–	–	–	109	108
HyTtec® Trident	7	–	121	128	116	112
HyTtec® Trifecta	5	–	–	120	120	119
HyTtec® Trophy	9	–	116	118	117	115
InVigor® T 4510	12	116	111	113	117	114
InVigor® T 6010	5	–	–	–	112	114
Pioneer® 45T03 TT	4	–	–	98	99	–
RGT Capacity™ TT	4	–	–	–	118	116
SF Dynatron TT™	5	–	–	–	118	118
SF Ignite TT	11	111	106	100	105	109
SF Spark TT	5	–	–	–	104	103
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	2.79	2.43	1.45	1.65	2.55
	No. trials	3	3	1	3	2
Hyola® Equinox CL	2	–	–	–	–	102
Pioneer® 43Y92 CL	8	108	105	108	–	108
Pioneer® 44Y94 CL	5	–	–	–	115	114
Pioneer® 45Y93 CL	8	–	107	–	107	110
Pioneer® 45Y95 CL	3	–	–	113	116	–
VICTORY® V75-03CL	5	–	–	–	91	92

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

Table 4: Yorke Peninsula mid-season canola yield performance. NVT data 2016, 2017, 2019 and 2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.67	2.89	0.00	1.16	1.15
	No. trials	1	1	0	1	1
ATR Bonito ^ᵀ	1	92	–	Trial failed	–	–
ATR Gem ^ᵀ	1	84	–		–	–
ATR Mako ^ᵀ	2	88	95		–	–
ATR Stingray ^ᵀ	2	90	93		–	–
DG 670TT	3	109	106		108	–
Hyola® Blazer TT	1	–	–		–	108
Hyola® Enforcer CT	2	–	–		109	115
HyTTec® Trident	2	–	–		117	135
HyTTec® Trifecta	2	–	–		121	121
HyTTec® Trophy	3	–	112		117	122
InVigor® T 4510	4	118	107		116	120
InVigor® T 6010	2	–	–		113	99
Pioneer® 45T03 TT	1	–	–		100	–
RGT Capacity™ TT	2	–	–		117	117
SF Dynatron TT™	2	–	–		119	115
SF Ignite TT	3	107	106		–	91
SF Spark TT	2	–	–	104	108	
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	2.77	3.29	0.00	1.24	1.12
	No. trials	1	1	0	1	1
Hyola® Equinox CL	1	–	–	Trial failed	–	111
Pioneer® 43Y92 CL	2	111	–		–	118
Pioneer® 44Y94 CL	2	–	–		116	124
Pioneer® 45Y93 CL	3	–	106		109	98
Pioneer® 45Y95 CL	1	–	–		118	–
VICTORY® V7002CL	3	–	95		91	89

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

Table 5: South East mid-season canola yield performance. NVT data 2016–2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.20	3.06	2.25	2.56	2.74
	No. trials	2	2	1	1	1
ATR Bonito [Ⓛ]	5	89	97	95	–	99
ATR Gem [Ⓛ]	2	84	–	–	–	–
ATR Mako [Ⓛ]	4	90	95	96	–	–
ATR Wahoo [Ⓛ]	5	92	100	95	–	107
DG 670TT	7	109	107	103	106	119
DG Murray TT [Ⓛ]	1	–	–	–	–	100
Hyola® Blazer TT	1	–	–	–	–	136
Hyola® Enforcer CT	2	–	–	–	107	109
HyTtec® Trident	2	–	–	114	–	109
HyTtec® Trifecta	2	–	–	–	115	131
HyTtec® Trophy	5	–	110	110	112	121
InVigor® T 4510	7	115	107	107	111	117
InVigor® T 6010	2	–	–	–	109	131
Pioneer® 45T03 TT	2	–	–	99	100	–
RGT Capacity™ TT	1	–	–	–	–	124
SF Dynatron TT™	1	–	–	–	–	130
SF Ignite TT	7	109	109	102	105	127
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	2.37	3.14	2.84	2.91	3.27
	No. trials	2	2	1	1	1
Hyola® Equinox CL	1	–	–	–	–	101
Pioneer® 43Y92 CL	5	107	103	104	106	–
Pioneer® 44Y94 CL	1	–	–	–	111	–
Pioneer® 45Y93 CL	3	–	109	–	106	–
Pioneer® 45Y95 CL	2	–	–	107	112	–
VICTORY® V75-03CL	2	–	–	–	94	91

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

Table 6: Upper Eyre Peninsula early season canola yield performance. NVT data 2016, 2018, 2019 and 2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	1.30	0.00	1.10	1.09	1.14
	No. trials	2	0	2	1	1
ATR Bonito [Ⓢ]	6	95	Not sown	93	96	87
ATR Stingray [Ⓢ]	6	93		87	92	78
Hyola® Blazer TT	1	–		–	–	122
Hyola® Enforcer CT	2	–		–	97	105
HyTTeC® Trident	3	–		123	–	140
HyTTeC® Trophy	4	–		108	105	123
InVigor® T 4510	6	109		111	107	123
SF Dynatron TT™	1	–		–	104	–
SF Spark TT	2	–		–	105	108
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	1.42	0.00	1.14	1.05	1.25
	No. trials	2	0	2	1	1
Pioneer® 43Y92 CL	6	101	Not sown	106	104	107
Pioneer® 45Y95 CL	2	–		113	–	–
CONVENTIONAL						
Variety	Mean yield t/ha	1.52	0.00	1.46	0.00	1.20
	No. trials	1	0	1	0	1
Nuseed Diamond	3	107	Not sown	112	Trial failed	124
Nuseed Quartz	3	108		107		116

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. Unseasonal conditions in 2017 resulted in no NVT canola trials being planted on UEP.
 – denotes no data available.

Table 7: Mallee early season canola yield performance. NVT data 2016–2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	1.22	1.27	0.62	0.93	1.01
	No. trials	1	1	1	1	1
ATR Bonito [®]	5	93	94	93	97	95
ATR Stingray [®]	3	94	–	86	–	91
Hyola [®] Blazer TT	1	–	–	–	–	108
Hyola [®] Enforcer CT	2	–	–	–	102	102
HyTTec [®] Trident	3	–	–	126	108	117
HyTTec [®] Trophy	4	–	115	102	105	109
InVigor [®] T 4510	5	116	112	109	105	110
RGT Capacity™ TT	1	–	–	–	–	110
SF Dynatron TT™	2	–	–	–	105	110
SF Spark TT	2	–	–	–	101	103
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	1.59	1.28	0.28	0.97	0.99
	No. trials	1	1	1	1	1
Pioneer [®] 43Y92 CL	5	96	101	120	101	103
Pioneer [®] 45Y95 CL	1	–	–	135	–	–

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

Table 8: South East early season canola yield performance. NVT data 2016–2020.

TRIAZINE TOLERANT						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.45	1.65	1.43	2.39	2.72
	No. trials	1	1	1	1	1
ATR Bonito ^{db}	5	96	95	92	95	92
ATR Stingray ^{db}	5	94	93	85	91	88
DG 670TT	1	–	–	101	–	–
Hyola® Blazer TT	1	–	–	–	–	126
Hyola® Enforcer CT	2	–	–	–	103	111
HyTTec® Trident	3	–	–	126	116	121
HyTTec® Trophy	4	–	109	112	109	117
InVigor® T 4510	5	107	109	114	110	114
Pioneer® 45T03 TT	1	–	–	95	–	–
RGT Capacity™ TT	2	–	–	–	109	114
SF Dynatron TT™	2	–	–	–	110	120
SF Spark TT	2	–	–	–	103	101
IMIDAZOLINONE TOLERANT						
Variety	Mean yield t/ha	2.41	1.90	1.48	3.08	3.09
	No. trials	1	1	1	1	1
Pioneer® 43Y92 CL	5	101	102	106	102	102
Pioneer® 45Y95 CL	1	–	–	114	–	–

NVT are not designed to allow comparison of varieties between herbicide tolerance groups. – denotes no data available.

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FABA BEAN

By Amanda Pearce and Sara Blake, SARDI, and Melissa Garcia, University of Adelaide

Faba bean variety choice for South Australian growers will be the same in 2022, with no new varieties released for the southern region in 2021.

PBA Amberley[®] was released in the spring of 2019 and was available for growers in 2020. It is a later-flowering variety that has yielded well in districts with a longer growing season, performing well at all reported NVT sites in the favourable 2021 season. It has a very good overall level of disease resistance, being highly resistant (rated RMR) to the predominant pathotype of *Ascochyta* blight and with lower susceptibility to chocolate spot (rated MRMS) than all other varieties. Plants have very good standing ability and low reported incidence of 'necking'. Seed is medium in size and suitable for co-mingling with other medium-sized varieties. Seed is available from the commercial partner Seednet.

PBA Bendoc[®] is the first faba bean variety with a high level of tolerance to some Group B herbicides. It was released in 2018. The Group B herbicide tolerance will increase options for control of broadleaf weeds in-crop and enable the variety to be grown where residues persist from application to a previous crop. PBA Bendoc[®] is moderately resistant (MR) to the predominant pathotype of *Ascochyta* blight. Seed is small-medium in size and suited to the Middle East markets. Seed is available from the commercial partner Seednet.

Imidazolinone (Group B) herbicide-tolerant faba beans are on the Nufarm Intercept[®] herbicide label for post-emergent application. Application timings, product label rates, plant-back periods and all label directions for use must be followed.

Faba beans are cross-pollinated by bees. Seed crops should be isolated from other varieties by at least 200 metres 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, seed quality and herbicide tolerance.

VARIETIES AND MARKET PREFERENCES

Australian faba beans are preferred by the Middle East human consumption market, although there is competition for market share from France, the United Kingdom and, more recently, the Baltic states. To access the export human food markets, Australian beans must be high quality and free from mechanical damage, weathering, disease staining and storage problems. Faba beans darken over time while in storage and seed can become unsuitable for the export market after about nine months.

Farah[®], Nura[®] and Fiesta VF varieties are well accepted in the Middle East. Seed of PBA Samira[®], PBA Bendoc[®], PBA Marne[®] and PBA Amberley[®] 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 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 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 to 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. Dry conditions can cause strong demand from graziers for feed beans.

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 and often when the crop is at the early flowering stage. Additional applications will be required if wet conditions favour epidemics, particularly when early disease symptoms are evident, soil moisture is high and dense canopy growth retains moisture levels.

Chocolate spot typically develops during early spring as temperatures increase; however, it can establish in crops earlier where there is prolonged high humidity, so faba beans should be monitored from late winter. PBA Amberley[®] is rated moderately resistant moderately susceptible (MRMS) to chocolate spot and should have less severe disease compared with all other varieties, which are rated susceptible (S) or moderately susceptible (MS).

A shift in virulence for *Ascochyta* blight has seen its disease rating separated into two pathotypes. However, the more recent pathotype 2, which is aggressive on Farah[®], is now predominant and widespread across the southern region. Resistant varieties allow growers to be more reactive to *Ascochyta* blight than with susceptible varieties. Disease management strategies can be based on monitoring levels in high-risk situations.

PBA Amberley[®], Nura[®] and PBA Samira[®] are highly resistant (RMR) while PBA Bendoc[®] has very good resistance (MR) to the predominant *Ascochyta* blight pathotype. The old varieties Farah[®] and Fiesta VF are susceptible (S) to *Ascochyta* blight while PBA Marne[®], PBA Rana[®] and PBA Zahra[®] are MRMS to this disease. Prophylactic fungicides are recommended in S, MS and MRMS varieties during early and vegetative growth to prevent or minimise disease establishment. Additional fungicides will most likely be required, especially in seasons favourable to disease epidemics, particularly during podding to prevent seed staining.

Rust can be an occasional problem in faba beans in seasons favouring disease outbreaks and can cause significant yield loss. The disease can survive over summer on volunteer bean plants and crops need to be monitored to reduce the impact of rust on production. Farah[®], Fiesta VF, PBA Amberley[®] and PBA Zahra[®] are very susceptible (VS) to rust, often displaying more pronounced symptoms than Nura[®], PBA Rana[®], PBA Samira[®] and PBA Bendoc[®], which are susceptible (S). PBA Marne[®] is MRMS to rust. Early sown crops are at greater risk, or where beans are sown adjacent to the

previous year's bean stubble. Disease control using suitable fungicides may be required before flowering, coinciding with the time chocolate spot management is being implemented.

Cercospora leaf spot is soil borne and typically occurs in paddocks with a history of faba beans, particularly where they have been grown in close rotation (less than four to six years) or within close proximity of these paddocks. Early control (five to eight weeks post-sowing) with carbendazim or tebuconazole is most effective in preventing disease establishment and consequent yield loss. All current faba bean varieties are susceptible (S), making early preventive control measures 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. It 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 can result in marketing downgrades and should be managed. Budworm needs early monitoring and control, even in seasons with below-average rainfall. To avoid damage, growers should harvest beans when they have a high moisture content (12 to 14 per cent) 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.

NOTES ON FABA BEAN VARIETIES

PBA AMBERLEY[®]

PBA Amberley[®] is the newest variety, commercially released in 2019 and available for production in 2020. It is a later-flowering type and has shown good adaptation in higher rainfall and longer growing season environments in the South East and Mid North of SA and in the Western Districts of Victoria.

Plants of PBA Amberley[®] have very good standing ability and a low incidence of 'necking'. PBA Amberley[®] has an improved level of disease resistance compared with all other faba bean varieties. It is RMR to the predominant and

widespread Ascochyta blight pathotype and rated MRMS to chocolate spot. It is less susceptible than other commercially available cultivars, but fungicide sprays may still be required to control the disease, especially in higher-rainfall situations.

It is rated S to Cercospora leaf spot. The improvement in disease resistance should assist in reliability of production in high-yielding situations where foliar diseases are a significant risk, although it has a very susceptible (VS) reaction to rust. Seed of PBA Amberley[®] is similar in size to PBA Samira[®] and PBA Marne[®] and should be suitable to co-mingle with these other varieties. PBA Amberley[®] is commercialised by Seednet and an end point royalty applies.

PBA BENDOC[®]

PBA Bendoc[®] was developed by the University of Adelaide, in collaboration with SARDI. It is the first commercially released variety selected for tolerance to imidazolinone herbicides. This tolerance 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.

Imidazolinone herbicide-tolerant faba beans are on the Nufarm Intercept[®] herbicide label for post-emergent application. Herbicide application timings, product label rates, plant-back periods and all label directions for use must be followed. Generally, PBA Bendoc[®] yields comparably with conventional varieties with no obvious yield penalty associated with herbicide tolerance.

PBA Bendoc[®] is similar in flowering time and maturity to Nura[®] and PBA Samira[®] and has very good resistance (MR) to the predominant pathotype of Ascochyta blight, also similar to Nura[®] and PBA Samira[®]. It is rated S to Cercospora leaf spot, rust, and chocolate spot, which 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 with Nura[®]. PBA Bendoc[®] seed can be co-mingled with these other varieties for the Middle East market. PBA Bendoc[®] is licensed to Seednet and an end point royalty applies.

PBA MARNE[®]

PBA Marne[®] is the result of a complex cross between four parents of diverse origins. It 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 with Fiesta VF and Farah[®], being rated MRMS to the predominant pathotype of Ascochyta blight and MRMS to rust. It is rated S to chocolate spot and Cercospora leaf spot. PBA Marne[®] produces medium-sized seeds that are comparable in size with 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 and an end point royalty applies.

PBA ZAHRA[®]

PBA Zahra[®] is the result of a cross between Farah[®] and an accession 920/3, which originated from Morocco. It has shown wide adaptation throughout southern Australia and is responsive to high-yielding situations. PBA Zahra[®] seed is a 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 rated MRMS to the predominant pathotype of Ascochyta blight, MS to chocolate spot, VS to rust, and S to Cercospora leaf spot. PBA Zahra[®] is licensed to Seednet and an end point royalty applies.

PBA SAMIRA[®]

PBA Samira[®] is a high-yielding faba bean variety for southern Australia. It is widely adapted and is responsive to high-yielding situations. It is mid flowering, five to 10 days later than Fiesta VF and Farah[®] but matures at the same time as these varieties. PBA Samira[®] is rated RMR to the predominant pathotype of Ascochyta blight, MS to chocolate spot and S to Cercospora leaf spot and rust.

PBA Samira[®] seed 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 and an end point royalty applies.

PBA RANA[®]

PBA Rana[®] has good vigour and stem strength. It is 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[®] is MRMS to the predominant pathotype of *Ascochyta* blight, MS to chocolate spot and S to *Cercospora* leaf spot and rust.

PBA Rana[®] produces large, plump, light brown seeds and is suited to Egyptian market requirements for that grade. PBA Rana[®] represents a unique category for faba bean marketing. As PBA Rana[®] is three-quarters Manafest in its breeding, it should establish itself into areas where Manafest was grown before *Ascochyta* blight caused its demise. PBA Rana[®] is licensed to Seednet and an end point royalty applies.

NURA[®]

Nura[®] is a medium-sized faba bean rated RMR to the predominant and widespread pathotype of *Ascochyta* blight. It is rated MS to chocolate spot and S to *Cercospora* leaf spot and rust. It is generally shorter than Fiesta VF and Farah[®], making it 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. Nura[®] has good seed appearance, light buff in colour, with minimal seed staining and discolouration. Flowering time is generally around seven days later than Farah[®], although it has similar maturity. Nura[®] is licensed to Seednet and an end point royalty applies.

FARAH[®]

Farah[®] was selected directly from Fiesta VF and is identical in many respects, with more uniform seed size and colour. Like Fiesta VF, Farah[®] is rated S to *Ascochyta* blight, so a proactive disease management strategy is recommended to achieve clean seed and ensure market standards are met. Long-term Farah[®] yields are similar to Fiesta VF but are generally lower than more recent varieties 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. Farah[®] is licensed to Barenbrug and an end point royalty applies.

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-mid flowering. It is rated as S to chocolate spot, although it is less susceptible than Fiord. Fiesta VF is rated S to *Ascochyta* blight, so a 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.

BROAD BEAN VARIETIES**PBA KAREEMA**

PBA Kareema was selected from Aquadulce and has similar plant type and adaptation, but PBA Kareema has larger and more uniform seed and fewer 'evergreens'. It is well adapted to the very high-rainfall broad bean districts in the lower south-east of SA. It has good resistance to *Ascochyta* blight (MR) and better rust resistance (MRMS) than Aquadulce, and is MS to chocolate spot.

However, disease ratings of this cultivar were last reviewed in 2017 and are no longer assessed as part of the annual NVT pulse disease ratings review. Like Aquadulce, PBA Kareema is more tolerant of waterlogging than most varieties of faba bean and is more tolerant of iron and manganese deficiencies. PBA Kareema is licensed to PGG Wrightson and an end point royalty applies.

AQUADULCE

Aquadulce is a tall broad bean variety with late flowering and maturity, suited to areas with at least 500mm average annual rainfall, such as the lower south-east of SA. It is rated MS for chocolate spot and can succumb under high disease pressure and rainfall situations. Like PBA Kareema, disease ratings are no longer assessed as part of the annual NVT pulse disease ratings review.

Aquadulce is more tolerant of waterlogging than most faba bean varieties and tolerates soils with iron and manganese deficiencies. Its large seed size means Aquadulce must be considered a specialty bean as it has different marketing opportunities to faba beans. It commands a price premium over faba beans, dependent on grading and seed size.

FURTHER INFORMATION

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

Table 1: Most-adapted faba bean varieties for each rainfall zone.

Rainfall zone (average annual rainfall)		
Low <375mm	Medium 375–500mm	High >500mm
PBA Marne ^{db}	PBA Zahra ^{db}	PBA Zahra ^{db}
PBA Bendoc ^{db}	PBA Amberley ^{db}	PBA Amberley ^{db}
Farah ^{db}	PBA Samira ^{db}	PBA Samira ^{db}
Fiesta VF	PBA Marne ^{db}	PBA Rana ^{db}
Nura ^{db}	PBA Bendoc ^{db}	Nura ^{db}
PBA Samira ^{db}	Nura ^{db}	PBA Bendoc ^{db}
PBA Zahra ^{db}	Farah ^{db}	PBA Marne ^{db}
	Fiesta VF	Fiesta VF

Table 2: Agronomic and disease characteristics of faba and broad bean varieties.

Variety	Plant height	Flower time	Maturity	Lodging resistance	Ascochyta blight*	Chocolate spot	Cercospora leaf spot	Rust	PSbMV seed staining	<i>Pratylenchus neglectus</i>	<i>Pratylenchus thornei</i>
FABA BEAN											
Farah ^{db}	Medium	Early-mid	Early-mid	MS	S	S	S	VS	S ⁱ	MR	MS
Fiesta VF	Medium	Early-mid	Early-mid	MS	S	S	S	VS	S ⁱ	RMR _p	MS
Nura ^{db}	Short	Mid	Early-mid	MR	RMR	MS	S	S	VS ⁱ	MR	MS
PBA Amberley ^{db}	Medium	Mid	Mid	MR	RMR	MRMS	S	VS	—	MR	MS _p
PBA Bendoc ^{db} +	Medium	Mid	Early-mid	MS	MR	S	S	S	S ⁱ	RMR _p	MRMS _p
PBA Marne ^{db}	Medium-short	Early	Early-mid	MR	MRMS	S	S	MRMS	MR ⁱ	MR	MS
PBA Rana ^{db}	Medium-tall	Mid	Mid	MR	MRMS	MS	S	S	MR ⁱ	MR	MS
PBA Samira ^{db}	Medium	Mid	Early-mid	MR	RMR	MS	S	S	S ⁱ	MR	MRMS
PBA Zahra ^{db}	Medium-tall	Mid	Mid	MR	MRMS	MS	S	VS	S ⁱ	MR	MS
BROAD BEAN											
Aquadulce	Tall	Mid	Late	MS	MS ⁱ	MS ⁱ	Si	MS ⁱ	S ⁱ	—	—
PBA Kareema	Tall	Mid	Late	MS	MR ⁱ	MS ⁱ	Si	MRMS ⁱ	S ⁱ	—	—

Source: Pulse Breeding Australia trials program 2012–17 and NVT Online.

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

p = provisional ratings.

ⁱ Not tested since 2019 or earlier.

+ Herbicide-tolerant variety.

— denotes no data available.

* Ascochyta blight ratings: ratings have previously been separated based on the older pathotype 1 and newer pathotype 2 strains. However, as pathotype 2 is now the predominant and widespread strain present in the southern region, ratings now reflect resistance to this strain as determined through the National Variety Trials (nvt.grdc.com.au).

Table 3: Mid North faba bean yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety		2016	2017	2018	2019	2020
	Mean yield t/ha	3.88	2.09	1.61	1.58	4.75
	No. trials	5	4	4	5	2
Farah ^{db}	20	93	95	96	97	99
Fiesta VF	19	93	99	95	92	102
Nura ^{db}	20	91	90	97	100	95
PBA Amberley ^{db}	20	100	102	102	100	107
PBA Bendoc ^{db}	20	94	95	104	106	96
PBA Marne ^{db}	20	107	92	97	104	89
PBA Rana ^{db}	18	89	95	89	84	–
PBA Samira ^{db}	20	100	105	100	97	106
PBA Zahra ^{db}	20	95	107	103	100	100

– denotes no data available.

Table 4: Yorke Peninsula faba bean yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.48	3.82	2.90	2.84	5.33
	No. trials	2	2	2	2	1
Farah ^{db}	9	99	100	98	97	97
Fiesta VF	9	96	100	98	95	98
Nura ^{db}	9	101	99	96	97	95
PBA Amberley ^{db}	9	97	98	102	101	103
PBA Bendoc ^{db}	9	104	102	100	102	101
PBA Marne ^{db}	9	105	95	96	102	93
PBA Rana ^{db}	8	88	96	96	91	–
PBA Samira ^{db}	9	97	103	102	99	103
PBA Zahra ^{db}	9	102	108	103	99	105

– denotes no data available.

Table 5: Lower Eyre Peninsula faba bean yield performance. NVT data for 2016, 2018, 2019 and 2020.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2017 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.57	0.00	3.68	3.58	3.83
	No. trials	1	0	1	1	1
Farah [Ⓛ]	4	94	No trial	96	95	104
Fiesta VF	3	93		96	–	98
Nura [Ⓛ]	4	93		96	96	108
PBA Amberley [Ⓛ]	4	101		100	102	107
PBA Bendoc [Ⓛ]	4	98		100	99	113
PBA Marne [Ⓛ]	4	104		100	108	89
PBA Rana [Ⓛ]	3	89		91	91	–
PBA Samira [Ⓛ]	4	100		100	97	102
PBA Zahra [Ⓛ]	4	98		102	92	101

– denotes no data available.

Table 6: South East faba bean and broad bean yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.90	3.35	3.09	3.00	4.30
	No. trials	5	5	4	4	2
FABA BEAN						
Farah [Ⓛ]	20	96	96	97	95	105
Fiesta VF	18	97	96	98	94	107
Nura [Ⓛ]	20	93	95	95	95	101
PBA Amberley [Ⓛ]	20	102	102	102	103	104
PBA Bendoc [Ⓛ]	20	97	101	100	104	91
PBA Marne [Ⓛ]	20	96	95	97	97	92
PBA Nanu [Ⓛ]	3	–	97	99	98	–
PBA Nasma [Ⓛ]	5	91	97	101	100	–
PBA Rana [Ⓛ]	18	95	91	94	86	–
PBA Samira [Ⓛ]	20	104	102	101	100	107
PBA Zahra [Ⓛ]	20	103	105	102	103	95
BROAD BEAN						
Aquadulce	5	93	92	–	102	–
PBA Kareema	5	97	97	–	101	–

– denotes no data available.

Table 7: Murray Mallee faba bean yield performance. NVT data for 2016, 2017 and 2019.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2018 and 2020 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	3.68	2.03	0.00	0.94	0.00
	No. trials	1	1	0	1	0
Farah ^{db}	3	96	97	No trial	93	No trial
Fiesta VF	3	98	100		91	
Nura ^{db}	3	94	96		93	
PBA Amberley ^{db}	3	100	95		109	
PBA Bendoc ^{db}	3	102	98		108	
PBA Marne ^{db}	3	95	105		90	
PBA Rana ^{db}	3	86	88		84	
PBA Samira ^{db}	3	101	97		102	
PBA Zahra ^{db}	3	109	104		102	

LENTIL

By Sarah Day, Jenny Davidson and Sara Blake, SARDI

Four lentil varieties developed by Grains Innovation Australia (GIA) are being considered for release in spring 2021 with seed licensed to PB Seeds.

GIA2002L and GIA2003L are imidazolinone-tolerant, high-yielding and broadly adapted small red lentil varieties. GIA2002L was the highest-yielding lentil across all National Variety Trials (NVT) in Australia in 2020, yielding approximately 10 per cent above all other varieties and breeding lines except GIA2003L. GIA2003L was the second-highest-yielding lentil in NVT but showed superior adaptation on the light, sandy-textured soils of southern Australia.

GIA1703 is the first lentil with improved tolerance to clopyralid soil residues from a prior crop, applied according to product label directions. GIA1703L is an imidazolinone-tolerant, small round red lentil with a grey seed coat. Its tolerance to imidazolinone and sulfonylurea soil residues is similar to existing XT varieties. However, it has improved tolerance to clopyralid soil residues from a prior crop over all lentil varieties. GIA1703L is slow growing with smaller plant parts, increased basal branching and shorter plant height compared with other lentil varieties. It is best suited to agronomic practices such as early sowing and lentil growing environments that maximise growth, harvest height and grain yield. Avoid growing this variety in low-fertility sandy soils or low-rainfall, frost-prone environments.

GIA2004L is the first lentil to combine imidazolinone and metribuzin herbicide tolerances. This unique combination expands weed control options, particularly in light-textured soils prone to damage from the application of Group C herbicides. Grain yield of GIA2004L is lower than existing lentil varieties in the absence of weed pressure, or where weeds are controlled effectively without crop damage from Group C herbicides. GIA2004L has a medium to large seed size with a grey seed coat.

Two new lentil varieties were made available to growers in spring 2020. PBA KelpieXT[®] (tested as CIPAL1721) is a large seed-sized, herbicide-tolerant red lentil released through commercial partner Seednet. It provides growers with further market opportunities by combining herbicide tolerance in the large seed market class, complementing previous small and medium red lentil releases. PBA KelpieXT[®] is an early to mid-flowering and maturing variety with moderate resistance to Botrytis grey mould (BGM) and Ascochyta blight (AB). The combination of high yield, improved agronomic features and moderate disease resistance, with herbicide tolerance and large seed size, will make this variety a popular option in diverse lentil growing regions.

GIA Leader[®] (tested as GIA1701L) is a new imidazolinone-tolerant, medium seed-sized red lentil developed by GIA for lentil growing areas with good soil types, in medium to higher-rainfall zones. GIA Leader[®] has mid to late flowering and maturity, making it well suited to early sowing. Provisional data indicates a good level of resistance to AB and BGM.

For herbicide-tolerant varieties it is important to adhere to all product labels, plant-back periods and directions for use, as any off-label usage can result in crop damage.

There are two pathotypes of AB in the southern region. The older pathotype 1 is virulent on Nipper[®] and the newer pathotype 2 is virulent on PBA Hurricane XT[®]. Pathotype 2 is commonplace on the Yorke Peninsula and widespread throughout the Mid and Lower North regions. Disease ratings have now been updated to reflect this shift in the pathogen population.

The recently released GIA Leader[®] has a very high level of resistance to both pathotypes, while PBA HighlandXT[®] is rated moderately resistant (MR) to both pathotypes. PBA Hurricane XT[®], PBA Hallmark XT[®] and the recently released PBA KelpieXT[®]

(provisional rating) are rated moderately resistant/moderately susceptible (MRMS) to pathotype 2 for foliar AB in South Australia. Fungicide sprays are not required if no disease is visible and if rain is not forecast.

However, growers are urged to monitor crops regularly for disease. Podding sprays ahead of a rain front may be required if disease is present during the growing season for PBA Hurricane XT[®], PBA Hallmark XT[®] and PBA KelpieXT[®] to protect the developing grain. It is important to diversify variety selections within a year and across rotations, alongside agronomic and disease management practices, to protect cultivar resistance, reduce the risk of fungicide resistance developing, and reduce the risk of crop failures.

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 Bolt[®] (S) and PBA Hurricane XT[®] (MS), among others. A foliar fungicide spray at canopy closure is also appropriate for varieties with improved resistance to BGM such as PBA Hallmark XT[®] (MR), GIA Leader[®] (provisionally rated MR), and PBA Jumbo2[®] (RMR), although follow-up sprays may not be needed in the latter. Early sowing is not recommended for varieties rated susceptible (S) or moderately susceptible (MS) 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 to minimise seed discolouration and weather damage and also to reduce the risk of yield loss from shattering.

SELECTION CRITERIA

Information on disease resistance, maturity, lodging resistance, shattering and seed type for each variety can be found in Tables 1 and 2. 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. NVT yield data is summarised in Tables 3 to 7.

NOTES ON SELECTED VARIETIES

SMALL RED LENTILS

PBA HIGHLANDXT[®]

PBA HighlandXT[®] is the fourth lentil variety 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 followed. PBA HighlandXT[®] offers an improved, herbicide-tolerant lentil that is showing adaptation to drier lentil growing regions of the Victorian Mallee and South Australia. It has medium seed size, high early vigour with early flowering and early to mid-maturity. PBA HighlandXT[®] has a disease rating for AB of moderately resistant (MR) and is moderately susceptible (MS) to BGM. PBA HighlandXT[®] is licensed to PB Seeds.

PBA HURRICANE XT[®]

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 that product label rates, plant-back periods and directions for use are still followed. PBA Hurricane XT[®] 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 MRMS rating for foliar AB pathotype 2 (PBA Hurricane XT[®] virulent) in South Australia. Severe lesions have occurred in seedling crops in 2018, 2019 and 2020, so may require a podding spray to prevent seed and pod infection. PBA Hurricane XT[®] has a MS rating for BGM and in disease-prone areas a strategic fungicide program for BGM will be required and early sowing should 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.

NIPPER[®]

Nipper[®] is rated RMR to BGM, MRMS to AB pathotype 1 and MR to AB pathotype 2. Crops should be monitored for presence of AB and strategic vegetative and podding sprays for AB are recommended in disease-prone areas if infection continues to spread. Nipper[®] has a small seed size, flowers later than Nugget but often matures earlier. Nipper[®] is more sensitive to metribuzin than most other varieties and caution is required to avoid application when conditions are conducive to damage. Nipper[®] is licensed to Seednet.

MEDIUM RED LENTILS**GIA LEADER[®]**

GIA Leader[®] (tested as GIA1701L) is a new imidazolinone-tolerant, medium seed-sized red lentil developed by GIA from PBA Jumbo2[®] for lentil growing areas with good soil types in medium to higher-rainfall zones. This variety has similar imidazolinone herbicide tolerance, and tolerance to residual levels of sulfonylurea herbicide from previous crops, to current XT lentil varieties (e.g. PBA Hurricane XT[®]). GIA Leader[®] has a high level of resistance to AB and is provisionally rated MR to BGM. GIA Leader[®] has mid to late flowering and maturity, making it well suited to early sowing. It has a uniform grey seed coat and the grain is well suited to the medium-sized Nugget-type red lentil human food market. GIA Leader[®] is licensed to PB Seeds.

PBA ACE[®]

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 high resistance to AB and is rated MS to BGM. It 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[®] it 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 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.

PBA BOLT[®]

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. Like PBA Flash[®], it has improved tolerance to boron and salt over most other varieties. PBA Bolt[®] has moderate resistance (MR) to AB pathotype 1 and MRMS rating for AB pathotype 2. PBA Bolt[®] is susceptible (S) to BGM, and this disease will need to be carefully managed in disease-prone areas. It has a grey seed coat colour and is licensed to PB Seeds.

PBA BLITZ[®]

PBA Blitz[®] is suited to all lentil growing areas. It has a particular adaptation to shorter-season areas, where its combination of early to mid-flowering, early maturity, moderate disease resistance to both AB and BGM, 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 coat. It has a low level of 'pale coat Blitz' seeds that 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. These 'pale coat Blitz' seeds are classified at receipt point as seeds of contrasting colour with a limit of one per cent allowed. PBA Blitz[®] is commercialised by PB Seeds.

PBA FLASH[®]

PBA Flash[®] is a red lentil with a green seed coat and medium seed size. It is well suited to shorter seasons and lower-yielding lentil growing areas where its earlier maturity improves reliability of yield. It is rated MS to AB and requires strategic foliar fungicide sprays before flowering and at podding in disease-prone areas. Earlier maturity makes PBA Flash[®] better suited to crop-topping than PBA Ace[®], although caution is still required with this practice due to seasonal variation in weed and crop maturity. PBA Flash[®] is rated MS to BGM but has improved tolerance to both boron and salt over all varieties except for PBA Bolt[®]. PBA Flash[®] is commercialised by PB Seeds.

PBA HALLMARK XT[®]

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 followed. 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 MR rating for BGM and is rated MRMS for AB pathotype 2 and RMR for AB pathotype 1 in South Australia, where it may require a podding spray to prevent seed and pod infection. Like Nipper[®] and PBA Hurricane XT[®], PBA Hallmark 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.

Vigour and plant height are slightly better than PBA Hurricane XT[®] and equivalent to PBA Bolt[®]. With similar lodging to PBA Hurricane XT[®], PBA Hallmark XT[®] can still lodge under some conditions. PBA Hallmark XT[®] is a high-yielding medium red lentil and is commercialised by PB Seeds.

LARGE RED LENTILS**PBA JUMBO2[®]**

PBA Jumbo2[®] is the highest yielding red lentil available for SA. It 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 and improved lodging, shattering and disease resistance. It is rated R for AB and RMR for BGM, but disease monitoring and a fungicide application before canopy closure are still recommended for BGM. It has a seed size and shape similar to PBA Jumbo[®] but with a grey seed. As with other large-seeded varieties, PBA Jumbo2[®] is well suited to the post-harvest removal of small broadleaf weed seeds. PBA Jumbo2[®] is licensed to PB Seeds.

PBA KELPIEXT[®]

PBA KelpieXT[®] is the first large seed-sized, herbicide-tolerant red lentil to be released in Australia. It provides growers with further market opportunities by combining herbicide tolerance in the large seed market class, complementing previous small and medium red lentil releases. PBA KelpieXT[®] is an early to mid-flowering and maturing variety with good resistance to BGM (provisionally rated MRMS). PBA KelpieXT[®] is rated MRMS to both pathotypes of AB in South Australia. It has moderate to good early vigour, is moderately resistant to pod drop and resistant to seed shattering. PBA KelpieXT[®] has similar herbicide tolerance characteristics to other PBA XT lentil varieties but offers a larger seed type. PBA KelpieXT[®] is licensed to Seednet.

MEDIUM GREEN LENTILS**PBA GREENFIELD[®]**

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 MRMS for AB pathotype 1 and is MR to AB pathotype 2 and BGM. PBA Greenfield[®] is mid-flowering and like the other green lentils has a mid to late-maturity rating. PBA Greenfield[®] has improved shattering resistance over both Boomer and PBA Giant[®] with an MR rating, but timely harvest is still important to produce good-coloured seed for ease of marketing. This may also be aided by strategic fungicide applications during podding to minimise seed staining from AB. PBA Greenfield[®] is commercialised by PB Seeds.

LARGE GREEN LENTILS

PBA GIANT^{db}

PBA Giant^{db} is the largest-seeded Australian green lentil available. It is a broadly adapted variety with similar yield to Boomer but improved shattering resistance. It produces a slightly larger and more consistent seed size. Although shattering resistance is improved over Boomer, PBA Giant^{db} is rated MRMS for this trait and timely harvest is important to prevent seed loss.

PBA Giant^{db} has moderate resistance (MR) to AB pathotype 2 but is rated MS to AB pathotype 1 and BGM, and therefore monitoring and timely application of fungicides will be important to ensure disease control. 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 may provide opportunity for removal of small broadleaf weed seeds from the harvested sample. PBA Giant^{db} is commercialised by PB Seeds.

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 (MR) to foliar AB and MRMS to BGM. Boomer is susceptible 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 S to shattering at maturity, and therefore delayed harvest can result in grain loss and a reduction of its green seed colour, resulting in downgrading. Boomer is licensed to Seednet.

Table 1: Most-adapted lentil varieties for each rainfall zone.

Rainfall zone (average annual rainfall)			
<400mm	400–450mm	450–500mm	>500mm
SMALL RED			
Nipper ^{db} #	Nipper ^{db}	Nipper ^{db}	Nipper ^{db}
PBA HighlandXT ^{db} +	PBA HighlandXT ^{db} +	PBA HighlandXT ^{db} +	PBA HighlandXT ^{db} +
PBA Hurricane XT ^{db} +	PBA Hurricane XT ^{db} +	PBA Hurricane XT ^{db} +	PBA Hurricane XT ^{db} +
MEDIUM RED			
PBA Bolt ^{db}	PBA Bolt ^{db}	PBA Blitz ^{db} ^	PBA Ace ^{db}
PBA Hallmark XT ^{db} +	PBA Hallmark XT ^{db} +	PBA Hallmark XT ^{db} +	PBA Hallmark XT ^{db} +
GIA Leader ^{db}	GIA Leader ^{db}	GIA Leader ^{db}	GIA Leader ^{db}
PBA Flash ^{db}	PBA Flash ^{db}	PBA Flash ^{db}	PBA Blitz ^{db} ^
PBA Ace ^{db}	PBA Ace ^{db}	PBA Ace ^{db}	PBA Flash ^{db}
PBA Blitz ^{db} ^	PBA Blitz ^{db} ^	PBA Bolt ^{db}	PBA Bolt ^{db}
LARGE RED			
PBA Jumbo2 ^{db}	PBA Jumbo2 ^{db}	PBA Jumbo2 ^{db}	PBA Jumbo2 ^{db}
PBA KelpieXT ^{db} +	PBA KelpieXT ^{db} +	PBA KelpieXT ^{db} +	PBA KelpieXT ^{db} +
MEDIUM GREEN			
PBA Greenfield ^{db}	PBA Greenfield ^{db}	PBA Greenfield ^{db}	PBA Greenfield ^{db}
LARGE GREEN			
PBA Giant ^{db}	PBA Giant ^{db}	PBA Giant ^{db}	PBA Giant ^{db}
Boomer	Boomer	Boomer	Boomer

+ Herbicide-tolerant variety.

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.

Table 2: Agronomic and disease characteristics of lentil varieties.

Variety	Seed coat colour	Cotyledon colour	Market category	Vigour	Plant height	Flowering time	Maturity time	Lodging resistance	Pod drop	Shattering	Botrytis grey mould	Ascochyta blight*			Pratylenchus neglectus resistance	Pratylenchus thornei resistance
												Foliage pathotype 1 (Nipper [Ⓛ] virulent)	Foliage pathotype 2 (PBA Hurricane XT [Ⓛ] virulent)	Seed		
SMALL RED																
Nipper [Ⓛ]	Grey	Red	SRP	Poor/Mod	Short	Mid-late	Mid	MR	MR	MR	RMR	MRMS	MR	MR ⁱ	RMR	MR
PBA HighlandXT [Ⓛ] +	Grey	Red	MRS	Mod/Good	Medium	Early	Early-mid	MR	MR	MR	MS	MR	MR	MR ⁱ	MR	MRMS
PBA Hurricane XT [Ⓛ] +	Grey	Red	SRP	Moderate	Medium	Mid	Mid	MR	MR	R	MS	RMR	MRMS	MR ⁱ	MRMS	MRMS
MEDIUM RED																
GIA Leader [Ⓛ] +	Grey	Red	MRS	Moderate	Medium	Mid-late	Mid-late	MR _p	MR _p	**	MR _p	RMR	RMR	**	MS _p	MR _p
PBA Ace [Ⓛ]	Grey	Red	MRS	Good	Medium	Mid	Mid	MRMS	R	MRMS	MS	R	R	R ⁱ	MR	MRMS
PBA Blitz [Ⓛ]	Grey	Red	MRS	Mod/Good	Med/Tall	Early	Early	MR	MR	MR	MRMS	MRMS	MR	MRMS ⁱ	MR	MRMS
PBA Bolt [Ⓛ]	Grey	Red	MRS	Mod/Good	Medium	Early-mid	Early-mid	R	R	R	S	MR	MRMS	RMR ⁱ	MR	MR
PBA Hallmark XT [Ⓛ] +	Grey	Red	MRS	Mod/Good	Medium	Mid	Mid	MR	MR	R	MR	RMR	MRMS	MR ⁱ	MR	MRMS
PBA Flash [Ⓛ]	Green	Red	MRS	Moderate	Medium	Early-mid	Early-mid	MR	MR	MR	MS	MS	MS	MS ⁱ	MRMS	MRMS
LARGE RED																
PBA Jumbo2 [Ⓛ]	Grey	Red	LRS	Mod/Good	Med/Tall	Mid	Mid	MRMS	MR	R	RMR	R	R	R ⁱ	MR	MRMS
PBA KelpieXT [Ⓛ] +	Grey	Red	LRS	Mod/Good	Medium	Early-mid	Early-mid	MRMS	MR	R	MRMS _p	MRMS	MRMS	**	MRMS _p	MRMS
MEDIUM GREEN																
PBA Greenfield [Ⓛ]	Green	Yellow	LG	Good	Tall	Mid	Mid-late	MS	R	MR	MR ⁱ	MRMS ⁱ	MR ⁱ	MRMS ⁱ	**	**
LARGE GREEN																
PBA Giant [Ⓛ]	Green	Yellow	LG	Good	Tall	Mid	Mid-late	S	R	MRMS	MS ⁱ	MS ⁱ	MR ⁱ	MS ⁱ	**	**
Boomer	Green	Yellow	LG	Good	Tall	Mid	Mid-late	S	R	S	MRMS ⁱ	MR ⁱ	MR ⁱ	MRMS ⁱ	**	**

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

** Untested. _p = provisional ratings. + Herbicide-tolerant variety. [#] Sourced from NVT online. ⁱ Not tested since 2017 or earlier.

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

Table 3: Lower Eyre Peninsula lentil yield performance. NVT data for 2016, 2017, 2018 and 2020.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2019 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.27	2.14	3.23	0.00	1.83
	No. trials	1	1	1	0	1
GIA Leader [Ⓛ]	1	–	–	–	–	109
Nipper [Ⓛ]	4	99	91	100	–	98
Nugget	3	110	106	102	–	–
PBA Ace [Ⓛ]	2	97	–	–	–	113
PBA Blitz [Ⓛ]	4	105	87	107	–	93
PBA Bolt [Ⓛ]	4	95	101	97	–	98
PBA Flash [Ⓛ]	3	105	104	103	–	–
PBA Hallmark XT [Ⓛ]	4	105	103	101	–	99
PBA HighlandXT [Ⓛ]	4	95	97	99	–	94
PBA Hurricane XT [Ⓛ]	4	113	102	105	–	102
PBA Jumbo2 [Ⓛ]	4	115	107	107	–	112
PBA KelpieXT [Ⓛ]	3	–	95	119	–	104

– denotes no data available.

Table 4: Mid North lentil yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.48	1.92	1.44	1.42	2.74
	No. trials	3	4	4	4	2
GIA Leader ^{db}	4	–	–	–	90	106
Nipper ^{db}	17	92	94	84	83	88
Nugget	13	105	100	95	85	–
PBA Ace ^{db}	13	103	104	110	94	107
PBA Blitz ^{db}	17	97	98	91	104	94
PBA Bolt ^{db}	17	98	100	102	102	100
PBA Flash ^{db}	13	102	103	103	104	–
PBA Greenfield ^{db}	7	138	114	104	91	–
PBA Hallmark XT ^{db}	17	106	100	100	95	101
PBA Herald XT	3	92	88	–	–	–
PBA HighlandXT ^{db}	17	99	100	104	110	101
PBA Hurricane XT ^{db}	17	109	100	98	94	103
PBA Jumbo2 ^{db}	17	111	106	106	107	111
PBA KelpieXT ^{db}	14	–	104	97	107	108

– denotes no data available.

Table 5: Yorke Peninsula lentil yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	3.92	2.60	1.63	1.50	2.49
	No. trials	3	5	5	5	2
GIA Leader ^{db}	5	–	–	–	98	112
Nipper ^{db}	20	95	90	87	92	100
Nugget	15	98	99	94	95	–
PBA Ace ^{db}	14	96	105	104	98	113
PBA Blitz ^{db}	20	105	96	97	101	90
PBA Bolt ^{db}	20	98	100	101	101	100
PBA Flash ^{db}	15	107	105	105	101	–
PBA Greenfield ^{db}	6	–	114	105	101	–
PBA Hallmark XT ^{db}	20	95	98	97	100	106
PBA Herald XT	2	–	82	–	–	–
PBA HighlandXT ^{db}	20	101	101	104	104	95
PBA Hurricane XT ^{db}	20	98	99	96	100	105
PBA Jumbo2 ^{db}	20	110	108	108	104	102
PBA KelpieXT ^{db}	17	–	104	101	105	97

– denotes no data available.

Table 6: Murray Mallee lentil yield performance. NVT data for 2018 and 2019.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2016, 2017 and 2020 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	0.00	0.00	0.73	0.35	0.00
	No. trials	0	0	1	1	0
GIA Leader [Ⓛ]	1	–	–	–	108	–
Nipper [Ⓛ]	2	–	–	61	111	–
Nugget	1	–	–	82	–	–
PBA Ace [Ⓛ]	1	–	–	–	124	–
PBA Blitz [Ⓛ]	2	–	–	73	87	–
PBA Bolt [Ⓛ]	2	–	–	109	99	–
PBA Flash [Ⓛ]	1	–	–	85	–	–
PBA Hallmark XT [Ⓛ]	2	–	–	119	97	–
PBA HighlandXT [Ⓛ]	2	–	–	115	88	–
PBA Hurricane XT [Ⓛ]	2	–	–	110	95	–
PBA Jumbo2 [Ⓛ]	2	–	–	96	101	–
PBA KelpieXT [Ⓛ]	2	–	–	89	80	–

– denotes no data available.

Table 7: South East lentil yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.74	2.58	2.13	2.25	2.57
	No. trials	1	1	1	1	1
GIA Leader [Ⓛ]	2	–	–	–	105	99
Nipper [Ⓛ]	5	95	86	70	101	90
Nugget	3	108	93	82	–	–
PBA Ace [Ⓛ]	3	112	–	–	105	104
PBA Blitz [Ⓛ]	5	93	101	93	99	99
PBA Bolt [Ⓛ]	5	99	100	104	98	99
PBA Flash [Ⓛ]	3	105	95	104	–	–
PBA Hallmark XT [Ⓛ]	5	102	108	97	98	95
PBA HighlandXT [Ⓛ]	5	95	107	112	95	101
PBA Hurricane XT [Ⓛ]	5	104	110	94	102	97
PBA Jumbo2 [Ⓛ]	5	110	105	111	109	113
PBA KelpieXT [Ⓛ]	4	–	120	102	108	108

– denotes no data available.

FIELD PEA

By Sarah Day and Jenny Davidson, SARDI

Several new field pea varieties will be available to growers for the 2022 season. PBA Taylor[®] (tested as OZP1408) is a 'Kaspa[®] seed type', semi-leafless, semi-dwarf field pea with wide adaptation. PBA Noosa[®] (tested as OZB1308) is a semi-leafless, semi-dwarf, blue field pea with broad adaptation and grain yield.

GIA 2005P is an advanced Kaspa[®]-type breeding line from Grains Innovation Australia (GIA) with improved tolerance to common in-crop and residual Group B herbicides (imidazolinone and sulfonylurea). It is superior to GIA Kastar[®] in both herbicide tolerance and plant type (early vigour). GIA2005P is early to mid-flowering and early maturing with an erect growth habit and a semi-leafless plant type. It is being considered for commercial release in spring of 2021.

Two new field pea varieties were made available to southern region growers in spring 2020. GIA Ourstar[®] and GIA Kastar[®] were developed by GIA and are the first field pea varieties to be released with improved herbicide-tolerance characteristics.

GIA Ourstar[®] is the first 'dun' field pea offering improved tolerance to common in-crop and residual Group B herbicides. It will provide increased flexibility and robustness in mixed farming systems and improved weed control options over all current field pea varieties. GIA Kastar[®] is the first Kaspa[®]-type field pea with improved tolerance to common in-crop and residual imidazolinone herbicides. It will provide increased weed control options over all current field pea varieties except for GIA Ourstar[®].

For herbicide-tolerant varieties it is important to adhere to all product labels, plant-back periods and directions for use, as any off-label usage can result in crop damage.

The disease forecasting model 'Blackspot Manager' predicted medium black spot risk levels in many regions of South Australia (SA) for the 2021 season due to the staggered opening rains. The heavy

winter rain would have increased the spread of this disease. Irrespective of the seasonal black spot risk, field peas should be grown in paddocks with at least four years' break from field peas and with a history of low black spot disease infection, and not adjacent to last year's field pea stubble.

Black spot can be reduced in paddocks where a grain yield of at least 1.5t/ha is achievable by using a fungicide strategy of P-Pickel T[®] seed dressing combined with two foliar fungicide sprays (four to nine weeks post-sowing and again at early flowering). Predictions of black spot spore release times in each field 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 Sara Blake: sara.blake@sa.gov.au).

SELECTION CRITERIA

The list of suggested varieties shown in Table 1 is based on performance within different rainfall zones. Information on the most important agronomic characteristics is shown in Table 2. Grain yield for each variety, where available, can be found in Tables 3 to 8. When selecting a variety, growers 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.

White and blue peas are not accepted in the bulk dun segregation so growers also need to consider the different seed quality types (Table 1) and where they can be delivered before deciding whether to grow these types.

NOTES ON SELECTED DUN-TYPE VARIETIES

Dun peas are segregated from white and blue peas due to the different market quality specifications. Some pea markets in India and Sri Lanka prefer Australian dun peas due to their distinct 'nutty' taste. Kaspas[®] seed type grain is also preferred over dimpled grain (such as PBA Percy[®] 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 Kaspas[®] seed type from the dimpled dun type.

KASPA[®] SEED TYPE

GIA KASTAR[®]

GIA Kastar[®] is the first Kaspas[®] seed type field pea with improved tolerance to common in-crop and residual imidazolinone herbicides. It has improved tolerance to post-emergent imazamox and imazethapyr applications as well as improved tolerance to commonly used residual Group B imidazolinone herbicides. GIA Kastar[®]'s response to residual sulfonylurea and post-emergent flumetsulam is similar to that of PBA Wharton[®]. It is imperative that growers adhere to product label rates, plant-back periods and all label directions for use.

GIA Kastar[®] is a mid-flowering variety with early to mid-maturity suitable for crop-topping. It has a semi-leafless plant type, an erect growth habit and is resistant to pod shatter at maturity. GIA Kastar[®] has a disease resistance profile similar to PBA Wharton[®] and is resistant to powdery mildew, moderately susceptible to black spot and susceptible to bacterial blight. GIA Kastar[®] was developed by Grains Innovation Australia using conventional breeding techniques and commercialised by AG Schilling & Co.

PBA BUTLER[®]

PBA Butler[®] is a Kaspas[®]-type field pea with high yields and improved resistance to bacterial blight over Kaspas[®]. It is mid to late flowering, early to mid-maturing and offers the same agronomic benefits of lodging and shattering resistance as Kaspas[®]. PBA Butler[®] has a medium seed size with a yellow split and a uniform tan seed coat colour that is similar to Kaspas[®]. It has a semi-leafless plant type with vigorous plant growth and is rated MS to black spot and S to downy mildew. PBA Butler[®] has wide adaptation across southern Australia and performs particularly well in medium to long growing seasons in SA. It may reduce yield losses in regions where bacterial blight is a significant disease. Seed is available from the commercial partner Seednet.

PBA GUNYAH[®]

PBA Gunyah[®] is a Kaspas[®] seed type field pea with earlier and longer flowering than Kaspas[®] and higher yield in shorter-season environments and drier seasons (yield potential below 2.25t/ha). It is early to mid-flowering and early maturing, making it more suitable than Kaspas[®] for crop-topping. It is better suited to delayed sowing than Kaspas[®] for black spot disease management. Its disease-resistance profile is similar to Kaspas[®] 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 Kaspas[®] due to its earlier maturity. PBA Gunyah[®] is licensed to Seednet.

NEW – PBA TAYLOR[®]

PBA Taylor[®] (tested as OZP1408) is a Kaspas[®] seed type, semi-leafless, semi-dwarf field pea with wide adaptation. It has resistance to viruses including pea seed-borne mosaic and bean leaf roll. PBA Taylor[®] outyields other Kaspas[®]-type varieties including PBA Wharton[®] and Kaspas[®], except in regions with high boron and salinity constraints. It is a mid-flowering variety with early to mid-maturity. It is expected to be available to growers for the 2022 season and is licensed to Seednet.

PBA TWILIGHT[®]

PBA Twilight[®] is a Kaspas[®] 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 low rainfall and very short season field pea growing environments. Widespread evaluation over several years shows that it is higher yielding than Kaspas[®] when yield potential is below 1.5t/ha. Its disease-resistance profile is similar to Kaspas[®] 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 Kaspas[®] due to its earlier maturity. PBA Twilight[®] is licensed to Seednet.

PBA WHARTON[®]

PBA Wharton[®] is a Kaspas[®] seed type dun pea offering improved powdery mildew and virus resistances (bean leafroll and pea seed-borne mosaic viruses). It provides the same agronomic benefits as Kaspas[®] (for example, lodging and shattering resistance), has some tolerance to boron toxicity, is moderately tolerant to salinity 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 crop-topping and delayed sowing for black spot management. It is licensed to Seednet.

KASPA[®]

Kaspas[®] is a semi-leafless, late-flowering variety with resistance to shattering, good early season vigour and moderate resistance to lodging. Kaspas[®] is susceptible to powdery mildew and downy mildew and is moderately susceptible to black spot. The seed of Kaspas[®] is distinct from traditional dun types (such as Parafield) as it is red-brown in colour and almost spherical in shape. Kaspas[®] needs to be considered carefully before use in low-rainfall areas or areas prone to early periods of high temperature and drought stress due to its late and condensed flowering period. Kaspas[®] is under contract to Seednet.

TRADITIONAL DIMPLED DUN SEED TYPE

GIA OURSTAR[®]

GIA Ourstar[®] is the first 'dun dimpled type' field pea offering improved tolerance to common in-crop and residual Group B herbicides. It has improved herbicide tolerance to post-emergent imazamox, imazethapyr and flumetsulam applications as well as improved tolerance to commonly used Group B imidazolinone and sulfonylurea herbicides. It is imperative that growers adhere to product label rates, plant-back periods and all label directions for use.

GIA Ourstar[®] is an early to mid-flowering variety with a relatively long flowering window and early to mid-maturity suitable for crop-topping. It has a semi-leafless plant type with a semi-erect growth habit and moderate resistance to pod shatter at maturity. GIA Ourstar[®] has a disease-resistance profile similar to PBA Oura[®] and is moderately susceptible to black spot and moderately susceptible to bacterial blight. GIA Ourstar[®] was developed by Grains Innovation Australia using conventional breeding techniques and commercialised by AG Schilling & Co.

PBA OURA[®]

PBA Oura[®] is a high-yielding, early to mid-flowering, semi-dwarf, dun dimpled type variety with higher yields than Kaspas[®], 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 and has fair to good lodging resistance at maturity. PBA Oura[®] seed is dimpled and not a Kaspas[®] seed type. PBA Oura[®] had improved resistance to downy mildew, but recently has been downgraded to S. It has improved tolerance to metribuzin herbicide over Kaspas[®]. Seed is licensed to Seednet.

PBA PERCY[®]

PBA Percy[®] is an early flowering, conventional, dun dimpled type variety with improved resistance (MR/MS) to bacterial blight over all other varieties, making it a preferred option in areas prone to this disease. Its early flowering and early maturity make it well suited to delayed sowing for disease management and crop-topping. It is moderately tolerant to salinity and produces non-sugar-type pods similar to PBA Oura[®]. PBA Percy[®] seed is dimpled and not a Kaspas[®] seed type. PBA Percy[®] generally produces yields similar to PBA Oura[®] but in low-rainfall environments can be the highest yielding dun variety in trials. It is licensed to Seednet.

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 stockfeed markets. Growers are advised to secure markets before deciding to grow these pea types.

PBA PEARL

PBA Pearl is a semi-leafless white pea variety that 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, often with excellent lodging resistance at maturity. It is early to mid-flowering and produces non-sugar-type pods similar to PBA Oura^{db}. It has a favourable disease-resistance profile, with good resistance to bean leafroll virus and 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 Kaspas^{db}-type export markets.

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, where peas are 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; 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 and they have a relatively poor disease-resistance profile.

NEW – PBA NOOSA^{db}

PBA Noosa^{db} (tested as OZB1308) is a semi-leafless, semi-dwarf blue field pea with broad adaptation and grain yield exceeding Excell by up to 30 per cent, with similar yield to Kaspas^{db} seed type varieties. PBA Noosa^{db} is moderately susceptible to downy mildew, resistance to bean leafroll virus and has shatter-resistant pods. It has early to mid-flowering and maturity. PBA Noosa^{db} is licensed to PB Seeds.

Table 1: Most-adapted field pea varieties for each rainfall zone.

Rainfall zone (average annual rainfall)			
<350mm	350–425mm	425–500mm	>500mm
DUN – KASPA ^{db} TYPE			
PBA Taylor ^{db}	PBA Taylor ^{db}	PBA Taylor ^{db}	PBA Taylor ^{db}
PBA Wharton ^{db}	PBA Butler ^{db^}	PBA Butler ^{db^}	PBA Butler ^{db^}
PBA Twilight ^{db}	PBA Wharton ^{db}	PBA Wharton ^{db}	PBA Wharton ^{db}
GIA Kastar ^{db} +	GIA Kastar ^{db} +	GIA Kastar ^{db} +	GIA Kastar ^{db} +
PBA Gunyah ^{db}	PBA Twilight ^{db}	PBA Gunyah ^{db}	Kaspas ^{db}
Kaspas ^{db}	PBA Gunyah ^{db}	Kaspas ^{db}	PBA Gunyah ^{db}
	Kaspas ^{db}	PBA Twilight ^{db}	PBA Twilight ^{db}
DUN (OTHER)			
PBA Oura ^{db^}	PBA Oura ^{db^}	PBA Oura ^{db^}	PBA Oura ^{db^}
GIA Ourstar ^{db} +	GIA Ourstar ^{db} +	GIA Ourstar ^{db} +	GIA Ourstar ^{db} +
PBA Percy ^{db^}	PBA Percy ^{db^}	PBA Percy ^{db^}	PBA Percy ^{db^}
Parafield	Parafield	Parafield	Parafield
WHITE			
PBA Pearl	PBA Pearl	PBA Pearl	PBA Pearl
BLUE			
PBA Noosa ^{db}	PBA Noosa ^{db}	PBA Noosa ^{db}	PBA Noosa ^{db}
Excell	Excell	Excell	Excell
Maki	Maki	Maki	Maki

+ Herbicide-tolerant variety.

^ Preferred variety where bacterial blight is a production constraint.

Table 2: Agronomic and disease characteristics of field pea varieties.

Variety	Seed type	Pod shattering at maturity	Lodging resistance at maturity	Downy mildew (Kaspa [®] strain)	Black spot	Powdery mildew	Bacterial blight (pv. <i>syringae</i>)	Pea seed-borne mosaic virus (PSbMV)	Bean leafroll virus (BLRV)	<i>Pratylenchus neglectus</i> resistance	<i>Pratylenchus thornei</i> resistance
GIA Kastar ^{db}	Dun (K)	R: SP	Fair-good	S	MS _p	R _p	Sp	R _p	**	RMR _p	Sp
Kaspa ^{db}	Dun (K)	R: SP	Fair-good	S	MS	S	S	S ⁱ	S ⁱ	RMR	MRMS
PBA Butler ^{db}	Dun (K)	R: SP	Fair-good	S	MS	S	MS	S ⁱ	S ⁱ	RMR	MRMS
PBA Gunyah ^{db}	Dun (K)	R: SP	Fair-good	S	MS	S	S	S ⁱ	S ⁱ	RMR	MRMS
PBA Taylor ^{db}	Dun (K)	R: SP	Fair-good	S	MS	S	S	R	R	RMR	MRMS
PBA Twilight ^{db}	Dun (K)	R: SP	Fair-good	S	MS	S	S	S ⁱ	**	RMR	MRMS
PBA Wharton ^{db}	Dun (K)	R: SP	Fair-good	S	MS	R _p	S	R ⁱ	R ⁱ	RMR	MRMS
GIA Ourstar ^{db}	Dun	MR: SP	Fair	S	MS _p	S	MS _p	Sp	**	MRMS _p	SVSp
Parafield	Dun	MR: NSP	Poor	S	MS ⁱ	S	MS ⁱ	S ⁱ	**	**	**
PBA Oura ^{db}	Dun	MR: NSP	Fair-good	S	MS	S	MS	S ⁱ	R ⁱ	MR	MRMS
PBA Percy ^{db}	Dun	MR: NSP	Poor	S	MS	S	MRMS	S ⁱ	S ⁱ	RMR	RMR
PBA Pearl	White	MR: NSP	Good	S	MS	S	MS	S ⁱ	R ⁱ	RMR	MRMS
PBA Noosa ^{db}	Blue	R: SP	Fair-good	MS _p	MS	S	S	S	R	MR	MR

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

S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant, SP = sugar pod, NSP = non-sugar pod.

^a Herbicide-tolerant variety.

_p = provisional data. ** Not tested. ⁱ No disease screening since 2019 or earlier.

Table 3: Lower Eyre Peninsula field pea yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.51	1.68	2.27	2.16	2.35
	No. trials	2	2	2	2	2
GIA Kastar ^{db}	2	–	–	–	–	84
GIA Ourstar ^{db}	2	–	–	–	–	80
Kaspa ^{db}	10	77	100	95	93	97
Parafield	6	89	82	85	–	–
PBA Butler ^{db}	8	97	103	105	100	–
PBA Gunyah ^{db}	8	88	102	98	97	–
PBA Oura ^{db}	10	101	102	100	103	94
PBA Pearl	10	105	108	109	107	108
PBA Percy ^{db}	10	115	97	97	109	97
PBA Taylor ^{db}	10	104	105	103	104	108
PBA Wharton ^{db}	10	92	104	97	98	91

– denotes no data available.

Table 4: Upper Eyre Peninsula field pea yield performance. NVT data for 2016, 2018 and 2020*.

Long-term yield expressed as a percentage of mean yield.

*Data for 2017 and 2019 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.88	0.00	0.39	0.00	1.25
	No. trials	1	0	1	0	1
GIA Kastar [Ⓛ]	1	–	–	–	–	81
GIA Ourstar [Ⓛ]	1	–	–	–	–	94
Kaspa [Ⓛ]	3	92	–	89	–	88
PBA Butler [Ⓛ]	2	100	–	96	–	–
PBA Gunyah [Ⓛ]	2	96	–	94	–	–
PBA Oura [Ⓛ]	3	94	–	97	–	103
PBA Pearl	3	89	–	91	–	108
PBA Percy [Ⓛ]	3	96	–	110	–	91
PBA Taylor [Ⓛ]	3	110	–	107	–	104
PBA Twilight [Ⓛ]	2	93	–	90	–	–
PBA Wharton [Ⓛ]	3	103	–	98	–	108

– denotes no data available.

Table 5: Mid North field pea yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	3.59	2.12	1.73	1.63	3.13
	No. trials	5	5	4	4	2
GIA Kastar [Ⓛ]	2	–	–	–	–	81
GIA Ourstar [Ⓛ]	2	–	–	–	–	75
Kaspa [Ⓛ]	20	93	93	91	92	87
Parafield	6	87	83	84	–	–
PBA Butler [Ⓛ]	18	103	103	102	100	–
PBA Gunyah [Ⓛ]	18	96	98	96	97	–
PBA Oura [Ⓛ]	20	98	99	98	103	94
PBA Pearl	20	103	102	102	108	102
PBA Percy [Ⓛ]	20	102	94	95	104	96
PBA Taylor [Ⓛ]	20	103	105	105	103	121
PBA Twilight [Ⓛ]	10	91	96	94	97	–
PBA Wharton [Ⓛ]	20	94	102	100	101	102

– denotes no data available.

Table 6: Yorke Peninsula field pea yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	4.01	3.00	2.15	1.69	1.33
	No. trials	3	3	2	3	1
GIA Kastar [Ⓛ]	1	–	–	–	–	89
GIA Ourstar [Ⓛ]	1	–	–	–	–	73
Kaspa [Ⓛ]	12	94	95	100	98	103
Parafield	7	90	81	88	87	–
PBA Butler [Ⓛ]	11	107	107	103	106	–
PBA Gunyah [Ⓛ]	11	96	98	100	99	–
PBA Oura [Ⓛ]	12	96	94	98	97	88
PBA Pearl	12	107	100	101	104	94
PBA Percy [Ⓛ]	12	103	88	100	101	90
PBA Taylor [Ⓛ]	12	101	105	104	103	112
PBA Twilight [Ⓛ]	3	88	93	–	93	–
PBA Wharton [Ⓛ]	12	86	97	98	93	94

– denotes no data available.

Table 7: Murray Mallee field pea yield performance. NVT data for 2016, 2017 and 2018.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2019 and 2020 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.85	1.08	1.11	0.00	0.00
	No. trials	1	1	1	0	0
Kaspa [Ⓛ]	3	97	82	68	–	–
Parafield	3	81	67	94	–	–
PBA Butler [Ⓛ]	3	111	107	100	–	–
PBA Gunyah [Ⓛ]	3	98	94	86	–	–
PBA Oura [Ⓛ]	3	96	103	112	–	–
PBA Pearl	3	111	120	135	–	–
PBA Percy [Ⓛ]	3	95	90	108	–	–
PBA Taylor [Ⓛ]	3	103	106	94	–	–
PBA Wharton [Ⓛ]	3	89	100	91	–	–

– denotes no data available.

Table 8: South East field pea yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	3.99	3.07	2.86	2.08	3.52
	No. trials	1	1	1	1	1
GIA Kastar [Ⓢ]	1	–	–	–	–	65
GIA Ourstar [Ⓢ]	1	–	–	–	–	80
Kaspa [Ⓢ]	5	97	92	100	85	89
Parafield	3	74	75	76	–	–
PBA Butler [Ⓢ]	4	110	114	105	113	–
PBA Gunyah [Ⓢ]	4	101	97	101	93	–
PBA Oura [Ⓢ]	5	99	97	96	92	95
PBA Pearl	5	115	120	99	109	107
PBA Percy [Ⓢ]	5	91	88	96	92	89
PBA Taylor [Ⓢ]	5	105	102	109	109	104
PBA Wharton [Ⓢ]	5	97	89	101	87	93

– denotes no data available.

CHICKPEA

By Sarah Day, Jenny Davidson and Sara Blake, SARDI

All chickpea varieties are rated as either susceptible (S) or moderately susceptible (MS) to *Ascochyta* blight (AB) infection. This follows observations of severe AB on previously resistant chickpea varieties across South Australia and Victoria. Chickpea growers now need to carefully consider their risk of AB infection along with their ability to effectively control the disease before choosing to grow this crop in southern Australia. This will be the case in high and low-rainfall regions as severe disease outbreaks can still occur in the latter for all current variety options during wet seasons, such as 2016.

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 three-year rotation between chickpeas in the same paddock and avoid planting adjacent to last year's chickpea stubble.

All chickpea crops will need to be regularly monitored for AB infection. Moderately susceptible varieties will require three to four strategic fungicide sprays ahead of rain events, offering two to three weeks of protection, starting at six to eight weeks post-sowing. Susceptible varieties will require regular fungicide sprays every two to three weeks throughout the growing season before rainfall events. As the pods of all commercial varieties are susceptible to AB, they will also require fungicide sprays ahead of rain fronts during pod setting to protect the pods from seed staining and seed abortion.

No new chickpea varieties will be available to growers in 2022. A new desi (CBA Captain[®]) and a new kabuli (PBA Magnus[®]) variety were released in 2020 and were first available to growers for the 2021 season.

CBA Captain[®] (tested as CICA1521) is a desi-type chickpea with broad adaptation and a medium seed size. It has good grain yields in South Australia, in particular in the Mid North region. CBA Captain[®] has excellent harvestability with improved plant height and improved height to the lowest pod, compared with all other desi varieties adapted to the southern region. It is a mid-flowering and mid-maturing variety, similar to Genesis[™] 090. CBA Captain[®] has a moderately susceptible rating (MS) to foliar AB in the southern region. It has superior grain quality to current southern desi varieties based on seed shape, size and colour. CBA Captain[®] meets the requirement of a 'Jimbour type' suitable for the subcontinent market.

PBA Magnus[®] (tested as CICA1352) is a large seed size kabuli chickpea with a significant yield advantage over Genesis[™] Kalkee and a slightly larger seed size. PBA Magnus[®] has a similar plant type to Genesis[™] 090 and similar mid-flowering and mid-maturity. It has a susceptible (S) rating for foliar AB in the southern region. PBA Magnus[®] has been licensed to PB Seeds.

PBA Royal[®] (tested as CICA1156) is a medium kabuli released in 2019. It is an early to mid-flowering chickpea and has mid-maturity. PBA Royal[®] has a medium seed size, with seed larger than Genesis[™] 090 but smaller than PBA Monarch[®]. PBA Royal[®] is particularly well adapted to the medium-rainfall chickpea growing regions (greater than 1.5t/ha) of south-eastern Australia. It is rated moderately susceptible for foliar AB infection.

SELECTION CRITERIA

The list of suggested varieties for 2022 is shown in Table 1. A range of chickpea types is 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 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 subcontinent and a small premium has been available for types fitting this use. Newer desi varieties have improved seed size and colour over older varieties, such as Genesis™ 509 and Tyson, and are suited to whole and splitting markets. They are therefore more likely to achieve the higher prices of the benchmark northern region varieties (such as Jimbour).

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 previously been oversupplied by several overseas countries. They may be required to hold seed from time to time as marketing opportunities are not always available or may be limited in size and price. Seed size is small, 6–8mm, so will not attract the higher prices of the larger-seeded kabuli types (such as PBA Monarch[®] and Genesis™ Kalkee). Further premiums may be obtained by grading and selling the seed on size.

MEDIUM-LARGE KABULI TYPES

PBA Monarch[®], Almaz[®] and Genesis™ Kalkee produce predominantly 8–10mm seed for traditionally larger-seeded kabuli markets where larger size is imperative to attract premium prices. Uniformity of seed size is also important in these markets and may be difficult to achieve for the large types such as Genesis™ Kalkee due to its relatively poor adaptation to dry finishing conditions. The medium-sized PBA Monarch[®] is likely to produce more uniform-sized seed under these conditions.

NOTES ON SELECTED DESI CHICKPEA VARIETIES

CBA CAPTAIN[®]

CBA Captain[®] is a desi-type chickpea with broad adaptation and a medium seed size. It has good grain yields in South Australia, in particular in the Mid North. CBA Captain has excellent harvestability with improved plant height and height to the lowest pod compared with all other desi varieties adapted to the southern region. It is a mid-flowering and mid-maturing variety, similar to Genesis™ 090. CBA Captain[®] has a moderately susceptible rating (MS) to foliar AB in the southern region. It has superior grain quality to current southern desi varieties based on seed shape, size and colour. CBA Captain[®] meets the requirement of a 'Jimbour type' suitable for the subcontinent market. Seed can be obtained through CBA Seed Distributors.

PBA MAIDEN[®]

PBA Maiden[®] is rated as susceptible to foliar infection by AB and will require regular vegetative and reproductive foliar fungicide sprays every two to three weeks. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto 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 per cent larger than PBA Slasher[®]) with a yellow-tan seed coat. This variety is targeted for whole-seed markets where its large, angular shape and bright yellow-tan seed coat are well suited to specific requirements. Growers are advised to investigate delivery and marketing options for

PBA Maiden[®] before 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 STRIKER[®]

PBA Striker[®] is susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every two to three weeks. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto emerging seedlings. PBA Striker[®] is a high-yielding desi chickpea with very 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 western and southern Australia, providing AB can be managed.

PBA Striker[®] has a similar plant type to PBA Slasher[®] but with larger seed size than all other southern desi varieties. Seed of PBA Striker[®] is also 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.

AMBAR[®]

Ambar[®] is an early flowering and maturing desi-type chickpea. It is rated as susceptible to AB and will require regular strategic fungicide sprays during the season ahead of rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto 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. Ambar[®] has a seed size smaller than PBA Slasher[®] and PBA Striker[®] but similar light colour. Seed is licensed to Heritage Seeds.

PBA SLASHER[®]

PBA Slasher[®] is rated as susceptible to AB and will require regular strategic fungicide sprays during the season ahead of rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent transmission of AB onto the emerging seedlings. PBA Slasher[®] is high yielding in all chickpea growing areas of SA, 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 as it has improved seed size and colour over varieties such as Genesis™ 509, which are only suited to split-seed markets. Seed is licensed to Seednet.

PBA SEAMER[®], PBA HATTRICK[®], PBA PISTOL[®], PBA BOUNDARY[®] AND PBA DRUMMOND[®]

These varieties have been released for northern NSW/southern Queensland (PBA Seamer[®], PBA HatTrick[®] and PBA Boundary[®]) and Central Queensland (PBA Pistol[®] and PBA Drummond[®]), where they offer specific production advantages. All five have limited suitability to South Australia due to late maturity and low relative yields.

NOTES ON SELECTED KABULI CHICKPEA VARIETIES

PBA ROYAL[®]

PBA Royal[®] is a high-yielding, medium-sized kabuli chickpea. It is particularly well adapted to the medium-rainfall chickpea growing regions of south-eastern Australia. In these regions, it has improved grain yields in mid to high-yielding environments (greater than 1.5t/ha) compared with Genesis™ 090, PBA Monarch[®] and Genesis™ Kalkee.

The foliar AB rating for PBA Royal[®] is moderately susceptible, similar to Genesis™ 090, and crops will require three to four strategic fungicide sprays during the season ahead of rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent transmission of AB onto the emerging seedlings. PBA Royal[®] has medium plant height with early to mid-flowering and mid-maturity. Seed is licensed to Seednet.

PBA MAGNUS[®]

PBA Magnus[®] is a large seed-sized kabuli chickpea. It has a significant yield advantage over Genesis™ Kalkee, particularly in short growing environments, due to its earlier flowering and maturity. It is well adapted to the medium-rainfall chickpea growing regions of south-eastern Australia where the large seed size can be obtained.

PBA Magnus[®] has a similar plant type to Genesis™ 090 and similar mid-flowering and mid-maturity. It has a susceptible (S) rating for foliar AB in the southern region. Seed of PBA Magnus[®] is larger than Genesis™ Kalkee, has a cream-beige seed coat, good wrinkling characteristics and has received favourable feedback on seed quality from domestic and internal traders. PBA Magnus[®] has been licensed to PB Seeds.

PBA MONARCH[®]

PBA Monarch[®] is a high-yielding, medium-sized kabuli chickpea with adaptation to all kabuli growing areas of Australia. The foliar AB rating for PBA Monarch[®] is susceptible and crops will require regular vegetative and reproductive foliar fungicide sprays every two to three weeks. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto the emerging seedlings. PBA Monarch[®] 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 with Genesis[™] 090 and Genesis[™] Kalkee.

PBA Monarch[®] 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 (<1t/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.

ALMAZ[®]

Almaz[®] is a medium to large-seeded kabuli type. It is susceptible to foliar AB and will require regular strategic fungicide sprays during the season before rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto the emerging seedlings. Almaz[®] is a mid-flowering and mid to late-maturing variety and is lower yielding than Genesis[™] 090 in southern Australia. Seed is licensed to Seednet.

GENESIS[™] 090

Genesis[™] 090 is a small to medium-seeded kabuli (7–8mm). Its foliar AB rating is moderately susceptible and crops will require three to four strategic fungicide sprays during the season ahead of rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto 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, mid-late in flowering and large in seed size. It is rated as susceptible to foliar AB and will require three to four strategic fungicide sprays during the season ahead of rain fronts. The sprays offer two to three weeks of protection against infection. All seed should be treated with a thiram-based fungicide to prevent seed transmission of AB onto the emerging seedlings. It has the largest seed size of all commercial kabuli types, making it more able to meet the size requirements of premium high-value markets. However, yield is inferior to the small kabuli types and PBA Monarch[®], but generally similar to Almaz[®] in SA. For seed distribution contact PB Seeds.

Table 1: Most-adapted chickpea varieties for each rainfall zone.

Rainfall zone (average annual rainfall)			
<400mm	400–450mm	450–500mm	>500mm
DESI			
PBA Striker ^{db}	PBA Striker ^{db}	CBA Captain ^{db}	CBA Captain ^{db}
CBA Captain ^{db}	CBA Captain ^{db}	PBA Striker ^{db}	PBA Slasher ^{db}
PBA Maiden ^{db^}	PBA Maiden ^{db^}	PBA Maiden ^{db^}	PBA Maiden ^{db^}
PBA Slasher ^{db}	PBA Slasher ^{db}	PBA Slasher ^{db}	Ambar ^{db}
Ambar ^{db}	Ambar ^{db}	Ambar ^{db}	PBA Striker ^{db}
SMALL KABULI			
Genesis™ 090	Genesis™ 090	Genesis™ 090	Genesis™ 090
MEDIUM/LARGE KABULI			
PBA Royal ^{db}	PBA Royal ^{db}	PBA Royal ^{db}	PBA Royal ^{db}
PBA Monarch ^{db}	PBA Magnus ^{db}	PBA Magnus ^{db}	PBA Magnus ^{db}
PBA Magnus ^{db}	PBA Monarch ^{db}	PBA Monarch ^{db}	PBA Monarch ^{db}
	Genesis™ Kalkee	Genesis™ Kalkee	Genesis™ Kalkee
	Almaz ^{db}	Almaz ^{db}	Almaz ^{db}

^{db} High-quality seed type.

Table 2: Agronomic and disease characteristics 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	<i>Pratylenchus neglectus</i> resistance	<i>Pratylenchus thornei</i> resistance
									Foliage	Seed			
DESI TYPE													
Ambar ^{db}	16		Light brown	Split & whole	–	Early	Early	Short-medium	S ⁱ	S	MR	MRMS ⁱ	MS ⁱ
CBA Captain ^{db}	18–20		Yellow-brown	Split & whole	Moderate	Mid	Mid	Medium-tall	MS	S	MR	MR _p	MS [^]
PBA Maiden ^{db}	21–24		Yellow-tan	Premium whole	Moderate	Early-mid	Mid	Short-medium	S	S	MS	MRMS	MRMS
PBA Slasher ^{db}	17–19		Light brown	Split & whole	Poor-mod	Mid	Mid	Short-medium	S	S	MS	MRMS	MRMS
PBA Striker ^{db}	20–22		Light brown	Split & whole	Good	Early	Early	Short-medium	S	S	MS	MRMS	MRMS
KABULI TYPE													
Almaz ^{db}	36–42	8–9	Cream	8–9mm	Poor	Mid	Mid-late	Medium-tall	S	S	MR	MRMS	S
Genesis™ 090	26–35	7–8	Cream	6–8mm	Good	Mid	Mid	Medium	MS	S	MR	MRMS	MS
Genesis™ Kalkee	40–46	8–9	Cream	8–10mm	Good	Mid-late	Late	Tall	S	S	R	MRMS	MS
PBA Magnus ^{db}	42–48	9	Cream-beige	9–10mm	Poor-mod	Mid	Mid	Medium	S	S	MRMS	MR	MS
PBA Monarch ^{db}	37–43	8–9	Cream	8–9mm	Poor-mod	Early	Early	Medium	S ⁱ	S	MS	MRMS ⁱ	MS ⁱ
PBA Royal ^{db}	39	8	Cream-beige	8–9mm	Moderate	Early-mid	Mid	Medium	MS	S	MR	MR	MS

^p = provisional data. ** AB ratings for southern region only. ⁱ No disease testing since 2019.

R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

– denotes data not available at time of publication.

Table 3: Mid North desi and kabuli chickpea yield performance. NVT data for 2016, 2017, 2018, 2019.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2020 not available due to poor seasonal conditions.

DESI						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.38	0.97	0.53	0.71	0.00
	No. trials	1	1	1	1	0
Ambar ^{db}	3	111	109	80	–	–
CBA Captain ^{db}	4	113	105	109	100	–
PBA Maiden ^{db}	4	99	98	96	102	–
PBA Slasher ^{db}	4	106	102	101	102	–
PBA Striker ^{db}	4	96	103	99	105	–
KABULI						
Variety	Mean yield t/ha	1.53	2.90	2.69	1.78	
	No. trials	1	1	1	1	
Almaz ^{db}	4	118	96	104	96	–
Genesis™ 090	4	113	105	104	104	–
Genesis™ Kalkee	4	91	97	89	90	–
PBA Magnus ^{db}	4	108	95	106	106	–
PBA Monarch ^{db}	4	84	94	100	104	–
PBA Royal ^{db}	4	122	103	106	102	–

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

– denotes no data available.

Table 4: Yorke Peninsula desi and kabuli chickpea yield performance. NVT data for 2016, 2017, 2018, 2019.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2020 not available due to poor seasonal conditions.

DESI						
Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.36	2.34	1.22	0.57	0.00
	No. trials	2	2	2	2	0
Ambar ^{db}	7	102	103	96	120	–
CBA Captain ^{db}	7	111	104	105	103	–
PBA Maiden ^{db}	8	97	99	100	98	–
PBA Slasher ^{db}	8	107	103	99	110	–
PBA Striker ^{db}	8	90	100	102	114	–
KABULI						
Variety	Mean yield t/ha	2.33	2.19	1.21	0.85	0.00
	No. trials	2	2	2	2	0
Almaz ^{db}	8	107	98	96	89	–
Genesis™ 090	8	109	103	101	109	–
Genesis™ Kalkee	8	93	94	93	86	–
PBA Magnus ^{db}	8	102	98	101	85	–
PBA Monarch ^{db}	8	86	97	103	95	–
PBA Royal ^{db}	8	115	103	99	99	–

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

– denotes no data available

LUPIN

By Amanda Pearce, SARDI, and Matt Aubert, AGT

Lupin variety choice for South Australian growers will be the same in 2022, with no new varieties released for the southern region in 2021.

AGT manages the lupin breeding program for Australian growers and in September 2019 released its first narrow-leaf lupin variety, Coyote[®]. Coyote[®] seed was available to southern region growers in 2021. Coyote[®] has consistently high yields and is widely adapted through South Australian growing regions. It has metribuzin tolerance similar to Mandelup[®] and is similar in maturity to PBA Jurien[®].

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 and cropping rotation.

Recent improvements in grain pricing for lupins and a shift towards legumes in cropping rotations may see the area grown to lupins increase in coming seasons. There is also growing interest in developing lupins for human consumption.

DOMESTIC MARKETING

Producers wanting to sell lupin grain into the Victorian and New South Wales markets must satisfy market access and transporting protocols, plus that grain is free of Anthracnose. Anthracnose grain tests are the most common method of identifying clean grain. Refer to the latest information for biosecurity requirements in Victoria (<https://agriculture.vic.gov.au/biosecurity/moving-plants-and-plant-products/plant-quarantine-manual>) and the restrictions that apply to exporting to NSW (<https://www.dpi.nsw.gov.au/biosecurity>).

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 when toxins are produced by the *Phomopsis* fungus, which may develop in the lupin stem as the plant matures. Current varieties may have levels of

resistance that slow the development of the fungus. However, when significant rains occur before and after crop maturity, fungal development can 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 that bulky crops, crop-topping and tight lupin rotations aid the development of the fungus and can increase the risk of lupinosis.

LUPIN AGRONOMY

A common problem reported by SA growers is the poor emergence and establishment of lupin crops. This affects early vigour, but it also 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 growers in recent seasons. Lupin plants have a high demand for manganese during grain development and maturity. Manganese deficiency can negatively influence grain development and cause it 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 2–2.5cm long.

NOTES ON SELECTED NARROW-LEAFED LUPIN VARIETIES

COYOTE[®]

Coyote[®] (tested as WALAN2546) was released in Western Australia in the spring of 2019. It is high yielding, setting a new benchmark for lupin varieties across South Australia. It has metribuzin tolerance similar to Mandelup[®]. It has similar maturity to PBA Jurien[®], which is slightly later than Mandelup[®]. It has a provisional MR (P) rating for Anthracnose and provisional MR (P) rating for cucumber mosaic virus. Coyote's[®] rating to Phomopsis stem infection is susceptible (S) (P), which is lower than other varieties available. Where the risk of Phomopsis is high, monitor livestock when grazing stubbles or remove grazing livestock completely. Coyote[®] is licensed to AGT and an end point royalty applies.

JENABILLUP[®]

Jenabillup[®] has been extensively evaluated 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 for crop-topping. Jenabillup[®] does not have tolerance to metribuzin herbicide and has a moderately susceptible (MS) rating to Anthracnose. It is licensed to Seednet and an end point royalty applies.

MANDELUP[®]

Mandelup[®] is widely adapted to SA conditions and is established as a leading variety. Mandelup[®] is tall with good early vigour and very early flowering and maturity. This makes it well suited to low-medium rainfall districts while still yielding well in higher-rainfall areas. Its early maturity makes it suitable for crop-topping, with careful attention to correct timing. Mandelup[®] has an MRMS rating for Anthracnose and RMR to Phomopsis stem infection. It can suffer pod loss/partial pod shattering with delayed harvest, and seed quality can suffer if wet conditions occur during harvest. Mandelup[®] is licensed to Barenbrug and an end point royalty applies.

PBA BARLOCK[®]

PBA Barlock[®] (tested as WALAN2325) was released in WA in spring 2013. It has improved metribuzin tolerance over the older varieties Tanjil and Wonga, allowing growers to use metribuzin for weed control. PBA Barlock[®] is moderately resistant to lodging in high-rainfall regions and shows improved pod shatter resistance compared with Mandelup[®]. It has a RMR rating for Anthracnose and MR rating for Phomopsis stem infection. PBA Barlock[®] is licensed to Seednet and an end point royalty applies.

PBA BATEMAN[®]

PBA Bateman[®] (tested as WALAN2533) was released in the eastern states in the spring of 2017. It has an MRMS (P) rating for Anthracnose and MR (P) for cucumber mosaic virus. PBA Bateman[®] has similar agronomic features 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 licensed to Seednet and an end point royalty applies.

PBA GUNYIDI[®]

PBA Gunyidi[®] (tested as WALAN2289) 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[®] has an MRMS rating for Anthracnose and RMR for Phomopsis stem infection. It flowers and matures slightly later than Mandelup[®]. PBA Gunyidi[®] is licensed to Seednet and an end point royalty applies.

PBA JURIE[®]

PBA Jurien[®] (tested as WALAN2385) was released in WA in spring 2015. It has a RMR rating for Anthracnose and a RMR rating for Phomopsis stem infection. Although rated RMR 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. It is like Mandelup[®] in height and can be moderately susceptible to 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 licensed to Seednet and an end point royalty applies.

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

Rainfall zone (average annual rainfall)		
Low <375mm	Medium 375–500mm	High >500mm
Coyote ^{db}	Coyote ^{db}	Coyote ^{db}
PBA Bateman ^{db}	PBA Bateman ^{db}	PBA Bateman ^{db}
PBA Jurien ^{db}	PBA Jurien ^{db}	PBA Gunyidi ^{db}
PBA Gunyidi ^{db}	PBA Gunyidi ^{db}	PBA Barlock ^{db}
Mandelup ^{db}	PBA Barlock ^{db}	Jenabillup ^{db}
PBA Barlock ^{db}	Mandelup ^{db}	PBA Jurien ^{db}

Table 2: Disease resistance characteristics of lupin varieties.

Variety	Anthraxnose	Bean yellow mosaic virus	Brown leaf spot	Cucumber mosaic virus	Phomopsis (pod infection)	Phomopsis (stem infection)	Pleiochaeta root rot
Coyote ^{db}	MR _p	–	MS _p	MR _p	MRMS _p	Sp	MR _p
Jenabillup ^{db}	MS	MR	MRMS	MRMS _p	MR	MS	MR _p
Mandelup ^{db}	MRMS	S	MS	MRMS _p	MS	RMR	MRMS _p
PBA Barlock ^{db}	RMR	MS	MS	MR _p	MR	MR	MRMS
PBA Bateman ^{db}	MRMS _p	MR	MS	MR _p	MS	RMR	MR _p
PBA Gunyidi ^{db}	MRMS	MS	MS	MS _p	MRMS	RMR	MR _p
PBA Jurien ^{db}	RMR	MR	MS	MS _p	MR	RMR	MR

Source: NVT Disease Ratings, www.nvt.grdc.com.au

R = resistant, R-MR = resistant to moderately resistant, MR = moderately resistant, MRMS = moderately resistant to moderately susceptible, MS = moderately susceptible, S = susceptible, VS = very susceptible

_p = provisional ratings

Disease rating definitions: https://nvt.grdc.com.au/_data/assets/pdf_file/0032/447098/NVT-disease-ratings_June-2021.pdf

Table 3: Mid North lupin yield performance. NVT data for 2016, 2017 and 2019.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2018 and 2020 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.83	1.96	0.00	1.47	0.00
	No. trials	1	1	0	1	0
Coyote ^{db}	2	119	104	–	–	–
Jenabillup ^{db}	3	87	96	–	106	–
Jindalee	3	70	91	–	74	–
Mandelup ^{db}	3	99	99	–	98	–
PBA Barlock ^{db}	3	98	95	–	100	–
PBA Bateman ^{db}	2	109	–	–	112	–
PBA Gunyidi ^{db}	3	110	103	–	107	–
PBA Jurien ^{db}	3	111	98	–	104	–
Wonga	3	74	92	–	93	–

– denotes no data available.

Table 4: Lower Eyre Peninsula lupin yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.32	1.11	2.90	1.26	2.02
	No. trials	1	1	1	1	1
Coyote ^{db}	4	112	104	115	–	105
Jenabillup ^{db}	5	106	98	92	87	101
Jindalee	4	83	91	–	88	89
Mandelup ^{db}	4	99	98	–	95	98
PBA Barlock ^{db}	4	103	94	–	76	93
PBA Bateman ^{db}	4	108	–	107	103	105
PBA Gunyidi ^{db}	4	105	103	–	105	103
PBA Jurien ^{db}	4	105	96	–	81	93
Wonga	5	96	94	82	83	96

– denotes no data available.

Table 5: South East lupin yield performance. NVT data 2016–2020.

Long-term yield expressed as a percentage of mean yield.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	3.12	1.94	1.42	2.17	2.77
	No. trials	3	2	1	2	3
Coyote ^{db}	9	111	109	108	–	112
Jenabillup ^{db}	11	103	100	92	104	97
Jindalee	10	84	84	–	89	80
Mandelup ^{db}	10	99	98	–	96	98
PBA Barlock ^{db}	10	104	97	–	90	94
PBA Bateman ^{db}	9	107	–	105	106	107
PBA Gunyidi ^{db}	10	104	105	–	103	106
PBA Jurien ^{db}	10	107	100	–	88	99
Wonga	11	95	92	85	98	87

– denotes no data available.

Table 6: Murray Mallee lupin yield performance. NVT data for 2016 only.*

Long-term yield expressed as a percentage of mean yield.

*Data for 2017, 2018, 2019 and 2020 not available due to poor seasonal conditions.

Variety	Year	2016	2017	2018	2019	2020
	Mean yield t/ha	2.82	0.00	0.00	0.00	0.00
	No. trials	1	0	0	0	0
Coyote ^{db}	1	114	–	–	–	–
Jenabillup ^{db}	1	96	–	–	–	–
Jindalee	1	79	–	–	–	–
Mandelup ^{db}	1	99	–	–	–	–
PBA Barlock ^{db}	1	100	–	–	–	–
PBA Bateman ^{db}	1	108	–	–	–	–
PBA Gunyidi ^{db}	1	106	–	–	–	–
PBA Jurien ^{db}	1	107	–	–	–	–
Wonga	1	86	–	–	–	–

– denotes no data available.

VETCH

By Stuart Nagel, Angus Kennedy and Gregg Kirby, SARDI

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

Grain or multi-purpose vetches are grown in the lower to mid-rainfall cereal areas of southern Australia and their grain yields have been similar to field pea. Note that common vetch grain is not used for human consumption.

Grain from Morava, Studenica[®], Rasina[®], Volga[®] and Timok[®] can be used without limit to feed all ruminants and up to 20 per cent in the diet of pigs. These five varieties possess less toxin in grain (<0.65 per cent) compared with Blanchefleur (0.95 per cent) and Languedoc (1.65 per cent).

Forage vetches are used for hay, green manure or mid to late-winter feed for grazing. There is a purple vetch (*Vicia benghalensis*) variety, Popany, and woolly pod vetch (*Vicia villosa*) 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 CANNOT be used to feed any livestock.

Vetch is valued for its benefits to subsequent cereal and oilseed 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 better stubble retention in the soil.

Morava, Studenica[®], 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, and 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.

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. This disease is generally less severe than Botrytis grey mould (BGM), which can develop high levels of infestation in cool/wet growing seasons.

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

Vetch variety characteristics are summarised in the following tables.

Table 1 contains information on adaptation of vetch varieties for grain production in different rainfall zones.

Table 2 contains information on selection of common and woolly pod vetch varieties for hay/silage, grazing and green manuring in different rainfall zones.

Table 3 provides varietal information on the most important criteria to consider for vetch grain and hay crops: yield potential, disease resistance, maturity, shattering resistance and hard seed percentage.

Table 4 displays yield results for grain and dry matter production of common vetch varieties tested at five sites over five years in South Australia by the Australian National Vetch Breeding Program (ANVBP).

Table 5 provides dry matter yield results for woolly pod and purple vetch varieties tested in SA by ANVBP.

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

Table 7 summarises dry matter yields at low-rainfall Mallee sites in SA and Victoria, cut in August to show early growth potential.

When selecting a vetch variety, growers also need to consider their individual farm and paddock situations and, most importantly, the intended end-use for the crop. Selections should be made using all of the available information.

NOTES ON VARIETIES

COMMON VETCH (*VICIA SATIVA*)

Studenica[®] is a new white-flowering variety of common vetch that became commercially available for sowing in 2021. It has the earliest flowering and maturity of the common vetches, flowering in approximately 85 to 90 days. It is rust resistant but susceptible to Botrytis, like other common vetch varieties. Studenica[®] has toxin/anti-nutritional (BCN) levels similar to Morava.

The advantage of Studenica[®] over other varieties is its superior winter growth and vigour combined with good frost tolerance, which enable it to put on more bulk through the cold parts of winter and provide fodder earlier in the season. It is particularly well suited to low-rainfall marginal cropping/mixed farming systems requiring early feed to fill the winter feed gap or late planting for spring fodder and hay. It offers a more reliable legume option in mixed enterprises in marginal cropping environments.

Studenica[®] has grain yields comparable with Timok[®] and Volga[®] in most environments. Its early growth and vigour sets it apart, particularly in cold environments, as demonstrated in Table 7. It is a multi-purpose variety – it can be used for grain, hay/silage, grazing or green/brown manure. It can be successfully grown in many Australian soil types, from non-wetting sand to heavy clay loam with pH 5.8 to 9.4, like other common vetch varieties.

Studenica[®] was bred, developed and trialled by the ANVBP in conjunction with GRDC and SAGIT and it is available from S&W Seeds.

LANGUEDOC

Languedoc is an early flowering and maturing variety recommended for low-rainfall areas, although it 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 five to 10 per cent and it is highly susceptible to rust. Languedoc grains possess 1.0 to 1.6 per cent anti-nutritional compound (BCN).

BLANCHEFLEUR

Before the release of Morava, Blanchefleur was 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. It is very susceptible to rust and 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 the Australian Quarantine and Inspection Service due to the vetch–lentil substitution issue. This has meant export markets of orange cotyledon varieties such as Blanchefleur are limited to small bird seed markets in Europe and seed for grazing and green manure crops. Blanchefleur grains possess 0.9 to 1.6 per cent BCN.

CUMMINS

Cummins is 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 moderately susceptible to Ascochyta blight. It possesses a similar percentage of BCN to Blanchefleur.

MORAVA

Morava is a rust-resistant, late-flowering variety with 100 per cent soft seeds, developed in 1998 by the ANVBP at SARDI. 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.

Morava's BCN level is 0.65 per cent, which is 50 per cent lower than Blanchefleur and Languedoc. Morava produces higher herbage yields than all other common vetch varieties. It 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 it produces very high biomass in wet/cool zones. It can be sourced from Barenbrug Australia.

RASINA[®]

Rasina[®] is a soft-seeded vetch developed in 2006 by the ANVBP. Rasina[®] replaces Languedoc, Blanchefleur and Cummins in low to medium-rainfall areas for grain production. It is five to 10 days earlier than Blanchefleur and 10 to 15 days earlier than Morava. Rasina[®] has a significant advantage in rust resistance over Languedoc, Blanchefleur and Cummins and it is slightly more tolerant to Ascochyta blight and Botrytis.

Rasina[®] is not expected to replace Morava in higher-rainfall districts or for hay production. Its level of anti-nutritional factors is between 0.6 per cent and 0.8 per cent, compared with 0.9 per cent to 1.6 per cent in Blanchefleur and Languedoc. Rasina[®] possesses a distinctive uniform dark-brown speckled seed coat with dark beige cotyledons. It can be sourced from Barenbrug Australia.

VOLGA[®]

Volga[®] was developed in 2012 by the ANVBP at SARDI. It is a 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; dry periods in September and October are common in many low to mid-rainfall areas.

Volga[®] has good initial establishment, is rust-resistant, and earlier flowering and maturing than Blanchefleur and Rasina[®]. It will improve the reliability and economic production of vetch in crop rotations, especially in low and mid-rainfall areas of 330 to 380mm per year.

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 because of its early flowering and maturity characteristics.

It can be successfully grown in many Australian soil types, from non-wetting sand to heavy clay loam with pH 5.8 to 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, such as Morava, in high-rainfall areas.

Toxin levels in the grain are around 0.54 per cent, lower than Morava at 0.65 per cent and Blanchefleur 0.95 per cent. Volga[®] seed size is very similar to Morava (100 seed weight, 7.82g). Volga[®] can be sourced from Barenbrug Australia.

TIMOK[®]

Timok[®] was bred to complement Morava in mid to high-rainfall areas for grain/seed and especially for hay/silage production. Timok[®] yielded more grain than Rasina[®], Morava and Blanchefleur by nine per cent, 18 per cent and 21 per cent, respectively, over five years at five sites in SA (Table 4).

Timok[®] has better initial establishment than Morava and will improve the reliability and economics of vetch production in crop rotations, especially in mid and high-rainfall areas, 350 to 450mm per year. Morava will remain the preferred variety for hay/silage in rainfall areas with greater than 450mm per year.

Timok[®] is high yielding, highly rust resistant, susceptible to Ascochyta blight and susceptible to Botrytis. It has good early establishment and is a soft-seeded variety. It matures between Rasina[®] and Morava (approximately 105 days from seeding to full flowering).

Timok[®] is very well adapted for grain production in rainfall areas greater than 380mm/year, and dry matter production is similar to Morava in high-rainfall regions (greater than 400mm/year). In low to medium-rainfall regions (330 to 380mm/year) dry matter production from Timok[®] is 19 per cent higher than Morava. Timok[®] is a multi-purpose variety – it can be used for grain, hay/silage, grazing or green/brown manure.

Toxin levels in Timok[®] grain are around 0.57 per cent. Seed weight is 6.88g per 100 seeds, similar in size to Rasina[®] at 6.92g per 100 seeds. It was developed in 2012 by ANVBP at SARDI. Timok[®] can be sourced from S&W Seeds.

HERBICIDE TOLERANCE

There are no differences between common vetch varieties to registered herbicides for control of broadleaf weeds and no differences between varieties to registered herbicides for grass weed control.

PURPLE VETCH

POPANY

Popany is a purple vetch (*Vicia benghalensis*) variety. Grain yield is significantly lower than for common vetch. Seeds are smaller than common vetch, therefore the seeding rates are lower at approximately 30 to 35kg/ha.

Grain from this variety can be used as a bird feed in mixtures with other recommended grains. Popany is a late-maturing variety, requiring more than 125 days from seeding to podding. It is a good variety in mid to high-rainfall areas for hay/silage. Popany possesses five to 10 per cent hard seeds. It is resistant to rust but susceptible to Ascochyta and chocolate spot. It has a black seed coat with distinctive white hilum.

WOOLLY POD VETCHES

CAPELLO and HAYMAKER

These woolly pod vetches (*Vicia villosa* subsp. *dasycarpa*) are lower in grain yield compared with common vetches but are much higher in dry matter production in rainfall areas greater than 450mm/year. 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 or once plants begin to develop seeds in pods. These two varieties are very good for hay/silage production in areas with more than 400mm of annual rainfall.

Haymaker and Capello are selected soft-seed varieties from Namoi. In the past few years these two varieties have become prone to setting hard (dormant) seeds. Both varieties are owned by Barenbrug Australia.

RM4[®]

RM4[®] (*Vicia villosa* subsp. *eriocarpa*) was selected by ANVBP at SARDI. It is a high producer of dry matter, has very good early establishment, is moderately resistant to Ascochyta blight, and is susceptible to Botrytis. It is a soft-seeded variety (greater than 94 per cent), emerges in 15 to 20 days and is earlier in maturity by 10 to 15 days than Haymaker or Capello.

RM4[®] is significantly higher in dry matter production in mid to low-rainfall areas (less than 380mm/year) than Haymaker or Capello. It is also suitable for higher-rainfall areas (400 to 650mm/year). RM4[®] is a multipurpose variety that can be used for hay/silage, grazing, green/brown manure or for seed. It can be successfully grown, like other woolly pod varieties, in many Australian soil types. It is excellent for soil fertility/structure and nitrogen fixation. It can be grazed from 10 nodes up to the end of flowering and can be used for hay/silage production where cutting in full flowering provides the best balance of feed value. RM4[®] performs better in grain production than other woolly pod varieties when the season finishes sharply.

RM4[®] is not sensitive to any herbicides registered for use in woolly pod vetch varieties. It is susceptible in early growth stages to red-legged earth mite and lucerne flea, like other woolly pod vetch varieties. RM4[®] is also 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 CANNOT be used to feed any livestock. RM4[®] can be sourced from Barenbrug Australia.

Table 1: Vetch grain variety rainfall zones.

Rainfall zone (average annual rainfall)				
<350mm	350–400mm	400–450mm	450–600mm	>600mm
Rasina ^{db}	Rasina ^{db}	Morava	Morava	Morava
Studenica ^{db}	Blanchefleur	Rasina ^{db}	Rasina ^{db}	Timok ^{db}
Volga ^{db}	Studenica ^{db}	Blanchefleur	Timok ^{db}	
Timok ^{db}	Morava	Cummins		
	Volga ^{db}	Volga ^{db}		
	Timok ^{db}	Timok ^{db}		

Table 2: Vetch hay/silage/grazing and green manuring variety rainfall zones.

Rainfall zone (average annual rainfall)				
<350mm	350–400mm	400–450mm	450–600mm	>600mm
Rasina ^{db}	Rasina ^{db}	Morava	Morava	Capello
Blanchefleur	Morava	Rasina ^{db}	Popany	Haymaker
Studenica ^{db}	Studenica ^{db}	Popany	Capello	Morava
Morava	Popany	Capello	Haymaker	Popany
Volga ^{db}	Blanchefleur	Haymaker	Timok ^{db}	Timok ^{db}
Timok ^{db}	Volga ^{db}	Volga ^{db}	RM4 ^{db}	RM4 ^{db}
RM4 ^{db}	Timok ^{db}	Timok ^{db}		
	RM4 ^{db}	RM4 ^{db}		

Table 3: Characteristics of selected vetch varieties.

Variety	Maturity	Yield potential		Flower colour	% of		Disease reaction		
		Grain	Dry matter		Pod shattering	Hard seeds	Rust	Ascochyta	Botrytis
COMMON VETCH VARIETIES (<i>VICIA SATIVA</i>)									
Blanchefleur	Mid	High	Moderate	White	5–10	5–10	VS	MR	S
Studenica ^{db}	Very early	High	High	White	0–2	0	R	MS	S
Morava	Late	High	High	Purple	0	0	R	S	VS
Rasina ^{db}	Early-mid	High	Moderate	Purple	0–2	0	R	MS	S
Volga ^{db}	Early	Very high	High	Purple	0–2	2–5	R	MS	S
Timok ^{db}	Mid	High	Very high	Purple	0–2	0–2	R	MS	S
PURPLE VETCH (<i>VICIA BENGHALENSIS</i> SUBSP. <i>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 ^{db}	Mid	Moderate	Very high	Purple	2–5	2–5	R	MS	VS

Table 4: Grain and dry matter yield for common vetch varieties.

Five sites over five years in SA, 2016 to 2020.

Variety	Grain yield (t/ha)	% of Volga ^{db}	Dry matter yield (t/ha)	% of Morava
Studenica ^{db}	1.7	86	4.7	92
Rasina ^{db}	1.8	92		
Morava	1.6	82	5.1	100
Volga ^{db}	1.9	100	4.8	94
Timok ^{db}	1.9	100	4.9	96
Mean yield	1.8		4.9	

Table 5: Woolly pod and purple vetch varieties.

Variety	Dry matter (t/ha)	% of Capello
WOOLLY POD VETCH VARIETY		
Capello	5.7	100
RM4 [Ⓛ]	5.9	104
Mean yield	5.8	
PURPLE VETCH VARIETY		
Popany	5.28 (2009–12)	84.75

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

Table 7: 2018 dry matter yields, t/ha, at low-rainfall Mallee sites in SA and Victoria, cut in August to show early growth.

Line	Waikerie 15 August	Walpeup 25 August
Studenica [Ⓛ]	4.81	3.22
Morava	3.69	1.71
Rasina [Ⓛ]	3.96	
Timok [Ⓛ]	3.75	2.11
Volga [Ⓛ]	4.21	2.19

NOTES

NOTES



	INTRO
	WHEAT
	BARLEY
	OAT
	CANOLA
	FABA BEAN
	LENTIL
	FIELD PEA
	CHICKPEA
	LUPIN
	VETCH
	NOTES

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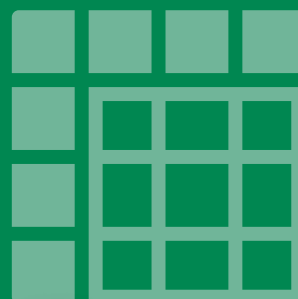
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