

2018 SOWING GUIDE



SOUTH AUSTRALIA



WHAT TO SOW NEXT SEASON

> THE ESSENTIAL GUIDE TO THE MOST SUITABLE VARIETIES

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SA GRAIN GROWERS FUNDING RESEARCH SOLUTIONS

SAGIT has invested almost \$3 million in new projects in 2017-18 supporting research crucial to the advancement of the industry with funds from the 30c/tonne contribution on all grain delivered by SA growers.

This year, SAGIT is investing in 26 projects including:

- Cereal Aphid Risk Assessment
- Common vetch as a break crop for marginal cropping systems
- Copper management
- Developing new capability for research on Rhizoctonia
- Development of dual purpose awnless wheat varieties for frost management
- Development of wheat population using speed breeding for salinity tolerance
- Efficiency of fertiliser N products on calcareous and sandy soil types
- Enhanced N-use efficiency in durum through improved genetics
- Enhancing diagnostics and extension for Khapra Beetle
- AquaTill demonstration field day
- Field testing of sodicity and salinity-tolerant oat varieties
- Further development of crown rot resistance in durums
- Increasing understanding of micronutrient deficiency in the Upper North
- Improving monitoring and management of etiology in lentils
- MacKillop Farm Management Group Annual Trial Results Book
- Optimisation of Seed Terminator settings in the SA context
- Publication of the 2018 Farm Gross Margin Guide
- Regional internship in applied grains research
- SA Crop Variety Sowing Guide
- SANTFA Conference 2018 – 2020
- Seed to Store video clip competition
- Spading header rows for grass control, yields & soil protection
- Swathing for barley grass weed seed collection and applying drone technology
- Towards molecular selection for heat stress tolerance in field pea
- Uniform seed distribution along the row to increase yields and reduce seed costs
- Use of drones to non-destructively assess wheat varieties

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

And, remember to follow SAGIT on social media!



South Australian Crop Variety Sowing Guide

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

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

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

The use of National Variety Trial (NVT) results and the analysis of individual and long term trial results by officers within Statistics for Australian Grains Industry (SAGI) and the Australian Crop Accreditation Service (ACAS) is also most appreciated.

Farmer cooperators are also to be thanked for the use of their land for the trials which have resulted in the data and information contained in this edition of the SA Sowing Guide.

All yield data presented in this edition is generated from GRDC funded NVT and PBA breeding trials. The yield data is presented in yield brackets using Multi Environment Trial (MET) analysis results for South Australia. Long Term MET results are currently the most accurate and reliable means of interpreting variety performance across sites and years.

The yield results presented in this edition are derived from the same information found in the NVT long term app. Available space in this document precluded presenting yield information at a local level. Growers and advisors are encouraged to refer to the app to for more specific local information. The app can be found at:

<http://nvtonline.com.au>

Cover photo: SAGIT

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A new yield high yielding milling oat, Kowari, has been released for South Australian growers in 2017.

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52 Lentils

No new lentil varieties were released in 2017. Red lentil PBA Jumbo2 is currently the highest yielding Australian variety with good disease resistance.

56 Chickpeas

A change in the virulence of ascochyta blight pathogen now means all current varieties are either rated as susceptible or moderately susceptible in South Australia.

60 Field Peas

New field pea, PBA Butler released offering growers a high yielding Kasper type pea with broad adaption.

Important notice: Although Primary Industries and Regions South Australia (PIRSA) and staff of SARDI's Sustainable Systems have taken all reasonable care in preparing information contained in this SA Crop Variety Sowing Guide, neither PIRSA, SARDI, nor their officers, staff or suppliers involved in the editing and production of this magazine accept any liability resulting from the interpretation or use of the information set out in this document. Information contained in this document is subject to change without notice.

Plant Breeder's Rights information and variety update for 2018

By Andrew Ware and Peter McCormack, SARDI

KEY POINTS

- Almost all recently new varieties are protected by PBR and growers need to be aware of the implications.
- Seed of varieties with PBR protection can only be bought from the owner, commercial partner/licensee or an agent (seed merchant) authorised by the owner, although "farmer to farmer trading" is allowed for some wheat varieties.
- Once purchased, growers can maintain seed of a variety with PBR protection to satisfy their seed requirements for the following season.
- Farmers can sell the products of a protected variety for commercial use as feed or food (e.g. deliver to Glencore, flourmill or sell as animal feed) unless bound by a 'closed loop' contract.
- Farmers cannot sell, trade or give away the variety for seed without authorization of the owner.
- Farmer to farmer trading of seed without authorisation of the owner will make them liable to prosecution.
- Commercial marketing arrangements between the owners and the licensee can vary between crops and varieties, and farmers must be aware of the conditions of the marketing arrangements.
- Before you take delivery of certified seed of a new variety, you are encouraged to request a copy of the paddock inspection report and the certificate of analysis report. It is important that you read the information contained in the inspection report and the seed analysis certificate to make sure you are buying the best available seed.
- When purchasing seed of a PBR Cultivar you should purchase it in the name or names of the entity or entities in which you intend to deliver. You should retain invoices to prove that you have entitlement to that seed and the crop produced.
- If farmers are unsure, they should seek information from the owner, commercial partner/licensee or the selling agent (seed merchant).

Plant Breeder's Rights

PBR was introduced to stimulate private investment in plant breeding by conferring ownership rights to varieties and thereby the potential to market those rights as part of a commercialisation process.

The Plant Breeder's Rights Act 1994 as amended act no:148 2002 gives an owner of PBR the exclusive right to sell, produce or reproduce, import, export, stock or condition the seed of a variety protected by PBR (or license another person or organisation to undertake these activities).

The rights are similar to patents or copyright, (these record ownership of the genetic material) and are administered under the Act. PBR protection can last up to 20 years for broadacre crops.

PBR guarantee ownership of a variety but do not specify how the variety should be commercialised or whether or where royalties should be charged.

In the absence of a contract stating otherwise, farmers can sell the harvest of a protected variety for direct consumption as food or feed (for example, deliver it for animal feed or to a flour mill) but they are not permitted to sell, trade or give away the variety for seed without the authorisation of the owners or licensee.

Royalties

- The concept generally referred to as 'end point royalty' collection gives the licensee the right to collect royalties on harvested grain.
- Increasingly more varieties being grown by farmers use the 'end point royalty' method of royalty collection.
- Farmers should carefully read any documentation provided to be fully aware of the conditions when purchasing seed of a variety. While the restrictions in the use of seed under the PBR Act are clearly defined, other contractual arrangements may have been imposed by the licensee following agreement by the owners. For example, some contracts specify that the harvested grain must be delivered to certain collection agencies; these are commonly called 'closed loop' marketing arrangements or that EPR's are on total grain production of the variety excluding seed saved for the following years production, 'farmer saved seed'.
- In some instances growers are permitted to trade "farmer to farmer" subject to a three party agreement involving the farmers and the licensee. This currently applies to varieties including: Axe, Cobra, Correll, Emu Rock, Espada, Estoc, Gladius, Mace, Scout, Scepter and Trojan wheats. ■

PLANT BREEDERS' RIGHTS

WHEAT						
Variety	Owner	Year of registration	Commercial partner/ licensee	Royalty Type (\$/tonne ex.GST)	Maximum quality in SA	Comments
AGT Katana	AGT	2009	AGT#	EPR \$3.00	AH	Tested as RAC1423
Axe	AGT	2007	AGT#	EPR \$2.50	AH	Tested as RAC1192
Beckom	AGT	2015	AGT#	EPR \$3.25	AH	Tested as VO6008-14
Bolac	DPI (Vic)	2006	Seednet	EPR \$2.10	AH	Tested as VQ2621
Caparoi	NSW DPI	2008	Seednet	EPR \$2.60	APDR1	Tested as TD60F
Chief ^{CL Plus}	InterGrain	2016	InterGrain	EPR \$4.25	APW	Tested as IGW6089
Corack	AGT	2011	AGT#	EPR \$3.00	APW	Tested as VW2316
Correll	AGT	2006	AGT#	EPR \$2.00	AH	Tested as WI23322
Cosmick	InterGrain	2014	InterGrain	EPR \$3.85	AH	Tested as IGW3423
Cutlass	AGT	2015	AGT#	EPR \$3.00	APW	Tested as RAC2069
DBA-Aurora	Uni of Adelaide	2014	Durum Growers Assoc	EPR \$3.00	APDR1	Tested as UAD951096
DS Darwin	Dow Seeds	2015	Seednet	EPR \$4.25	AH	Tested as ADV03.0056
DS Pascal	Dow Seeds	2016	Seednet	EPR \$4.25	APW	Tested as ADV08.0062
Emu Rock	InterGrain	2011	InterGrain#	EPR \$3.50	AH	Tested as IGW3167
Espada	AGT	2008	AGT#	EPR \$2.50	APW	Tested as RAC1263
Estoc	AGT	2010	AGT#	EPR \$3.00	APW	Tested as RAC1412
Gladius	AGT	2006	AGT#	EPR \$2.50	AH	Tested as RAC1262
Grenade ^{CL Plus}	AGT	2012	AGT	EPR \$3.80	AH	Tested as RAC1689R
Harper	Intergrain	2013	Intergrain#	EPR \$3.80	APW	Tested as IGW3170
Hatchet ^{CL Plus}	AGT	2015	AGT	EPR \$3.80	AH	Tested as RAC1843
Hyperno	AGT	2009	AGT/DGA	EPR \$3.00	APDR1	Tested as WID22209
Justica ^{CL Plus}	AGT	2011	AGT	EPR \$3.55	APW	Tested as RAC1683
Kord ^{CL Plus}	AGT	2011	AGT	EPR \$3.55	AH	Tested as RAC 1669R
LongReach Arrow	Longreach PB	2016	Advanta Seeds	EPR \$3.00	AH	Tested as LPB11-1728
Longreach Catalina	Longreach PB	2006	Seednet	EPR \$2.50	AH	Tested as LRPB0268
Longreach Cobra	Longreach PB	2011	Advanta Seeds#	EPR \$3.50	AH	Tested as LPB07-0956
Longreach Impala	Longreach PB	2011	Advanta Seeds	EPR \$3.50	ASFT	Tested as C51021
Longreach Kittyhawk	Longreach PB	2017	Advanta Seeds	EPR \$4.25	AH	Tested as LPB11-0140
Longreach Orion	Longreach PB	2010	Advanta Seeds#	EPR \$3.00	ASFT	Tested as LRPB04-2039
Longreach Phantom	Longreach PB	2012	Advanta Seeds#	EPR \$3.80	AH	Tested as LPB06-1040
Longreach Scout	Longreach PB	2007	Advanta Seeds#	EPR \$2.80	AH	Tested as LPB05-1164
Longreach Trojan	Longreach PB	2013	Advanta Seeds#	EPR \$4.00	APW	Tested as LPB08-1799
Mace	AGT	2007	AGT#	EPR \$3.00	AH	Tested as RAC 1372
Manning	Ausgrainz	2013	Grainsearch	EPR \$3.50	Feed	Tested as WAWHT2726
Peake	Nugrain	2007	Seedcell	EPR \$2.95	AH	Tested as NGSP006
Saintly	AGT	2009	AGT/DGA	EPR \$3.00	APDR1	Tested as WID22279
Scepter	AGT	2015	AGT#	EPR \$3.25	AH	Tested as RAC2182
Shield	AGT	2012	AGT#	EPR \$3.25	AH	Tested as RAC1718
Tenfour	Edstar	2015	Elders	EPR \$3.00	Feed	Tested as SMBW12-086
Tjilkuri	Uni of Adelaide	2010	Durum Growers Assoc	EPR \$3.00	APDR1	Tested as WID801
WID802	Uni of Adelaide	2012	Durum Growers Assoc	EPR \$3.00	APDR1	Tested as WID802
Wyalkatchem	InterGrain	2001	InterGrain#	EPR \$1.92	APW	Tested as WAWHT2212
Yawa	Uni of Adelaide	2012	Durum Growers Assoc	EPR \$3.00	APDR1	Tested as WID803
Yitpi	Uni of Adelaide	1999	Seednet	EPR \$1.00	AH	Tested as WI96080

All the varieties listed above are PBR varieties and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

* These varieties may have 'End Point' (EP) royalty or 'grazing fee' depending on the 'end use' of the crop.

Growers purchasing seed of any of these varieties should seek information from the agent (seed merchant), or licensee regarding the type of royalty payment to be made.

Farmer to Farmer trading of varieties including Axe, Cobra, Emu Rock, Espada, Estoc, Gladius, Correll, Corack, Mace, Scout, Scepter and Trojan is allowed subject to an agreement with the licensee where the original seed was purchased through a recognized retailer.

PLANT BREEDERS' RIGHTS

BARLEY						
Variety	Owner	Year of registration	Commercial partner/ licensee	Royalty Type (\$/tonne ex.GST)	Maximum quality in SA	Comments
Admiral	UofA / Joe White Maltings		Seednet	EPR \$4.00	Malting	Tested as WI4259
Alestar	Edstar	2016	Elders	EPR \$3.00	Pending classif	Tested as SMBA1-2341
Bass	Intergrain	2011	Intergrain	EPR \$3.50	Malting	Tested as WABAR2315
Charger	UofA / Carlsberg	2013	Aust Grain Growers Co-op	Closed loop	Malting	Tested as Ca412402
Commander	UofA	2008	Seednet	EPR \$3.80	Malting	Tested as WI3416
Compass	UofA	2013	Seednet	EPR \$3.80	Pending classif	Tested as WI4593
Fathom	UofA	2011	Seednet	EPR \$2.00	Feed	Tested as WI4483
Flagship	UofA	2005	Seednet/Heritage seeds	EPR \$1.80	Malting	Tested as WI3408
Flinders	Intergrain	2012	Syngenta	EPR \$3.80	Malting	Tested as WABAR2537
Fleet	UofA	2006	Seednet	EPR \$1.50	Feed	Tested as WI3804
GrangeR	Nickersons	2010	Heritage seeds	EPR \$2.95	Malting	Tested as SMBA09-3353
Hindmarsh	AVS	2006	Seednet	EPR \$1.50	Food	Tested as VB0324
LaTrobe	Intergrain	2013	Intergrain/Syngenta	EPR \$4.00#	Malt	Tested as IGB1101
Maltstar	Edstar	2016	Elders	EPR \$3.00	Pending classif	Tested as SMBA11-1771
Maritime	UofA	2002	Seednet	EPR \$1.50	Feed	Tested as WI3297
Navigator	UofA	2011	Seednet	EPR \$3.80	Malt	Tested as WI 4262
Oxford	Nickersons	2009	Heritage seeds	EPR \$2.50	Feed	
RGT Planet	RGT Semences	2016	Seed Force	EPR \$4.00	Pending classif	Tested as SF85-014
Rosalind	Intergrain	2015	Intergrain/Syngenta	EPR \$3.50	Feed	Tested as IGB1302
Scope ^{CL}	AVS	2009	Seednet	EPR \$3.50	Malt	Tested as VB0805
Sloop SA	UofA	2002	Seednet/Heritage seeds	EPR \$1.70	Malting	Tested as WI3167
SouthernStar	UofA / Sapporo	2013		EPR \$3.80	Malting	
ShineStar	UofA / Sapporo	2015			Malting	Tested as SC11001-37
Spartacus	Intergrain	2015	Intergrain/Syngenta	EPR \$4.25	Pending classif	Tested as IGB1334T
Westminster	Nickersons	2010	Grainsearch	EPR \$3.00	Malting	Tested as GS 5033
Spartacus ^{CL}	Intergrain	2015	Intergrain/Syngenta	EPR \$4.25	Pending classif	Tested as IGB1334T
Wimmera	UofA	2011			Pending classif	Tested as VB0432
Westminster	Nickersons	2010	Grainsearch	EPR \$3.00	Malting	Tested as GS 5033

Most of the varieties listed above are PBR varieties and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

Some malting quality varieties attract a lower EPR when grain is sold as feed quality. These included, Flagship (EPR \$1.50 – feed), Vlamingh (EPR \$1.50 – feed)

Farmer to Farmer trading of varieties including La Trobe is allowed subject to an agreement with the licensee. where the original seed was purchased through a recognized retailer.

LUPINS					
Variety	State of origin	Year of registration	Commercial partner/ licensee	Royalty (ex. GST)	Comments
Jenabillup	WA	2007	Seednet	EPR \$2.30	Tested as WALAN2224
Jindalee	NSW	2000	Seednet	EPR \$1.25	Tested as WL318
Mandelup	WA	2005	Heritage Seeds	EPR \$2.30	
PBA Barlock	WA	2013	Seednet	EPR \$2.50	Tested as WALAN2325
PBA Bateman	WA	2017	Seednet	EPR \$2.50 TBC	Tested as WALAN2533
PBA Gunyidi	WA	2011	Seednet	EPR \$2.50	Tested as WALAN2289
PBA Jurien	WA	2015	Seednet	EPR \$2.50	Tested as WALAN2385
PBA Leeman	WA	2017	Seednet	EPR \$2.50	Tested as WALAN2428

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PLANT BREEDERS' RIGHTS

CANOLA			
Variety	Year of registration	Commercial partner/licensee	Royalty
Archer	2012	Heritage Seeds	Seed (hybrid)
ATR Bonito	2013	Nuseed	EPR \$5.00/t
ATR Gem	2011	Nuseed	Seed
ATR Mako	2015	Nuseed	EPR \$5.00/t
ATR Stingray	2011	Nuseed	Seed
ATR Wahoo	2013	Nused	EPR \$5.00/t
AV Garnet	2007	Nuseed	Seed
Banker ^{CL}	2015	Heritage Seeds	Seed (hybrid)
DG 560 TT	2015	Seednet/ Landmark	Seed (hybrid)
DG 670 TT	2016	Seednet/ Landmark	Seed (hybrid)
Hyola 350TT	2017	Advanta Seeds	Seed(hybrid)
Hyola 50	2007	Advanta Seeds	Seed (hybrid)
Hyola 559TT	2012	Advanta Seeds	Seed (hybrid)
Hyola 575 ^{CL}	2010	Advanta Seeds	Seed (hybrid)
Hyola 650TT	2014	Advanta Seeds	Seed (hybrid)
Hyola 970 ^{CL}	2014	Advanta Seeds	Seed (hybrid)
HyTTech Trophy	2017	Nuseed	EPR \$10/t TBC
InVigor T 4510 (TT)	2016	Bayer	Seed (hybrid)
Nuseed Diamond	2013	Nuseed	Seed (hybrid)
Nuseed Quartz	2017	Nuseed	Seed (hybrid)
Monola 314TT	2013	Nuseed Crop Network	Seed (closed loop with premium)
Monola 416TT	2015	Nuseed Crop Network	Seed (closed loop with premium)
Monola 515TT	2014	Nuseed Crop Network	Seed (closed loop with premium)
Pioneer 43C80 (CL)	2008	Pioneer Brand Seeds	Seed
Pioneer 44T02 (TT)	2016	Pioneer Brand Seeds	Seed (hybrid)
Pioneer 45T01 (TT)	2015	Pioneer Brand Seeds	Seed (hybrid)
Pioneer 43Y92 (CL)	2017	Pioneer Brand Seeds	Seed (hybrid)
Pioneer 44Y90 (CL)	2016	Pioneer Brand Seeds	Seed (hybrid)
Pioneer 45Y91 (CL)	2016	Pioneer Brand Seeds	Seed (hybrid)
Pioneer Sturt TT	2012	Pioneer/ NPZ Australia	EPR \$5.00/t
SF Ignite TT	2016	Seed Force	Seed (hybrid)
SF Turbine TT	2015	Seed Force	Seed (hybrid)
Victory 3002	2012	Cargill/AWB	Seed (closed loop with premium)
Yenta	2015	Heritage Seeds	Seed (hybrid)
Canola	2015	Agronomy for Profit	EPR \$4.00/t
Victory V3002	2011	Cargill/ AWB	Seed (hybrid)(closed loop with premium)
Yenta Convenient Canola	2015	Agronomy for Profit	Seed

All the varieties listed above are PBR varieties and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee. This is NOT a complete list of PBR's Canola varieties but a selection of recently released varieties. Space prevents us from listing all varieties. If growers intend sowing seed of varieties other than those listed above they will need to check the PBR status of those varieties.

PLANT BREEDERS' RIGHTS

OATS					
Variety	State of origin	Year of registration	Commercial partner/licensee	Royalty (ex. GST)	Quality
Bannister	WA / DAFWA	2012	Seednet	EPR \$2.30	Milling/feed
Brusher	SA / SARDI	2002	AEXCO Pty Ltd	EPR \$2.00*	Hay
Durack	SA / SARDI	2016	Heritage Seeds	EPR \$2.30	Milling/feed
Forester	SA / SARDI	2011	AGF Seeds	EPR \$2.00	Hay
Kangaroo	SA / SARDI	2003	AEXCO Pty Ltd	EPR \$2.00*	Hay
Kowari	SA / SARDI	2017	Heritage Seeds	EPR \$2.50 TBC	Milling/feed
Mitika	SA / SARDI	2004	Heritage seeds	EPR \$2.00	Milling/feed
Mulgara	SA / SARDI	2009	AEXCO Pty Ltd	EPR \$2.00*	Hay
Possum	SA / SARDI	2002	Seednet	EPR \$1.70	Milling/feed
Tammar	SA / SARDI	2010	AEXCO Pty Ltd	EPR \$2.00	Hay
Tungoo	SA / SARDI	2008	AEXCO Pty Ltd	EPR \$2.00*	Hay
Williams	SA / SARDI	2013	Heritage seeds	EPR \$2.30	Milling/feed
Wintaroo	SA / SARDI	2001	AEXCO Pty Ltd	EPR \$2.00*	Hay
Wombat	SA / SARDI	2011	Seednet	EPR \$2.00	Milling/feed
Yallara	SA / SARDI	2008	Seednet	EPR \$2.00	Milling/feed

All the varieties listed above are covered by PBR and therefore the seed cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

*Notes on hay varieties

Growers wanting to purchase seed of Mulgara, Tammar, Tungoo, Wintaroo, Brusher and Kangaroo need to contact one of the AEXCO Export Hay Processors. Growers will be asked to declare 'end use' (ie export hay or on farm feed) at the point of sale so as to determine the royalty type. Hay sold through an AEXCO export hay processor will incur an 'end point' royalty while hay for 'domestic sale' or 'on farm use' will incur a seed royalty. This endpoint royalty will increase to \$2.00 from October 2013.

TRITICALE					
Variety	State of origin	Year of registration	Commercial partner/licensee	Royalty (ex. GST)	Comments
Astute	SA/ AGT	2015	AGT	EPR\$2.75	Tested as TSA0466
Berkshire	NSW		Waratah Seeds Co.		
Bison	SA / AGT	2014	AGT	EPR \$2.75	Tested as TSA0451
Bogong	UNE/NSW		Viterra	EPR \$2.20	
Canobolas	UNE/NSW	2008	Viterra	EPR \$2.20	
Chopper	SA	2010	AGT	EPR \$3.00	
Endeavour	NSW		Waratah Seeds Co.	Area based Royalty	Tested as AT528
Fusion	SA	2012	AGT	EPR \$3.00	Tested as TSA 291
Goanna	SA	2012	Cooper/Elleway	No PBR or royalty	
Hawkeye	SA	2007	AGT	EPR \$2.50	
Jackie	NSW	2001	Waratah Seeds Co.	Seed	Dual purpose/grazing
Jaywick	SA	2007	AGT	EPR \$2.50	
Kosciusko	NSW	2003	Wilson Bros.	Seed	
Tobruk	NSW		Waratah Seeds Co.	Area based Royalty	Tested as AT574
Tuckerbox	SA	2010	Cooper/Elleway	No PBR or royalty	
Speedee	SA	2003	Seed Distributors	No PBR or royalty	
Yowie	SA	2010	Cooper/Elleway	Seed	

Some of the varieties listed above are PBR varieties and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee. Credit, Rufus, Speedee, Tickit, Tahara, Tuckerbox, Treat and Yukuri are no longer covered by PBR and can be traded 'over the fence'.

PLANT BREEDERS' RIGHTS

FIELD PEAS

Variety	State of origin	Year of registration	Commercial partner/ licensee	Royalty (ex. GST)	Comments
Kaspa	Vic	2001	Seednet	EPR \$2.00	
Parafield	SA	1999	PlantTech Pty Ltd	Seed	No PBR
PBA Butler	PBA	2017	Seednet	EPR \$2.60 TBC	Tested as OPZ1101
PBA Coogee	PBA	2013	Seednet	EPR \$2.60	Dual purpose, Non 'Kaspa' seed type
PBA Gunyah	PBA	2010	Seednet	EPR \$2.50	'Kaspa' seed type
PBA Hayman	PBA	2012	Seednet	Seed	Dual purpose
PBA Pearl	PBA	2012	Seednet	EPR \$2.70	White seed
PBA Percy	PBA	2011	Seednet	EPR \$2.60	Non 'Kaspa' seed type
PBA Oura	PBA	2011	Seednet	EPR \$2.60	Non 'Kaspa' seed type
PBA Twilight	PBA	2010	Seednet	EPR \$2.50	'Kaspa' seed type
PBA Wharton	PBA	2013	Seednet	EPR \$2.60	'Kaspa' seed type
Sturt	Vic	2003	Premier Seeds	Seed	White seed
Yarrum	NSW	2004	AGT	EPR \$4.00	Non 'Kaspa' seed type

All the varieties listed above are PBR varieties, except Parafield, and Bundi and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee. # contact DPI Victoria for seed.

CHICKPEAS

Variety	State of origin	Year of registration	Commercial partner/ licensee	Royalty (ex GST)	Maximum quality	Comments
Almaz	CLIMA	2005	Seednet	EPR \$6.50	Kabuli type	Med size 8-9mm
Ambar	WA	2012	Heritage Seeds	EPR \$ 4.00	Desi type	Splitting and direct consumption
Gensis™509	Vic	2005	AACT	EPR \$5.00	Desi type	'splitting' enduse
Genesis™079	Vic	2007	AACT	EPR \$5.00	Kabuli type	Small size 6-7mm
Genesis™090	Vic	2004	AACT	EPR \$5.00	Kabuli type	Small size 7-8mm
Genesis™114	Vic	2007	AACT	EPR \$5.00	Kabuli type	Med size 8-9mm
Genesis™Kalkee	Vic	2011	AACT	EPR \$5.00	Kabuli type	Med-large size 8-10mm
Genesis™425	Vic	2007	AACT	EPR \$5.00	Kabuli type	Small size 7-8mm
Neelam	WA	2012	Heritage Seeds	EPR \$4.00	Desi type	Splitting and direct consumption
PBA Boundary	PBA	2011	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption
PBA HatTrick	PBA	2009	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption
PBA Maiden	PBA	2013	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption
PBA Monarch	PBA	2013	Seednet	EPR \$6.50	Kabuli type	Med size 8-9mm
PBA Pistol	PBA	2011	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption
PBA Slasher	PBA	2009	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption
PBA Striker	PBA	2012	Seednet	EPR \$4.00	Desi type	Splitting and direct consumption

All the varieties listed above are PBR varieties or have 'commercial marketing arrangements' and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

VETCH

Variety	State of origin	Year of registration	Commercial partner/ licensee	Royalty	Comments
Capello	SA	1999	Heritage seeds	Seed	Namoi alternative
Haymaker Plus	SA	1999	Heritage seeds	Seed	High level hard seed
Morava	SA	1999	Heritage seeds	Seed	Forage use
Rasina	SA	2006	Heritage seeds	Seed	Tested as SA34719

All the varieties listed above are PBR varieties or have 'commercial marketing arrangements' and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

PLANT BREEDERS' RIGHTS

LENTILS					
Variety	State of origin	Year of registration	Commercial partner/licensee	Royalty (ex. GST)	Market restrictions
Boomer	CIPAL	2005	Seednet	EPR \$5.00	Delivery to nominated receivers
Nipper	CIPAL	2005	Seednet	EPR \$5.00	Open marketing to authorised traders
Nugget	CIPAL	1999	Heritage seeds	EPR \$5.00	Open marketing to authorised traders
PBA Ace	PBA	2012	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Bolt	PBA	2012	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Bounty	PBA	2009	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Blitz	PBA	2010	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Flash	PBA	2009	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Giant	PBA	2014	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Greenfield	PBA	2014	PB Seeds Pty Ltd	EPR \$5.50	Open marketing to authorised traders
PBA Herald XT	PBA	2011	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Hurricane XT	PBA	2013	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Jumbo	PBA	2010	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders
PBA Jumbo2	PBA	2014	PB Seeds Pty Ltd	EPR \$5.00	Open marketing to authorised traders

All the varieties listed above, except Aldinga, Northfield and Digger, are PBR varieties or have 'commercial marketing arrangements' and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

BEANS						
Variety	State of origin	Year of registration	Commercial partner/licensee	Royalty (ex. GST)	Maximum quality	Comments
Farah	SA	2003	Heritage Seeds	EPR \$3.00	Fie grade 1	Tested as 483/3
Fiesta VF	SA	1998	Heritage Seeds	No PBR or royalty	Fie grade 1	
Nura	SA	2005	Seednet	EPR \$3.00	Fie grade 1	
PBA Kareema	SA	2009	PGG Wrightson	EPR \$4.00	Broad bean	
PBA Rana	SA	2011	Seednet	EPR \$3.50	New category	Tested as 974*(611*974)/15-1
PBA Samira	SA	2014	Seednet	EPR \$3.50	Fie grade 1	Tested as AF05069
PBA Zahra	SA	2015	Seednet	EPR \$3.50	New category	Tested as AF05095-1

All the varieties listed above are PBR varieties or have 'commercial marketing arrangements' and therefore seed of these varieties cannot be sold, traded or given away, nor can it be 'traded over the fence' without the authorisation of the owners or licensee.

Explanation of abbreviations

AEXCO = Australian Exporters Company, SAGIT = South Australian Grains Industry Trust, AGT = Australian Grain Technologies, AAC = Australian Agricultural Commodities, COGGO = Council of Grain Grower Organisations, DAFWA = Dept Agriculture and Food Western Australia, DGA = Durum Growers Association, PBA = Pulse Breeding Australia, UofA = University of Adelaide

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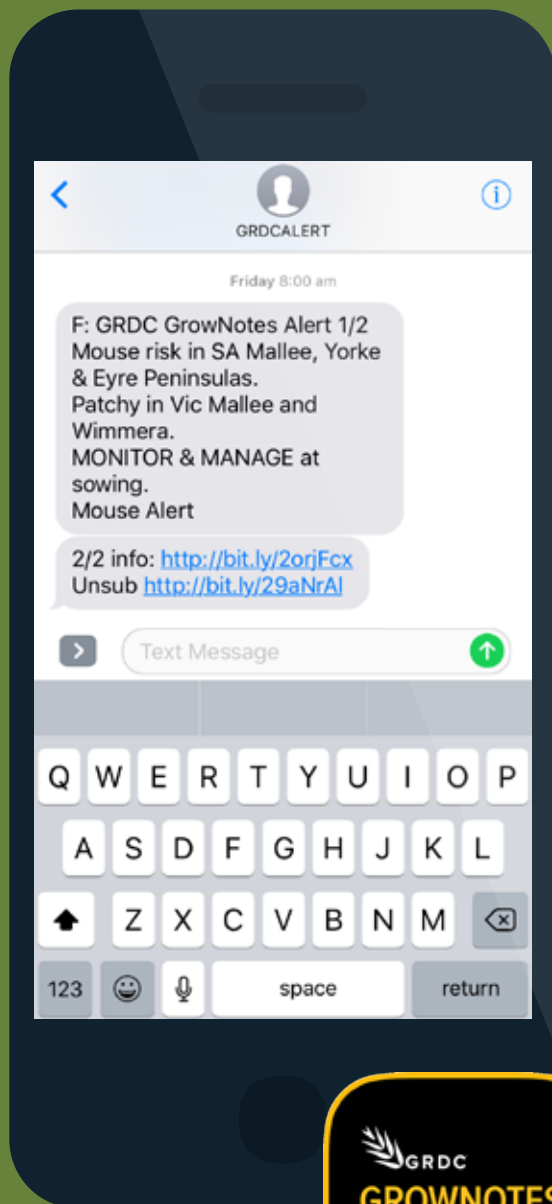
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Wheat variety sowing guide 2018

By Kenton Porker and Hugh Wallwork, SARDI

This sowing guide provides data and guidance on hard, soft and durum wheat varieties for sowing in South Australia in 2018.

Since publication of the 2017 sowing guide, there have been limited new releases. A milling wheat LongReach Havoc, DS Pascal and a feed wheat Tenfour have been added to the list including the introduction of selected winter wheats to the sowing guide. Other more recent releases including LongReach Arrow, Chief CL Plus, Scepter and Cutlass have now been widely evaluated in the National Variety Trials (NVT) and longer term SA grain yield data is provided within this publication.

Varieties differ in flowering and maturity time. Since flowering time is critical for wheat yield, growers need to understand the optimal flowering periods for their environment and how to achieve these flowering periods by matching variety development with sowing time.

The optimal flowering period is a compromise between frost risk, moisture stress, and heat stress events and differs from region to region. The majority of widely adapted fast – medium developing wheat varieties are suited to early May sowing. There are a growing number of varieties being evaluated that may offer potential for Mid-Late April sowing, however these need wider evaluation in the context of pre May sowing.

The majority of long term data generated from NVT results presented in this publication are derived from commercially relevant May sowing dates. Extensive state-wide evaluation within NVT over coming seasons will provide more confidence in varieties that may have specific adaptation requirements. Winter wheats may facilitate early sowing opportunities prior to 20th April in frost prone environments. Winter wheats have an obligate requirement for cold (vernalisation) in order for them to flower.

While limited yield data is provided in this publication, the winter cultivars RAC2341 and Kittyhawk will become commercially available in 2018 and are being trialed in early sown NVT trials and a series of agronomy trials across SA as part of the GRDC management of early sown wheat project in 2017.

Growers should note that a number of the newer varieties listed in this guide are below acceptable industry standards for rust resistance but offer other important or useful attributes. If grown, these varieties should be accompanied by suitable rust preventative strategies. Where varieties do not meet minimum

disease resistance standards for rust, as set by industry, they are listed with a cautioning note.

Varieties in table 1 have been listed according to maximum market receival quality classification and are listed in alphabetical order and not in order of preference.

Domestic Flours Millers Wheat Variety Preferences

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

Selection criteria

Information on the most important selection criteria, grain yield, quality, maturity and disease resistance for main season wheat and durum varieties can be found in tables 2 and 3. Durum and long season wheat information can be found in Table 4 and 5. While the varieties listed are considered likely to provide the best return within each quality grade, farmers need to consider their individual farm and paddock situation and make their selection based on all available information.

Where possible, the growing of a single variety only should be avoided. Climatic, disease and price risks should be spread by growing at least two or more varieties with varying maturity, disease resistance and/or quality classification. Average protein content for current wheat varieties is very similar and rarely varies by more than one percent when grown under identical conditions. Perceived differences in protein achieving capability between varieties should be given only minor emphasis and protein should be managed through good crop nutrition.

Notes on varieties

AGT Katana is an early flowering, premium AH classification

WHEAT

Table 1.

Variety and current max. grade	Suitability and significant features
HARD	
AGT Katana	Low to medium rainfall districts but below minimum standards for stem rust resistance.
Arrow	All districts, below minimum standards for stripe rust resistance. LongReach suggest similar yields to Mace with shorter plant height.
Axe	Low to medium rainfall districts, particularly areas with sharp dry finish, potential pre harvest sprouting risk. Below minimum standards for leaf rust resistance.
Beckom	Low to medium rainfall districts.
Bolac	High rainfall districts especially South East region and Kangaroo Island.
Chief CL Plus	All districts, imidazolinone tolerant.
Cobra	Medium to high rainfall districts but below minimum standards for stripe rust resistance.
Correll	All districts, avoid low test weight situations and wheat stubbles due to yellow leaf spot susceptibility. Below minimum standards for leaf rust resistance.
Cosmick	All districts but below minimum standards for stripe rust resistance, wheat on wheat option.
Derrimut	Medium to high rainfall districts but below minimum standards for stripe rust resistance.
DS Darwin	Low to medium rainfall districts, more evaluation needed. Below minimum standards for leaf rust resistance.
Emu Rock	Low to medium rainfall districts but below minimum standards for leaf rust resistance.
Gladus	All districts but avoid areas with potential pre harvest sprouting risk.
Grenade CL Plus	All districts, imidazolinone tolerant.
Hatchet CL Plus	Low to medium rainfall districts, imidazolinone tolerant, potential pre harvest sprouting risk. Below minimum standards for leaf rust resistance.
Kiora	High rainfall districts especially South East region and Kangaroo Island.
Kord CL Plus	All districts, imidazolinone tolerant but avoid areas with potential pre harvest sprouting risk.
Mace	All districts but well below minimum standards for stripe rust resistance, wheat on wheat option.
Scepter	All districts but below minimum standards for stripe rust resistance, wheat on wheat option, more evaluation needed.
Scout	All districts, avoid wheat stubbles due to yellow leaf spot susceptibility and note below minimum standards for stripe rust resistance.
Shield	Low to medium rainfall districts.
Yitpi	All districts, avoid wheat stubbles due to yellow leaf spot susceptibility and note well below minimum standards for stem rust resistance.
Kittyhawk	Slow maturing winter wheat, very early sowing in medium to higher rainfall zones, more evaluation needed.
APW	
Corack	Low to medium rainfall districts and note below minimum standards for stripe and leaf rust resistance.
Cutlass	Medium to high rainfall districts and early sowing situations.
DS Pascal	Earlier sowing in medium to high rainfall districts, good spouting tolerance, more evaluation needed.
Espada	All districts but avoid areas with a potential pre harvest sprouting risk.
Estoc	Medium to high rainfall districts and early sowing situations.
Forrest	High rainfall, long season districts especially the South East region.
Havoc	All districts, but more evaluation is needed.
Justica CL Plus	All districts, imidazolinone tolerant but below minimum standards for leaf rust resistance.
Trojan	Medium to high rainfall districts.
Wyalkatchem	All districts but below minimum standards for stripe rust resistance and now also more susceptible to leaf rust.
SOFT	
Barham	Soft wheat producing districts and Bowie replacement but below minimum standards for stripe rust resistance.
Impala	Soft wheat producing districts but below minimum standards for leaf rust resistance.
Orion	Soft wheat producing districts.
FEED	
TenFour	All districts.
Manning	High rainfall, winter wheat suited to long season districts especially the South East region.
DURUM	
Caparoi	All durum districts.
DBA-Aurora	All durum districts.
Hyperno	All durum districts although now generally outclassed by newer varieties.
Saintly	All durum districts and potential for hay production.
Tjilkuri	All durum districts.
Yawa	All durum districts but note marginal grain size, avoid late sowings.

WHEAT

variety. Derived from Kukri, Katana has good physical grain quality, similar to Yitpi, and yields similar to Wyalkatchem on average. Katana has modest rust resistance and is moderately susceptible to CCN but rated MS to yellow leaf spot. Seed available from AGT (conditional Seed Sharing allowed).

Axe is a vigorous growing, very early flowering, AH quality variety. With large grain and low screenings losses, it has shown high yield potential in SA under very dry and sharp finishing conditions albeit with more moderate yields under favourable spring conditions. It is susceptible to sprouting. Axe has moderate stripe rust resistance but is susceptible to leaf rust, septoria tritici blotch, yellow leaf spot and CCN. Seed available from AGT (conditional Seed Sharing allowed).

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

Chief CL Plus is a mid-season maturing slightly later than Mace, imidazolinone herbicide tolerant (Clearfield type) APW wheat, derived from Wyalkatchem and released in 2016 by Intergrain. Chief CL Plus is rated as moderately resistant to leaf rust, stem rust and yellow leaf spot, but is susceptible to stripe rust and CCN. Chief CL Plus was evaluated in SA NVT trials in 2014, and 2016 but not in 2015. The long term results show grain yields are higher than other released CL Plus varieties. Seed is available for 2018 planting from Intergrain affiliates.

Corack is an early maturing, APW quality wheat derived from Wyalkatchem. It has CCN resistance and good yellow leaf spot resistance but is moderately susceptible to stripe rust and very susceptible to powdery mildew and leaf rust. Long term NVT results in SA show a high yield potential, particularly in low to medium rainfall situations, with good grain quality size. Seed available from AGT (conditional Seed Sharing allowed).

Cosmick is a broadly adapted early to mid-season flowering, AH quality wheat targeted at medium rainfall districts. Cosmick has moderate susceptibility to stem and stripe rusts but is susceptible to leaf rust and CCN. Cosmick is rated MRMS to yellow leaf spot. Cosmick has shown high grain yield potential in SA NVT but more moderate grain size characteristics. Seed from Intergrain affiliates.

Cutlass has an APW classification in SA and was released by AGT in 2015. Cutlass is a mid to late maturing variety like Yitpi. Cutlass is rated as moderately resistant to CCN with good levels of resistance to all rusts (MS to Yr) but moderately susceptible (MSS) to yellow leaf spot. Yield data suggests Cutlass is outclassed by some other new releases however its unique flowering behaviour and commercial data suggests it has an application for early sowing and frost risk management where Yitpi has been successful. Seed available from AGT

(conditional Seed Sharing allowed).

DS Darwin is the first variety released by Dow Seeds in 2015, targeted for Southern Australia. It has AH quality and is early to mid-season flowering. Darwin is MR to stem rust, MR to stripe rust and is very susceptible to leaf rust. Darwin is susceptible to septoria tritici blotch and has been tested in NVT since 2015. Seed is available from Seednet partners in 2018.

DS Pascal is a variety released by Dow Seeds. While limited data exists on its performance, early sown commercial and long season NVT data suggests Pascal has high yielding potential and can be sown from mid-late April. Pascal has good pre-harvest sprouting tolerance relative to other varieties, and is RMR for stripe rust, MRMS for leaf rust, and MS for septoria tritici blotch and stem rust. DS Pascal is available from Seednet partners in 2018.

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

Gladius has an AH classification and is broadly adapted, high yielding and well adapted to low rainfall environments. It has boron tolerance, and has good resistance to stem rust, MRMS to stripe rust and MS to leaf rust, CCN and yellow leaf spot. Gladius has midseason maturity and good grain size like Yitpi albeit with slightly lower test weight. It is susceptible to pre harvest sprouting. Trials indicate Gladius to have a lower tolerance to Ally® and Hussar®. Seed available from AGT (conditional Seed Sharing allowed).

Grenade CL Plus is an imidazolinone herbicide tolerant (Clearfield type) AH variety. It is early to mid-season flowering with moderate resistance to CCN, and stem rust (MR) and stripe rust (MRMS). It is however susceptible to leaf rust and yellow leaf spot. Seed available from AGT affiliates.

Harper is derived from Yitpi and Stylet and was released by Intergrain in 2013 as a mid to long season APW variety. Harper has moderate resistance to CCN and stripe rust but moderate susceptibility to stem rust and is susceptible to leaf rust and yellow leaf spot. Harper is an alternative to Yitpi and Estoc with slightly higher yield. Seed available from Intergrain.

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

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Table 2: Some agronomic characteristics of selected varieties under SA conditions.

Variety	Max. Quality	Flowering	Coleoptile length	Boron tol.	CCN resis.	Sprouting tolerance	Other features
AGT Katana	AH	EM	-	MI	MS	MI*	Strong dough properties like Kukri
Arrow	AH	EM	-	-	-	-	
Axe	AH	E	VS	I	S	I / VI	Good early vigour, moderate test weight
Barham	ASFT	EM	M	MI	MS	I*	Bowie plant type
Beckom	AH	M	-	MT	R	MI/I	Acid soil tolerance, mod grain size
Bolac	AH	L	M	-	S	I*	Acid soil tolerance
Chief ^{CL Plus}	APW	EM	-	-	-	-	2 gene Imidolazine tolerant,
Cobra	AH	EM	M	MI	MS	I	Potential for moderate test weight
Corack	APW	EM	MS	I	RMR	MI	Below minimum disease standards for Yr
Correll	AH	M	ML	MT	MR	I / VI*	Potential for low test weight
Cosmick	AH	EM	L	-	S	-	Moderate grain size
Cutlass	APW	ML	ML	MT	MR	I	Moderate grain size
DS Darwin	AH	M	VS	-	MSS	-	Very susceptible to septoria
DS Pascal	APW	ML	VS		S	MT/MI	Good sprouting tolerance
Emu Rock	AH	E	M	-	S	-	Plump grain like 'Kukri'
Espada	APW	M	-	MT	MS	I / VI	Moderate test weight
Estoc	APW	ML	ML	MT	MR	MT/MI	Good test weight
Gladius	AH	EM	M	MT	MS	I / VI	Moderate test weight, low tolerance of Hussar®
Grenade ^{CL Plus}	AH	EM	M	T	MR	MI / I	2 gene Imidolazine tolerant
Harper	APW	ML	ML	-	MR	MI	
Hatchet ^{CL Plus}	AH	VE	S	MI	MR	I/VI	2 gene Imidolazine tolerant
Havoc	AH	EM	-				More evaluation needed
Impala	ASFT	EM	M	-	S	I	Below minimum standards for leaf rust
Kittyhawk	AH	L	M		S	MI	Winter wheat requires vernalisation
Kord ^{CL Plus}	AH	EM	S	MT	MR	I	2 gene Imidolazine tolerant
Justica ^{CL Plus}	APW	M	-	MT	MS	MI	2 gene Imidolazine tolerant, below minimum standards for leaf rust
Mace	AH	EM	MS	MT	MRMS	MI / I	Well below minimum disease standards for Yr
Phantom	AH	ML	MS	MT	MS	MI / I	Potential early growth yellowing
Scepter	AH	EM	MS	MT	MRMS	MI/I	
Scout	AH	M	ML	MT	R	MT/MI	Below minimum disease standards for Yr
Shield	AH	EM	VS	MI	MRMS	MI	Potential for moderate test weight, acid soils tolerance
Tenfour	Feed	E	MS	-	MS	-	Feed wheat
Trojan	APW	ML	M	MT	MS	MI	
Wyalkatchem	APW	EM	MS	MI	S	I	Short stiff straw, below minimum disease standards for Yr
Yitpi	AH	ML	M	MT	MR	MI / I	Well below minimum disease standards for Sr
DURUMS							
Aurora	APDR	M	ML	MT	MS		Good early vigour and weed competitiveness
Caparoi	APDR	M	ML	-	MS	MI / I*	Plump and high protein achiever
Hyperno	APDR	M	ML	I	MS	I*	Some high temperature tolerance
Saintly	APDR	E	ML	-	MS	MI / I*	Awnless head, early maturing
Tjilkuri	APDR	M	ML	T	MS	I*	
WID802	APDR	M	ML	-	MS		
Yawa	APDR	M	ML	-	MS		Potential for small grain size

* provisional rating

* indicative rating more data needed

Flowering: VE= very early; E= early; EM= early to mid season; M= midseason; ML= mid to late season; L=late

Coleoptile Length: VL = very long L = long; M = intermediate; S = short VS = very short

Boron/sprouting tolerance: I = intolerant; MI = moderately intolerant; MT = moderately tolerant; T = tolerant

- variety yet to be fully evaluated. * provisional rating based on limited NVT data

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 sprouting tolerance was provided by Prof Daryl Mares, University of Adelaide and disease resistances were provided by Dr Hugh Wallwork, SARDI

WHEAT

Kiora was released by AGT in 2014 as an alternative to Bolac for higher rainfall districts with AH quality, mid to late maturity and excellent rust resistance but susceptibility to CCN and black point. Slightly earlier flowering than Bolac, Kiora offers higher yields with improved grain size. Seed from AGT (conditional Seed Sharing allowed).

Kord CL Plus carries two genes for Clearfield resistance and is derived from Gladius with similar maturity and susceptibility to pre harvest sprouting but is MR to CCN. Kord CL Plus has an AH classification and has yielded similar to Gladius in all districts. Seed is available from AGT affiliates.

LongReach Arrow is a new mid-season maturing AH quality wheat from Longreach Plant breeders, released in 2016. For SA NVT trials in 2015 and 2016, Arrow yields were similar to Mace in the lower-medium yielding environments and had a small improvement over Mace in the higher yielding environments. Arrow is susceptible to CCN and is MRMS to yellow spot. Arrow is provisionally rated as moderately susceptible to stripe rust and susceptible to leaf rust. Arrow has good physical grain quality with good black point resistance and relatively short plant height suited to stubble retained systems. Seed is available from Pacific Seeds.

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

Longreach Havoc is an early maturing AH variety. Havoc was tested for the first time in NVT 2016 and the results suggest it performed slightly below Mace. Havoc has a shorter canopy than Mace is moderately resistant to stripe rust, susceptible to leaf rust and is moderately susceptible to stem rust (MS). Havoc is MRMS to yellow leaf spot. More evaluation is needed. Seed is available from Pacific Seeds.

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

LongReach Trojan is a mid-maturing variety slightly later than Mace, APW quality variety with high yield potential, particularly in medium to high rainfall districts. Trojan is well suited to main season plantings in high production zones and slightly earlier planting in medium rainfall zones. It is moderately susceptible to CCN, moderately resistant to stripe rust but MRMS to leaf rust and MSS to yellow leaf spot. Trojan has recently been downgraded to SVS for powdery mildew. Trojan has moderate

boron tolerance and grain is large with low screenings, high test weight and good black point resistance. Seed from Pacific Seeds (conditional Seed Sharing allowed).

Mace with early to mid-season maturity, has an AH classification, is MR to stem rust, and rated MRMS to CCN and YLS. Mace is now rated as MSS to a new leaf rust strain in SA and rated SVS to stripe rust. If grown, Mace must be carefully monitored and best avoided in districts prone to stripe rust unless a fungicide regime is in place. 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 (conditional Seed Sharing allowed).

Scepter has an AH classification in SA and was released by AGT in 2015. Scepter is derived largely from Mace with many similar characteristics but improved grain yield and stripe rust resistance and slightly lower black point tolerance and powdery mildew resistance. Scepter is rated MR to stem rust, MSS to leaf rust and is rated MRMS to CCN and yellow leaf spot. Scepter is rated MSS to stripe rust being susceptible early in the season but may show useful resistance later in the season when the temperature warms up.

When grown there should be a fungicide regime in place. Scepter was first tested in SA NVT trials in 2015 and long term data suggests a 3 – 6% yield advantage over Mace. Scepter shows wide adaptation and is suitable for wheat on wheat application. Seed is available from AGT (conditional Seed Sharing allowed).

Shield is an early to mid-season flowering, moderate yielding milling wheat with AH classification and acid soils tolerance. Shield has resistance to CCN, good resistance to all rusts (stem rust – RMR, stripe rust – MR and leaf rust – R) and rated MSS to yellow spot. Shield has moderate black point susceptibility, moderate test weight and a low sprouting risk. Seed available from AGT (conditional Seed Sharing allowed).

SOFT WHEATS

Barham is a mid-season soft biscuit (ASF1) grade variety producing large grain with low screening losses but low test weights. It has CCN resistance but is MSS to stripe rust and is MS to black point. Barham is available from Seednet.

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

Longreach Orion is a mid to long season maturing soft biscuit (ASF1) wheat targeted to eastern Australia. Orion, is susceptible to CCN and YLS but has good stem and leaf rust resistance and is MSS to stripe rust. Orion is S to black point and susceptible to sprouting. Seed available from Pacific Seeds.

WHEAT

Table 3: Mean yield (% of yield group) of main season wheat varieties and the number of trials evaluated in NVT trials from 2012-2016.

Variety	<2t/ha		2-3t/ha		3-4t/ha		4-5t/ha		>5t/ha		Stem Rust	Stripe Rust#	Leaf Rust	Septoria tritici blotch	Yellow leaf spot	Powdery Mildew	Black point
Ave Yield	1.47	No trials	2.50	No trials	3.58	No trials	4.44	No trials	6.14	No trials							
AGT Katana	104	30	103	27	102	27	100	22	99	8	MSS	MRMS	MS	MS	MS	MRMS	S
Arrow	110	10	108	11	109	12	107	7	106	8	-	S	S	MS	MR	S	-
Axe	101	30	98	27	96	27	92	24	91	12	MS	RMR	SVS	SVS	S	MS	S
Barham	103	3	91	8	90	7	93	10	90	7	MR	MSS	MRMS	MSS	MSS	SVS	MRMS
Beckom	111	20	108	23	108	20	109	21	107	11	MR	MRMS	S	S	MSS	MS	-
Chief CL Plus	93	5	102	12	104	10	103	14	94	7	RMR	MSS	MR*R	MRMS	RMR	MR	-
Cobra	94	30	102	27	105	27	106	24	110	12	RMR	MSS	MR	MS	MS	MRMS	MSS
Corack	110	30	109	27	108	27	106	24	103	12	MR	MS	S	S	MRMS	SVS	S
Correll	101	30	97	24	95	26	96	24	95	12	MRMS	MRMS	S	S	SVS	MRMS	MS
Cosmick	108	20	107	23	106	20	107	18	107	10	MS	MRMS	SVS	S	MRMS	MSS	-
Cutlass	105	10	98	11	100	12	105	7	104	8	R	MS	RMR	MSS	MSS	MSS	-
DS Darwin	94	1	99	8	98	17	97	22	99	11	MR	MR	SVS	S	S	MRMS	MR
DS Pascal	78	2	87	3	94	7	93	13	102	10	MSS	RMR	MR	MS	MRMS	-	MRMS
Emu Rock	108	30	106	27	104	27	101	24	100	12	MRMS	MRMS	SVS	SVS	MRMS	S	MSS
Espada	105	29	102	22	100	21	100	19	96	7	MR	MRMS	R	S	MS	S	S
Estoc	101	30	99	27	99	27	100	24	99	12	MR	MS	MSS	S	MSS	MSS	MS
Gladius	100	30	98	27	98	27	97	24	97	12	MR	MRMS	MS	S	MS	MSS	MS
Grenade CL Plus	102	30	98	27	97	27	95	24	94	12	MR	MRMS	S	S	S	MS	MS
Harper	104	9	97	12	97	16	99	21	97	11	MRMS	MS	S	MS	MSS	MS	-
Hatchet CL Plus	102	30	99	27	97	26	94	22	93	11	MS	MRMS	SVS	SVS	S	MS	-
Havoc	89	1	99	5	99	6	98	6	99	7	S	MR	S	MS	MRMS	-	MS
Impala	104	3	97	8	95	7	96	13	94	7	MR	MR	SVS	SVS	MSS	RMR	MRMS
Justica CL Plus	99	30	97	27	96	27	96	24	96	12	MR	MRMS	MSS	SVS	SVS	S	S
Kord CL Plus	103	20	98	23	95	20	95	21	91	11	MR	MRMS	MS	MS	MSS	MSS	MRMS
Mace	110	30	108	27	107	27	106	24	102	12	MR	SVS	MSS	S	MRMS	MSS	MRMS
Orion	97	2	91	5	88	6	89	8	87	2	MR	MSS	R	MRMS	MSS	SVS	MSS
Phantom	95	29	94	22	95	26	97	24	98	12	MS	MR	MSS	S	SVS	MRMS	MRMS
Scepter	114	10	112	11	112	12	109	7	108	8	MR	MSS	MSS	S	MRMS	SVS	-
Scout	99	30	101	27	102	27	103	24	106	12	MR	MS	MS	MSS	SVS	MS	SVS
Shield	107	30	102	27	100	26	98	22	96	11	RMR	MR	R	S	MS	MRMS	MS
Tenfour	108	16	111	20	111	12	111	8	109	2	S	SVS	MS	S	MRMS	-	MSS
Trojan	102	30	105	27	106	27	110	24	111	12	MRMS	MR	MRMS	MS	MSS	SVS	MRMS
Wallup	96	9	100	11	99	17	99	17	99	11	MRMS	MRMS	S	S	MSS	S	MS
Wyalkatchem	102	30	103	27	104	27	103	24	102	12	MS	S	SVS	S	MR	SVS	MRMS
Yitpi	98	20	94	22	93	20	96	21	95	11	S	MRMS	S	MSS	SVS	MRMS	MS

R = resistant MR = moderately resistant MS = moderately susceptible S = susceptible VS = very susceptible - = variety yet to be fully evaluated Black Point is not a disease but is a physiological response to certain humid conditions.

- variety yet to be fully evaluated. * provisional rating based on limited NVT data

Information on disease reaction was provided by the Field Crop Pathology Unit (SARDI) and compiled before the full data from 2017 was available. Contact Dr Hugh Wallwork (08) 8303 9382.

WHEAT

Table 4: Mean yield (% of yield group) of Durum wheat varieties and the number of trials evaluated in NVT trials from 2012-2016, and reaction to common disorders

Variety	<2.5t/ha		2.5-4.0t/ha		>4t/ha		Stem Rust	Stripe Rust#	Leaf Rust	Septoria tritici blotch	Yellow leaf spot	Powdery Mildew	Black point
	Ave Yield	No Trials	Ave Yield	No Trials	Ave Yield	No Trials							
Caparoi	93	6	98	12	99	10	RMR	RMR	RMR	RMR	MR	MS	MSS
DBA-Aurora	109	6	105	12	108	10	RMR	RMR	R	MR	MRMS	MR	MSS
Hyperno	96	6	98	12	100	10	RMR	MR	R	MR	MRMS	MR	MS
Saintly	113	6	104	12	102	10	MR	MR	MRMS	MSS	MRMS	MSS	MS
Tjilkuri	83	6	99	12	105	10	MR	MR	R	MS	MRMS	MRMS	MSS
WID802	97	6	101	12	99	5	RMR	MR	R	MR	MRMS	MRMS	MSS
Yawa	97	6	103	12	108	10	RMR	MR	R	MR	MRMS	MS	MRMS

R = resistant MR = moderately resistant MS = moderately susceptible S = susceptible VS = very susceptible - = variety yet to be fully evaluated

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

Information on disease reaction was provided by the Field Crop Pathology Unit (SARDI) and compiled before the full data from 2017 was available. Contact Dr Hugh Wallwork (08) 8303 9382.

WINTER WHEATS

Longreach Kittyhawk is an AH winter wheat that requires vernalisation and has been developed for long season growing areas with slow maturity. It is suited to early planting or grazing opportunities similar to Wedgetail in the higher rainfall zones. Longreach Kittyhawk has improved disease and grain quality package compared to Wedgetail especially for stripe rust (RMR), stem rust (MRMS) and leaf rust (MRMS). More evaluation is needed. Seed available from Pacific Seeds.

RAC2341 is a true winter variety that is yet to receive its final quality classification. Once its vernalisation requirement is met it is relatively fast to flower and fill grain similar to its parent Mace. RAC2341 has a broad sowing window but will be most suited to April plantings. RAC2341 has not been widely tested in early sowing NVT and commercial trials. More data will be available after the 2017 growing season. Preliminary data suggests RAC2341 has a good physical grain quality package and is resistant to stripe and stem rust. Seed is available from AGT (conditional Seed Sharing allowed).

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

DURUM WHEATS

Caparoi was developed and released by the Tamworth durum program and has been widely tested in SA, showing slightly earlier flowering than Tamaroi, similar yields and good semolina colour. Caparoi has excellent physical grain quality and high grain protein coupled with moderate yields. Seed available from Seednet.

DBA-Aurora was released from the University of Adelaide in

2014 with seed currently available from the Southern Australia Durum Growers Association. DBA-Aurora has a good disease resistance profile, similar to other recently released varieties. DBA-Aurora yield potential is consistently one of the highest and has significantly improved grain size and lower screenings when compared to other varieties such as Yawa. DBA-Aurora has shown good early vigour and grass weed competitiveness.

Hyperno has a similar maturity, adaptation and disease resistance profile to Kalka and Tamaroi, but generally offers greater yields, improved semolina colour and better sprouting and black point tolerance. Hyperno is eligible for APDR grade in SA and was released from AGT with seed available from the Durum Growers Association.

Saintly is awnless, earlier flowering than Kalka and Tamaroi, and has performed very well in dry finishing conditions in SA. Saintly has slightly less stem and leaf rust resistance compared to Hyperno. Saintly was released from AGT with seed available from the Durum Growers Association.

Tjilkuri has a similar maturity, adaptation and disease resistance profile to Tamaroi, but generally offers greater yields, like Hyperno together with improved semolina colour. Tjilkuri is eligible for APDR grade in SA and was released from the University of Adelaide in 2010.

FEED WHEATS

TenFour is a white grained feed wheat released in 2015 that has shown high yield potential in SA NVT trials across a wide range of environments. TenFour is available through Elders and through Selected Seed Partners. ■

Acknowledgment: The authors gratefully acknowledge the contribution that Rob Wheeler had made to previous editions of this article.

WHEAT

Table 5: Mean yield (% of yield group) of longer season wheat varieties and the number of trials evaluated in NVT trials from 2012-2016., and reaction to common disorders

Variety	Yield (as % of mean)	No. Sites	Stem Rust	Stripe Rust#	Leaf Rust	Septoria tritici blotch	Yellow leaf spot	Powdery Mildew	Black point
Ave Yield									
Beaufort	115	5	S	RMR	MS	MSS	S	MRMS	MSS
Bolac	103	5	MRMS	RMR	MRMS	MSS	MSS	MRMS	MS
DS Pascal	110	4	MR	RMR	MS	MS	MRMS	MRMS	S
EGA Wedgetail	94	5	RMR	R	SVS	MS	MS	MR	MS
Kiora	109	5	RMR	RMR	MRMS	MS	MSS	MRMS	MS
Kittyhawk	101	2	R	MR	MR	MR	MRMS	R	MS
Manning	120	4	MR	RMR	RMR	MR	MRMS	S	MRMS
Preston	109	5	SVS	RMR	SVS	S	S	R	MRMS
SQP Revenue	104	5	RMR	R	S	MS	MS	MR	MRMS
Trojan	107	4	MRMS	MR	MS	MS	MSS	SVS	MRMS
av. yield t/ha	5.70								

R = resistant MR = moderately resistant MS = moderately susceptible S = susceptible VS = very susceptible - = variety yet to be fully evaluated

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

Information on disease reaction was provided by the Field Crop Pathology Unit (SARDI) and compiled before the full data from 2017 was available. Contact Dr Hugh Wallwork (08) 8303 9382. Please note these data are generated from only the Conmurra site in the South East using trials conducted between 2012-16. Sowing dates from these trials have ranged from 4 May – 28 May during this period. Earlier sowing wasn't possible due to dry soil conditions.

NOTES

Barley variety sowing guide 2018

By Kenton Porker and Courtney Peirce, SARDI

This sowing guide provides data and guidance on the most suitable barley varieties for sowing in South Australia in 2018.

Since publication of the 2017 sowing guide RGT Planet has been released into the Australian market with commercial plantings in 2017. Feed variety Keel, and malt variety Flagship have been removed as they are now generally considered outclassed

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

- Market demand and malting varietal storage segregations in bulk storage facilities (Table 2);

- The difference in payments between malting and feed grades compared to yield differences (Table 3);
- The likelihood of producing a malting grade barley within malt receival specifications;
- The disease resistance and agronomic considerations (Table 4 and Table 5 respectively).

Growers need to consider which varietal option will lead to the greatest profitability. The relative difference in the price premium paid for malt relative to feed may counteract the yield difference between malt and feed or food varieties. Other scenarios may favour high yielding feed or food varieties where there is a low probability of achieving malt and a desire for

Table 1. Suitable barley varieties for planting in SA, according to current (2017/18) quality classification grade and in alphabetical order and not in order of preference

Variety	Max. Grade	Suitability and significant features
Buloke	malting	All areas except where leaf rust and CCN is a problem.
Commander	malting	All areas, except areas prone to net form net blotch.
La Trobe	malting	All areas, note modest early vigour and weed competitiveness especially in light soils.
Navigator	malting	South East region but very susceptible to leaf rust.
Schooner	malting	All areas except leaf rust prone areas, now agronomically outclassed, declining industry demand.
Scope	malting	All areas except where leaf rust and CCN is a problem. imidazolinone tolerant.
Westminster	malting	High rainfall long season South East region.
Hindmarsh	food	All areas, noting modest early vigour and weed competitiveness especially in light soils.
Alestar	feed	Targeted for South East region of South Australia.
Capstan	feed	Medium to high rainfall areas where very high yields are targeted and test weight is easily achieved.
Compass	feed	All areas, being evaluated for malting accreditation. At risk with some strains of leaf rust and lodging in high yielding environments.
Fathom	feed	All areas, noting susceptibility to net form net blotch.
Fleet	feed	All areas, particularly for districts with lower rainfall and light soils noting high net form net blotch risk.
Keel	feed	All areas except deep sandy soils of lower fertility and avoid areas prone to leaf rust. Earliest maturing feed variety. Outclassed.
Maritime	feed	Low to medium rainfall areas (<400mm) except in areas prone to net form net blotch.
Oxford	feed	Medium to high rainfall areas (>400mm) especially where leaf rust is prevalent .
RGT Planet	feed	All areas but has little evaluation in SA. Note susceptibility to spot form and net form net blotch.
Rosalind	feed	All areas.
Spartacus CL	feed	All areas, imidazolinone tolerant, being evaluated for malting accreditation. Similar competitive characteristics as Hindmarsh.

Table 2 Malt variety market suitability and demand in SA (sourced from Barley Australia)

	Year accredited	Domestic Export Demand	Export Brewing Demand
Buloke	2008	Low	Low
Commander	2009	High	High
La Trobe	2015	Low	High
Scope	2013	Low	High
Westminster	2013	Medium	Medium

lower input costs. Among malt and food varieties differential pricing will be a continuing trend and growers need to consider market premiums and discounts in addition to agronomic performance to maximize profitability. Newer food and malt varieties are now offering good yield potential. Varieties accredited and varieties currently undergoing malt evaluation now have similar yield potential as feed varieties making it worthwhile for growers to consider including some malting varieties in their cropping program.

It is important that growers contact their grain marketers of choice to discuss market demand prior to sowing a malting variety. Malting barley is grown, stored and sold on a variety-specific basis and it is important to ascertain if the variety chosen is able to be stored and marketed in your area (Table 2). The preferred list of Barley Australia is updated annually as a guide to industry on the market preferred varieties and can be found online at www.barleyaustralia.com.au. The preferred list is determined by marketing companies and reflects their opinion on which malting varieties will be sought by purchasers of Australian malting barley. In many cases a new variety accreditation does not mean the variety will be a preferred variety until market demand is established. Table 3 lists the current released varieties under malt barley evaluation by the MBIBTC in conjunction with PBA and Barley Australia, including the anticipated timeline for accreditation. Accreditation is only granted if the variety satisfies the selection criteria set by MBIBTC and Barley Australia (see www.barleyaustralia.com.au).

Barley varieties differ in flowering and maturity time. Most high yielding and widely adapted barley lines are fast – medium maturity that are suited to May planting dates with yield potential optimized by early – mid May plantings. In regions of minimal frost risk, varieties can be sown in late April particularly in shorter season districts defined by terminal moisture and heat stress events during grain fill. Barley is slightly more frost tolerant than wheat however there are limited varieties with a suitable flowering behavior for sowing before April 25. Urambie is the only current winter barley available for dual purpose graze and grain from early April planting but has not been included for evaluation in NVT in SA.

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

Cereal cyst nematode levels should be carefully monitored

where there is a history of growing susceptible varieties such as Schooner, Scope, Buloke, Oxford and Gairdner. Seed dressings which have activity on powdery mildew should be applied to all varieties susceptible to powdery mildew. Hindmarsh, Latrobe, 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.

The varieties, Charger and SouthernStar are niche malting quality varieties grown under closed loop contract. See more information within the variety notes section. Flagship has excellent export malting and Shochu quality however segregations are now limited. Westminster, while not yet segregated for malt in SA has some limited direct marketing opportunities in the South East (SE) and into Port Adelaide. Segregations are available in a number of regions for Compass to support market development.

Notes on older varieties

Bass has been developed by Intergrain and is targeted as an export quality malting accredited variety principally for WA. It is a mid to late maturing variety with variable resistance to scald and leaf rust, resistance to barley yellow dwarf virus but no CCN resistance and it is susceptible to both net and spot form net blotch. Bass has shown very good physical grain quality with high test weight and low screenings. Seed is available from Syngenta.

Buloke is an export quality profile malting variety developed by VicDPI and released in 2005. It is a tall, midseason variety with a flowering time similar to Commander. Buloke has shown consistent high yield and has useful resistance to net form of net blotch and powdery mildew but susceptibility to CCN and some leaf rust strains. Buloke has averaged slightly lower retention and higher screenings but similar test weight to Commander and is moderately susceptible to black point. Buloke has a moderately short coleoptile and moderately slow early growth. Seed is available through Seednet.

Charger is a malting barley, accredited in 2014 and developed by Carlsberg and Heineken Breweries in collaboration with the University of Adelaide. It is mid maturing with good straw strength and resistance to leaf rust and powdery mildew but is very susceptible to net form of net blotch and leaf scald. Charger has shown consistently high grain yield particularly in

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favourable environments. Contract production is exclusively managed by Australian Grain Growers Cooperative.

Commander is a malting quality variety released by the University of Adelaide in 2008 and suitable for domestic, Chinese and SE Asian export brewing markets. Commander has mid-season maturity and across many seasons, demonstrates wide adaptation and very high yield relative to other malting varieties, particularly in seasons with favourable spring finishes. Commander has excellent grain plumpness, but generally has lower test weight relative to LaTrobe. Commander is resistant to CCN but is moderately susceptible to most foliar diseases including net form net blotch and therefore should not be grown on barley stubble and areas prone to net form net blotch. Compared to LaTrobe, Commander has poor straw strength and is prone to lodging in high yielding environments and wet spring conditions. Seed is available through Seednet.

Fathom is an early maturing feed quality variety developed using wild barley to improve stress tolerance and water use efficiency. Fathom has averaged very high yields similar to Hindmarsh based on NVT data since 2010 and shows good early vigour and weed competitiveness. Fathom typically flowers three to four days later than Hindmarsh with early May sowing and flowers similar to Hindmarsh with later sowings. Fathom has good levels of resistance to CCN, powdery mildew and spot form net blotch. Fathom has shown susceptibility to net form net blotch, scald and leaf rust and is not recommended for growing in high risk situations unless an appropriate fungicide strategy is applied. Seed is available from Seednet.

Fleet is a midseason maturing, CCN resistant feed barley, developed by the University of Adelaide and released in 2006. Fleet has a long coleoptile and has shown wide adaptation combined with good yield potential. Fleet exhibits an excellent disease resistance profile, although now highly susceptible to net form net blotch and some leaf rust strains. Fleet has plump grain but slightly lower test weights than other feed types. Its strong awn can reduce threshability and attention to concave and thresher adjustment is important, especially in maintaining test weight. Seed is available through Seednet.

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

blotch. Segregation and marketing opportunities for malting are currently limited in SA. Seed is available from Heritage Seeds.

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

Maritime is a tall, early maturing feed variety with CCN resistance released by the University of Adelaide in 2004. Maritime was developed specifically for manganese deficient soils where it exhibits good adaptation. Maritime has moderate to high yield potential on other soil types but is very susceptible to the net form net blotch. Maritime has excellent physical grain quality and early vigour, and is a good option for lower rainfall environments where tall straw and high test weights are sought but areas of low risk of net form net blotch. Seed is available through Seednet.

Oxford is a feed quality variety which has shown very high yield potential in seasons with high spring rainfall. Oxford can be sown in mid – late April scenarios. Oxford has late maturity, good straw strength and low shattering. While Oxford is susceptible to CCN, leaf scald and spot form net blotch, it has good resistance to leaf rust and powdery mildew. It is also susceptible to some strains of net form net blotch. Oxford is a useful option for SE high rainfall districts. Seed is available through Heritage Seeds.

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

Table 3. Released varieties undergoing malt evaluation and expected timeline (Barley Australia)

Variety	Year 0	Stage 1	Stage 2	Target Decision Date
Compass	2012 (accepted)	2016 (passed)	2017	March 2018
Spartacus CL	2015 (accepted)	2016 (passed)	2017	March 2018
Alestar	2017 (accepted)	-	-	2020
RGT Planet	2017 (accepted)	2017	-	2019

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Table 4: Yield of barley varieties in South Australian as a percentage of yield brackets across South Australia (NVT data 2012 – 2016 inclusive, along with number of observations in adjacent columns).

Variety	<2t/ha		2-3t/ha		3-4t/ha		4-5t/ha		>5t/ha	
Ave Yield	1.55	No. trials	2.64	No. trials	3.51	No. trials	4.44	No. trials	5.88	No. trials
MALTING										
Bass	101	10	99	19	99	28	99	13	100	21
Buloke	103	10	100	19	100	27	99	18	97	16
Charger	105	3	103	4	102	16	102	16	99	16
Commander	101	10	103	19	103	28	101	19	99	21
Flagship	97	6	96	18	95	26	91	19	87	7
Flinders	93	10	94	18	95	27	95	19	96	20
Gairdner	88	3	90	5	90	21	90	16	89	18
Granger	94	10	97	18	97	27	98	18	100	18
La Trobe	125	10	111	19	110	28	108	2	101	21
Navigator	68	2	84	1	94	4	95	10	102	4
Schooner	96	10	93	18	93	26	89	15	85	9
Scope	101	10	100	19	99	28	98	17	96	21
Sloop SA	99	2	95	8	95	13	89	8	84	4
Westminster	73	3	79	5	86	21	90	17	97	18
FOOD										
Hindmarsh	127	10	111	19	110	28	107	6	99	21
FEED										
Barque	102	2	99	11	101	13	95	2	94	5
Capstan	84	2	95	2	97	2	104	19	111	5
Fathom	124	10	113	19	112	28	109	8	103	21
Fleet	111	10	108	19	107	28	103	18	98	20
Keel	122	10	109	19	108	28	104	18	96	19
Maritime	100	5	99	17	98	23	95	19	93	8
Oxford	76	10	88	18	92	27	95	8	104	12
Rosalind	131	8	116	8	117	14	114	8	108	17
PENDING MALT ACCREDITATION										
Alestar	88	4	94	13	95	24	98	18	102	15
Compass	133	10	118	19	115	28	110	18	98	21
RGT Planet	-		103	1	106	2	111	11	117	14
Spartacus CL	131	8	114	8	114	14	110	11	102	17

SouthernStar is a new malting barley developed by Sapporo Breweries and the University of Adelaide. SouthernStar is a Flagship plant type and incorporates a patented novel gene for improved beer quality. It has almost identical agronomic characteristics to Flagship with good early vigour, CCN resistance and a strong foliar disease resistance profile. SouthernStar also has sensitivity to sprouting so timely harvest must be a priority. SouthernStar can be grown under production contract to Barrett Burston Maltings and Cargill Malting.

Westminster was developed by European based Nickersons Plant Breeders and is a mid – late maturing variety with medium

– tall, stiff straw and improved shattering tolerance compared to Gairdner. Malting accreditation was completed in March 2013. Westminster has excellent foliar disease resistance coupled with good resistance to black point but is susceptible to spot form of net blotch. Westminster is well suited to the SE of SA and higher rainfall environments. Seed is available from Grainsearch affiliates.

Newer varieties

Alestar is a variety currently undergoing malt accreditation, with a similar maturity to Commander, and is targeted for the high rainfall regions of the SE in SA. Alestar is a yield improvement

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Table 5: Disease reaction of selected barley varieties

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

Disease rating codes:

R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible

Ratings provided are primarily from 2016 and have not been update with new data.

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

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

compared to Westminster. More evaluation is required for its adaptation to SA. Seed is available through Elders and through selected seed partners

Compass has been developed by the University of Adelaide as an early – mid season maturing, potential malting quality variety and is expected to complete Barley Australia malt accreditation in March 2018. It is closely related to Commander but is significantly higher yielding.

It has a similar growth habit to Commander but is earlier flowering with typical May sowing and improved net form net blotch resistance. Compass has similar straw strength to Commander and will be prone to lodging in high yielding

environments. Compass is now susceptible (SVS) to a new strain of leaf rust in SA. Compass has shown good physical grain quality with high retention and low screenings and moderate test weight. Seed is available from Seednet.

La Trobe is a malting accredited variety released from Intergrain in 2014 with early maturity and semi dwarf growth habit and plant architecture very similar to Hindmarsh. Its yield and agronomic performance in SA NVT since 2013 has also been very similar to Hindmarsh with slightly higher yield. La Trobe is resistant to CCN but S to SFNB and MS to net form of net blotch but shows variable resistance to leaf rust and leaf scald. La Trobe seed is available from Syngenta.

Table 6: Agronomic characteristics of selected barley varieties

Variety	Coleoptile length	Early vigour	Standing ability	Height to head	Earliness to flower	Head retention	Ease of threshing	Boron tox symptoms	Manganese efficiency
Barque		6	6	7	6	5	3	6	3
Bass	5	4	7	4	4	6		8	
Buloke	4	5	5	7	5	4	8	3	
Commander	6	6	4	6	5	5	7	6	
Compass	6	6	4	6	7	7	7	6	
Fathom	7	7	7	6	7	6	4	5	-
Flagship	5	5	5	6	5	7	7	8	
Fleet	8	6	3	7	6	6	4	5	
Gairdner	5	4	6	5	4	8	6	7	3
GrangeR	5	5	7	6	5	8			
Hindmarsh	3	3	7	5	7	7	7	8	
Keel		6	5	6	8	5	6	6	4
La Trobe	3	3	7	5	7	7	7	8	
Maritime	7	8	4	6	6	7	7	8	7
Navigator	6	4	7	4	4	7	8	2	
Oxford	5	6	8	4	3	8	7	7	
Rosalind	4	4	8		6	8			
RGT Planet	4	6			5				
Schooner	6	6	6	7	5	4	7	7	5
Scope	4	5	5	7	5	4	8	3	
Spartacus CL	3	3	7	5	7	7	7		
Westminster	6	4	8	5	3	7			

Relative values based on a 0-9 scale, a high figure indicating the variety expresses the character to a high degree. These values are only a guide; growing conditions greatly influence differences. * A high boron toxicity symptom score relates to high presence of leaf symptoms.

Flinders is a malting accredited variety developed by Intergrain and market development is in progress. It is a mid – late maturing variety with variable resistance to leaf rust and is susceptible to spot form net blotch, scald, and CCN. Seed is available from Syngenta.

Rosalind is a feed quality variety recently released by Intergrain in 2015. It has been evaluated in SA NVT since 2014 and has demonstrated broad adaptation and very high yields in high rainfall environments. Rosalind has a Hindmarsh plant type and flowers two to three days later than Hindmarsh and La Trobe. Rosalind has resistance to CCN, net form net blotch, leaf rust, and variable resistance to powdery mildew and leaf scald but susceptibility to spot form net blotch. Seed is available from Syngenta.

RGT Planet is a direct introduction from Europe bred by RAGT seeds where it is a high yielding malting variety. Planet is a mid-season flowering variety similar to Commander. RGT Planet was included in NVT SA for the first time in 2016 and was

the highest yielding variety across the state. However, more evaluation is needed in typical Australian spring conditions. RGT Planet is very susceptible to spot and net form net blotch. Quality data from 2016 suggests Planet has a lower test weight than Commander. RGT Planet is currently undergoing malt evaluation in Australia. Seed is available for 2018 through SeedForce agents.

Spartacus CL is a new imidazolinone tolerant barley developed by Intergrain and released in 2016 with a similar plant type and flowering behaviour to Hindmarsh and La Trobe. Within SA NVT during 2014 - 2016, Spartacus CL has also exhibited similar agronomic performance for grain yield and disease resistance profile including resistance to CCN and susceptibility to loose smut. Yields have averaged around 5% below Compass but more than 15% above the widely grown imidazolinone tolerant Scope CL. Spartacus CL has commenced Barley Australia malt accreditation with a decision on its suitability expected March 2018. Seed is available for sowing as a feed option while industry accreditation is completed. Seed is available from Syngenta. ■

Canola variety sowing guide 2018

By Andrew Ware, SARDI

At the time of writing there have been six new canola varieties released and available for planting in South Australia since the publication of the 2017 Canola Variety Sowing Guide. Of these, Pioneer 43Y92 is a new Clearfield tolerant variety, and Hyola 350TT, HyTTec Trophy SF and Ignite TT are new triazine tolerant varieties and Nuseed Quartz is a new conventional variety. There may be further variety releases in the months to follow, with seed possibly being available for planting in 2018, but these can't be confirmed at this time.

It should be noted that the marketing company responsible for each of the varieties listed in this document has advised that they are planning to have seed available for each of these varieties for planting in 2018, however not all varieties that are still marketed have been tested in NVT trials in 2017. Some older varieties have not been evaluated in NVT trials for several years, but seed remains available.

There are two groups NVT canola trials conducted in South Australia, mid-maturity and early maturity series. Both sets trials have similar sowing and harvest times and have a similar complement of varieties, although there may be several early maturity varieties in the early series that are not tested in the mid series, or vice versa. The main difference between the series is that the trials are located in areas suited to their maturity, with the majority of the early series in the lower rainfall zone and the mid-season in the medium to high rainfall zones.

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

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

Speciality Types

In recent years a number of specialty canola varieties have been released. These include the Victory® varieties (marketed by Cargill) and Monola® varieties (marketed by Nuseed). These varieties have a different oil profile than commodity canola that is more suitable for use in the food industry. Agronomically speciality canola is the same as commodity canola. Speciality canola is being offered to growers in a closed loop marketing systems, attracting a significant premium price. Production

contracts for these varieties are available in the South East and Mid North regions.

Winter Type/ Grain 'n Graze Canola

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

Varietal selection

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

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

South Australian Mid-Season Long Term Canola Yields & Agronomic Information														
Variety	Licensee	Release Year	Type^	Maturity	Yield Group (% Site Mean)						Oil(%)*	Blackleg Rating (Bare)	Blackleg Rating (+Jockey)	Blackleg Resistance Group
					<1.5T/Ha		1.5-2.5T/Ha		>2.5T/Ha					
					No. Trials		No. Trials		No. Trials					
CONVENTIONAL														
AV Garnet	Nuseed	2007	OP	M	96	7	100	18	103	7	43.2 (5)	MS	-	A
Hyola 50~	Advanta Seeds	2007	Hybrid	M	116	4	108	13	107	3	-	-	-	AD
Nuseed Diamond	Nuseed	2013	Hybrid	E	139	6	115	12	117	5	43.3 (5)	MR	-	ABF
Nuseed Quartz	Nuseed	2017	Hybrid	M	-	-	-	-	129	4	44.2 (5)	R	-	ABD
Victory® V3002	Cargill/ AWB	2012	OP - Spec. Oil	M	106	6	102	15	100	6	42.4 (5)	MR	R	ABF
Conventional Site Mean Yeild (t/ha)					1.12		1.97		2.72					
CLEARFIELD														
Banker CL	Heritage Seeds	2012	Hybrid	M	116	4	117	9	123	7	43.8 (5)	MR-MS	-	A
Hyola 575CL	Advanta Seeds	2010	Hybrid	M	93	8	100	20	104	11	43.6 (5)	R	-	BF
Pioneer 43Y92 (CL)	Pioneer Brand	2017	Hybrid	E	-	-	-	-	123	6	42.6 (5)	MR-R	-	B
Pioneer 44Y89 (CL)~	Pioneer Brand	2014	Hybrid	EM	117	6	107	11	109	6	43.2 (5)	-	-	BC
Pioneer 44Y90 (CL)	Pioneer Brand	2016	Hybrid	EM	131	3	121	6	128	5	43.3 (5)	R-MR	R	B
Pioneer 45Y91 (CL)	Pioneer Brand	2016	Hybrid	ML	-	-	112	3	117	6	44.1 (5)	MR	R	B
Clearfield Site Mean Yield (t/ha)					1.13		2.00		2.70					
TRIAZINE TOLERANT														
ATR Bonito	Nuseed	2013	OP	EM	99	5	97	20	95	11	44.3 (6)	MS	-	A
ATR Gem	Nuseed	2011	OP	EM	92	5	94	21	94	11	43.5 (6)	MS	-	A
ATR Mako	Nuseed	2015	OP	EM	99	3	97	12	95	7	40.8 (6)	MR	-	A
ATR Stingray	Nuseed	2011	OP	E	92	2	94	18	96	7	-	MR	-	C
ATR Wahoo	Nuseed	2013	OP	ML	85	5	94	18	96	9	-	MS	-	A
DG 560TT	Seednet	2016	Hybrid	M	-	-	103	5	101	6	41.7 (6)	MR	R	BF
DG 670TT	Seednet	2017	Hybrid	ML	-	-	-	-	115	5	42.2 (6)	MR	R	BF
Hyola 350TT	Advanta Seeds	2017	Hybrid	E	-	-	-	-	114	3	-	R	-	ABDF
Hyola 559TT	Advanta Seeds	2012	Hybrid	EM	106	5	104	20	105	11	43.4 (6)	R-MR	-	ABD
Hyola 650TT	Advanta Seeds	2014	Hybrid	ML	89	3	102	13	108	8	-	R	-	ABD
InVigor T 4510	Bayer	2016	Hybrid	EM	-	-	-	-	118	5	42.1 (6)	MR-MS	R	BF
Monola 314TT	Nuseed	2013	OP - Spec. Oil	EM	89	3	83	10	83	3	-	MR	-	unknown
Monola 515TT	Nuseed	2015	OP - Spec. Oil	ML	68	3	82	8	83	6	43.8 (6)	MR	-	unknown
Pioneer 44T02 TT	Pioneer Brand	2016	Hybrid	EM	-	-	104	6	109	4	-	R-MR	R	ABD
Pioneer 45T01TT	Pioneer Brand	2015	Hybrid	M	-	-	98	12	97	7	-	MS	R-MR	AB
SF Ignite TT	Seed Force	2017	Hybrid	ML	-	-	-	-	117	5	43.8 (6)	MR	R	BF
SF Turbine TT	Seed Force	2016	Hybrid	EM	-	-	114	5	117	5	43.8 (6)	MR-MS	R-MR	BF
Triazine Tolerant Site Mean Yeild (t/ha)					1.17		1.96		2.71					
NVT Trials are not designed to allow comparison of varieties between herbicide tolerance groups.														
Data source: SARDI/GRDC, NVT 2012-2016 MET data analysis by National Statistics Program. ~ Seed no longer available - included as industry standard ^Type: OP = Open Pollinated Spec. Oil = High Stability Specialty Oil Maturity: E= early, M= mid, L= Late														
Oil = Average of 2016 SA NVT trials where all varieties were present, adjusted to 6% moisture. Number of trials in brackets (). Blackleg rating key: R = resistant, MR = moderately resistant, MS = moderately susceptible, S= susceptible. Jockey® seed dressing contains fluquinconazole														
Blackleg resistance group refers to the combinations of blackleg resistance genes carried by each variety.														

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Varietal Characteristics

Notes on newly released conventional varieties

Nuseed Quartz. Mid maturing hybrid. Potential replacement for AV Garnet. Medium height. Blackleg resistance rating of R (resistance group ABD). Tested in NVT trials 2016-17. Bred and marketed by Nuseed Pty Ltd.

Notes on recently released conventional varieties

AV-Garnet. Mid-early to mid to maturing. Medium height. Widely adapted. Blackleg resistance rating of MS (resistance group A). Tested in NVT trials 2006-2017. Bred by DPI Victoria. Marketed by Nuseed Pty Ltd.

Nuseed Diamond. Early maturing hybrid. Very fast to flower. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of MR (resistance group ABF). Tested in NVT trials in 2012-17. Bred and marketed by Nuseed Pty Ltd.

SF Brazzil. Late maturing, winter dual-purpose open pollinated variety. Suited to early sowing and winter grazing in very high rainfall zones. Blackleg resistance rating of R-MR (resistance group BC). Not tested in NVT trials. Marketed by Seed Force.

Victory V3002. Early-mid maturing conventional specialty (high stability oil) hybrid. Blackleg resistance rating of MR (resistance group ABF). Tested in NVT trials in 2011-2017. Bred by Cargill and DPI Victoria. Marketed by AWB under contract.

Withdrawn and no longer available: SF Sensation, AV-Zircon, Hyola 50

HERBICIDE TOLERANT

Notes on newly released Clearfield (imidazolinone tolerant) varieties

Pioneer 43Y92 (CL). Early maturing hybrid. High oil content. Medium plant height. Blackleg resistance rating of R-MR (resistance group B). Suited to low - medium rainfall areas and short season growing zones. Tested in NVT trials 2016-17. Marketed by Pioneer Brand Seeds.

Notes on recently released Clearfield (imidazolinone tolerant) varieties

Banker CL Mid maturing hybrid. Medium plant height. Suited to medium rainfall areas. Blackleg resistance rating MR-MS (resistance group A). Tested in NVT trials 2014-17, marketed by Heritage Seeds.

Hyola® 575CL. Mid-Early maturing CL hybrid. Fast to flower from early sowing. Medium plant height. Suited to medium to high rainfall areas. Blackleg resistance rating of R (resistance group BF). Tested in SA NVT trials in 2010-17. Bred by Pacific Seeds and marketed by Advanta Seeds.

Hyola® 970CL. Long season, winter graze and grain dual purpose hybrid. Advanta Seeds indicate high-very high biomass, good grain yield and oil content. Suited to sowing in early-mid autumn and spring sowing in very high rainfall zones.

Blackleg resistance rating of R (resistance group H). Not tested in NVT trials. Marketed by Advanta Seeds.

Pioneer 44Y90 (CL) An early-mid maturing hybrid. High oil content. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of R-MR (resistance group B). Tested in NVT trials in 2015-17. Marketed by Pioneer Brand Seeds.

Pioneer 45Y91 (CL) A mid maturing hybrid variety. Medium-tall plant height. Suited to medium-high rainfall areas. A blackleg rating of MR (resistance group B). Tested in NVT trials in 2015-17. Marketed by Pioneer Brand Seeds.

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

Withdrawn and no longer available: Archer, Carbine, Hyola 474CL, Hyola 577CL, Pioneer 43Y85CL, Pioneer 44Y87CL, Pioneer 44Y89CL

Notes on newly released Triazine tolerant (TT) varieties for 2017

Hyola® 350TT. Early maturing TT hybrid. Medium plant height. Blackleg resistance rating of R (resistance groups ABDF). Tested in NVT trials in 2016-17. Bred and marketed by Advanta Seeds.

HyTTech Trophy (coded as NCH15T085). An early to mid-maturing hybrid canola. Medium-tall plant height. Nuseed indicates a blackleg rating from internal trials of R-MR, with the resistance group yet to be determined. In NVT for the first time in 2017, release for 2018 season. HyTTech Trophy will be marketed with an EPR expected to be \$10/tonne, but a reduced seed price compared to other hybrid varieties. Bred and marketed by Nuseed.

SF Ignite TT – (coded SFR65-014TT). Mid to mid-late maturing hybrid. Suited to medium to high rainfall zones. Medium plant height. Suited to medium-high rainfall areas. Blackleg resistance rating of MR (resistance group BF). Tested in NVT 2016-17. Marketed by Seed Force.

Notes on recently released Triazine tolerant (TT) varieties

ATR Bonito Early-mid season maturing open pollinated variety. Short-medium height. Suited to low-medium rainfall areas. Blackleg resistance rating of MS (resistance group A). Tested in NVT trials 2012-17. Marketed by Nuseed. An EPR of \$5 per tonne (GST ex) applies.

ATR Gem Early-mid maturity variety open pollinated. Medium plant height. Blackleg resistance rating of MS (resistance group A). Tested in NVT trials 2011-16. Marketed by Nuseed Pty Ltd.

ATR Mako Early-mid maturity triazine tolerant open pollinated variety. Medium (slightly taller than Gem) plant height. Suited to medium – high rainfall areas. Blackleg resistance rating of MR (resistance group A). Tested in NVT trials 2013-17. Marketed by Nuseed Pty Ltd. An EPR of \$5 per tonne (GST ex) applies.

ATR-Stingray. Early maturing open pollinated variety. Fast to flowering. Short height. Blackleg resistance rating of MR

South Australian Early-Season Long Term Canola Yields & Agronomic Information

Variety	Licensee	Release Year	Type^	Maturity	Yield Group (% Site Mean)		Oil(%)*	Blackleg Rating (Bare)	Blackleg Rating (+Jockey)	Blackleg Resistance Group
					All SA early Conv.					
						No. Trials				
CONVENTIONAL										
AV Garnet	Nuseed	2007	OP	M	100	5	46.3 (2)	MS	-	A
Nuseed Diamond	Nuseed	2013	Hybrid	E	117	4	45.8 (2)	MR	-	ABF
Nuseed Quartz	Nuseed	2017	Hybrid	M	115	2	45.9 (2)	R	-	ABD
Victory® V3002	Cargill/ AWB	2012	OP - Spec. Oil	M	100	4	44.2 (2)	MR	R	ABF
Conventional Site Mean Yield (t/ha)					1.74					

Variety	Licensee	Release Year	Type^	Maturity	Yield Group (% Site Mean)				Oil(%)*	Blackleg Rating (Bare)	Blackleg Rating (+Jockey)	Blackleg Resistance Group
					<1.5t/ha		>1.5t/ha					
						No. Trials		No. Trials				
CLEARFIELD												
Banker CL	Heritage Seeds	2012	Hybrid	M	114	5	115	6	43.9 (5)	MR-MS	-	A
Hyola 575CL	Advanta Seeds	2010	Hybrid	M	105	7	105	12	44.0 (5)	R	-	BF
Pioneer 43Y92 (CL)	Pioneer Brand	2017	Hybrid	E	132	2	118	3	43.4 (5)	MR-R	-	B
Pioneer 44Y89 (CL)	Pioneer Brand	2014	Hybrid	EM	121	6	109	11	43.3 (5)	-	-	BC
Pioneer 44Y90 (CL)	Pioneer Brand	2016	Hybrid	EM	134	5	118	5	43.9 (8)	R-MR	R	B
Clearfield Site Mean Yield (t/ha)					1.02		2.03					

TRIAZINE TOLERANT

ATR Bonito	Nuseed	2013	OP	EM	95	6	96	10	45.6 (4)	MS	-	A
ATR Gem	Nuseed	2011	OP	EM	92	2	93	5	-	MS	-	A
ATR Mako	Nuseed	2015	OP	EM	-	-	97	2	-	MR	-	A
ATR Stingray	Nuseed	2011	OP	E	99	6	100	10	45.2 (4)	MR	-	C
DG 560TT	Seednet	2016	Hybrid	M	-	-	102	3	-	MR	R	BF
Hyola 559TT	Advanta Seeds	2012	Hybrid	EM	105	6	108	10	45.5 (4)	R-MR	-	ABD
InVigor T 4510	Bayer	2016	Hybrid	EM	-	-	111	3	43.8 (4)	MR-MS	R	BF
Monola 314TT	Nuseed	2013	OP - Spec. Oil	EM	-	-	77	2	-	MR	-	unknown
Monola 515TT	Nuseed	2015	OP - Spec. Oil	ML	-	-	78	2	-	MR	-	unknown
Pioneer 44T02 TT	Pioneer Brand	2016	Hybrid	EM	110	3	108	5	44.9 (4)	R-MR	R	ABD
Pioneer 45T01TT	Pioneer Brand	2015	Hybrid	M	-	-	102	4	-	MS	R-MR	AB
SF Turbine TT	Seed Force	2016	Hybrid	EM	-	-	110	3	-	MR-MS	R-MR	BF
Triazine Tolerant Site Mean Yield (t/ha)					1.05		2.00					

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

Data source: SARDI/GRDC, NVT 2012-2016 MET data analysis by National Statistics Program. ~ Seed no longer available - included as industry standard ^Type: OP = Open Pollinated Spec. Oil = High Stability Specialty Oil

Maturity: E= early, M= mid, L= Late Oil = Average of 2016 SA NVT trials where all varieties were present, adjusted to 6% moisture. Number of trials in brackets ().

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

Jockey® seed dressing contains fluquinconazole Blackleg resistance group refers to the combinations of blackleg resistance genes carried by each variety.

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(resistance group C). Tested in NVT trials 2011-17. Bred by Nuseed Pty Ltd and DPI Victoria. Marketed by Nuseed Pty Ltd.

ATR Wahoo Mid maturity open pollinated variety. Medium plant height. Blackleg rating of MS (resistance group A). Suited to medium – high rainfall areas. Tested in NVT trials 2012-17. Marketed by Nuseed. An EPR of \$5 per tonne (GST ex) applies.

DG 560TT A mid maturity Triazine Tolerant hybrid. Medium to tall plant height. Suited to medium rainfall areas. Blackleg resistance of MR (resistance group BF). Tested in NVT in 2015-17. Marketed by Seednet.

DG 670TT A mid-late maturity Triazine Tolerant hybrid. Medium to tall plant height. Suited to medium-high rainfall areas. Blackleg resistance of MR (resistance group BF). Tested in NVT in 2016-17. Marketed by Seednet.

Hyola® 559TT. Mid-early maturing TT hybrid. Medium plant height. Suited to low-medium through to high rainfall areas. Blackleg resistance rating of R-MR, (resistance groups ABD). Tested in NVT trials in 2012-17. Bred and marketed by Advanta Seeds.

Hyola® 650TT. Mid to mid-late maturing TT hybrid. Medium-tall plant height. Suited to medium –high rainfall areas. Blackleg resistance rating of R (resistance groups ABD). Tested in NVT trials in 2013-17. Marketed by Advanta Seeds.

In Vigor T 4510. Mid-season Triazine Tolerant hybrid variety. Medium plant height. Suited to medium rainfall areas. Blackleg resistance rating of MR-MS (resistance group BF). Tested in NVT trials 2016-17. Marketed by Bayer.

Monola® 314TT. Early maturing specialty oil open pollinated variety. Medium planted height. No current blackleg rating

(resistance group unknown). Tested in NVT trials in 2013-15. Bred and marketed by Nuseed Pty Ltd. A premium payment will apply to Monola 314TT. Must be delivered to Glencore Grain at Tarlee and Coomandook.

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

Pioneer 44T02 (TT) An early-mid maturing hybrid variety. Medium plant height. Suited to low-medium rainfall areas. Blackleg resistance rating of R-MR (resistance group ABD). Tested in NVT trials in 2015-17. Marketed by Pioneer Brand Seeds.

Pioneer 45T01 (TT). A mid maturing triazine tolerant hybrid. Medium plant height. Suited to medium-high rainfall areas. Blackleg rating of MS (resistance group AB). Tested in NVT trials in 2013-16. Marketed by Pioneer Brand Seeds.

SF Turbine TT Early-Mid maturing hybrid. Medium plant height. Suited to medium rainfall areas. Blackleg resistance rating of MR-MS (resistance group BF). Tested in NVT 2015-17. Marketed by Seed Force.

Withdrawn and no longer available: Hyola 450TT, Monola 314TT, Pioneer Atomic HT

NOTES

Triticale variety sowing guide 2018

By Charlton Jeisman, SARDI

Triticale has been discontinued as part of the National Variety Trial program with 2015 being the final season of evaluation.

Triticale is well adapted to a wide range of soil types although it is often grown on sandy soils in South Australia where low fertility and moderate acidity are present.

Triticale generally has vigorous early growth, protecting fragile soils from wind erosion and a number of varieties have good tolerance to soil borne diseases (such as cereal cyst nematode). Triticale also performs well in soils with high boron content and can tolerate moderate waterlogging.

Resistance to stripe rust has been a feature of many triticale varieties although there is now increased susceptibility to some new rust strains.

Growers should observe resistance levels when selecting varieties. Please refer to table 1 and the latest disease guides for the most up to date information.

Triticale is primarily grown for stock feed as the starch component is readily digestible by livestock. A small component is used for human consumption; however milling techniques used for triticale are different to those used for milling wheat and so triticale is unlikely to become a simple substitute for wheat in the near future.

Dual purpose triticale varieties, suitable for grazing and grain production are an option for higher rainfall areas such as the South East of SA. Refer to table 1 for further information about the suitability of certain varieties in different rainfall zones.

Notes on current triticale varieties

Astute

Astute (AGT 2015) is a mid-season variety suited to medium to high yield potential environments, and is an alternative to Hawkeye. Astute has acid soil tolerance and has very high and stable grain yields across seasons. Seed is protected by PBR and is available to growers through AGT affiliates.

Berkshire

Developed by the University of Sydney and the Pork CRC. Berkshire has been purpose bred for its feed quality traits for pigs and has a high digestible energy and amino acid content.

Berkshire is mid-season maturity (like Tahara) with good straw strength but is moderately susceptible to stripe rust. Seed is available from Waratah Seed Co. Ltd.

Bison

Bison (AGT 2014) has early to mid-season maturity and is a Rufus alternative for the low to medium rainfall zone. It has a reduced awn head type and good resistance to stem, stripe and leaf rusts. Bison is protected by PBR. Seed is available to growers through AGT affiliates.

Bogong

Bogong (University of New England, Armidale 2008) is an early to mid-season flowering variety, is fully awned, has stiff straw and has good resistance to all three rust types. Bogong has consistently high yields across all environments in SA. Bogong is a widely adapted spring variety that is moderately susceptible to CCN. Bogong is protected by PBR with seed marketed by Viterra.

Canobolas

Canobolas (University of New England, Armidale 2008) is an early to mid season grain variety, is fully awned, has stiff straw but is MSS to stripe rust. Canobolas is a widely adapted spring variety that has improved tolerance to acidic soils. Canobolas is protected by PBR with seed marketed by Viterra.

Chopper

Chopper (AGT 2010) is a very early maturing spring variety (one to two weeks earlier than Tahara), is fully awned and offers CCN and rust resistance. Chopper is semi dwarfed (shorter than all other triticale varieties) which significantly reduces its tendency to lodge when grown in high yielding environments. Chopper performs well in short growing season environments with unfavourable finish and is suited to late sowing. It is protected by PBR with seed available from AGT Seeds.

Fusion

Fusion (AGT 2012) is a mid-season maturing spring triticale. It is fully awned, has excellent resistance to stripe, stem and leaf rusts and has CCN resistance. Fusion is moderately tall (like Rufus) and has very high and stable grain yields across seasons. Fusion has good grain size and low screenings. It is protected by PBR with seed available from AGT Seeds.

TRITICALE

Goanna

Goanna (Cooper & Elleway 2011) is an early-mid season spring type. Goanna has good resistance to leaf, stem, and stripe rust and has CCN resistance. Goanna is a fully awned, tall variety and achieves reliable grain production and quality (protein and test weight) under dry conditions. Goanna is a non PBR variety and seed is available from Cooper & Elleway.

Hawkeye

Hawkeye (AGT 2007) is a broadly adapted, mid maturing variety with high yield potential. It has good resistance to all three rusts and has CCN resistance. Hawkeye produces large grain with low screenings and above average test weight. Seed is protected by PBR and is available from AGT Seeds.

Jaywick

Jaywick (AGT 2007) is a broadly adapted, mid maturing variety with high yield potential. It has moderate to good resistance to all rusts and has CCN resistance. Jaywick produces large grain with low screenings and above average test weight. Seed is protected by PBR and is available from AGT Seeds.

KM10

KM10 (Cooper and Elleway 2015) is very fast growing with excellent early forage production in all rainfall zones. Although tending to have reduced grain size, KM10 is particularly suited to grain production in shorter season environments but could also be considered as a dual purpose variety when sown early.

KM10 is a reduced awn head type and has good resistance to all three rusts but is susceptible to CCN. It is a non PBR variety with seed available from Cooper & Elleway.

Tahara

Tahara is a long term benchmark variety for use in cereal rotations in most districts up to 500 mm average annual rainfall. Tahara's tall plant height makes it prone to lodging when grown in high rainfall environments. Tahara has good resistance to CCN and root lesion nematode (*Pratylenchus neglectus*) making it a valuable disease break option. Tahara is moderately susceptible to stripe rust and largely outclassed for yield by many newer grain varieties. Tahara seed can be purchased from commercial growers.

Yowie

Yowie (Cooper and Elleway 2010) is a mid-season spring type grain variety. It is slightly later heading than Tahara and has good resistance to current pathotypes of stem, stripe, and leaf rust, as well as CCN. Yowie is a fully awned, medium-tall, modest yielding variety, with relatively good test weight and low screenings. Yowie is a non-PBR variety available from Cooper & Elleway.

Dual purpose (DP) triticale varieties

Dual purpose varieties produce high volumes of dry matter and

Table 1. Agronomic and disease characteristics of triticale varieties

Variety	Origin	Purpose	Height	Maturity	Head Type	Stripe Rust	CCN Resistance	Pratylenchus neglectus Resistance	Pratylenchus thornei Resistance	Rainfall Zone and environment
Astute	AGT	Grain	T	M	W/Awned	RMR	R	R	MRMS	
Berkshire	NSW	Grain	T	E-M	W/Awned	MRMS	-	MR	MS	
Bison	SA	Dual Purpose	T	M	W/R Awn	RMR	R	MR	RMR	
Bogong	NSW	Grain	M-T	E-M	W/Awned	RMR	MS	MR	S	
Canobolas	NSW	Grain	M-T	E-M	W/Awned	MRMS	-	MR	MSS	
Chopper*	SA	Grain	S-M	Very E	W/Awned	MRMS	R	MRMS	MSS	
Fusion	SA	Grain	M-T	M	W/Awned	R	R	RMR	MS	Low rainfall (<375mm)
Goanna	SA	Grain	M	E-M	W/Awned	R	R	MRMS	SVS	
Hawkeye	SA	Grain	M-T	M	W/Awned	RMR	R	MR	MS	
Jaywick	SA	Grain	M-T	M	W/Awned	MR^	R	-	-	
KM10	SA	Grain	M-T	E	W/R Awn	R	S	MR	MS**	
Rufus	NSW	Dual Purpose	T	M	W/R Awn	MRMS	R	MRR	MRR	
Tahara	Vic	Grain	T	M	W/Awned	MS	R	MRR	R	
Yowie	SA	Grain	M-T	M	W/Awned	MR	R	MR	MSS	
Endeavour	NSW	Dual Purpose	-	Very L	W/R Awn	RMR	R	MR	SVS	High rainfall (>500mm)
Tuckerbox	SA	Dual Purpose	T	M	W/R Awn	MR	R	MRMS	S	
Yukuri	NSW	Dual Purpose	-	M-L	W/R Awn	RMR	S	-	-	

* Suits late sowing Height: S= Short, M= Medium, T= Tall Maturity: E= Early, M= Mid, L= Late

Head Type: W= White (versus brown), R Awned= Reduced Awned

Disease resistance: S= Susceptible, MS Moderately Susceptible, MR= Moderately Resistant, R= Resistant (^ some Susceptible plants in mix, ** provisional rating)

Note that all recommended varieties are MR-R to stem and leaf rust, yellow leaf spot, mildew and scald.

All varieties are S to crown rot and MS to common root rot

TRITICALE

Endeavour

Rufus

Tuckerbox

Yukuri

For further information on triticale as a stock feed: www.porkcrc.com.au/1A-102_Triticale_Guide_Final_Fact_Sheets.pdf

Variety	Yield Bracket				
	< 1.0 t/ha	1.0 to 2.0 t/ha	2.0 to 3.0 t/ha	3.0 to 4.0 t/ha	> 4.0 t/ha
Abacus	81	88	87	93	91
Astute	120	108	111	109	113
Berkshire	108	102	104	104	103
Bison	128	111	113	111	110
Bogong	113	101	106	108	109
Canobolas	104	99	103	104	106
Chopper	114	105	104	105	99
Endeavour	59	92	86	81	87
Fusion	130	112	113	111	109
Goanna	98	99	99	99	99
Hawkeye	104	103	104	101	103
Jaywick	92	99	99	97	101
KM10	102	106	102	98	94
Rufus	97	100	98	98	97
Tahara	97	99	98	98	96
Tuckerbox	65	90	86	85	87
Yowie	81	95	94	92	95
Mean Yield	0.55	1.63	2.52	3.49	5.15
Number of Trials	3	11	13	13	19

Data source: ACAS/ GRDC South Australian NVT trials 2011-2015

NOTES

Faba bean variety sowing guide 2018

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

Faba bean variety choice for South Australian growers will remain the same in 2018, with no new varieties released in 2017.

The faba bean choices for growers in the major bean production regions in South Australia have tended to be Nura and Farah. However, the new widely adapted high yielding varieties PBA Zahra and PBA Samira are expected to be grown widely and become the dominant varieties.

Yields of PBA Zahra and PBA Samira have averaged approximately 5-10 % more than current varieties in most regions. In 2016 yields of PBA Zahra were on average across all National Variety Sites up to 5 % greater than other varieties. PBA Samira tended to be more similar to other varieties.

PBA Zahra was released for cultivation in 2016. It is particularly responsive to high yielding environments, demonstrated in 2016. It has large seeds with uniform size and colour. PBA Zahra has a good overall level of disease resistance. It is resistant to the ascochyta blight pathotype 1, however, a shift in virulence for ascochyta blight (pathotype 2) identified in many growing regions has resulted in a MS/MR response in this variety to this new pathotype. This means that it is likely to require a fungicide application during podding. PBA Zahra is less susceptible to chocolate spot and faba bean rust than Farah and Fiesta VF.

PBA Samira, released in 2015, is high yielding and responsive to high yielding situations. It is resistant to both ascochyta blight pathotype 1 (widely distributed in the southern region) and pathotype 2 (recently identified in the mid-north of SA), and together with Nura, are the only varieties that are resistant to both pathotypes. PBA Samira is similar to Nura in response to chocolate spot. PBA Samira is relatively late flowering, but matures at the same time as other faba bean varieties.

PBA Rana continues to be grown in the medium to high rainfall regions of southern Australia with growers utilising its disease resistance. PBA Rana generally requires one less fungicide spray compared with other varieties. PBA Rana is resistant to the ascochyta blight pathotype 1, and MS/MR to pathotype 2. This means that it is likely to require a fungicide application during podding.

Faba beans are cross-pollinated by bees. Seed crops should be isolated from other varieties by at least 200 m to minimise

the risk of cross-pollination and maintain genetic purity of the variety. This is particularly important for specific traits such as disease resistance and seed quality.

Varieties and market preferences

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

Farah, Nura and Fiesta VF varieties are well accepted in the Middle East. PBA Samira is of similar size to these varieties and is expected to be accepted 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.

PBA Rana seed is larger than other varieties and is 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 market to the major food markets in the Middle East.

The medium seed size "Fiesta grade" is expected to remain the dominant quality type as it is currently well accepted in the Middle East market and also is easier to manage for on-farm operations. The PBA faba bean breeding program has a major focus on developing new varieties to fit this grade. New varieties will also be developed for the large seed quality type where premium prices might be obtained.

Product that does not meet export standards or is surplus to demand is consumed domestically in stockfeed rations, often at lower prices. Sound beans are also finding a place in many integrated cropping and grazing enterprises as a means of

finishing lambs on farm. Strong demand by graziers for feed beans can occur in dry conditions.

Varieties and disease management

In growing regions or seasonal conditions that favour chocolate spot development, all varieties require a protective fungicide spray before canopy closure, when the crop is at the early flowering stage. Additional applications will be required if wet conditions continue, particularly when disease symptoms are evident, soil moisture is high and dense canopy growth retains moisture levels within the canopy. Chocolate spot typically develops during early spring as temperatures increase; however it can infect crops earlier, so faba beans should be monitored from later winter.

A shift in virulence for ascochyta blight found in the mid-north of SA has seen the disease rating for ascochyta blight separated into pathotype 1 (widely distributed in the southern region) and pathotype 2 (identified in the mid-north of SA in 2013, but crop monitoring and pathotype screening in subsequent years has demonstrated that this new pathotype is spreading to other districts).

Nura and PBA Samira are the only varieties resistant to both pathotypes. Farah, PBA Rana and PBA Zahra are only resistant to ascochyta blight pathotype 1. Resistant varieties allow growers to be more reactive to ascochyta blight than in susceptible varieties and disease management strategies can be based on monitoring levels in high risk situations.

Fiesta VF is susceptible to ascochyta blight. Growers must maintain disease control in crops, until after flowering is finished to ensure seed staining is minimised. Similarly, this management strategy must be adopted for Farah crops in regions where pathotype 2 is present.

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

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

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

Where these situations occur, and given good conditions for crop production and disease development, fungicide applications to control rust may be necessary at the same time as chocolate spot is being targeted.

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

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

Harvest

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

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

Crop topping of faba beans can make them more vulnerable to seed staining, particularly if rain falls soon after application. Crop topping too early or using products or rates that cause crops to dry down quickly can exacerbate the issue. Maturity of current faba bean varieties are not as well suited to crop

Table 1. FMost adapted faba bean varieties for each rainfall zone

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

Table 3. Faba Bean Yields (National Variety Trials)
Variety grain yield expressed as % of mean yield for each yield bracket

Variety	<2.0t/ha		2-3t/ha		3-4t/ha		>5t/ha	
Average Yield	1.42	No. Trials	2.48	No. Trials	3.48	No. Trials	4.68	No. Trials
Farah	98	24	97	20	98	15	97	15
Fiesta VF	98	24	98	20	98	15	98	13
Nura	92	24	94	20	95	15	94	15
PBA Rana	86	24	88	20	90	15	94	15
PBA Samira	98	24	104	20	102	15	104	15
PBA Zahra	99	24	106	20	103	15	106	15
Aquadulce*	99	1	103	3	92	2	108	4
PBA Kareema*	104	1	102	3	92	2	107	4

* Broad bean varieties

BEANS

Variety	Plant height	Flower time	Maturity	Lodging resistance	Ascochyta blight*		Chocolate spot	Cercospora	Rust	PSbMV seed staining
					Pathotype 1	Pathotype 2				
FABA BEANS										
Farah	Medium	Early-mid	Early-mid	MS	MR/R	S	S	S	S	S
Fiesta VF	Medium	Early-mid	Early-mid	MS	MS	S	S	S	S	S
Nura	Short	Mid	Early-mid	MR	MR/R	MR/R	MS	S	MS	VS
PBA Rana	Medium/Tall	Mid	Mid	MR	R	MS/MR	MS	S	MS	MR
PBA Samira	Medium	Mid	Early/Mid	MR	MR/R	MR/R	MS	S	MS	S
PBA Zahra	Medium/Tall	Mid	Mid	MR	R	MS/MR	MS	S	MS	S
BROAD BEAN										
Aquadulce	Tall	Mid	Late	MS	MS	MS	MS	S	MS	S
PBA Kareema	Tall	Mid	Late	MS	MR	MR	MS	S	MS-MR	S
Key: R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible										
* Ascochyta blight ratings for pathotype 1 which is widely distributed throughout the southern region, and pathotype 2, which has been become established many growing districts in Southern Australia.										

topping as the industry would like, particularly in better seasons, hence all grain may not be mature when the ryegrass is ready to top.

Notes on faba bean varieties

PBA Zahra

PBA Zahra (evaluated as AF05095 and re-selection AF05095-1) is the result of a cross between Farah and an Accession 920/3 which originated from Morocco. It has shown wide adaption throughout southern Australia and is very responsive to high yielding situations.

PBA Zahra seed is uniform large size and colour and should be suitable to co-mingle with PBA Rana for a medium-large faba bean category for the Egyptian market. PBA Zahra is mid flowering, similar to Nura, PBA Rana and PBA Samira and mid maturity similar to PBA Rana. It is a medium/tall plant similar to PBA Rana and taller than other varieties. It is resistant to the old strain of ascochyta blight (pathotype 1) but is MS/MR to pathotype 2. PBA Zahra is rated as moderately susceptible to chocolate spot and rust. It is susceptible to Cercospora leaf spot. PBA Zahra is licensed to Seednet and an end point royalty applies.

PBA Samira

PBA Samira (tested as AF05069 and the re-selection AF05069-2) is one of the highest yielding faba bean varieties for southern Australia. It is widely adapted and is responsive to high yielding situations. It has mid flowering (similar to Nura and PBA Rana) and 5-10 days later than Fiesta VF and Farah, but matures at the same time as other varieties. PBA Samira is resistant to ascochyta blight pathotype1 and pathotype 2. It is moderately susceptible to chocolate spot and rust, and susceptible to Cercospora leaf spot. Seed of PBA Samira is slightly larger than Fiesta VF, Farah and Nura, but the overall seed colour is similar for all varieties. PBA Samira can be co-mingled with these other varieties for the Middle East market. PBA Samira is licensed to Seednet and an end point royalty applies.

PBA Rana

PBA Rana (tested as AF01006-1 or 974*(611*974)/15-1) has good vigour and stem strength. It has mid flowering (similar to Nura) and mid maturity (later than Nura and Farah). PBA Rana is well adapted to high rainfall areas with long growing seasons. PBA Rana has good resistance to ascochyta blight pathotype 1 and MS/MR to pathotype 2. This variety is moderately susceptible to chocolate spot. It has demonstrated very useful resistance to rust (MS). PBA Rana produces large, plump, light brown seeds and is suited to meeting Egyptian market requirements for that grade. PBA Rana represents a unique category for faba bean marketing. As PBA Rana is three quarters Manafest in its breeding, it should establish itself into areas where Manafest was grown before ascochyta blight saw its demise. PBA Rana is licensed to Seednet and an end point royalty applies.

Nura

Nura is a medium-sized faba bean with resistance to both strains of ascochyta blight (pathotype 1 & 2) and moderate susceptibility to rust. Nura is moderately susceptible to chocolate spot, especially in situations when sown early and where disease pressure is high. Nura is susceptible to Cercospora leaf spot. Protection from ascochyta blight and rust is only required in high risk situations which is a major advantage for growers, as it means a likely reduction in fungicide sprays.

Nura is more sensitive to high rates of imazethapyr (e.g. Spinnaker®) than Farah but is more tolerant of simazine and metribuzin. It is generally shorter than Fiesta VF and Farah meaning it is less likely to lodge. However since its bottom pods are closer to the ground, harvest can be more difficult in lower rainfall districts or when sown late. In most areas long-term yields of Nura tend to be slightly lower than Farah, although this is improved when Nura is sown early. It has good seed appearance, light buff in colour, with minimal seed staining and discolouration. Flowering time of Nura is generally around 7 days later than Farah, although has similar maturity. Seed is available from Seednet and an end point royalty applies.

BEANS

Farah

Farah was selected directly from Fiesta VF and is identical in many respects, except for its moderate resistance to ascochyta blight pathotype 1 and more uniform seed size and colour.

The risk of crop infection and seed staining from ascochyta blight is high where pathotype 2 of ascochyta blight is present, which is now reported in many growing districts. In those situations

Farah will exhibit a susceptible reaction to ascochyta blight, comparable to Fiesta VF, so a proactive disease management strategy is recommended to achieve clean seed and ensure market standards are met. Farah's yields are similar to Fiesta VF and slightly higher than Nura in most regions of southern Australia.. Farah is licensed to Heritage Seeds 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 to mid flowering. It is classed as susceptible to chocolate spot, although it is less susceptible than Fiord. Fiesta VF is susceptible to ascochyta blight pathotype 1 and 2, 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 to this variety, but larger and more uniform seed and no "evergreens". It is well adapted to the very high rainfall, broad bean districts in the Lower South-East of SA.

It has significantly improved resistance to ascochyta blight (MR) and better rust resistance (MR) than Aquadulce and is slightly less susceptible to chocolate spot than other faba bean varieties.

Like Aquadulce, PBA Kareema is more tolerant of waterlogging than most varieties of faba bean, and is more tolerant of iron and manganese deficiencies. Trials in the South-East of SA have shown PBA Kareema yields to be similar to, or slightly less than, Aquadulce.

Aquadulce

Aquadulce is a tall broad bean variety, with late flowering and maturity, suited to areas with at least 500 mm average annual rainfall, such as the Lower South-East of SA. It is rated MS for chocolate spot, but can succumb under high disease pressure and rainfall situations.

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

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

NOTES

Lupin variety sowing guide 2018

By Amanda Pearce, SARDI

One new Australian sweet (narrow-leafed lupin), PBA Bateman, has been released for planting in South Australia in 2018. PBA Bateman, tested as WALAN2533, is an Australian sweet lupin variety, and will provide an alternative high yielding variety in most lupin growing areas of South Australia.

PBA Bateman is the last PBA lupin variety to be released for the eastern states. The lupin breeding program has now been privatised, with AGT now managing the program for Australian growers.

Another Australian sweet lupin, PBA Leeman, has been released as a high grain protein, highly metribuzin tolerant variety for Western Australia only. Long term yields of PBA Leeman in South Australia are consistently lower than Mandelup.

A new albus lupin, Seednet Murring, has been released in New South Wales. No evaluation of albus lupins has been conducted in South Australia for some years, although they are expected to be suited to medium to high rainfall lupin growing areas.

In 2016 two recently released narrow-leafed lupins, PBA Jurien and PBA Bateman, were equally the highest yielding lupin varieties across the SA National Variety Trials (NVT), out-yielding Mandelup by 11 % when averaged across all sites.

PBA Barlock was the next top-performing variety in 2016. PBA Barlock was released in 2013 and has been widely evaluated in South Australia. It was released as a Tanjil/Wonga replacement, having good resistance to anthracnose and high yields. Again PBA Barlock out-classed Wonga in all trials.

The newer lupin varieties (PBA Bateman, PBA Jurien, PBA Gunyidi and PBA Barlock) tend to have their greatest advantage

over Mandelup on the Upper Eyre Peninsula, Mid North and in the South East. Mandelup out-performed these varieties in the Murray Mallee in 2016.

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

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

Domestic marketing

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

Grazing of lupin stubbles

Lupin stubbles can be a high value feed source for livestock, however growers have lost stock to lupinosis. This livestock health problem occurs as a result of toxins being produced from the phomopsis fungus that develops in the lupin stem as the plant matures. All current varieties have a reasonable level of resistance that slows the development of the phomopsis fungus. However, when significant rains occur while the crop matures and afterwards, fungal development can still occur,

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

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

Table 3 . Lupin Yields (National Variety Trials 2012-16)

Variety	<1t/ha		1-2t/ha		>2t/ha	
	Average Yield	No. Trials	Average Yield	No. Trials	Average Yield	No. Trials
Jenabillup	104	9	99	13	101	22
Jindalee	88	9	82	13	86	22
Mandelup	98	9	101	13	102	22
PBA Barlock	102	8	102	12	103	21
PBA Bateman	107	4	109	6	110	6
PBA Gunyidi	103	9	105	13	104	22
PBA Jurien	101	7	103	12	105	17
PBA Leeman	94	6	97	8	96	8

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

Variety	Flowering	Height	Early vigour	Lodging (high rainfall)	Pod shatter	Anthrachnose	Brown leaf spot	Grey Spot	CMV on seed	Phomopsis on stem	Phomopsis on pod	BYMV Resistance
Jenabillup	Mid	Tall	Med	MSMR	MS	S	MRMS	R	MS	MS	MR	MR
Mandelup	V early	Tall	Fast	MS	MS	MR	MS	R	MS	R	MRMS	S
PBA Barlock	Mid	Med	Med	MR	MRMS	R	MS	R	MR	MR	R	MS
PBA Bateman	Early	Tall	Fast	MSMR	MRMS	MR	MS	R	MRMS	MR	MR	MR
PBA Gunyidi	Early	Med	Fast	MR	MR	MR	MS	S	MS	R	MR	MS
PBA Jurien	Early	Tall	Fast	MS	MRMS	R	MS	R	MS	R	MRMS	MR

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

Source: Agriculture and Food, DPIRD Western Australia and Pulse Breeding Australia (PBA) trials program 2013-2016.

regardless of the resistance level of the plant.

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

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

Lupin Agronomy

A common problem reported by SA growers is the poor emergence and establishment of lupin crops. This is particularly prevalent in Mandelup. This obviously effects crop establishment and 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 a number of growers in recent seasons. Lupin plants have a high demand for manganese during seed development and maturity. Manganese deficiency can have a negative influence on seed development and cause seed to split or shrivel in pods. Deficient plants can be slow to ripen, remaining green for longer and causing difficulty at harvest. Manganese deficiency can be overcome by applying 1 kg/ha of manganese at flowering. Timing is important and manganese should be applied at mid-flowering of the first lateral, by which time growth of the first pods on the main stem should be 2 - 2.5 cm long.

Notes on current Australian sweet (narrow-leaved) lupin varieties

PBA Barlock

PBA Barlock was released in WA in spring 2013. It is a high yielding variety. PBA Barlock has improved metribuzin tolerance over the varieties Tanjil and Wonga, allowing growers to use metribuzin for weed control. PBA Barlock is early flowering and maturing, is MR to lodging in high rainfall regions, and shows improved pod shatter resistance compared to Mandelup. It is R

to anthracnose and MR to phomopsis stem blight. PBA Barlock has its greatest long-term yield advantage over Mandelup on the Eyre Peninsula. PBA Barlock seed is available through Seednet.

PBA Bateman

PBA Bateman (tested as WALAN2533) was released in the eastern states in the spring of 2017. It is a high yielding variety providing significant yield improvements to the current varieties in the majority of SA regions. It is MR to anthracnose, similar to PBA Gunyidi and Mandelup. PBA Bateman is MP to phomopsis stem blight, MS to brown spot and R to grey spot. It is MR to BYMV and Black Pod Syndrome. It is MR/MS to CMV seed transmission, better than PBA Jurien, PBA Gunyidi, Jenabillup and Mandelup. PBA Bateman has similar agronomic characteristics when compared to PBA Jurien, with flowering time similar to PBA Jurien and Mandelup and earlier than PBA Barlock. It has similar plant height to Mandelup being taller than PBA Barlock. PBA Barlock shows similar tolerance to metribuzin as PBA Jurien, PBA Barlock and PBA Gunyidi. Seed is medium to large, similar to Mandelup, with alkaloid content on average similar to PBA Gunyidi. Growers should contact Seednet Partners for supply of seed.

PBA Gunyidi

PBA Gunyidi was released in WA in September 2011 as a potential Mandelup replacement with improved resistance to pod shattering. This feature has enabled growers to harvest later without incurring significant losses. PBA Gunyidi is MR to anthracnose and R to phomopsis stem blight. It flowers and matures slightly later than Mandelup. It is R to metribuzin herbicide, but is more susceptible to damage from Eclipse®. Long-term trials in SA show PBA Gunyidi is particularly well suited to the Eyre Peninsula region. Seed is available through Seednet.

Jenabillup

Jenabillup has been in extensively trialled in SA trials, were it typically has an advantage over Mandelup in regions with a longer growing season. In these regions its extended flowering window can assist with increased yield. Jenabillup flowers slightly later and for a longer period than Mandelup, making it less suitable to crop topping. Jenabillup is R to black pod syndrome, although this rarely occurs in SA. Jenabillup does not have tolerance to metribuzin herbicide and has an S anthracnose rating. Jenabillup was first available to SA growers in 2011 and seed is available through Seednet.

LUPINS

Jindalee

Jindalee is the latest flowering and maturing variety currently available. It is suited to early sowing in higher rainfall districts where its vernalisation (cold requirement) prevents it from flowering too early. It is suited to situations of bulky dense canopies that would otherwise lead to poor pod set in other varieties. Jindalee can benefit from late spring rains. Jindalee long-term yield performance is well below Mandelup across all districts in SA. Jindalee's anthracnose rating is MS, this level is generally adequate if combined with seed testing, paddock monitoring and sound crop hygiene management. Jindalee is R to phomopsis and MR to brown leaf spot. In SA it appears to have improved resistance to root rots and premature wilting that occurs on duplex soils with shallow underlying clay. Jindalee has speckled seed and medium seed alkaloid levels. Seed is available through Seednet.

PBA Jurien

PBA Jurien was released in WA in spring 2015. It has improved yields compared to Mandelup across most SA regions, with long-term yield advantages observed on the Eyre Peninsula. It is R to anthracnose, phomopsis on stem and grey spot. Although rated R to anthracnose seed dressings are still recommended to reduce the risk of soil borne disease. It is tolerant to metribuzin.

superior to PBA Barlock. PBA Jurien has similar agronomic characteristics to PBA Gunyidi, flowering slightly earlier than PBA Barlock. It is similar to Mandelup in height and is MS to 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 available to Eastern states growers for 2017 planting. PBA Jurien seed is available through Seednet.

Mandelup

Mandelup is widely adapted to SA conditions and as such is established as a leading variety. Mandelup is a tall variety, with good early vigour and very early flowering and maturity, making it well-suited to low/medium rainfall districts in SA while still yielding well in higher rainfall areas. Its early maturity makes it suitable for crop topping, with careful attention to correct timing. Mandelup is MR to anthracnose. It is R to phomopsis on stem and MS to brown leaf spot.

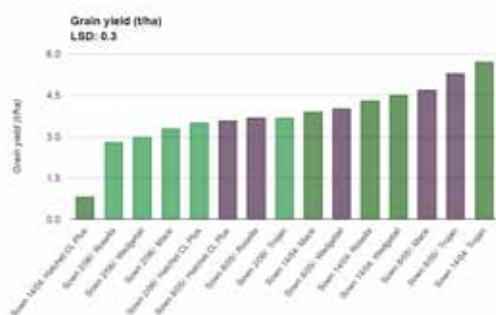
It can suffer pod loss/partial pod shattering with delayed harvest and seed quality can suffer if wet conditions occur during harvest. A possible weakness in higher rainfall districts is its relatively poorer stem strength and potential lodging, although this has not been observed at wet sites in recent years. Mandelup seed is available in SA through Heritage Seeds Pty Ltd. ■

NOTES

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Use the OFT website to discover relevant trial research information and result data from your region or across Australia. Apply search filters, view result charts, access research report documents and view associated rainfall, temperature and soil information. Visit the OFT website to get started or to learn more about using OFT to publish your research online.



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Oats variety sowing guide 2018

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

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

Varieties adapted to low, medium, and high rainfall regions and categorised by grain and hay end-use are shown in Table 1.

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

End use	Annual Rainfall (mm)		
	<375	375-500	>500
Milling grain	Kowari	Kowari	Kowari
	Mitika	Mitika	Mitika
	Yallara	Yallara	Yallara
	Wombat	Wombat	Wombat
	Bannister	Possum	Possum
	Durack	Bannister	Bannister
		Williams	Williams
Feed grain-sheep, cattle		Durack	
	Kowari	Kowari	Kowari
	Mitika	Mitika	Mitika
	Yallara	Yallara	Yallara
	Wintaroo	Wintaroo	Wintaroo
	Mulgara	Mulgara	Mulgara
	Wombat	Wombat	Wombat
	Echidna	Echidna	Echidna
Feed grain - pigs, poultry	-	Numbat	Numbat
Oat hay	Brusher	Wintaroo	Forester
	Mulgara	Mulgara	Tammar
	Wintaroo	Tammar	Tungoo
	Walleroo	Tungoo	Glider
	Durack	Kangaroo	Kangaroo
		Brusher	Brusher
		Durack	Mulgara
Hay and legume mixes			Wintaroo
	Brusher	Wintaroo	Forester
	Mulgara	Tammar	Tammar
	Wintaroo	Tungoo	Tungoo
	Yallara	Kangaroo	Glider
	Walleroo	Brusher	Kangaroo
		Potoroo	

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

Is cereal cyst or stem nematode a production constraint?

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

Varieties contained in Table 1 provide options for different end uses. Table 5 should then be used in conjunction with this table to determine if the variety of choice has both resistance and

Table 2. Five year (2012-2016) average grain yield (t/ha) of oat varieties tested in grain trials.

	Region						
	Lower EP	Upper EP	Yorke Pen.	Mid North	South East	Murray Mallee	Average for all states
SEMI-DWARF (HUSKED)							
Bannister	2.7	1.5	4.4	4.2	4.0	1.7	4.1
Kowari	2.9	1.2	4.2	4.0	3.8	1.5	3.8
Mitika	2.8	1.2	4.2	3.8	3.7	1.4	3.7
Possum	2.8	1.3	4.0	3.8	3.7	1.5	3.7
Potoroo	2.4	1.3	4.1	3.9	3.9	1.6	3.9
Wombat	2.7	1.4	4.0	3.9	3.8	1.5	3.8
SEMI-DWARF (NAKED)							
Numbat	2.1	0.7	2.5	2.3	2.6	0.5	2.4
TALL (HUSKED)							
Durack	2.5	1.0	3.4	3.5	3.5	1.4	3.4
Williams	2.8	1.4	4.0	4.0	3.9	1.6	4.0
Yallara	2.1	1.0	2.9	3.3	3.4	1.4	3.4
No. trials	2	2	5	18	15	5	159

Table 3. Ten year (2007-2016) average hay and grain production of oat varieties tested in hay trials.

	Hay yield (t/ha)			Grain yield (t/ha)		
	Rainfall zone			Rainfall zone		
	<375mm	375-500 mm	>500mm	<375mm	375-500 mm	>500mm
TALL (HUSKED) - EARLY TO MID SEASON MATURITY						
Brusher	7.5	10.3	12.0	1.7	2.8	2.9
Durack	6.8	9.3	11.1	2.2	3.4	3.6
Mulgara	7.4	10.2	12.0	2.0	2.9	3.0
Wallaroo	7.4	10.0	11.5	1.8	2.8	2.8
Wintaroo	8.0	10.8	12.6	2.0	2.9	3.0
Yallara	7.6	10.2	12.0	2.3	3.3	3.4
TALL (HUSKED) - MID LATE TO VERY LATE MATURITY						
Forester	na	9.7	11.4	1.3	2.2	2.2
Glider	na	9.8	11.5	1.5	2.4	2.5
Kangaroo	na	10.0	12.0	1.9	2.8	2.8
Tammar	na	10.2	11.9	1.8	2.7	2.8
Tungoo	na	10.1	11.8	1.6	2.5	2.6
No. trials	16	41	12	21	43	13

tolerance to CCN if it is a problem or resistance and tolerance to SN if it is a problem. Varieties grown where CCN or SN is present should be resistant to the particular nematode which is a problem so that multiplication of the nematode is limited. The variety should also be tolerant so that it yields well in the presence of the nematode. Yield penalties of up to 80% can occur if an intolerant variety is sown in a paddock where CCN or SN is a problem.

There are ten varieties resistant to CCN listed in Table 5 and eight of these are also tolerant: Wombat, Tammar, Mulgara, Tungoo, Kangaroo, Wintaroo, Wallaroo and Potoroo are all varieties with both CCN resistance and tolerance. The remaining two resistant varieties, Yallara and Brusher are intolerant of CCN. There are eight varieties tolerant to stem nematode. These are Wombat, Tammar, Mulgara, Tungoo, Wintaroo, Glider, Quoll and Echidna. All of these are rated as resistant or moderately resistant to SN except Echidna which is rated as moderately susceptible. Bannister, Kangaroo, Potoroo and Wallaroo are intermediate in their reaction to SN. In cold wet seasonal conditions these varieties may suffer more yield loss than in warmer, drier winter conditions.

Is leaf disease a production constraint?

Resistance to leaf diseases is important in most environments. However, even though varieties are listed as resistant to stem and leaf rust, changes in rust pathotypes can occur. Recently a stem rust pathotype moved into the southern region of South Australia from northern NSW causing all stem rust resistance to be ineffective in the presence of this pathotype. Table 5 indicates a range of resistance reactions for stem rust depending on whether the new pathotype of stem rust is present or not. Monitoring of disease levels is essential and application of fungicide may still be required depending on seasonal conditions. Table 1 should be used to determine the variety options available for a particular end use. Next, Table 5 should be used to further refine your choice. For example, if

a variety for oat hay is required in a high rainfall environment, Forester, Tammar, Tungoo, Glider and Kangaroo are suitable (Table 1). Table 3 indicates that Kangaroo is the highest yielding for hay in this environment. However, using Table 5 Forester, Tammar, Tungoo, and Glider have better resistance to both stem and leaf rust. These varieties also vary in their level of resistance to septoria, barley yellow dwarf virus (BYDV), bacterial blight and red leather leaf which may be also be important. Table 4 should then be used to determine if the variety selected matures at the time required.

Is milling quality required?

The probability of a variety meeting the classification criteria for milling grade is an important consideration when selecting a variety for milling end-use. This is greatly influenced by seasonal conditions. Premium milling varieties such as Yallara, Mitika, Possum, Wombat, Bannister, Williams and Kowari, will reach the classification criteria for milling grade more often than other varieties such as Echidna (Table 6). Although some varieties are not considered milling class, they may reach milling grade criteria, but would not be accepted for milling. It is imperative that you check with your miller about the quality standards and varieties that are accepted for milling before you sow a grain crop.

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

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If export hay quality is required

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

Oats for grazing

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

Notes on recently released varieties

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

Milling varieties

Kowari[®] oats, released in September at the Royal Adelaide Show, is a new potential milling oat variety with dwarf stature measuring 65 to 70 cm. It is slightly taller than Mitika. It has a maturity similar to Mitika, but is 2 to 8 days earlier to head than Yallara, 8 to 10 days earlier than Bannister and 3 to 10 days earlier than Williams. Kowari is 4 to 8 days later to head than Durack.

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

The grain quality is excellent. Kowari has slightly lower hectolitre weight and similar 1000 grain weight when compared to Mitika. It combines high beta-glucan with low screenings. Kowari has high protein and slightly higher groat percent compared to Mitika. The trait of interest for this variety is improved beta-glucan content. The beta-glucan content was measured using the Megazyme method. Kowari has 5.2% (dm basis) compared to 4.7% for Mitika and Kojonup. Like Mitika, it also has low hull lignin.

Heritage is the commercial partner. Approximately 85t was produced in 2016 and a further bulk up occurred in 2017 for commercial sale and test mill.

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

Durack has good lodging and shattering resistance and good early vigour. It is susceptible to very susceptible for stem rust

Table 4. Agronomic features of varieties.

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

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

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

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

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

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in South Australia & Victoria so a fungicide application will be mandatory if grown in areas where stem rust is a problem. Durack is rated resistant to susceptible for leaf rust depending on which pathotype of the rust is present. Again a fungicide may be required in leaf rust prone areas. Durack is moderately susceptible to septoria, moderately resistant to susceptible for bacterial blight, moderately susceptible to red leather leaf and intolerant to stem nematode. Durack is however resistant and moderately intolerant to moderately tolerant to CCN.

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

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

Williams¹ is a tall milling variety commercialised by Heritage and released in Western Australia in 2013. Williams, formerly known as the breeding line WA2332, is a high yielding early to

midseason variety with similar maturity compared to Yallara. It is three to seven days later maturing than Mitika. Williams is 15 cm taller than Mitika, 5 cm taller than Bannister, and 15 cm shorter than Yallara.

Although classified as MS for septoria, Williams has the highest level of septoria resistance compared to all other current oat varieties. It is resistant to leaf rust and depending on the stem rust pathotype present can range from moderately resistant to susceptible. Williams is resistant to bacterial blight and moderately resistant to moderately susceptible for BYDV. It is susceptible and intolerant to CCN.

Williams has similar grain yield to Bannister with slightly inferior grain quality. Screenings are similar to Wombat and can be high, especially in the low rainfall regions. Williams has high B-glucan levels.

Williams averages slightly lower hay yield compared to other hay varieties. Hay quality is similar to Wintaroo with slightly lower water soluble carbohydrates and slightly higher crude protein.

Bannister² is a dwarf milling variety with high grain yield

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

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

	Rust		Barley yellow	CCN		Stem nematode		Septoria	Bacterial blight	Red leather leaf
Variety	stem1	leaf	dwarf virus2	resistance	tolerance	resistance	tolerance			
SEMI-DWARF (HUSKED)										
Bannister	MR-S	R	MS	VS	I	-	MI	-	MR-S	MS
Echidna	S	S	MS	S	I	MS	MT	S	S	MS
Kowari	S	R	MS	S	-	-	I	S	MR	MS
Mitika	MR-S	R	S	VS	I	S	I	S	MR	S
Possum	MS-S	MS	S	VS	I	S	I	MS	S	MS-S
Potoroo	S	S	MS	R	T	S	MI	S	VS	S-VS
Wombat	MS-S	MS	MR	R	MT	MR	MT	MS	MS	MS
SEMI-DWARF (NAKED)										
Numbat	MR-S	R	S	S	I	S	I	MR	S	MS
TALL (HUSKED)										
Brusher	MS-S	MR-MS	MS	R	MI	MS	I	MS	MR-MS	MR-MS
Durack	S-VS	R-S	MS-S	R	MI-MT	-	I	MS	MR-S	MS
Forester	R-S	MR-MS	MR-S	MS	MI	S	I	MR	MS-S	R-MR
Glider	MR-S	R	S-MR	MS	I	R	T	R	R	R
Kangaroo	MS-S	MS	MR-S	R	MT	MS	MI	MR-MS	MR-MS	MS
Mulgara	MS-S	MR	MS	R	MT	R	MT	MS	MR	MS
Tammar	MR-S	MR	MS	MR	MT	R	MT	MR	MR	R-MS
Tungoo	MS-S	MR	MR-MS	R	MT	R	MT	MR	MR	R
Wallaroo	S	S	MS	R	MT	MS	MI	S	S	MS
Williams	MR-S	R	MR-MS	S	I	-	I	MS	MR	MS
Wintaroo	S	MS	MR-MS	R	MT	MR	MT	MR-MS	MR	MS
Yallara	MR-S	R	MS	R	I	S	I	MS	MR-MS	MS

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

Key to symbols used: VS = very susceptible, S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant, VI = very intolerant, I = intolerant, MI = moderately intolerant, MT = moderately tolerant, T = tolerant, VT = very tolerant.

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Table 6. Grain quality comparisons.

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

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

released for Western Australia in 2012. Bannister is suited to eastern Australia as well as Western Australia. It is adapted to low, medium, and high rainfall zones of Southern Australia. It is 13 cm taller than Mitika and heads about 3 to 4 days later than Mitika. Seednet is the commercial partner. Bannister is resistant to leaf rust and moderately resistant to bacterial blight. It is susceptible and intolerant to CCN. Bannister has slightly lower hectolitre weight and slightly higher screenings compared to Mitika. It is similar to Mitika for groat percent.

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

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

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

Mitika[®] is an early maturing dwarf milling oat developed by SARDI and now commercialised by Heritage Seeds. It is resistant to leaf rust and moderately resistant to stem rust and bacterial blight. However, Mitika is susceptible to CCN, BYDV,

septoria and red leather leaf and intolerant to CCN and stem nematode. Mitika is a milling quality oat with high hectolitre and grain weight, low screenings percent and moderately high groat percent. It is also a high feed value oat with low hull lignin and high grain digestibility. Mitika averages higher levels of Beta-glucan than Possum, Yallara and Euro. It is recommended for all rainfall zones where CCN or stem nematode is not a problem.

Yallara[®] is a medium-tall milling oat variety developed by SARDI and commercialised by Seednet. Yallara 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. Long term yield of this variety is a 2% improvement compared to Euro. However, yield increases of between 40 and 100% have been recorded for varieties with stem rust resistance similar to Yallara in years where stem rust is yield limiting. Yallara is slightly taller than Euro and 2 days earlier to head. It has premium oat quality and averages higher hectolitre weight and groat percent and lower screenings percent than Euro, Mitika, Possum and Wombat. Yallara is an improvement compared to Euro for bacterial blight resistance. Like Euro, Yallara is resistant to CCN but intolerant, moderately susceptible to septoria and red leather leaf and intolerant to stem nematode. Yallara is recommended to replace Euro in all areas but particularly where stem and leaf rust can be yield limiting. In addition, Yallara has bright grain and high grain digestibility making it suitable for the horse racing industry. Based on herbicide tolerance trials conducted by the SARDI New Variety Agronomy Group, Yallara is particularly sensitive to applications of Banvel-M®. For more

Table 7. Hay quality comparisons.

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

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

information about the herbicide tolerance of Yallara go to www.nvtonline.com.au.

Hay varieties

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

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

Seed of Forester is available from AGF Seeds.

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

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

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

Mulgara[®] is a tall mid season hay oat similar in heading time

and height to Wintaroo. It is available to growers through AEXCO Pty Ltd.

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

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

The seed size of Mulgara is larger than other hay varieties and similar to Swan. Care should be taken to sow this variety at the correct seed density.

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

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

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

Brusher[®] is an early-mid season tall oat developed by SARDI and commercialised by AEXCO Pty Ltd in 2003. It is two to four days earlier to head than Wintaroo and this suits it well to low rainfall areas. Although Brusher has inferior hay yield when compared to Wintaroo it is recommended to replace this variety where improved resistance to stem and leaf rust or improved hay quality is desired.

Grain yield and grain quality is similar to Wintaroo, Wallaroo and Kangaroo with higher grain protein. Brusher is moderately susceptible to stem rust, BYDV, septoria, red leather leaf and bacterial blight. It is resistant to leaf rust, resistant but moderately intolerant of cereal cyst nematode and intolerant of stem nematode. When there is a high CCN population in a paddock with favourable seasonal conditions, Brusher will have significantly lower hay yield than tolerant varieties. Brusher is moderately low in grain lignin.

Notes on interstate varieties

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

Vetch variety sowing guide 2018

By Stuart Nagel and Gregg Kirby, SARDI

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

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

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

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

Vetch is valued for its benefits to subsequent cereal and oil seed crops in the rotation, these benefits are usually greater than from other pulses particularly in lower rainfall areas. On sandy soils vetches provide better soil protection than peas and provide better stubble retention in the soil.

Morava, Rasina, Volga and Timok are resistant to rust and are the preferred varieties for grain in areas prone to rust infections.

Disease management is critical when growing a vetch crop regardless of the end use, where possible disease resistant varieties should be planted as a preference. Care must be taken when growing rust susceptible varieties as grazing or feeding hay/silage from rust infected plants may induce abortions in pregnant livestock.

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

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

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

Table 1: contains adaptation information for vetch varieties grown for grain and hay in different rainfall zones.

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

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

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

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

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

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

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

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Table 3. Characteristics of selected vetch varieties

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

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

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

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

Notes on varieties

Common vetch (*Vicia sativa*)

Languedoc is an early flowering and maturing variety recommended for low rainfall areas although its can lodge severely making harvest difficult under certain conditions. Languedoc generally exceeds Blanchefleur's grain yield in areas with less than 350mm rainfall. Its hard seed content is generally around 5-10% and it is highly susceptible to rust. Languedoc grains possess 1.0-1.6% of anti-nutritional level (BCN).

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

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

Cummins 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 moderate susceptible to Ascochyta blight. Cummins possess similar % of BCN to Blanchefleur.

Morava is a rust resistant late flowering vetch variety with 100% soft seeds, develop in 1998 by SARDI's Australian National Vetch Breeding Program (ANVBP), led by R. Matic and assist by I. Pearce. Grain yield is superior to other vetches in the high rainfall areas and to Blanchefleur, Languedoc and Cummins in all other areas in the presence of rust. It is larger seeded and more resistant to shattering than other vetch varieties.

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

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

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

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

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

However, Rasina is not expected to replace Morava in higher rainfall districts or for hay production. The level of anti-nutritional factors is 0.6 to 0.8 compared to 0.9 to 1.6 in Blanchefleur and Languedoc, respectively. Rasina possesses a

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Table 5: 2010-14 Woolly pod vetch varieties		
Variety	Dry matter (t/ha)	% of Capello
Cappello	6.23	100.0
Haymaker	6.26 (2009-12)	100.4
RM 4	6.71	107.7
Mean yield	6.4	
PURPLE VETCH VARIETY		
Popany	5.28 (2009-12)	84.75

distinctive uniform dark brown speckled seed coat with dark beige cotyledons. Rasina is a PBR variety and can be sourced from Heritage Seeds.

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

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

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

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

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

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

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

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

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

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

Table 4. 2010-14 grain and dry matter yield for common vetch varieties,				
(5 sites * 5yrs)				
Variety	Grain yield (t/ha)	% of Blanchefleur	Dry matter yield (t/ha)	% of Morava
Blanchefleur	2.15	100	4.03 (2009-13)	80
Rasina	2.37	110	4.7 (2009-13)	93
Morava	2.16	100	5.06	100
Volga	2.75	128	5.51	109
Timok	2.48	115	5.26	104
Mean yield	2.38		4.91	

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

Timok matures between Rasina and Morava (100-105 days from seeding to full flowering). Timok is very well adapt for grain production in rainfall areas >380mm/yr, and dry matter production is similar to Morava in high rainfall regions (>400mm), but 19% higher than Morava in low to medium rainfall regions (330-380mm). Timok is multipurpose variety--can be used for grain, hay/silage, grazing or green/brown manure.

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

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

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

Purple Vetch (*Vicia benghalensis*)

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

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

Woolly pod vetches

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

Also, these varieties can only be grazed from the 10-node stage to podding stage. It is not recommended that grazing occur

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

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

* in Australia only Popany existing as Purple vetch variety

earlier and also once plants begin to develop seeds in pods. These two varieties are very good for hay/silage production in areas >400mm of rainfall annually.

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

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

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

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

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

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

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

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

NOTES

Lentil variety sowing guide 2018

By Sarah Day, Jenny Davidson, SARDI and Laura James, PBA Lentil Breeder, DEDJTR Victoria

Lentil variety choice remains the same for 2018 with no new varieties being released in 2017.

Although PBA Hurricane XT has moderate resistance to foliar ascochyta blight (AB) and does not require fungicide sprays if no disease is visible, low amounts of AB infection were identified in several paddocks in 2015, 2016 and 2017. Growers are urged to monitor crops regularly for disease and podding sprays may be required if disease is present during the growing season in this variety.

The rapid and dominant uptake of PBA Hurricane XT, particularly on the Yorke Peninsula, threatens the longevity of the AB resistance in this cultivar. It is important to diversify variety selections within a year and across rotations, alongside agronomic and disease management practices to maintain the sustainability of the system and reduce the risk of crop failures.

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

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

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

Selection criteria

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

Notes on selected varieties

Small Red Lentils

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

PBA Herald XT was the first lentil variety with improved tolerance to the herbicides imazethapyr and flumetsulam, plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. However it is important to note that product label rates, plant-back periods and directions for use must still be adhered to. It is a mid to late flowering and maturing variety with yields lower than PBA Hurricane XT. It has high levels of disease resistance to both AB (R) and BGM (R/MR), however disease monitoring and a fungicide application for BGM prior to canopy closure is still recommended. PBA Herald XT is more sensitive than most other varieties to group C herbicides such as metribuzin and simazine and caution is urged with the application of these products particularly on variable soil types. As a natural part of its genetic make-up PBA Herald XT has very

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low levels (0.1% or less) of seed with a black seed coat, which is classified at receival point with seeds of a contrasting colour limited at 1%. PBA Herald XT is commercialised by PB Seeds.

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

Nipper is more sensitive to metribuzin than most other varieties and caution is required to avoid application when conditions are conducive to damage. Nipper is licensed to Seednet.

Table 1. Lentil variety sowing guide 2018			
Rainfall zones (mm)			
Below 400	400-450	450-500	Above 500
SMALL RED			
PBA Bounty	PBA Bounty	Nipper	Nipper
Nipper#	Nipper	PBA Bounty	PBA Bounty
Northfield	Northfield	Northfield	Northfield
PBA Hurricane XT+	PBA Hurricane XT+	PBA Hurricane XT+	PBA Hurricane XT+
PBA Herald XT+#	PBA Herald XT+	PBA Herald XT+	PBA Herald XT+
MEDIUM RED			
PBA Bolt	PBA Bolt	PBA Blitz~	PBA Ace
PBA Flash	PBA Flash	PBA Flash	PBA Blitz~
PBA Ace	PBA Ace	PBA Ace	PBA Flash
Nugget	PBA Blitz~	PBA Bolt	PBA Bolt
PBA Blitz~	Nugget	Nugget	Nugget
LARGE RED			
PBA Jumbo2	PBA Jumbo2	PBA Jumbo2	PBA Jumbo2
PBA Jumbo	PBA Jumbo	PBA Jumbo	PBA Jumbo
Aldinga	Aldinga	Aldinga	Aldinga
MEDIUM & LARGE GREEN			
PBA Greenfield	PBA Greenfield	PBA Greenfield	PBA Greenfield
PBA Giant	PBA Giant	PBA Giant	PBA Giant
Boomer	Boomer	Boomer	Boomer
# = not well suited to low rainfall areas or dry seasonal conditions due to low biomass type, must be sown early in these situations			
~ = variety best suited to crop-topping + = herbicide tolerant variety			

Medium Red Lentils

PBA Ace is a vigorous growing, mid flowering and mid maturing variety with high yield potential and broad adaptation. It provides an alternative to Nugget in all regions. PBA Ace has resistance to AB and is rated MR/MS to BGM. PBA Ace is one of the highest yielding medium red lentils in long term trials in all regions of SA and Victoria, but due to its later maturity than PBA Bolt, PBA Blitz and PBA Flash is likely to be better suited to areas where mid maturing varieties are favoured. PBA Ace can be prone to lodging under conditions of high biomass production often making BGM difficult to control. When grown in favourable environments particularly when sown early a small reduction in seeding rate may be beneficial in this variety to reduce biomass and lodging. A small level of shattering has been observed under some conditions in PBA Ace at maturity but it is unlikely to cause significant yield loss. PBA Ace has a grey seed coat colour and is licensed to PB Seeds.

PBA Bolt is a mid flowering but early to mid 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 to AB but is susceptible 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 is suited to all current lentil growing areas, with particular adaptation to shorter-season areas, where its combination of early to mid flowering, early maturity, moderate disease resistance and medium seed size will improve lentil reliability and economics of production. PBA Blitz is the earliest maturing lentil variety and the best option where crop topping and/or delayed sowing are practised. It has a good level of early vigour and an erect plant type. PBA Blitz is a medium sized red lentil (larger than PBA Flash and Nugget) with a grey coloured seed coat. PBA Blitz has a low level of "pale coat Blitz" seeds which still have red cotyledons and are a natural part of the genetic make-up of the variety. These do not affect the splitting or cooking characteristics of the variety. These "pale coat Blitz" seeds are classified at receival point as seeds of contrasting colour with a limit of 1% allowed. PBA Blitz is commercialised by PB Seeds.

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

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Large Red Lentils

PBA Jumbo2 is the highest yielding red lentil available for SA. PBA Jumbo2 was released as a direct replacement for PBA Jumbo although grain size is almost the only similarity. It has improved agronomic characteristics over PBA Jumbo, including greater early vigour, improved lodging, shattering and disease resistance.

It is rated R for AB and R/MR for BGM, however disease monitoring and a fungicide application prior to canopy closure is still recommended for the latter. It has a seed size and shape similar to PBA Jumbo and Aldinga (20% larger than Nugget) 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 Jumbo is a high yielding large seeded red lentil. PBA Jumbo is moderately susceptible to BGM and this disease will need to be managed in disease prone areas. It is rated MR/MS to AB and this will also need to be managed in conditions conducive to disease. PBA Jumbo has moderate early vigour and is moderately susceptible to lodging. It has a seed size and shape similar to Aldinga (20% larger than Nugget) but with a grey seed coat and like Aldinga is well suited to the post-harvest removal of small broadleaf weeds seeds. PBA Jumbo is commercialised by PB Seeds.

Medium and Large Green Lentils

PBA Giant is the largest seeded Australian green lentil available. It is a broadly adapted variety with similar yield to Boomer but improved shattering resistance and produces a slightly larger and more consistent seed size. Although shattering resistance is improved over that of Boomer, it is rated MR/MS for this trait and timely harvest is important to prevent seed loss. PBA Giant has moderate resistance to AB but is rated moderately susceptible to BGM, and therefore monitoring and timely application of fungicides will be important to ensure the control of disease.

As pods are susceptible to AB infection a strategic fungicide application at podding may also be required to minimise seed staining and maximise seed quality. The large seed size may provide opportunity for removal of small broadleaf weed seeds from the harvested sample. PBA Giant is commercialised by PB Seeds.

PBA Greenfield is the highest yielding Australian green lentil variety. It is a medium sized green lentil with broad adaptation and good early vigour. It is rated MR/MS for AB, and is moderately resistant to BGM. PBA Greenfield is mid flowering and like the other green lentils has a mid to late maturity rating. PBA Greenfield has improved shattering resistance over both Boomer and PBA Giant with an MR rating, however 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.

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 resistance to foliar AB and MR/MS 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 susceptible to shattering at maturity, and therefore delayed harvest can result in grain loss and also a reduction of its green seed colour resulting in downgrading in this variety. Boomer is licensed to Seednet. ■

Table 3. Predicted long term yields of selected lentil varieties grouped by yield bracket mean. Yields expressed as a percentage of yield bracket mean (SARDI, PBA & NVT data, 2012-2016)

Yield Group	< 1 t/Ha	1 to 2 t/Ha	> 2 t/Ha
Mean Yield	0.69	1.58	2.76
Number of Trials	9	30	19
Aldinga		99	92
Boomer	81	94	94
Nipper	76	83	94
Northfield	87	85	82
Nugget	89	93	93
PBA Ace	97	103	98
PBA Blitz	89	101	103
PBA Bolt	109	101	95
PBA Bounty	102	101	102
PBA Flash	105	100	99
PBA Giant	94	98	93
PBA Greenfield	97	108	108
PBA Herald XT	68	78	84
PBA Hurricane XT	99	97	96
PBA Jumbo	86	99	101
PBA Jumbo2	105	112	112



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Table 2. Characteristics of selected lentil varieties																
Variety	Seed coat colour	Cotyledon colour	Seed size relative to Nugget	Market category	Vigour	Plant height	Flowering time	Maturity time	Lodging resistance	Pod drop	Shattering	Botrytis grey mould	Ascochyta blight		Boron	Salt
													Foliage	Seed		
SMALL RED																
PBA Bounty	Grey	Red	90	SRP	Moderate	Short/Med	Mid/Late	Mid	S	R	R	MS	MR/MS	MS	I	MI
PBA Herald XT	Grey	Red	75	SR	Poor/Mod	Short	Mid/Late	Mid/Late	MR/MS	MR	MR	R/MR	R	R	I	I
Nipper	Grey	Red	75-80	SRP	Poor/Mod	Short	Mid/Late	Mid	MR	MR	MR	R/MR	MR/MS	MR	I	MT
PBA Hurricane XT	Grey	Red	85	SRP	Moderate	Medium	Mid	Mid	MR	MR	R	MR/MS	MR*	R/MR	I	I
Northfield	Tan	Red	80	SRP	Poor/Mod	Short	Mid	Mid	MR/MS	MR/MS	MR	S	MR/MS	MR	I	I
MEDIUM RED																
Nugget	Grey	Red	100	MRS	Moderate	Medium	Mid	Mid/Late	MS	MR	R	MR/MS	MR/MS	MR/MS	I	I
PBA Ace	Grey	Red	100	MRS	Good	Medium	Mid	Mid	MR/MS	R	MR/MS	MR/MS	R	R	I	I
PBA Blitz	Grey	Red	115-120	MRS	Mod/Good	Med/Tall	Early	Early	MR	MR	MR	MR	MR	MR/MS	I	I
PBA Bolt	Grey	Red	100	MRS	Mod/Good	Medium	Early/Mid	Early/Mid	R	R	R	S	MR	R/MR	MI	MI
PBA Flash	Green	Red	100-110	MRS	Moderate	Medium	Early/Mid	Early/Mid	MR	MR	MR	MR/MS	MS	MS	MI	MI
LARGE RED																
Aldinga	Green	Red	120	LRS	Moderate	Medium	Mid	Mid	S	R	MR/MS	MS	MR/MS	MS	I	MI
PBA Jumbo	Grey	Red	120	LRS	Moderate	Medium	Early/Mid	Mid	MS	MR	MR	MS	MR/MS	S	MI	I
PBA Jumbo2	Grey	Red	120	LRS	Mod/Good	Med/Tall	Mid	Mid	MR/MS	MR	R	R/MR	R	R	MI	I
MEDIUM AND LARGE GREEN																
Boomer	Green	Yellow	150	LG	Good	Tall	Mid	Mid/Late	S	R	S	MR/MS	MR	MR/MS	MI	I
PBA Greenfield	Green	Yellow	130	LG	Good	Tall	Mid	Mid/Late	MS	R	MR	MR	MR/MS	MR/MS	I	MI
PBA Giant	Green	Yellow	170	LG	Good	Tall	Mid	Mid/Late	S	R	MR/MS	MS	MR	MS	MI	I
R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, I = intolerant, MI = moderately intolerant, Market category: MRS = medium red split, SRP = small red premium round (football), LRS = large red split, LG = large green. * = Ascochyta foliaae rating for PBA HurricaneXT is under observation: Isolated crops have developed moderately susceptible leaf lesions during 2016 and 2017																

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

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

* = Ascochyta foliar rating for PBA HurricaneXT is under observation: Isolated crops have developed moderately susceptible leaf lesions during 2016 and 2017

Chickpea variety sowing guide 2018

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

A virulence change in the ascochyta blight (AB) pathogen in southern Australia now means that all current varieties are rated as either susceptible or moderately susceptible to AB infection. This follows observations of severe AB on previously resistant chickpea varieties in 2015 and 2016 across South Australia and Victoria. Chickpea growers now need to carefully consider their risk to AB infection along with the ability to effectively control the disease prior to choosing to grow this crop in southern Australia. This will be the case in both high and low rainfall regions as severe disease outbreaks can still occur in the latter in all current variety options during wet seasons such as 2016. All chickpea crops will need to be regularly monitored for AB infection.

Moderately susceptible varieties will require 3 to 4 strategic fungicide sprays ahead of rain events offering 2 to 3 weeks protection, starting at 6 to 8 weeks post sowing. Susceptible varieties will require regular fungicide sprays every 2-3 weeks throughout the growing season in front of rainfall events. As the pods of all commercial varieties are susceptible to AB they

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

Kabuli and desi chickpea variety options for southern region growers remain the same in 2018 with no new varieties released in 2017 suitable for southern chickpea growing regions. With a combination of high yields, medium seed size and broad adaptation, PBA Monarch continues to be good alternative to small seeded kabuli varieties Genesis™ 090 and Genesis™ 079, and the large seeded kabuli variety Genesis™ Kalkee, however it is now rated susceptible to AB compared to a rating of moderately susceptible in the other three varieties, making it a higher risk alternative.

Table 1. Chickpea variety sowing guide 2018

Seed type	Rainfall zones (mm)			
	Below 400	400-450	450-500	Above 500
Desi	PBA Slasher	PBA Slasher	PBA Slasher	PBA Slasher
	PBA Striker	PBA Striker	PBA Maiden*	PBA Maiden*
	PBA Maiden*	PBA Maiden*	PBA Striker	Neelam
	Neelam	Neelam	Neelam	Ambar
	Ambar	Ambar	Ambar	
Small kabuli	Genesis™ 090	Genesis™ 090	Genesis™ 090	Genesis™ 090
	Genesis™ 079	Genesis™ 079	Genesis™ 079	
Medium/ large kabuli	PBA Monarch	Genesis™ Kalkee	Genesis™ Kalkee	Genesis™ Kalkee
		PBA Monarch	PBA Monarch	PBA Monarch
		Genesis™ 114	Genesis™ 114	Genesis™ 114
		Almaz	Almaz	Almaz

* = high quality seed type

Selection Criteria

The list of suggested varieties for 2018 is shown in Table 1. A range of chickpea types are now available offering growers the opportunity to exploit particular management and or market opportunities, providing AB can be managed effectively. Information on key selection criteria and yield for each variety can be found in Tables 2, 3 and 4. When selecting a chickpea type and variety to grow, growers need to make their decision on the basis of AB resistance, yield, price and marketability. Other agronomic traits such as maturity, cold tolerance, root lesion nematode susceptibility and lodging resistance also need to be considered.

Desi types

Larger seeds are preferred for desi types, regardless of whether they are used for splitting or whole seed use. There has been an increasing use of large whole seeded desi types in a range of food preparations in the sub-continent and a small premium has been available for types fitting this use. 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 (eg Jimbour).

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Table 2. Agronomic features of chickpea varieties

Variety	Seed size g/100 seeds	Kabuli main seed size (mm)	Seed colour	Market type suitability	Early vigour	Flowering	Maturity	Plant height	Ascochyta blight		Botrytis grey mould	Flowering cold tolerance	Lodging resistance	Pratylenchus neglectus	
									Foliage	Seed				Resistance	Tolerance
DESI TYPE															
Ambar	16		light brown	split & whole		early	early	short-medium	MS	S	S		MR		
Genesis™ 509	15-17		dark brown	split	moderate	mid	early-mid	medium	MS	S	MS	S	MR	MS	
Howzat	19-21		light brown	split & whole	poor/mod	mid	mid	medium	S	S	MS	S	MS	S	MI
Neelam	17		brown	split & whole		mid	mid	medium-tall	MS	S	S		MR		
PBA HatTrick	19-21		light brown	split & whole	moderate	mid-late	mid-late	tall	S	S	S	S	MR		
PBA Maiden	21-24		yellow-tan	premium whole	moderate	early-mid	mid	short-medium	S	S	S	S	MS		
PBA Slasher	17-19		light brown	split & whole	poor/mod	mid	mid	short-medium	MS	S	S	S	MS		
PBA Striker	20-22		light brown	split & whole	good	early	early	short-medium	S	S	S		MS		
Sonali	16-20		dark brown	split	good	early	early	medium	S	S	S	T	MS	MR	
KABULI TYPE															
Almaz	36-42	8-9	cream	8-9mm	poor	mid	mid-late	medium-tall	MS	S	S	S	MR	MR	
Genesis™ 079	24-28	6-7	cream	6-7mm	moderate	early	early	short	S	S	MS	S	MR	MS	
Genesis™ 090	26-35	7-8	cream	6-8mm	good	mid	mid	medium	MS	S	S	S	MR	MR	
Genesis™ 114	36-42	8-9	cream	8-9mm	good	mid	mid-late	tall	S	S	S	S	R		
Genesis™ Kalkee	40-46	8-9	cream	8-10mm	good	mid-late	late	tall	MS	S	S	S	R		
PBA Monarch	37-43	8-9	cream	8-9mm	poor/mod	early	early	medium	S	S	S	S	MS		

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

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Small kabuli types

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

Medium-large kabuli types

PBA Monarch, Almaz, Genesis™ 114 and Genesis™ Kalkee produce predominantly 8 to 10mm seed for traditional larger seeded kabuli markets where larger seed size is imperative to attract premium prices. Uniformity of seed size is also important in these markets and may be difficult to achieve in the large types e.g. Genesis™ Kalkee due to its relative poor adaptation to dry finishing conditions. The medium sized type PBA Monarch is likely to produce more uniform sized seed under these conditions.

Notes on selected desi chickpea varieties

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

PBA Striker is now susceptible to AB and will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. PBA 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

Table 3. Predicted long term yields of selected desi chickpea varieties grouped by yield bracket. Yields expressed as a percentage of yield bracket mean (SARDI, PBA & NVT data, 2012-2016). #Small kabuli types

Yield Group	< 1 t/ha	1 to 2 t/ha	> 2 t/ha
Mean Yield	0.7	1.5	2.49
Number of Trials	6	11	14
Ambar	107	112	108
Genesis 079	115	105	110
Genesis 090	93	106	103
Genesis 509	89	104	102
Genesis 836	94	95	96
Howzat	99	94	95
Neelam	107	116	107
PBA Boundary	92	95	95
PBA Hatrick	93	95	95
PBA Maiden	108	104	105
PBA Slasher	110	110	107
PBA Striker	118	107	107

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 is an early flowering and maturing desi type chickpea. It is now rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. Ambar has had similar but generally lower yields than PBA Slasher in southern Australia. It produces a short to medium canopy that can be difficult to harvest in some seasons and it has a seed size smaller than PBA Slasher and PBA Striker but light in colour. Seed is licensed to Heritage Seeds.

Neelam is a mid flowering and maturing desi type chickpea. It is now rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. Neelam has similar yields to PBA Slasher but lower yields than PBA Striker in South Australia and produces seed smaller than both these varieties. Neelam has a medium tall plant height, taller than Ambar and PBA Slasher. Seed is licensed to Heritage Seeds.

PBA Slasher is now rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season

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ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. 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 similar to Howzat. PBA Slasher is suitable for both the split and whole seed markets as it has improved seed size and colour over varieties like Genesis™ 509 which are only suited to split seed markets. Seed is licensed to Seed Net.

PBA Seamer , PBA HatTrick , PBA Pistol & PBA Boundary

These varieties have been released for northern NSW/southern Qld (PBA Seamer, PBA HatTrick & PBA Boundary) and Central Queensland (PBA Pistol) where they offer specific production advantages. All four have limited suitability to SA and Victoria due to late maturity and low relative yields.

Notes on selected kabuli chickpea varieties

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

Almaz is a medium to large seeded kabuli type. It is moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. Almaz is a mid flowering and mid to late maturing variety and is lower yielding than Genesis™ 090 in southern Australia. Seed is licensed to Seednet.

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

Genesis™ 114 is a medium to large seeded (8-9 mm) kabuli

Table 4. Predicted long term yields of selected kabuli chickpea varieties grouped by yield bracket. Yields expressed as a percentage of yield bracket mean (SARDI, PBA & NVT data, 2012–2016).

Yield Group	< 1 t/ha	1 to 2 t/ha	> 2 t/ha
Mean Yield	0.52	1.54	2.56
Number of Trials	3	10	14
Almaz	78	102	97
Genesis 079	115	102	105
Genesis 090	97	111	102
Genesis 114	-	95	93
Genesis Kalkee	85	94	94
PBA Monarch	112	98	102

type chickpea. The AB rating for Genesis™ 114 has been reduced to susceptible and it will require regular vegetative and reproductive foliar fungicide sprays every 2 to 3 weeks. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. Genesis™ 114 has a flowering time similar to Almaz but later than Genesis™ 090. It has a medium to tall erect plant type. Harvestability of Genesis™ 114 is excellent with greater height to lowest pod than Genesis™ 090 and Almaz. For seed distribution contact PB Seeds.

Genesis™ 090 is a small to medium seeded kabuli (7-8 mm). The AB rating for Genesis™ 090 has been reduced to moderately susceptible and crops will now require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. 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 is a medium to large seeded kabuli type, late in flowering and large in seed size. It is rated as moderately susceptible to AB and will require 3 to 4 strategic fungicide sprays during the season ahead of rain fronts, the sprays offering 2-3 weeks protection against infection. All chickpea seed should be treated with a thiram based fungicide to prevent seed transmission of AB on to the emerging seedlings. It has the largest seed size of all commercial kabuli types hence more able to meet the size requirements of premium high valued markets. However yield is inferior to the small kabuli types and PBA Monarch but generally similar to Almaz in SA. For seed distribution contact PB Seeds. ■

Field pea variety sowing guide 2018

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PBA Butler (tested as OZP1101) is a new release high yielding 'Kaspa type' field pea that will be available to growers for the 2018 season. It is a mid to late flowering semi leafless variety with improved resistance to bacterial blight and downy mildew over Kaspa.

PBA Butler has broad adaptation and can be grown across all field pea production zones in southern Australia. It is particularly well suited to medium to long growing seasons and may reduce yield losses in regions where downy mildew and bacterial blight are major diseases.

The disease forecasting model 'Blackspot Manager' predicted low to medium blackspot risk levels in many regions of SA for the 2017 season. In some regions delayed sowing until a reduced risk prediction occurs is possible, however if the risk does not reduce and delayed sowing is not a viable option growers are advised to select another paddock or break crop to sow.

If peas are still the preferred crop of choice growers should select paddocks not previously sown to field peas, or paddocks with at least four years break from field peas and with a low history of black spot disease infection. They should also not sow field peas in close vicinity to last year's field pea stubble and in areas where a yield of at least 2 t/ha is achievable they can consider using a fungicide strategy of P-Pickle T seed dressing combined with two mancozeb foliar fungicide sprays (6-10 weeks post sowing and at early flowering).

In situations where delayed sowing occurs for blackspot management, a number of recently released, earlier flowering and maturing varieties will provide improved yield stability over later flowering types such as Kaspa.

Predictions of blackspot spore release times in each pea growing district can be obtained through 'Blackspot Manager' via the internet (www.agric.wa.gov.au/cropdiseases) or a free SMS service (to subscribe email Jenny Davidson: jenny.davidson@sa.gov.au).

Selection criteria

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

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

Notes on selected varieties

DUN TYPES

Dun peas are segregated from white and blue peas due to the different quality market specifications. Some pea markets in India and Sri Lanka prefer Australian dun peas due to their distinct 'nutty' taste. 'Kaspa seed type' grain is also preferred

Table 1. Pea variety sowing guide 2018

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

* Green manure/forage option ** Green manure/forage ONLY ^ Preferred varieties where bacterial blight is a production constraint.



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Table 2. Variety characteristics of selected pea varieties

Variety	Seed type	Seed size	Plant habit	Plant height	Early vigour	Flower colour	Flowering time	Maturity time	Pod shattering, at maturity	Lodging resistance at maturity	Downy mildew		Blackspot	Powdery mildew	Bacterial blight (<i>pv syringae</i>)
											Parafield strain	Kaspa strain#			
Alma	Dun	Me	C	T	High	P	M-L	L	MR: NSP	Poor	S	S	MS	S	-
Dundale	Dun	Me	C	T	High	P	E	M	MR: NSP	Poor	S	-	MS	S	-
Excell	Blue	Me	SL	Me-T	High	W	E-M	L	S: NSP	Good	MR	S	MS	S	S
Kaspa	Dun (K)	Me	SL	Me-T	High	Pi	L	M	R: SP	Fair-Good	MR	S	MS	S	S
Maki	Blue		SL	Sh	Mod	W	E	E	S: NSP	Poor-Fair	S	S	S	R	S
Morgan	Dun	Sm	SL	T	High	P	L	L	MR: NSP	Poor-Fair	MR	S	MS	S	MS
Parafield	Dun	Me-Lg	C	T	High	P	M	M	MR: NSP	Poor	S	S	MS	S	MS
PBA Butler	Dun (K)	Me	SL	Me-T	High	Pi	M-L	E-M	R: SP	Fair-good	S	MS	MS	S	MR/MS
PBA Coogee	Dun	Lg	C	T	High	P	M	M	MR: NSP	Poor	-	-	MS	R	MS
PBA Gurnyah	Dun (K)	Me	SL	Me-T	High	Pi	E-M	E	R: SP	Fair-Good	R	S	MS	S	S
PBA Hayman	White	Sm	C	T	Low-Mod	W	VL	VL	MR: NSP	Fair	MR/R	-	MS	R	MR
PBA Ora	Dun	Me	SL	Me-T	High	P	E	E	MR: NSP	Fair-Good	MR	MR/MS	MS	S	MR/MS
PBA Pearl	White	Me-Lg	SL	Me-T	High	W	E-M	E	MR: NSP	Good	MS	S	MR/MS	S	MS
PBA Percy	Dun	Me-Lg	C	T	High	P	E	E	MR: NSP	Poor	S	S	MS	S	MR
PBA Twilight	Dun (K)	Me	SL	Me-T	High	Pi	E	E	R: SP	Fair-Good	R	S	MS	S	S
PBA Wharton	Dun (K)	Me	SL	Me-T	High	Pi	E-M	E	R: SP	Fair-Good	R	S	MS	R	S
Sturt	White	Me-Sm	C	T	High	W	E-M	M	MR: NSP	Poor	MS	S	MS	S	MS
Yarrum	Dun	Me	SL	Me-Sh	Mod	P	L	M	MR: NSP	Poor-Fair	S	S	MS	R	MS

K = Kaspa type, Sm = small, Me = medium, Lg = large, C = conventional, SL = semi-leafless, P = purple, W = white, Pi = pink, T = tall, Sh = short, E = early, M = mid, L = late
H = high, M = moderate, L = low, S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant, SP = sugar pod, NSP = non-sugar pod

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over dimpled grain (such as Parafield and PBA Oura) in these markets due to its round shape and lack of dimples allowing easier seed coat removal and greater split returns. It is important to check segregation plans for local delivery points as some will segregate the 'kasper seed type' from the dimpled dun type.

Kasper seed type

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

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

PBA Gunyah is a 'Kasper seed type' field pea with earlier and longer flowering than Kasper and higher yield in shorter season environments and drier seasons (yield potential below 2.25 t/ha) than this variety. It is early to mid flowering and early maturing, making it more suitable than Kasper to the practice of crop topping. It is better suited to delayed sowing than Kasper for disease management. Its disease resistance profile is similar to Kasper 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 Kasper due to its earlier maturity. PBA Gunyah is licensed to Seednet.

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

Kasper is a semi-leafless, late flowering variety with resistance to

Table 3. Predicted long term yields of selected pea varieties grouped by yield bracket. Yields expressed as a percentage of yield bracket mean (SARDI, PBA and NVT data, 2012-2016).

Yield Group	< 1 t/Ha	1 to 2 t/Ha	> 2 t/Ha
Mean Yield	0.82	1.49	2.85
Number of Trials	7	25	45
Excell	-	76	72
Kasper	89	92	94
Morgan	-	92	93
Parafield	72	83	88
PBA Butler	104	105	108
PBA Gunyah	100	98	98
PBA Oura	114	100	99
PBA Pearl	121	107	106
PBA Percy	124	96	98
PBA Twilight	101	97	95
PBA Wharton	100	100	96
Sturt	92	91	96
Yarrum	-	96	96

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

Traditional dimpled dun seed type

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

PBA Percy is an early flowering conventional dun variety with improved resistance (MR) to bacterial blight (pv syringae) over all other varieties making it a good option in areas prone to this disease. Its early flowering and early maturity make it well

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suited to delayed sowing for disease management and the agronomic practice of crop-topping. It produces non sugar-type pods, but is not prone to shattering (similar to PBA Oura). PBA Percy seed is dimpled and not a 'kasper 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. Seed is licensed to Seednet.

PBA Coogee is a mid flowering and mid maturing conventional dun pea suitable for either grain or forage production. It has higher grain yield and similar biomass production to Morgan, and grain yield between Parafield and Kasper. Flowering and pod set is generally slightly later than both Parafield and Kasper. PBA Coogee is resistant to powdery mildew and has improved tolerance to soil boron and salinity compared to other varieties. Seed is licensed to Seednet.

WHITE TYPES

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

PBA Pearl is a semi-leafless white pea variety which is broadly adapted and the highest yielding field pea in long term evaluation trials in all areas of SA. It has an erect growth habit, often with excellent lodging resistance at maturity. It is early to mid flowering and produces non sugar-type pods but is not prone to shattering (similar to PBA Oura). It has a favourable disease resistance profile, with good resistance to Bean Leaf Roll virus, 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 Kasper type export markets.

Sturt is a conventional leaf type, small seeded white pea similar to Parafield in height, lodging resistance and disease

susceptibility. Flowering and maturity time of Sturt is similar but generally slightly earlier than Parafield. It has consistently yielded higher than other varieties in trials affected by reproductive frosts, indicating some level of tolerance to this stress.

Sturt is more sensitive than Kasper and Parafield to label rates of both post sowing pre-emergent and post emergent applications of metribuzin. Sturt is licensed to Premier Seeds.

PBA Hayman is a late flowering and late maturing conventional pea suitable for forage production as a potential alternative to vetch. It has lower grain yield than Morgan (which has been considered a dual purpose variety) but has higher biomass production. Due to its low yields (20-80% of Kasper) grain retrieval in dry seasons or low rainfall districts can be difficult. Flowering and maturity of PBA Hayman is much later than other field pea varieties and peak growth rates and biomass accumulation also occurs much later than other varieties. PBA Hayman is rated R for powdery mildew, MR for bacterial blight (similar to PBA Percy), and MR/R for the Parafield downy mildew strain (although its response against the Kasper downy mildew strain is unknown). It is more susceptible to blackspot than all varieties and this must be considered carefully before growing this variety. Seed is licensed to Seednet.

BLUE TYPES (GREEN COTYLEDONS)

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

Two blue field pea varieties, Excell and Maki, have been available to growers in the past.

Maki is best suited to the north-eastern field pea growing areas of northern Australia, and limited testing has occurred in southern Australia.

Both varieties are outclassed for yield and agronomic adaptation by the newer dun and white pea releases in the southern region of Australia and they have a relatively poor disease resistance profile, as shown in Table 2. ■



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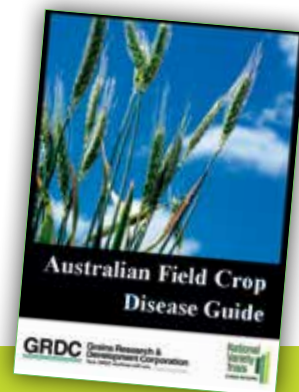
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The **CROP DISEASE AU** application has been developed by the Australian National Variety Trials program (NVT) and funded by the GRDC. It provides access to up-to-date variety information from the NVT database, as well as current disease-resistance ratings, disease information and an extensive disease image library.