

2017 VICTORIAN WINTER CROP SUMMARY



VICTORIA



National
Variety
Trials
A GRDC INITIATIVE



ARE YOU GROWING THE BEST
VARIETY FOR YOUR SITUATION?

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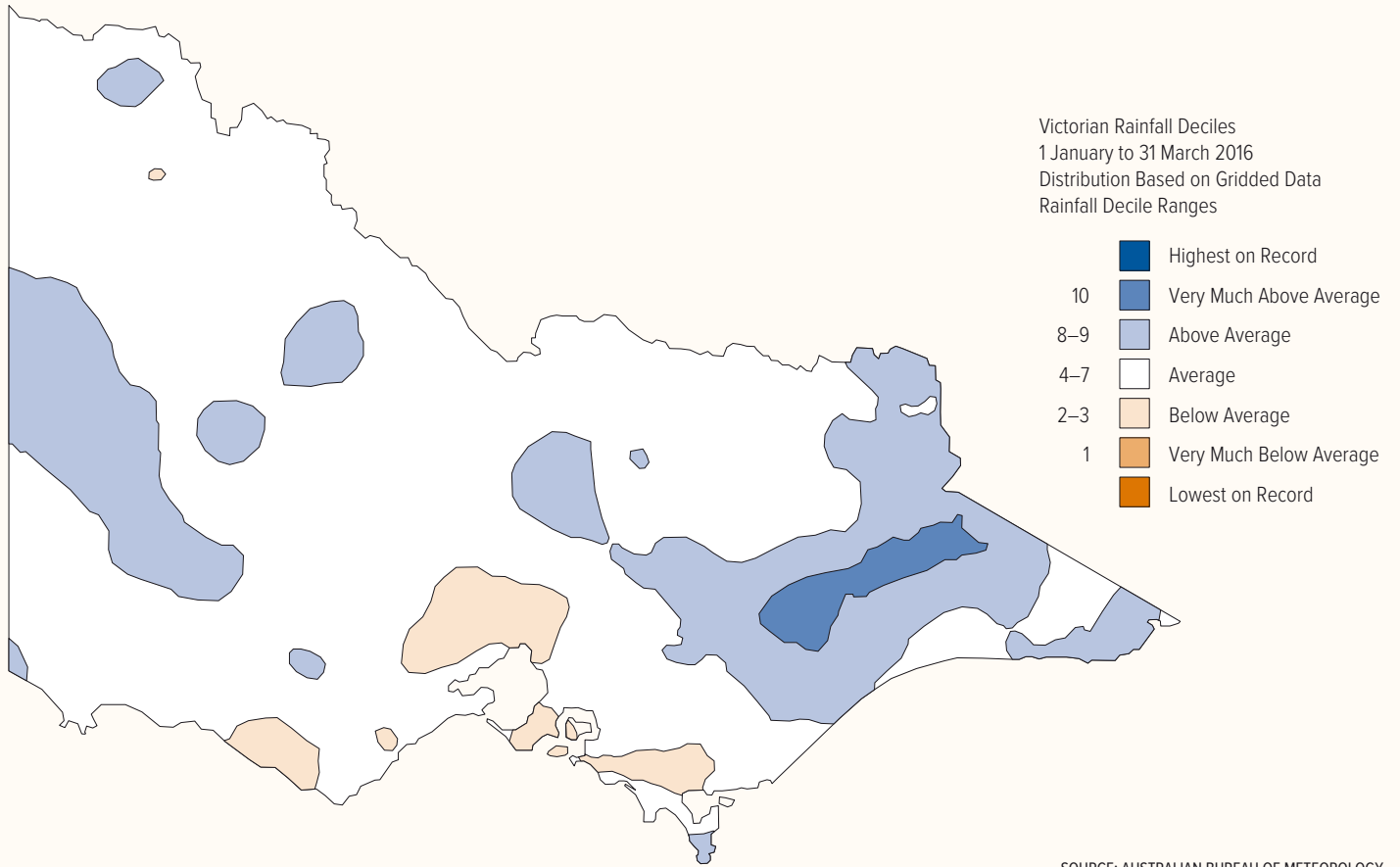
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This guide can be downloaded to your computer or tablet at
www.grdc.com.au/NVT-Victorian-Winter-Crop-Summary
Remember to update it each March

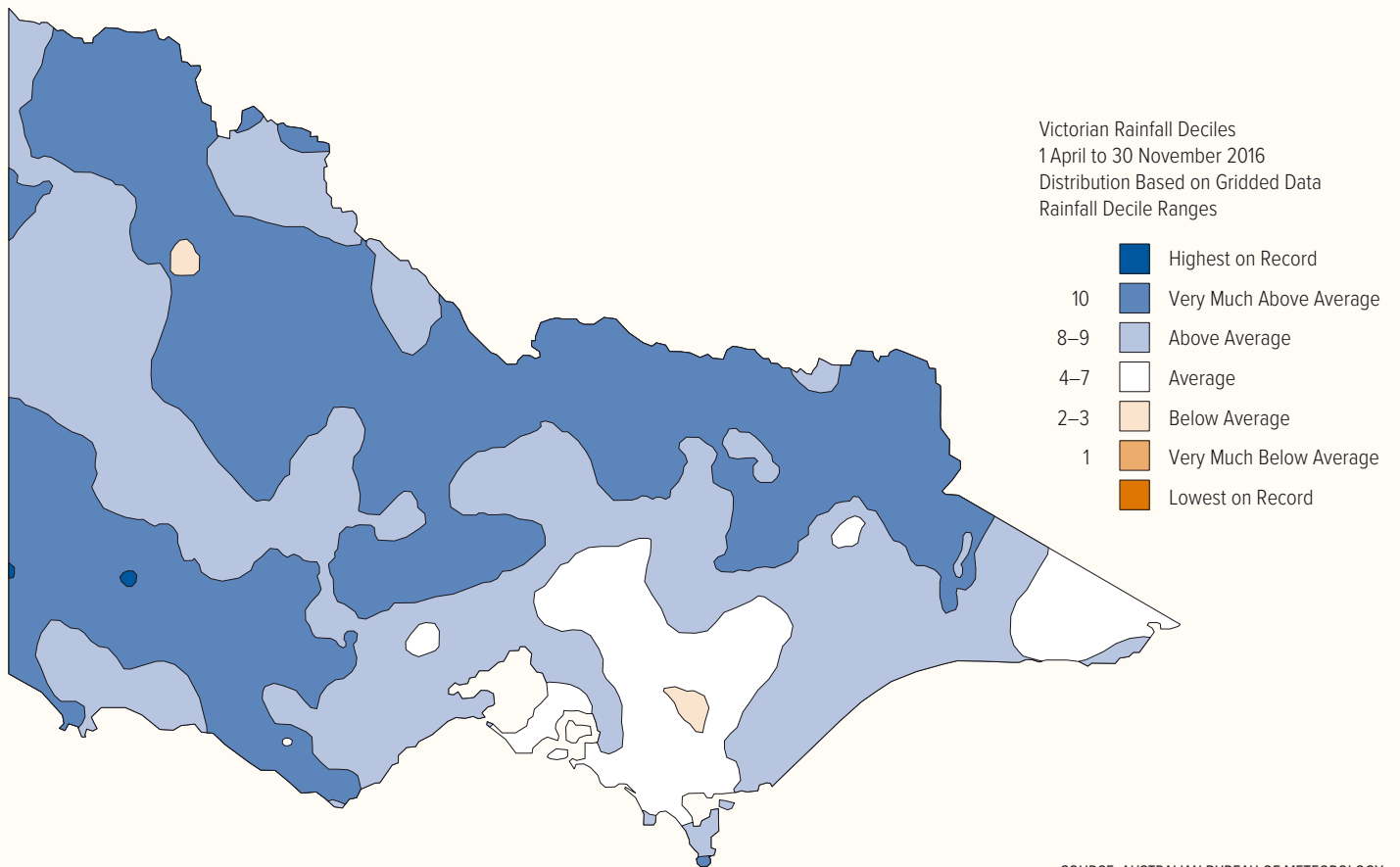
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FIGURE 1 2016 Victorian rainfall deciles for the pre-season (January to March).



SOURCE: AUSTRALIAN BUREAU OF METEOROLOGY

FIGURE 2 2016 Victorian rainfall deciles for the growing season (April to November).



SOURCE: AUSTRALIAN BUREAU OF METEOROLOGY

INTRODUCTION

THE SEASON

Season 2016

Much of the state received average to above average rainfall in January, which, although welcome, had little impact on stored soil moisture following the prolonged dry conditions throughout 2015. Average to drier conditions continued (Figure 1) until the May break delivered the best start to the cropping season that had been seen in a number of years, except for part of the West Wimmera which saw average May rainfall.

The season began in April in the northern Mallee and North East Victoria, but most other areas started in mid to late May. May rainfall assisted germination, but had limited impact on stored moisture in the Wimmera, Mallee and North Central with the majority of moisture being absorbed in the top horizon.

The initial discovery of the exotic pest Russian wheat aphid (RWA), *Diuraphis noxia*, in South Australia in May, and its subsequent detection in Victoria, was of major concern to growers in 2016. However, most affected cereal crops were able to recover from early seedling damage caused by this new aphid species. The pest appeared to be controlled with relative ease using either chlorpyrifos or pirimicarb (APVMA PER82792) and an economic threshold approach which in many cases saw predation by natural enemies. The cool and especially wet conditions throughout winter and spring together with the development of entomopathogenic fungi appeared to halt significant population build-up. Despite few reported cases of yield loss in 2016, the full impact of this new pest is yet to be determined under normal spring conditions.

Above average rainfall continued after the May break with decile 8-10 rainfall across Victoria (Figure 2). The exception was Gippsland which received average growing season rainfall, and areas in the northern Mallee were still looking for further rainfall up until August to support crop growth. Until then very little moisture had penetrated past 40 centimetres in the north-west of the state.

Warm temperatures throughout winter led to limited frosts and above average winter growth. However, some low lying areas of the Wimmera were still impacted by frost in spring.

Rainfall across the state in September reversed the trend with waterlogging in areas which received over 100 millimetres in one week. Flooding impacted the Loddon, Avoca, Wimmera and South West catchments. These wet conditions also led to high disease pressure across the state. Wet conditions also resulted in relatively low numbers of aphids and therefore a low incidence of viruses in all crops.

Above average spring rainfall delayed growers hay programs, with many starting programs later than usual. Hay required longer

time on the ground to cure, resulting in issues with quality. High biomass crops led to high hay yields, albeit with low energy and protein. Continued rainfall also resulted in a large amount of volunteer and weed growth in those paddocks cut for hay.

Harvest was delayed by three to four weeks across the state due to September flooding and above average October rainfall. Harvest got underway in the northern Mallee in the last week of October and continued through into January, 2017, in the south. Crops yielded well across the state except for some in the far North West, which were heavily impacted by an extreme, early November storm.

November and late December rain and scattered storms only frustrated growers who were trying to harvest high yielding crops. Rain caused harvest delays and an unfortunate boost to summer weeds. Some seed quality may also have been affected, with the possibility of sprouting where rainfall totals were high. Due to the record volume of grain produced in 2016, growers experienced issues with storing and moving grain throughout harvest. Many growers used temporary silo bags to store cereal grain due to low prices.

Looking forward to 2017

Unused soil moisture in many parts of the state and summer rain will mean summer volunteer and weed control is important. This will help to preserve soil moisture reserves, save nutrients and minimise the green bridge for pests and diseases, including Russian wheat aphid.

Sourcing clean seed for sowing will be important in 2017. Seed that was rain damaged at harvest may experience germination or vigour problems at sowing. Growers will need to conduct germination and vigour tests to identify the best seed to use. Careful attention will need to be paid to pre-emergent herbicides, seed dressings, coleoptile length, vigour and sowing depth, to prevent poor establishment. Testing for seed borne diseases will also be important in pulses after high disease pressure in 2016.

Growers should remember while there is a natural desire to get everything in the ground while the weather is warm and the soil moist, spreading sowing time is a useful technique to minimise risk. Likewise, growers are encouraged to use varieties with a range of maturities and frost sensitivities to minimise damage.

Frost susceptibility rankings

Frost susceptibility rankings for wheat and barley varieties are available on the NVT website in the format of relative frost values. Growers can use the interactive tool to select a set of either wheat or barley varieties, adapted relative to their production region, to display graphically using an interactive tool. This enables growers to manage the frost risk of new varieties based on how known varieties of similar ranking are currently managed.

The rankings are not due to difference in phenology/flowering time, and refer to the relative susceptibility of varieties flowering at the same time during a frost event. They do not take into account the frost risk associated with a particular variety flowering on a certain sowing date. Selecting an appropriate maturity for a particular sowing time is still the best option in limiting damage resulting from frost. Hence the reproductive frost ranking needs to be considered in relation to the relative time of sowing and flowering time prediction.

No current wheat or barley varieties are frost tolerant. Under severe frost (for example -8°C) or multiple minor frosts (several nights of -2° to -4°C) all varieties tested to date are equally susceptible, resulting in up to 100 per cent sterility in flowering heads.

Growers should continue to select varieties based on the best yield, maturity, agronomic and disease performance information from various sources such as regional agronomy trials and NVT. Once a variety has been adopted, use the preliminary reproductive frost susceptibility rankings to fine tune frost risk management, based on how known varieties are currently managed with a similar ranking.

For example, Wyalkatchem, which is more susceptible to frost than Yitpi, is managed differently in terms of sowing date, position in landscape and the associated frost risk; thereby trying to maximise production while also minimising frost risk. Ensuring that flowering occurs within the optimum flowering window to minimise frost, heat and terminal drought continues to be critical, and the reproductive frost rankings need to be used within this context.

This research has been funded as part of the GRDC's multidisciplinary National Frost Initiative.

THE WINTER CROP SUMMARY

This publication summarises information on current varieties of the major winter crops grown in Victoria. Sources of additional information are listed in each chapter. Local advisers are also a key resource for information relevant to individual localities.

This publication aims to prompt growers to ask themselves, 'Am I growing the best variety for my situation?' Use it as a guide for discussion with consultants, advisers and marketing agents.

Thank you to the Grains Research and Development Corporation (GRDC) for its support in making this guide available to Victoria.

More information

Additional information on the National Variety Trials (NVT) is available from NVT Online at www.nvtonline.com.au.

The Winter Crop Summary can be downloaded to your computer or tablet at www.grdc.com.au/NVT-Victorian-Winter-Crop-Summary.

National Variety Trials (NVT)

The majority of variety trials presented in this book are sourced from the NVT program. NVT also provide data from some breeding trials to add to the information available. In Victoria, NVTs are fully funded by the GRDC and in 2016 were contracted to three Service Providers: Agrisearch Services Pty Ltd, Birchip Cropping Group and Southern Farming Systems.

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

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

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

New NVT Long Term Yield Reports App

The National Variety Trials has launched the NVT Long Term Yield Reports App to provide growers and advisors with an easy-to-use means of accessing and interpreting Long Term MET (Multi Environment Trial) results from the NVT program. These Long Term MET results are presented in this publication.

The NVT Long Term Yield Reports App gives users the ability to view data in yield based groupings and/or seasonal outcome across states, regions or selected trials right down to a single site level. Information is most accurate and reliable when viewed at a single site level, but the option is provided to use regional or multi-site selections for improved usability and relevance to growers. Data can be viewed in table format, or on a chart where specific variety comparisons can be made.

The app is designed for tablets and computers (not phones) and is available online at www.nvtonline.com.au/apps/

Australian Field Crop Disease Guide App

The National Variety Trials has developed the Australian Field Crop Disease Guide App. This national app allows users to select their state to access local varieties, ratings and descriptions.

The app is suitable for phones and is available online at www.nvtonline.com.au/apps/

Plant Breeding Rights (PBR)

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

End Point Royalties (EPR's)

EPR's payable for 2017-18 are quoted ex GST and quoted from www.varietycentral.com.au. Compliance with EPR systems is vital to ensure the future of the Australian grains industry through the funding of new varieties and long term productivity gains.

WHEAT

REVIEW OF 2016

Season

Extended dry conditions in 2015 and limited summer rainfall meant most of the state remained dry up until autumn, with Gippsland the exception. A solid autumn break provided an excellent start for emerging wheat crops in most areas.

Continued mild, wet conditions resulted in good early vigour and growing conditions throughout the season. Above average rainfall in September and October meant crops were not water limited as they have been in previous seasons. Some wheat crops, particularly in the North Central and high rainfall regions, were impacted by waterlogging.

Frost was not a widespread issue due to generally mild conditions. Some low lying areas particularly in the Wimmera were impacted by frost, however high yields generally compensated for losses. Late season storms in the northern Mallee also impacted yield and quality for some crops. Continued spring rainfall meant harvest was delayed across the state, and low prices meant many growers were leaving wheat until last, harvesting other crops with higher margins first.

Quality was generally good with many achieving ASW, APW, H and some APH classification. High yields across all growing regions made up for the shortfall in pricing. Record high global wheat stocks in December didn't encourage prices, with wheat prices sitting at a global low at the beginning of harvest. Prices saw a small increase in January in response to record low wheat plantings in the US, however prices could remain low for some time due to global oversupply.

Disease and pest issues

The wet spring conditions during 2016 were favourable for the development of diseases in wheat. Where proactive control strategies were used, losses were minimised, but in other cases losses greater than 20 per cent occurred.

Yellow leaf spot was widespread across the Wimmera Mallee and severe in some cases. Yellow leaf spot inoculum will be high on stubble in 2017.

Rusts were widespread but mild spring temperatures didn't provide ideal conditions for disease development despite wet conditions. There were some reports of stem rust late in the season.

Septoria tritici blotch (STB) has continued to increase in importance in the high rainfall regions, but was also observed in Wimmera crops in 2016. Many varieties are rated as susceptible or worse. The importance of this disease is compounded by the presence of strains with reduced sensitivity to many common fungicides.

Rhizoctonia impacted growers due to previous dry seasonal conditions while take-all resulted in white heads in wheat crops in 2016 due to wet conditions. The levels of many root diseases will have increased with the wet spring.

Russian wheat aphid was a major concern for cereal growers in 2016. Further information on this new pest is available in the barley chapter of this guide.

LOOKING FORWARD TO 2017

New varieties

The new wheat varieties added this year are Coolah, LRPB Arrow, LRPB Kittyhawk and Tenfour.

Quality changes

Wheat Quality Australia (WQA) has upgraded Sunlamb to ASW. AH upgrades are LRPB Flanker and LRPB Lancer.

Disease and pest management

Disease management following a wet year and summer rainfall is important for growers to consider moving into 2017. Seasonal conditions were conducive to a number of diseases in 2016 allowing for inoculum to build up and carryover on stubble and the green bridge.

Summer weeds and volunteers are also important hosts for insect pests and viruses. The green bridge creates an inoculum source for aphid transmitted viruses, while also providing a refuge for aphids themselves. Controlling the green bridge will help to reduce virus inoculum and aphid population build-up.

Summer rainfall will increase the opportunity for rust carryover on volunteer cereals. Given suitable conditions rust can increase rapidly, particularly where susceptible varieties are grown. Avoiding susceptible varieties will reduce rust pressure and the chance of yield loss while also reducing inoculum carry-over between seasons and decreasing the chance of resistance breakdown. To control rust growers should also remove volunteer cereals by late-March, use fungicides on seed or fertiliser at sowing, and monitor crops to enable timely fungicide application where required.

Yellow leaf spot is best controlled by avoiding sowing susceptible varieties into paddocks with infected stubble present. The pressure from yellow leaf spot will be greatly reduced if susceptible (S) and very susceptible varieties (VS) are replaced with those rated moderately susceptible (MS) or better. Complete resistance is not needed to achieve sustainable control of this disease.

It is critical that an integrated approach is used to manage Septoria tritici blotch (STB). Control needs to combine variety (avoiding susceptible cultivars - see Table 3) and paddock selection (avoid

infected wheat stubble) with the timely use of fungicides. Should a foliar fungicide be needed, it should be applied early in disease development.

To slow the development of more serious mutations of STB it is important to mix and/or alternate different azole fungicides. Not all azole fungicides are affected equally by mutations of the STB fungus. Growers must always follow directions for use contained on individual product labels and ensure maximum residue limits are adhered to.

Bunts and smuts must be controlled every year. Seed treatments provide cheap and effective control of bunt and smut diseases. Seed should be treated every year with a fungicide. Without treatment, bunt and smut can increase rapidly, resulting in unsaleable grain. Good product coverage of seed is essential for control. Note that fertiliser treatments do not control bunt and smuts, so additional seed treatments are required. Clean seed should be sourced if a seed lot is infected.

Root disease levels will have increased with favourable spring conditions. A PreDicta B soil test can be used prior to sowing to identify potential root disease issues before they affect crop yield, and to implement appropriate management. Contact your local agronomist to organise testing. Most cereal root and crown diseases (take-all, crown rot, cereal cyst and root lesion nematode) can be controlled with a one or two year break from susceptible hosts. It is important that break crops are kept free of grass weeds to be effective.

Frost

Frost susceptibility rankings are available on the NVT website in the format of relative frost values. These rankings are explained in more detail in the Introductory chapter of this book.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports App

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AG0508 Growing wheat
- AG1160 Cereal disease guide

VARIETY DESCRIPTIONS

Information about each variety is presented as overview statements, then as comparison tables of yield, crop growth and disease reaction characteristics. Wheat quality is for the Southern Zone.

(¹) denotes Plant Breeders Rights apply

* denotes default classification

Abbreviations used are:

CCN = Cereal Cyst Nematode

BYDV = Barley Yellow Dwarf Virus

RLN = Root Lesion Nematode

APH = Australian Prime Hard (min protein 13%)

AH = Australian Hard (min protein 11.5%)

APW = Australian Premium White (min protein 10%)

ASW = Australian Standard White

ADR = Australian Premium Durum

ASWN = Australian Standard Noodle (Protein 9.2–11%)

APNW = Australian Premium Noodle (Protein 10–11.5%)

ASFT = Australian Soft (Protein 9.5%)

FEED = Australian Feed

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Bread wheat – AXE⁽¹⁾

AH quality. Semi-dwarf awned wheat with early maturity. Stem rust MS, stripe rust RMR, leaf rust SVS, CCN S and yellow leaf spot S. MSS to *Pratylenchus neglectus*. Good yield under terminal drought stress, large grains and SVS to pre-harvest sprouting. Released 2007 and marketed by AGT. EPR \$2.50.

Bread wheat – BECKOM⁽¹⁾

AH quality. Semi-dwarf awned wheat with mid-season maturity and wide adaptation across Victoria. Stem rust MRMS, stripe rust MRMS, leaf rust MSS, yellow leaf spot MSS, septoria SVS and CCN R. Short height, tolerant to acid soils and boron. Released 2015, tested as V06008-14 and marketed by AGT. EPR \$3.25.

Bread wheat – BOLAC⁽¹⁾

AH quality. Fully awned, mid to late season maturity suited to high rainfall zones. Stem rust MRMS, stripe rust RMR, leaf rust S, yellow leaf spot S, septoria MSS and CCN S. Bolac is a high yielding milling wheat for south-west Victoria with small grain size. Released 2006 and marketed by Seednet. EPR \$2.10.

Bread wheat – CONDO⁽¹⁾

AH quality. A very early maturing variety. Excellent yield potential in North Central, North Eastern Vic and Southern NSW. Stem rust RMR, stripe rust MSS, leaf rust S. MR to CCN and MS to yellow leaf spot. MT to aluminium, large grain size, and low screenings. Released 2014 and marketed by AGT. EPR \$3.25.

NEW Bread wheat - COOLAH⁽¹⁾

APW quality. Mid to late season maturity suitable for end of April/early May sowing. Similar to EGA Gregory in most traits, but with improved yield potential, yellow leaf spot resistance and straw strength. Stem rust RMR, stripe rust RMR, leaf rust MR, yellow leaf spot MSS, septoria MSS and CCN S. Tolerant of acid soils, high test weight and low screenings. Released 2016, tested as V07176-69 and marketed by AGT. EPR \$3.50.

Bread wheat – CORACK⁽¹⁾

APW quality. An early to mid-maturing short semi-dwarf variety with good straw strength. Stem rust MR, stripe rust MS, leaf rust SVS, yellow leaf spot MR#, septoria S and CCN RMR. High yield potential, good wheat on wheat option with large grain and low screenings. Released 2011. Marketed by AGT. EPR \$3.

Bread wheat – CORRELL⁽¹⁾

AH quality. Fully awned with mid-season maturity. Stem rust MRMS, stripe rust MRMS, leaf rust MSS, yellow leaf spot SVS, septoria MSS and CCN MR. Tolerant of boron toxicity, SVS to pre-harvest sprouting, low test weights and MS to screenings. Released 2007 and marketed by AGT. EPR \$2.

Bread wheat – COSMICK⁽¹⁾

AH quality. Fully awned with early to mid-season maturity. Stem rust MS, stripe rust MSS, leaf rust SVS, yellow leaf spot MRMS, septoria SVS and CCN MS. Good wheat on wheat option where CCN is managed. Excellent yield, good test weight and MS to screenings. Released 2014, and marketed by InterGrain. EPR \$3.85.

Bread wheat – CUTLASS⁽¹⁾

APW quality. Mid-late maturing variety with a flexible sowing time like Yitpi. Stem rust R, stripe rust MS, leaf rust R, yellow leaf spot MSS, septoria S and CCN MR. Boron tolerant. Released 2015, tested as RAC2069 and marketed by AGT. EPR \$3.

Bread wheat – DERRIMUT[Ⓛ]

AH quality. Semi-dwarf early to mid-season variety widely adapted in Victoria. Stem rust MR, stripe rust MSS, leaf rust MSS, yellow leaf spot S, septoria S and CCN R. Moderately tolerant of boron toxicity and MS to screenings. Released 2007 and marketed by Nuseed. EPR \$2.95.

Bread wheat – DS DARWIN[Ⓛ]

AH quality. Early to mid-season maturity suited to medium and high rainfall zones. Stem rust MRMS, stripe rust MR, leaf rust S, yellow leaf spot S, septoria SVS and CCN MS. MR for black point. Wide sowing window with large grain and low screenings. Released 2015, tested as ADV03.0056 and marketed by Dow Seeds. EPR \$4.25.

Bread wheat – DS PASCAL[Ⓛ]

APW quality. Mid to late season maturity suited to high rainfall zones and irrigation. Stem rust MSS, stripe rust RMR, leaf rust MS, yellow leaf spot MRMS, septoria MSS and CCN S. Good sprouting and lodging tolerance. Released 2015, tested as ADV08.0062 and marketed by Dow Seeds. EPR \$4.25.

Bread wheat – EGA GREGORY[Ⓛ]

APW* quality. Mid to late season variety with medium to slow maturity suited to north eastern Victoria. Stem rust MR, stripe rust MR, leaf rust MR, yellow leaf spot S, septoria S and CCN S. MSS to black point. Low screenings and MS to lodging. Released 2004 and marketed by Pacific Seeds. EPR \$2.10.

Bread wheat – EGA WEDGETAIL[Ⓛ]

APW* quality. A mid to long season dual-purpose winter wheat. Developed for early sowing, suited to medium-high rainfall areas. Has a similar maturity to Rosella. Stem rust MRMS, stripe rust MS, leaf rust MS, yellow leaf spot MSS, septoria MSS and CCN S. Tolerant of acid soils and suitable for early winter grazing. Registered 2002 and marketed by Seednet. EPR \$1.45.

Bread wheat – ELMORE CL PLUS[Ⓛ]

AH quality. Mid maturing variety with similar adaptation to Janz best suited to moderate to high yielding areas. Stem rust MR, stripe rust MRMS, leaf rust RMR, yellow leaf spot S, septoria MSS and CCN S. A two gene Clearfield variety tolerant to label rates of Intervix® herbicide. Released 2011. Developed and marketed by AGT. EPR \$3.55.

Bread wheat – EMU ROCK[Ⓛ]

AH quality. An awned semi-dwarf early season variety that is best suited to medium to low rainfall environments. Produces large grain with good test weight, has a low susceptibility to screenings. Stem rust MRMS, stripe rust MRMS, leaf rust S, yellow leaf spot MRMS, septoria MSS and CCN S. Offers partial crown rot resistance (MS). Released 2011. Bred and marketed by InterGrain. EPR \$3.50.

Bread wheat – ESTOC[Ⓛ]

APW quality. A mid to late season variety, slightly earlier flowering than Yitpi. Stem rust MR, stripe rust MRMS, leaf rust MSS, yellow leaf spot S, septoria S and CCN S. Has a long coleoptile and flexibility in sowing time similar to Yitpi. Has outperformed Yitpi in dry seasons. Tolerant of boron. Released 2010 and marketed by AGT. EPR \$3.

Bread wheat – FORREST[Ⓛ]

APW quality. Awned semi-dwarf long season variety suited to the high rainfall zones for early April to early May sowing. Stem rust RMR, stripe rust RMR, leaf rust MSS, yellow leaf spot MRMS, septoria MS and CCN S. Possesses resistance/tolerance to Wheat Streak Mosaic Virus. Released 2011. Bred by Advantage Wheats and marketed by Seednet. EPR \$3.50.

Bread wheat – GRENADE CL PLUS[Ⓛ]

AH quality. Fully awned early-mid season variety. Two gene tolerance to label rates of Intervix® herbicide. Stem rust MR, stripe rust MRMS, leaf rust S, yellow leaf spot S, septoria S and CCN MR. Tolerant to boron and acid soils. Released 2012 and marketed by AGT. EPR \$3.80.

Bread wheat – HATCHET CL PLUS[Ⓛ]

AH quality. Semi-dwarf awned wheat with very early maturity, 1-2 days earlier than Axe. Two gene tolerance to label rates of Intervix® herbicide. Stem rust MS, stripe rust MRMS, leaf rust SVS, CCN MR and yellow leaf spot S. Fast maturity can allow extra time to manage weeds prior to sowing, SVS to pre-harvest sprouting. Released 2015, tested as RAC1843 and marketed by AGT.

Bread wheat – KIORA[Ⓛ]

AH quality. Mid to late season maturity best suited to medium to high rainfall areas. Stem rust RMR, stripe rust RMR, leaf rust MRMS, yellow leaf spot MSS, septoria S, CCN MSS and black point MSp. Released 2014 and marketed by AGT.

Bread Wheat – KORD CL PLUS[Ⓛ]

AH quality. Fully awned semi-dwarf with mid-season maturity. Two gene tolerance to label rates of Intervix® herbicide. Stem rust MR, stripe rust MRMS, leaf rust MS, yellow leaf spot MSS, septoria S and CCN MR. Based on Gladius with very similar adaptation. SVS to pre-harvest sprouting. Released 2011 and marketed by AGT. EPR \$3.55.

NEW Bread wheat – LRPB ARROW[Ⓛ]

AH quality. Mid maturity, 3-4 days later than Mace with short canopy. Good yield stability with large grain size, low screenings. Stem rust S, leaf rust SVS, Stripe rust S, yellow leaf spot MRMS, septoria S and CCN MS. Released 2016, tested as LPB11-1728 and marketed by Pacific Seeds. EPR \$3.

Bread wheat – LRPB COBRA[Ⓛ]

AH quality. Short semi-dwarf early-mid season variety suited to medium to high yield potential environments on both acid and alkaline soils. Stem rust RMR, stripe rust MSS, leaf rust MR, yellow leaf spot MRMS, septoria MSS and CCN MS. Compact plant height, moderately resistant to lodging, but SVS to pre-harvest sprouting. Released 2012 and marketed by Pacific Seeds. EPR \$3.50.

Bread wheat – LRPB FLANKER[Ⓛ]

AH quality. Early to mid-season variety with similar maturity to EGA Gregory and suited to medium to high rainfall areas in North East Victoria. Stem rust RMR, stripe rust RMR, leaf rust MR, yellow leaf spot MSS and septoria MSS. Susceptible to lodging. Released 2015, tested as LPB10 2555 and marketed by Pacific Seeds. EPR \$4.25

Bread wheat – LRPB GAUNTLET[Ⓛ]

APW quality. A mid to late season variety suited to acid soils in North Central and North East Victoria. Short to medium plant height with good early vigour. Stem rust RMR, stripe rust MRMS, leaf rust MSS, yellow leaf spot MS, septoria MSS and CCN MRMS. Released 2012 and marketed by Seednet. EPR \$3.

NEW Bread/Dual purpose wheat – LRPB KITTYHAWK[Ⓛ]

AH quality. Mid to long season dual-purpose winter wheat with similar maturity to EGA Wedgetail. Developed for early sowing, suited to medium to high rainfall areas. Stem rust MRMS, stripe rust RMR, leaf rust MRMS, yellow leaf spot MSS, septoria MSS and CCN S. Suitable for early winter grazing. Improved test weight over EGA Wedgetail. Released 2016, tested as LPB11-0140 and marketed by Pacific Seeds. EPR \$4.25.

Bread wheat – LRPB LANCER[Ⓛ]

AH quality. Mid-long season variety for early planting. Short semi-dwarf with awns suited to medium to high rainfall areas. Stem rust R, stripe rust MR, leaf rust RMR, yellow leaf spot MS, septoria MSS and CCN S. Compact plant height and moderate lodging resistance. Released 2013 and marketed by Pacific Seeds. EPR \$4.25.

Bread wheat – LRPB LINCOLN[Ⓛ]

AH quality. Mid season variety, semi-dwarf with awns suited to medium to high rainfall areas. Stem rust MR, stripe rust RMR, leaf rust S, yellow leaf spot MSS, septoria S and CCN S. MS to lodging and SVS to pre-harvest sprouting. Best suited to North Central and North East Victoria. Released 2007 and marketed by Pacific Seeds. EPR \$2.50.

Bread wheat – LRPB PHANTOM[Ⓛ]

AH quality. A mid to late season variety tolerant of boron and acid soils. Stem rust MS, stripe rust MR, leaf rust S, yellow leaf spot SVS, septoria SVS, CCN MS and black point MRMS. MS to lodging. Released 2012 and marketed by Pacific Seeds. EPR \$3.80.

Bread wheat – LRPB SCOUT[Ⓛ]

AH quality. An awned white chaff variety with mid-season maturity and has wide adaptation across Victoria. Stem rust MR, stripe rust MS, leaf rust MS, yellow leaf spot S, septoria S, CCN R and black point SVS. Adapted to alkaline soils. Released 2009. Marketed by Pacific Seeds. EPR \$2.80.

Bread wheat – LRPB TROJAN[Ⓛ]

APW quality. Mid-long season variety. Broadly adapted variety suited to medium to high rainfall areas and has become a high yielding benchmark. Stem rust MRMS, stripe rust MR, leaf rust MRMS, yellow leaf spot MSS, septoria MSS and CCN MS. MR to lodging and MT to boron and aluminium. Released 2013 and marketed by Pacific Seeds. EPR \$4.

Bread wheat – MACE[Ⓛ]

AH quality. An awned variety of medium height. Stem rust MR, stripe rust SVS, leaf rust MSS, yellow leaf spot MRMS, septoria SVS and CCN MS. Tolerant of boron. A comprehensive fungicide strategy is required to control stripe rust. Released 2008, marketed by AGT. EPR \$3.

Bread wheat – SCEPTER[Ⓛ]

AH quality. Early to mid-season maturity of medium height. Stem rust MR, stripe rust MSS, leaf rust MSS, yellow leaf spot MRMS, septoria S and CCN MRMS. Tolerant of boron. Intended to replace Mace, flowering two days later. It has improved resistance to leaf and stripe rust however growers will need to manage accordingly. Released 2015, tested as RAC2182 and marketed by AGT. EPR \$3.25.

Bread wheat – SHIELD[Ⓛ]

AH quality. A white fully awned early-mid season variety. Stem rust RMR, stripe rust MR, leaf rust R, yellow leaf spot MSS, septoria S and CCN MRMS. Short to medium plant height with a short coleoptile. Moderate tolerance to acid soils. Released 2012 and marketed by AGT. EPR \$3.25.

Bread wheat – SUNLAMB[Ⓛ]

ASW quality. A white grained long season spring variety suited to the medium to high rainfall zone and irrigation. It is best sown early to mid-April. Slow maturing and suitable for dual purpose applications. Stem rust R, stripe rust S, leaf rust MRMS, yellow leaf spot MRMS, septoria MRMS and CCN MR. Released 2015, tested as SUN521C and marketed by AGT. EPR \$2.75.

Bread wheat – SUNTOP[Ⓛ]

AH quality. A white fully awned variety suited to North Central and North East Victoria. Stem rust MR, stripe rust MRMS, leaf rust MRMS, CCN S and yellow leaf spot MSS. Medium plant height. Tolerance to acid soils, but SVS to pre-harvest sprouting and MS to screenings. Released 2012 and marketed by AGT. EPR \$3.25.

Bread wheat – WALLUP[Ⓛ]

AH quality. Mid season maturity fully awned white variety suited to medium rainfall environments. Stem rust MRMS, stripe rust MRMS, leaf rust SVS, yellow leaf spot MSS, septoria S, CCN MR and black point MSS. MR to lodging. Released 2011. Marketed by AGT. EPR \$3.

Bread wheat – YITPI[Ⓛ]

AH quality. White fully awned semi-dwarf which has dominated production in low rainfall areas of Victoria due to its high flexibility of sowing time, adaptation to stress and good physical grain quality. Stem rust S, stripe rust MRMS, leaf rust S, yellow leaf spot SVS, septoria MSS and CCN MR. Boron tolerant, large grain and low screenings, Yitpi suits low – medium rainfall areas. Registered 2000 and marketed by Seednet. EPR \$1.

Biscuit wheat – LRPB GAZELLE[Ⓛ]

ASFT quality. Mid-late season variety suited to medium-high rainfall zones and irrigation. Stem rust MR, stripe rust RMR, leaf rust MR, yellow leaf spot S, septoria MSS and CCN MSS. Released 2012 and marketed by Pacific Seeds. EPR \$4.00.

Biscuit wheat – LRPB IMPALA[Ⓛ]

ASFT quality. Early-mid season variety suited to medium rainfall zones in Victoria. Stem rust RMR, stripe rust MR, leaf rust SVS, yellow leaf spot MSS, septoria SVS and CCN MSS. Released 2012 and marketed by Pacific Seeds. EPR \$3.50.

Durum – CAPARO[Ⓛ]

ADR quality. Mid season semi-dwarf type developed for durum zones interstate. Stem rust RMR, stripe rust MR, leaf rust RMR, yellow leaf spot MR and septoria RMR. Strong seedling vigour, strong straw and lodging and shedding resistance. Released 2008 and marketed by Seednet. EPR \$2.60.

Durum – DBA AURORA[Ⓛ]

ADR quality. A mid-season, very high yielding variety. Stem rust RMR, stripe rust RMR, leaf rust RMR, yellow leaf spot MR, and septoria MR. Good grain size, with good early vigour and weed competitiveness. Bred by Durum Breeding Australia, released 2014 and marketed by SA Durum Growers Association. EPR \$3.

Durum – HYPERNO[Ⓛ]

ADR quality. An awned mid-season white chaffed variety adapted to medium rainfall zones. Stem rust RMR, stripe rust MR, leaf rust RMR, yellow leaf spot MR, septoria MRMS and CCN MS. Performs well in high yielding environments but is intolerant of boron. Released 2008 and marketed by AGT. EPR \$3.

Durum – TJILKURI[Ⓛ]

ADR quality. A mid-season fully-awned variety. Stem rust MR, stripe rust MR, leaf rust RMR and yellow leaf spot MRMS. Tolerant to Boron. Released 2010 and marketed by SA Durum Growers Association. EPR \$3.

Durum – WID802[Ⓛ]

ADR quality. A mid-season variety. Stem rust RMR, stripe rust MR, leaf rust RMR, CCN MS and yellow leaf spot MRMS. High yielding, but may have low protein if nitrogen is limiting. Likely to produce high screenings in short finishes. Released 2012 and marketed by SA Durum Growers Association. EPR \$3.

Feed – BEAUFORT[Ⓛ]

FEED quality. An awnless red grained mid to long season variety suited to high rainfall zones of southern Australia. Stem rust SVS, stripe rust RMR, leaf rust MSS, yellow leaf spot MRMS, septoria MSS and CCN S. Strong straw suited to early-mid season sowing with aluminium tolerance. A comprehensive fungicide strategy is required to control stem rust. Released 2008 and marketed by GrainSearch. EPR \$3.

Feed/Dual purpose – MANNING[Ⓛ]

FEED quality. Dual purpose white grain wheat suited to longer growing season zones and irrigation. Stem rust MR, stripe rust RMR, leaf rust MS, yellow leaf spot MRMS, septoria MRMS and CCN S. Resistant to BYDV. Bred by CSIRO/GRDC (as CS9274.33), released 2013 and marketed by GrainSearch. EPR \$3.50.

Feed/Dual purpose – NAPAROO[Ⓛ]

FEED quality. A white grained awnless long season winter wheat suited to hay production or grazing. Stem rust RMR, stripe rust R, leaf rust S, yellow leaf spot MS and septoria MS. Released 2007. Marketed by AGT. EPR \$2.50.

Feed – PRESTON[Ⓛ]

FEED quality with white grain. An awned semi-dwarf mid to late season variety with high yield potential suited to the high rainfall zone. Stem rust SVS, stripe rust RMR, leaf rust SVS, yellow leaf spot S, septoria MSS and CCN S. A comprehensive fungicide strategy is required to control stem rust. Released 2009 and marketed by Seednet. EPR \$2.20.

Feed/Dual purpose – SF ADAGIO

FEED quality. An awned red winter wheat. It is a mid to long season variety for high rainfall zones and irrigation. Adagio is suitable for dual purpose applications when early sowing is possible. Stem rust SVS, stripe rust RMR, leaf rust S, yellow leaf spot MRMS, septoria MRMS and CCN S. A comprehensive fungicide strategy is required to control stem rust. Released 2014, marketed by AGF Seeds.

Feed/Dual purpose – SF OVALO

FEED quality. Awnless red winter wheat. It is a long season variety for high rainfall zones and irrigation. Ovalo is suitable for dual purpose applications when early sowing is possible. Stem rust SVS, stripe rust R, leaf rust MSS, yellow leaf spot MR and septoria MR. Bred by AGT, released 2014 and marketed by Seedforce. EPR \$4.

Feed/Dual purpose – SF SCENARIO

FEED quality. Awnless red winter wheat. It is a long season variety with similar maturity to Frelon and a direct replacement for Frelon and Amarok. Stem rust MSS, stripe rust R, leaf rust S, yellow leaf spot MS, septoria MRMS and CCN S. Bred by AGT, released 2013 and marketed by AGF Seeds.

Feed/Dual purpose – SQP REVENUE[Ⓛ]

FEED quality. A red grained awnless winter wheat suited to longer growing season zones and irrigation. Stem rust RMR, stripe rust R, leaf rust VS, yellow leaf spot MS, septoria MSS and CCN S. Has good early vigour and stands well with good head retention. Bred by AusGrainz and CSIRO (as CSIRO 95102.1), released 2009 and marketed by GrainSearch. EPR \$3.50.

NEW Feed – TENFOUR

FEED quality. TenFour is a widely adapted early-maturing wheat for the South West, North East and irrigation. Stem rust S, stripe rust SVS, leaf rust MSS, yellow leaf spot MRMS, septoria SVS and CCN MS. Released 2016 and tested as SMBW12-086. Marketed by Elders. EPR \$3.

TABLE 1 Suggested minimum levels of wheat disease resistance for the southern region.

Annual rainfall	Rust Stem	Rust Stripe	Rust Leaf	Yellow leaf spot	Septoria tritici
Low < 350 mm	MSS	MS	MS	MSS	S
Medium 300-550 mm	MS	MRMS	MS	MSS	MS
High * > 500 mm	MR	MR	MR	MSS	MS

TABLE 2 Wheat variety agronomic guide.

	Maximum Quality Southern Zone	Rainfall			Screenings	Maturity	Height	Coleoptile length	Lodging	Sprouting	Head type		Soil tolerance	
		Low <400mm	Med 4-500mm	High >500mm							Colour	Awn	Boron	Acid
BREAD WHEAT														
Axe	AH	✓			MR	E	M-S	S	MR	SVS	W	A	I	I
Beckom	AH	✓	✓	✓	MRMS	M	S	M	MRMS	MSS	W	A	MT	MT
Bolac	AH		✓	✓	S	M-L	M	M	MR	S	W	A	I	I
Condo	AH	✓	✓		R	E	MT	M	MS	S	W	A	I	MT
Coolah	APW		✓	✓	MR	M-L	MT	M	MRMS		W	A	I	MT
Corack	APW	✓	✓		R	E-M	S	MS	MR	S	W	A	I	T
Correll	AH	✓	✓		MS	M	M	ML	MS	SVS	W	A	MT	MT
Cosmick	AH	✓	✓		MS	E-M	M	L	MRMS	S-SVSp	W	A		
Cutlass	APW	✓	✓		MRMS	M-L	MT	ML	MRMS	S	W	A	MT	MT
Derrimut	AH	✓	✓		MS	E-M	MS	MS	MRMS	S	W	A	MT	
DS Darwin	AH		✓	✓	MR	M	M		MR	SVSp	W	A		
DS Pascal	APW			✓		M-L	M		MR	MRp	W	A		
EGA Gregory	APW*		✓	✓	MR	M-L	T	M	MS	S	W	A		MT
EGA Wedgetail	APW*			✓	MR	M-L (+W)	M	MS	MR	S	W	A	I	MT
Elmore CL Plus	AH		✓		MS	M	M	M	MRMS	S	W	A	I	I
Emu Rock	AH	✓	✓		R	E	S	M	R	S	W	A		
Estoc	APW	✓	✓			M-L	M	ML	MR	MRMS	W	A	MT	MT
Forrest	APW		✓	✓	MR	L	M	S-M		S	W	A		
Grenade CL Plus	AH		✓		MR	EM	M	ML		S	W	A	MT	MT
Hatchet CL Plus	AH	✓			MR	E	S	S		SVS	W	A	MI	MT
Kiora	AH		✓	✓	MS	M-L	M	M	MR	S	W	A	MI	MI
Kord CL Plus	AH	✓	✓		MR	M	M	S		SVS	W	A	MT	MT
LRPB Arrow	AH	✓	✓	✓	MR	M	S	M	MR	S	W	A	I	MT-MI
LRPB Cobra	AH	✓	✓	✓	MRMS	E-M	S	M	MR	SVS	W	A	I	MT
LRPB Flanker	AH		✓	✓	MR	M-L	T	M	MS	S	W	A	I	MT-MI
LRPB Gauntlet	APW		✓	✓	MR	M-L	SM	M	MS	S	W	A	I	MT
LRPB Kittyhawk	AH		✓	✓	MR	M-L (+W)	M	MS	MR	S	W	A	I	MT-MI
LRPB Lancer	AH		✓	✓	MR	M-L	S	M	MR	S	W	A	I	MI-I
LRPB Lincoln	AH	✓	✓	✓	MR	M	M	MS	MS	SVS	W	A	I	MT
LRPB Phantom	AH		✓	✓	MR	M-L	MT	MS	MS	MSS	W	A	MT	MT
LRPB Scout	AH	✓	✓	✓	MR	M	M	ML	MRMS	MS	W	A	MI	MT
LRPB Trojan	APW		✓	✓	MR	ML	M	M	MR	MSS	W	A	MT	MT-MI
Mace	AH	✓	✓		MR	E	M	MS	MR	S	W	A	MT	MT
Scepter	AH	✓	✓		MR	E-M	M	MS	MR	S	W	A	MT	MT
Shield	AH	✓	✓		MR	EM	M	S		S	W	A	I	MT
Sunlamb	ASW		✓	✓	MR	L	M	M	MR	MSp	W	AL	I	MI
Suntop	AH	✓	✓	✓	MS	M	MT	M	MR	SVS	W	A	I	MT
Wallup	AH		✓		MR	M	M	MS	MR	S	W	A	I	I
Yitpi	AH	✓	✓		MR	M	T	ML	MS	MS	W	A	MT	MT
BISCUIT WHEAT														
LRPB Gazelle	ASFT		✓	✓	MRMS	M-L	M		MR	S	W	A	I	MT
LRPB Impala	ASFT	✓	✓	✓	MR	E-M	ML		MS	MSS	W	A	I	MT
DURUM														
Caparoi	ADR		✓			M	S-M	S-M	MR	M				I
DBA Aurora	ADR		✓	✓	R	M	M		MR	MR	W	A	MT	
Hyperno	ADR		✓			M	M		MR	MR	W	A	I	
Tjilkuri	ADR				MS	M	M			S	W/B	A	T	
WID802	ADR				MS	E-M				MR				

TABLE 2, cont. next page

(CONTINUED) TABLE 2 Wheat variety agronomic guide.

	Maximum Quality Southern Zone	Rainfall			Screenings	Maturity	Height	Coleoptile length	Lodging	Sprouting	Head type		Soil tolerance	
		Low <400mm	Med 4-500mm	High >500mm							Colour	Awn	Boron	Acid
FEED WHEAT														
Beaufort	Feed		✓	✓		ML	M		MR-MS	MR	R	AL		MT
Manning	Feed			✓		L (+W)				MSSp	W	AL		
Naparoo	Feed			✓		L (+W)				Sp	W	A		
Preston	Feed			✓		L	S		MR	Sp		A		
SF Adagio	Feed		✓	✓		M-L (+W)				Rp	R	A		
SF Ovalo	Feed			✓		L (+W)				Rp	R	AL		
SF Scenario	Feed			✓		L (+W)				Rp	R	AL		
SQP Revenue	Feed			✓		L (+W)	S			Rp	R	AL		
Tenfour	Feed	✓	✓	✓	MR	E	M	M	R	Sp	W	A		MT

Maturity: E = early, M = mid, L = late (+W) = Winter wheat

Height: S = short, M = medium, T = tall

Coleoptile length: S = short, M = medium, L = long

Soil tolerance; I = intolerant, T = tolerant

Head Colour; W = white, B = black, R = red

Head type; A = awned, AL = awnless

Screening, lodging & sprouting resistance - see key used in Table 3

TABLE 3 Wheat variety disease rating guide.

	Rust			Yellow Leaf Spot	<i>Septoria tritici</i>	CCN Res	Pratylenchus		Crown Rot	Common Root rot	Black Tip (black point)	Flag Smut
	Stem	Stripe	Leaf				<i>P. neglectus</i> resistance	<i>P. thornei</i> resistance				
BREAD WHEAT												
Axe	MS	RMR	SVS	S	SVS	S	MSS	MS	S	MSS	S	S
Beckom	MRMS	MRMS	MSS	MSS	SVS	R	MSS	MS	S	MSS	-	MR
Bolac	MRMS	RMR	S	S	MSS	S	MSS	MRMS	S	MS	MSS	RMR
Condo	RMR	MSS	S	MS	S	MR	S	MRMS	S	MSS	MS	S
Coolah	RMR	RMR	MR	MSS	MSS	S	MSS	MRMS	MSS	S	S	Rp
Corack	MR	MS	SVS	MR#	S	RMR	MSS	S	S	MS	S	S
Correll	MRMS	MRMS	MSS	SVS	MSS	MR	MSS	S	S	MS	MS	R
Cosmick	MS	MSS	SVS	MRMS	SVS	S	MSS	MSS	S	MSS	MRMS	SVS
Cutlass	R	MS	R	MSS	MSS	MR	MS	MSS	S	MS	-	MRMS
Derrimut	MR	MSS	MSS	S	S	R	MSS	S	MSS	S	MSS	RMR
DS Darwin	MRMS	MR	S	S	SVS	MS	MSS	S	S	MSS	MR	MR
DS Pascal	MSS	RMR	MS	MRMS	MSS	S	MSS	S	MSSp	MS	-	SVS
EGA Gregory	MR	MR	MR	S	S	S	MSS	MSS	S	MSS	MSS	MSS
EGA Wedgetail	MRMS	MS	MS	MSS	MSS	S	S	S	S	-	MS	-
Elmore CL Plus	MR	MRMS	RMR	S	MSS	S	S	MSS	S	S	MS	S
Emu Rock	MRMS	MRMS	S	MRMS	SVS	S	MSS	S	MS	MSS	MS	MS
Estoc	MR	MRMS	MSS	S	S	MR	S	S	MSS	MRMS	MS	MRMS
Forrest	RMR	RMR	MSS	MRMS	MS	S	S	SVS	SVS	MS	MR	MR
Grenade CL Plus	MR	MRMS	S	S	S	MR	MSS	S	S	MRMS	MS	MR
Hatchet CL Plus	MS	MRMS	SVS	S	SVS	MR	MS	MSS	S	MS	-	RMR
Kiora	RMR	RMR	MRMS	MSS	S	MSS	MSS	MRMS	S	MS	MS	MRMS
Kord CL Plus	MR	MRMS	MS	MSS	S	MR	MSS	MS	S	MRMS	MRMS	MR
LRPB Arrow	S	S	SVS	MRMS	S	MS	MRMS	MRMS	S	MS	-	MSS
LRPB Cobra	RMR	MSS	MR	MRMS	MSS	MS	MSS	MSS	S	MSS	MSS	S
LRPB Flanker	RMR	RMR	MR	MSS	MSS	S	S	MS	S	MSS	MS	R
LRPB Gauntlet	RMR	MRMS	MSS	MS	MSS	MRMS	S	MR	MSS	MSS	MSS	MS
LRPB Kittyhawk	MRMS	RMR	MRMS	MRMS	MSS	S	MSS	S	-	S	-	MR
LRPB Lancer	R	MR	RMR	MS	MSS	S	S	MS	MSS	S	MS	MSS
LRPB Lincoln	MR	RMR	S	MSS	S	S	MSS	SVS	SVS	MS	MR	RMR
LRPB Phantom	MS	MR	S	SVS	SVS	MS	S	S	MSS	MSS	MRMS	MRMS
LRPB Scout	MR	MS	MS	SVS	S	R	S	MS	S	S	S	MR
LRPB Trojan	MRMS	MR	MRMS	MSS	MSS	MS	MSS	MSS	MS	MS	MRMS	SVS
Mace	MR	SVS	MSS	MRMS	SVS	MS	MS	MS	S	MRMS	MS	S
Scepter	MR	MSS	MSS	MRMS	S	MRMS	S	MSS	S	MS	-	MSS
Shield	RMR	MR	R	MSS	S	MRMS	MSS	MSS	S	MRMS	MS	S
Sunlamb	R	S	MRMS	MRMS	MRMS	MR	MS	MS	MSSp	MS	MS	SVS
Suntop	MR	MRMS	MRMS	MSS	S	S	MSS	MRMS	MSS	MS	MS	R
Wallup	MRMS	MRMS	SVS	MSS	S	MR	MRMS	MRMS	S	MS	MSS	SVS
Yitpi	S	MRMS	S	SVS	MSS	MR	MSS	S	S	MS	MS	MR
BISCUIT WHEAT												
LRPB Gazelle	MR	MR	MR	S	MSS	MSS	S	S	S	MSS	S	S
Impala	RMR	MR	SVS	MSS	SVS	MSS	S	S	S	MSS	MRMS	SVS
DURUM WHEAT												
Caparoi	RMR	MR	RMR	MR	RMR	MS	MSS	MR	VS	MRMS	MSS	R
DBA Aurora	RMR	RMR	RMR	MR	MR	MSS	MRMS	RMR	VS	MRMS	MS	R
Hyperno	RMR	MR	RMR	MR	MRMS	MS	MS	RMR	SVS	MRMS	MS	R
Tjilkuri	MR	MR	RMR	MRMS	MRMS	MS	MRMS	MR	VS	MS	MSS	R
WID802	RMR	MR	RMR	MRMS	MRMS	MS	MS	MS	VS	MS	MS	R

TABLE 2, cont. next page

(CONTINUED) TABLE 3 Wheat variety disease rating guide.

	Rust			Yellow Leaf Spot	Septoria tritici	CCN Res	Pratylenchus		Crown Rot	Common Root rot	Black Tip (black point)	Flag Smut
	Stem	Stripe	Leaf				<i>P. neglectus</i> resistance	<i>P. thornei</i> resistance				
FEED WHEAT												
Beaufort	SVS	RMR	MSS	MRMS	MSS	S	MS	MS	S	MSS	MRMS	R
Manning	MR	RMR	MS	MRMS	MRMS	S	MSS	S	VS	SVS	MRMS	R
Naparoo	RMR	R	S	MS	MS	-	SVS	SVS	S	S	-	VS
Preston	SVS	RMR	SVS	S	MSS	S	MSS	MSS	S	MS	MRMS	S
SF Adagio	SVS	RMR	S	MRMS	MRMS	S	MS	MS	SVS	MS	MR	MS
SF Ovalo	SVS	R	MSS	MR	MR	S	MSS	MS	-	MS	MR	MRMS
SF Scenario	MSS	R	S	MS	MRMS	S	MSS	MS	SVSp	MS	MRMS	RMR
SQP Revenue	RMR	R	VS	MS	MSS	S	MSS	MSS	S	SVS	MS	S
TenFour	S	SVS	MSS	MRMS	SVS	MS	MSS	MS	S	MS	-	RMR

Varieties marked may be more susceptible if alternative strains are present.

Resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.

TABLE 4 Wheat time of sowing guide.

This table is a guide only and has been compiled from observations of departmental agronomists and plant breeders.

MALLEE	April				May				June				July			
Cutlass, DS Darwin, Estoc, LRPB Phantom, LRPB Trojan, Tenfour, Yitpi			>	X	X	X	X	X	<							
Beckom, Corack, Correll, Cosmick, Derrimut, Elmore CL Plus, Grenade CL Plus, Janz, Kord CL Plus, LRPB Arrow, LRPB Scout, Mace, Peake, Scepter, Shield, Suntop				>	X	X	X	X	X	<	<					
Axe, Condo, Emu Rock, Hatchet CL Plus, Tenfour, Ventura, Wyalkatchem				>	>	X	X	X	X	X	<	<				
WIMMERA	April				May				June				July			
Bolac, Kiora, Tenfour			>	X	X	X	<									
Coolah, Cutlass, DS Darwin, Estoc, LRPB Gazelle, LRPB Phantom, LRPB Trojan, Yitpi, Durum varieties				>	X	X	X	X	<							
Beckom, Corack, Cosmick, Correll, Derrimut, Elmore CL Plus, Frame, Grenade CL Plus, Janz, Kord CL Plus, LRPB Arrow, LRPB Cobra, LRPB Impala, LRPB Lincoln, LRPB Scout, Mace, Peake, Scepter, Shield, Suntop, Wallup, Wyalkatchem					>	X	X	X	X	<	<					
Axe, Condo, Emu Rock, Hatchet CL Plus, Tenfour						>	X	X	X	X	<	<	<	<	<	
NORTH CENTRAL	April				May				June				July			
Bolac, Kiora, LRPB Lancer, Tenfour,			>	X	X	X	<									
Coolah, Cutlass, Cosmick, DS Darwin, EGA Gregory, Estoc, LRPB Flanker, LRPB Gauntlet, LRPB Phantom, LRPB Trojan, Yitpi				>	X	X	X	X	X	<	<					
Beckom, Corack, Correll, Derrimut, Elmore CL Plus, Grenade CL Plus, Janz, Kord CL Plus, LRPB Cobra, LRPB Impala, LRPB Arrow, LRPB Lincoln, LRPB Scout, Mace, Peake, Scepter, Shield, Suntop, Ventura, Wallup, Wyalkatchem						>	X	X	X	X	<	<				
Axe, Condo, Emu Rock, Hatchet CL Plus, Tenfour							>	X	X	X	X	X	X	<		
NORTH EAST	April				May				June				July			
MacKellar, Manning (Mar-Apr), SQP Revenue, Sunlamb, Tenfour	X	X	X	<												
EGA Wedgetail, Forrest, LRPB Kittyhawk	>	X	X	X	X	X	X	<								
Bolac, DS Pascal, Kiora, LRPB Lancer,			>	X	X	X	<									
Coolah, Cutlass, DS Darwin, EGA Gregory, Estoc, LRPB Flanker, LRPB Gauntlet, LRPB Phantom, LRPB Trojan, Yitpi				>	X	X	X	X	<	<						
Beckom, Corack, Cosmick, Elmore CL Plus, Grenade CL Plus, Janz, LRPB Arrow, LRPB Cobra, LRPB Impala, LRPB Lincoln, LRPB Scout, Mace, Scepter, Shield, Suntop, Ventura, Wyalkatchem					>	X	X	X	X	<						
Condo, Emu Rock, Hatchet CL Plus, Tenfour						>	X	X	X	X	<					
SOUTH WEST	April				May				June				July			
Frelon, MacKellar, Manning (Mar-Apr), Naparoo, SQP Revenue, Sunlamb (early April), Tenfour	X	X	X	X	X	X	X	<	<							
EGA Wedgetail, Forrest, LRPB Kittyhawk	>	X	X	X	X	X	X	X	<							
Beaufort, Bolac, Coolah, DS Pascal, Kiora, Preston,				>	X	X	X	X	<							
LRPB Arrow, Beckom, Derrimut, LRPB Phantom, LRPB Trojan, Tenfour				>	>	X	X	X	X	<	<					

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 5 Victorian wheat varieties - Domestic Flours Millers Assessment.

Interpretation provided by David Hogan, Quality Operations Manager for Laucke Flour Mills.

HARD WHEAT VARIETY	Preferred grade	Max class grade	End product category		Comment	
			Plant bakery	Artisan breads		
Axe	AH	AH	1	1	Very poor water absorption, strong dough characteristics and long mix time.	
Beckom	AH	AH	2	2	Some interest. Marginal long mix time & tough dough.	
Bolac	AH	AH	2	2	Marginal AH - strong dough characteristics.	
Condo	AH	AH	1	2	Marginal strong dough & mix time. Possible specialist application.	
Coolah	APW	AH	2	2	Acceptable for Domestic mills. Acceptable water absorption, marginal long mix requirement & strong dough resistance, acceptable bake performance.	
Corack	APW	APW	2	1	Acceptable APW quality. Suit domestic mills.	
Correll	AH	AH	3	1	Acceptable AH quality.	
Cosmick	AH	AH	3	2	Acceptable AH for Domestic market.	
Cutlass	APW	APW	3	1	Suit Domestic application. Good WA & acceptable bake.	
Derrimut	AH	AH	3	1	Appears acceptable as AH quality to suit plant bakery.	
DS Darwin	AH	AH	2	1	Limited data available. High water absorption may suit domestic mills as blend.	
DS Pascal	APW	APW	2	1	Limited data available. Potentially limited domestic interest.	
EGA Gregory	APW*	APW*	2	1	Limited data, but indicate suitable for domestic APW.	
EGA Wedgetail	APW*	APW*	1	2	Over strong APW. Long mix requirement. Appears to suit specialist segregation.	
Elmore CL Plus	AH	AH	3	1	Good water absorption & acceptable bake performance. Acceptable AH quality.	
Emu rock	AH	AH	3	2	Acceptable AH. Marginal long mix requirement.	
Estoc	APW	APW	2	1	Marginal APW quality. Some interest from domestic mills.	
Forrest	APW	APW	2	1	Acceptable APW quality for Domestic market.	
Grenade CL Plus	AH	AH	2	2	Marginal strong. Limited domestic interest.	
Hatchet CL Plus	AH	AH	2	2	Some domestic interest. Marginal strong dough.	
Kiora	AH	AH	2	2	Marginally strong dough. Some interest from Domestic market.	
Kord CL Plus	AH	AH	3	1	Appears suitable for domestic mills.	
LRPB Arrow	AH	AH	2	2	Acceptable for Domestic mills. Low water absorption and marginal extensibility. Good (short) mix time, good bake performance.	
LRPB Cobra	AH	AH	3	1	Appears acceptable. Some concerns over low viscosity and high yellow pigment.	
LRPB Flanker	AH	AH	2	2	Some domestic interest. Marginal strong dough.	
LRPB Gauntlet	APW	APW	3	1	Appears acceptable. Good dough & bakery results.	
LRPB Kittyhawk	AH	AH	2	2	Acceptable for Domestic Mills. Good water absorption and strong doughs. Acceptable bake performance.	
LRPB Lancer	AH	AH	2	1	Acceptable APW. Good water absorption & bake volume, but marginal long mix time.	
LRPB Lincoln	AH	AH	2	1	Appears to have limited suitability as domestic AH.	
LRPB Phantom	AH	AH	3	1	Appears to suit domestic mills.	
LRPB Scout	AH	AH	2	1	Suitable AH, marginal long mix time.	
LRPB Trojan	APW	APW	2	1	Some interest from domestic mills. Marginal water absorption, long mix time but good bake volume.	
Mace	AH	AH	3	1	Suitable as domestic AH.	
Scepter	AH	AH	2	1	Suit Domestic application. Acceptable AH quality.	
Shield	AH	AH	3	1	Marginal strong. Expect some domestic interest.	
Sunlamb	ASW	ASW	2	1	Limited interest. Poor extraction but acceptable rapid bake.	
Suntop	AH	AH	2	2	Strong AH. Good water absorption, but marginally long mix time.	
Wallup	AH	AH	1	2	Long mix requirement. Appears to suit specialist segregation. Limited interest from domestic millers.	
Yitpi	AH	AH	3	2	Acceptable AH quality.	
SOFT OR NOODLE WHEAT VARIETY	Preferred grade	Max class grade	End product category			Comment
			Biscuit	Cake	Hot plate goods	
LRPB Gazelle	Soft	SF1	3	2	1	Acceptable Biscuit quality
LRPB Impala	Soft	SF1	3	2	1	Acceptable Biscuit quality

On the quality scale, a rating of 3 is preferred for a particular varietal end-use, 3 preferred, 2 suitable, 1 not suitable.

TABLE 6 Wheat disease guide.

Disease	Organism	Symptoms	Occurrence	Inoculum source	Control
FOLIAR					
Leaf rust	<i>Puccinia triticina</i>	Small orange-brown powdery pustules on leaf.	Develops in spring. Favoured by mild (15°C–22°C) moist weather.	Airborne spores from living wheat plants.	Resistant varieties, control volunteer summer-autumn wheat. Seed dressings and foliar fungicides.
Stem rust	<i>Puccinia graminis</i> f. sp. <i>tritici</i>	Red-brown, powdery, oblong pustules with tattered torn edges on leaf and stem.	Can develop from mid spring into summer. Favoured by warm (15–30°C) humid conditions.	Airborne spores from living plants (wheat, barley, durum and triticale).	Resistant varieties, control volunteer summer-autumn wheat and barley. Foliar fungicides.
Stripe rust	<i>Puccinia striiformis</i> f. sp. <i>tritici</i>	Yellow powdery pustules often in stripes on leaves.	Can develop throughout the growing season. Favoured by cool (8–15°C), moist weather.	Airborne spores from living wheat and barley grass plants.	Resistant varieties, fungicides (seed, fertiliser and foliar), control volunteer summer-autumn wheat.
Septoria nodorum blotch (Glume blotch)	<i>Stagonospora nodorum</i>	Leaf lesions with minute black spots, leaf death. Can infect the head.	More common in early sown crops and in wet springs	Initially airborne spores released from stubble, and then spread by rain splashed spores within crop.	Resistant varieties, foliar fungicides, seed treatments, stubble removal.
Septoria tritici blotch	<i>Zymoseptoria tritici</i>	Leaf lesions with minute black spots, leaf death.	More common in early sown crops and in wet springs.	Initially airborne spores released from stubble, and then spread by rain splashed spores within crop.	Resistant varieties, foliar fungicides, seed treatments, stubble removal.
Yellow spot	<i>Pyrenophora tritici-repentis</i>	Leaf lesions often with yellow border, leaf death.	More severe in close rotations, when wheat is sown into wheat stubble.	Ascospores from stubble infect plants. Then secondary spread is by airborne spores in spring.	Stubble removal, crop rotation, foliar fungicides, resistant varieties.
BYDV	Barley yellow dwarf virus	Yellowing, dwarfing of infected plants, interveinal chlorosis, reduced seed set.	Most common in perennial grass pastures and in early sown crops.	A virus transmitted by aphids from infected grasses and cereals.	Resistant varieties, seed treatments and/or insecticide treatments to control aphids
GRAIN					
Bunt	<i>Tilletia laevis</i> <i>T. tritici</i>	Seed contains a black, foul smelling mass of spores. Affected grain is not accepted at silos.	Potentially region wide.	Spores on seed coat infect seedling before it emerges.	Seed applied fungicide.
Flag smut	<i>Urocystis agropyri</i>	Stunted plants with black, powdery streaks in leaves.	Most likely in crops sown early in warm soils.	Soil and seedborne spores.	Resistant varieties, seed-applied fungicide.
Loose smut	<i>Ustilago tritici</i>	Black powdery heads on diseased plants.	Region wide.	Infected seed is the predominant source.	Seed-applied fungicide.
ROOT/CROWN					
Common root rot	<i>Bipolaris sorokiniana</i>	Browning of the roots, sub-crown internode and the stem base. Brown spots on leaves. White heads and pinched grain.	Scattered through crop.	Soil borne on grass and cereal residues. Also as spores in the soil.	Crop rotation, one year free from hosts.
Crown rot	<i>Fusarium pseudograminearum</i> , <i>F. culmorum</i>	Browning of stem bases, crown and sometimes roots. White heads and pinched grain.	More severe following a wet winter and dry spring, especially on heavy soils which are poorly drained	Soil borne on grass and cereal residues.	Crop rotation. Avoid highly susceptible varieties, especially durum wheat.
Cereal cyst nematode (CCN)	<i>Heterodera avenae</i>	Yellow, stunted plants with knotted roots, often in patches.	Light soils and well-structured clays where cereals are common.	Present in most soils in the southern region of Australia.	Resistant varieties, two year break from susceptible cereals and grasses, in particular wild oats.
Rhizoctonia bare patch	<i>Rhizoctonia solani</i> (AG 8)	Patches of stunted plants with yellow-red erect leaves. Spear tipped roots.	Associated with reduced tillage and poor weed control in autumn. Discouraged by soils with high organic matter.	Fungus carries over in organic matter in the soil. Wide host range.	Pre-cropping weed control, chemical fallow, cultivation, modified sowing equipment. Group B herbicides may increase severity on some soil types. Read the label.
Root lesion nematode	<i>Pratylenchus thornei</i> and <i>Pratylenchus neglectus</i>	Reduced tillering, ill thrift; a lack of root branching and lesions on roots.	Favoured by wheat in rotation with chickpea, medic and vetch.	Survive as dormant nematodes in the soil.	Crop rotation using resistant crops and resistant varieties.
Take-all	<i>Gaeumannomyces graminis</i> var. <i>tritici</i>	Blackening of roots, stem bases and crown. Plant stunting with white heads and pinched grain.	Favoured by a wet spring with a dry finish.	Soil borne on grass hosts and cereal residues.	Crop rotation, at least one year free of hosts (cereals and grasses, especially barley grass). Fungicide applied to seed or fertiliser.

This table has been developed from information in the publications Wallwork H (2000) (Ed) Cereal Root and Crown Diseases (Grains Research and Development Corporation, SARDI) and Wallwork H (2000) (Ed) Cereal Leaf and Stem Diseases (Grains Research and Development Corporation, SARDI).

TABLE 7 Mallee and Wimmera wheat (main season). Long term predicted yield expressed as a percentage of mean yield.

Year	Mallee						Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		1.59	1.73	2.38	1.38	3.87		2.90	3.58	2.81	1.29	6.69
	No. trials	5	8	8	6	5	No. trials	5	4	1	3	5
AGT Katana	13	104	103	103	112	100	1	104	100	103	113	100
Axe	32	99	98	96	111	91	18	103	94	93	108	93
Beckom	27	109	110	113	113	112	13	105	107	113	118	108
Bolac							4	92	91	88	77	97
Bremer	8	106	106	103	95	88	1	104	103	102	110	94
Buchanan	6	91	87	90	82	103	3	90	91	93	77	98
Catalina	13	97	94	100	98	110	9	96	91	95	96	100
Chief CL Plus	13	110	102	100	105	90	6	101	101	113	117	94
Clearfield Janz	5	88	88	95	85	114	5	91	91	88	75	103
Condo	13	98	97	92	104	87	9	100	98	98	101	93
Corack	32	109	111	104	123	92	18	110	110	111	124	101
Correll	26	101	99	104	93	104	18	99	93	96	102	97
Cosmick	27	107	108	111	109	110	13	104	106	108	113	107
Cutlass	11	104	105	111	89	109	8	101	100	101	104	103
Dart	13	96	97	94	104	94	10	100	97	94	98	96
Derrimut	32	101	99	104	99	107	18	99	96	99	102	101
DS Darwin	5	94	96	92	98	96	8	98	100	94	89	100
Elmore CL Plus	24	99	96	103	88	106	18	96	92	96	96	98
Emu Rock	32	106	106	105	125	101	18	107	103	106	121	101
Espada	5	106	103	105	105	98	5	103	97	103	114	96
Estoc	32	102	101	104	94	102	18	100	98	99	101	99
Frame	5	96	93	93	81	91	5	95	95	94	87	93
Gladius	32	99	99	100	101	100	18	100	97	97	101	98
Grenade CL Plus	32	102	100	102	104	98	18	101	95	97	108	95
Harper	32	103	100	107	91	106	18	99	95	99	104	99
Hatchet CL Plus	27	99	99	98	112	95	13	103	96	95	107	96
Hydra	8	108	111	114	108	112	4	105	109	110	114	109
Impala							18	100	94	94	101	97
Impress CL Plus	5	92	85	75	91	71	5	93	94	94	83	85
Justica CL Plus	32	100	97	102	95	106	18	97	93	97	100	98
Kord CL Plus	27	104	101	104	102	96	13	102	93	97	113	93
LRPB Arrow	11	108	107	105	112	102	8	104	109	114	114	105
LRPB Cobra	32	93	98	92	100	102	18	98	110	102	82	109
LRPB Flanker							8	95	97	91	82	89
LRPB Gauntlet	5	91	87	88	76	87	9	92	88	85	80	88
LRPB Lancer							5	90	91	89	73	98
LRPB Lincoln	5	91	87	86	85	95	17	91	94	94	77	96
LRPB Merlin	5	89	86	84	83	93	5	91	93	91	74	95
LRPB Phantom	32	95	96	100	83	105	18	96	95	91	86	100
LRPB Scout	32	97	101	102	102	111	18	100	104	100	93	108
LRPB Spitfire	5	91	89	90	88	98	5	93	93	90	81	96
LRPB Trojan	32	102	108	109	94	110	18	102	110	105	97	110
Mace	32	110	110	107	120	96	18	108	107	111	125	100
Magenta	18	101	99	107	91	111	18	97	94	98	100	101
Scepter	11	115	116	116	127	108	8	111	111	118	133	107
Shield	32	108	103	109	111	107	18	102	94	106	120	98
Tenfour							8	110	117	112	114	111
Wallup	5	97	96	92	99	93	18	98	100	98	93	98
Wyalkatchem	32	104	102	99	106	96	18	101	103	108	107	100
Yitpi	27	98	97	102	83	102	13	97	93	93	94	96
Young	5	93	94	96	111	111	5	97	97	97	91	106

TABLE 8 North Central and North East wheat (main season). Long term predicted yield expressed as a percentage of mean yield.

Year	North Central						North East					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		3.53	2.88	3.65	1.44	7.32		3.72	4.21	5.78	3.60	6.80
	No. trials	2	3	2	2	2	No. trials	3	3	3	4	4
Axe	11	96	97	96	102	88	15	93	101	90	96	85
Barham	11	102	93	96	96	98	15	102	89	97	89	101
Beaufort							2	104	98	111	100	116
Beckom	9	107	111	108	105	107	14	107	110	110	111	108
Bolac							4	103	99	100	98	99
Buchanan	2	106	104	106	92	110	4	109	102	112	102	115
Chara	5	94	95	100	86	96	8	96	100	101	97	97
Chief CL Plus	2	104	102	105	95	97	2	104	104	105	100	100
Clearfield Janz	2	92	91	92	96	97	3	93	91	92	92	95
Cobalt	6	106	111	108	101	107	8	106	111	111	109	108
Condo	11	103	106	104	106	100	17	101	108	102	105	98
Coolah	2	103	100	106	89	99	5	106	102	109	99	105
Corack	11	102	107	100	115	101	17	99	106	97	108	97
Correll	11	105	101	99	103	99	15	102	100	97	96	98
Cosmick	9	104	107	104	104	105	13	103	106	104	105	105
Cutlass	4	103	106	105	98	105	8	104	106	108	105	106
Dart	5	97	94	93	109	91	6	95	94	88	96	89
Derrimut	11	99	99	97	103	100	17	98	97	96	98	98
DS Darwin	6	94	97	97	101	98	17	95	99	96	101	96
DS Newton	4	91	93	94	94	98	10	92	94	94	95	96
DS Pascal	4	87	90	93	88	102	14	90	91	96	95	100
EGA Gregory	10	103	99	103	87	96	16	104	102	104	94	99
Elmore CL Plus	11	101	99	100	97	99	16	102	98	101	97	101
Emu Rock	11	98	101	97	112	98	15	95	101	93	104	93
Espada	4	101	103	102	99	104	6	101	103	103	103	103
Estoc	11	100	101	98	106	102	15	99	99	97	102	100
Frame	2	94	94	95	97	98	2	94	95	94	96	96
Gascoigne	9	97	99	100	98	99	12	98	100	100	101	99
Gazelle	5	95	94	96	94	101	8	97	94	98	96	102
GBA Ruby	2	93	92	95	94	94	1	93	95	94	94	93
Gladius	11	95	97	94	106	97	16	93	97	91	99	93
Grenade CL Plus	11	99	96	93	111	96	15	97	93	90	96	94
Harper	11	101	100	99	102	101	15	101	99	99	98	101
Hatchet CL Plus	9	89	97	92	109	93	3	86	100	86	102	84
Hydra	3	112	112	108	106	111	3	112	108	111	107	114
Impala	11	105	102	100	107	103	16	105	98	100	100	104
Janz	2	94	95	97	96	96	1	95	97	96	98	95
Justica CL Plus	11	96	97	94	105	99	15	94	96	92	98	95
Kord CL Plus	9	101	100	97	109	96	12	98	99	93	99	94
Livingston	2	97	96	96	103	92	5	96	97	92	97	91
LRPB Arrow	4	98	102	98	109	102	8	97	101	97	105	99
LRPB Cobra	11	99	105	105	97	106	17	101	107	108	108	106
LRPB Flanker	6	105	103	107	87	101	9	107	104	110	98	106
LRPB Gauntlet	11	98	96	100	94	91	16	98	100	98	96	93
LRPB Lancer	2	92	89	97	83	93	13	95	93	98	91	96
LRPB Lincoln	11	90	96	94	99	101	15	90	98	93	100	95
LRPB Merlin	10	98	95	95	107	93	15	96	95	91	96	92
LRPB Phantom	11	98	101	101	97	104	16	100	101	103	102	104
LRPB Reliant	6	110	102	104	99	93	9	108	103	102	94	97
LRPB Scout	11	102	104	102	102	105	17	103	102	104	104	105

TABLE 8, cont. next page

(CONTINUED) TABLE 8 North Central and North East wheat (main season). Long term predicted yield expressed as a percentage of mean yield.

Year	North Central						North East					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		3.53	2.88	3.65	1.44	7.32		3.72	4.21	5.78	3.60	6.80
	No. trials	2	3	2	2	2	No. trials	3	3	3	4	4
LRPB Spitfire	10	95	95	95	103	94	16	94	95	91	97	91
LRPB Trojan	11	105	108	106	101	107	17	105	107	108	106	107
LRPB Viking	6	102	102	106	84	101	11	105	105	109	97	105
Mace	9	100	105	100	111	99	14	97	105	97	106	95
Magenta	11	100	102	99	101	102	16	99	102	98	99	100
Orion	5	94	93	97	88	106	6	98	92	102	96	107
QAL2000	10	99	96	100	90	104	13	102	95	104	96	107
Scepter	4	109	112	104	121	108	8	105	107	102	112	105
Sentinel	2	95	94	98	90	95	3	96	97	98	95	95
SF Adagio							1	99	100	100	101	103
SF Ovalo							3	93	83	90	79	90
SF Scenario							1	95	97	92	97	92
Shield	1	102	102	100	103	100	1	101	101	99	101	99
Steel	4	94	97	98	100	90	8	92	103	93	100	87
Sunmate	6	104	100	101	106	100	10	104	97	101	101	102
Suntop	10	107	102	104	103	96	17	107	101	104	101	101
Tenfour	4	111	115	109	114	106						
Wallup	11	96	98	100	95	96	17	96	102	99	100	95
Yitpi	9	98	97	95	99	98	12	96	97	94	94	95
Young	2	98	96	99	94	89	3	97	101	95	94	89

TABLE 9 North East and South West wheat (early season). Long term predicted yield expressed as a percentage of mean yield.

Year	North East					South west					
		2012	2013	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		4.88	6.31	6.20	5.37		4.08	4.84	5.32	4.29	7.20
	No. trials	1	1	1	1	No. trials	3	3	3	3	2
Beaufort	2	104	115	113	103	14	106	118	111	108	117
Beckom	2	111	108	108	106	5	108	111	110	119	106
Bolac	4	98	103	102	99	14	101	104	102	104	101
Chara	4	102	99	102	100	14	100	102	104	107	101
Cobalt						6	112	110	105		103
Coolah	2	111	111	105	108	8	110	109	104	109	105
Cutlass	2	112	117	105	110	5	115	112	101	109	103
DS Darwin	4	103	92	95	100	9	97	92	98	97	95
DS Newton	2	97	89	97	96	9	94	92	100	106	93
DS Pascal	3	96	109	107	99	11	104	111	105	112	104
EGA Gregory	4	102	97	95	101	9	100	94	95	97	94
EGA Wedgetail	4	93	106	100	99	14	102	103	96	94	100
Elmore CL Plus	4	102	104	101	102	14	104	103	100	104	99
Estoc	2	104	98	102	101	6	100	101	104	110	100
Forrest	3	91	109	102	98	11	104	107	96	102	98
Gascoigne	3	101	92	95	99	12	97	92	97	100	94
Gazelle	4	94	110	103	99	14	106	109	98	109	97
Kellalac	3	89	97	96	95	12	95	96	94	93	95
Kiora	4	104	110	108	103	14	106	112	107	113	107
LRPB Flanker	2	109	106	98	107						
LRPB Gauntlet	4	100	86	95	97						
LRPB Kittyhawk	2	91	100	101	95	5	96	102	100	97	102
LRPB Lancer	4	101	94	100	98	3	96	97	104	105	100
LRPB Phantom	3	107	107	102	106	11	108	105	102	109	100
LRPB Scout	1	109	106	103	106	14	107	105	103	108	102
LRPB Trojan	3	116	111	108	110	11	111	112	109	115	109
LRPB Viking	4	106	103	100	104	11	105	101	100	103	99
Manning	3	93	109	111	96	11	98	113	109	99	117
Mansfield	3	79	86	92	87	9	83	86	90	75	94
Naparoo						6	93	93	87	75	95
Preston	4	106	110	108	104	14	107	112	108	111	109
QAL2000	4	102	112	105	104	14	109	111	102	112	101
RGT Accroc	2	108	136	118	111	8	121	132	109	108	123
Sentinel	2	104	105	103	103	6	105	105	103	108	102
SF Adagio	2	100	121	112	103	11	109	120	107	100	117
SF Ovalo	3	92	110	101	99	8	100	104	95	78	108
SF Scenario	2	86	104	102	93	11	94	104	99	84	108
SQP Revenue	4	97	116	109	101	14	103	114	104	87	118
Steel						6	91	84	94		89
Sunlamb	2	95	99	99	97						
Suntop	2	108	100	103	104						
Tenfour						3	98	96	100		97

TABLE 10 South West wheat (long season). Long term predicted yield expressed as a percentage of mean yield.

Year		2013	2014	2015	2016
Mean yield (t/ha)		5.04	5.77	3.81	7.20
	No. trials	2	2	2	2
Beaufort	4	113	108	124	124
Bolac	6	103	99	105	105
Bowie	2	99	100	97	99
Brennan	6	103	99	90	98
DS Darwin	2	82	101	98	99
DS Newton	2	95	104	113	106
DS Pascal	8	98	103	119	105
EGA Wedgetail	8	102	99	95	95
Einstein	6	85	103	70	110
Forrest	8	110	99	107	92
Gazelle	4	112	97	99	103
LRPB Lancer	4	87	93	101	86
LRPB Trojan	6	111	104	127	111
LRPB Viking	4	98	94	108	86
Mackellar	8	107	107	102	108
Manning	8	117	112	96	123
Mansfield	4	91	101	71	105
Mitch	2	93	97	98	95
Naparoo	8	98	83	69	64
RGT Accroc	4	103	114	114	128
Rudd	8	113	102	92	100
Sentinel	2	103	107	121	110
SF Adagio	4	100	111	110	117
SF Ovalo	4	81	104	78	110
SF Scenario	4	103	103	91	107
SQP Revenue	8	127	110	108	122
Steel	4	72	76	69	47
Sunlamb	6	73	93	75	91
Tennant	8	99	94	63	99
Wylah	8	117	97	101	87

TABLE 11 2016 Mallee (main season) wheat yield (as a percentage of site mean yield).

	Birchip	Hopetoun	Quambatook	Ultima
Sowing Date*	1/5/16	1/5/16	18/5/16	17/5/16
Axe	94	83	95	87
Beckom	120	118	108	114
Chief CL Plus	76	102	92	84
Corack	95	88	98	83
Correll	106	101	96	106
Cosmick	100	124	108	101
Cutlass	109	102	103	121
Derrimut	103	115	98	103
DS Darwin	99	98	94	94
Elmore CL Plus	111	110	98	105
Emu Rock	99	99	100	98
Estoc	115	99	98	104
Gladius	84	96	93	98
Grenade CL Plus	99	94	96	92
Harper	112	111	102	105
Hatchet CL Plus	87	81	96	95
Impress CL Plus	48	57	83	77
Justica CL Plus	106	102	94	100
Kord CL Plus	94	92	99	97
LRPB Arrow	95	107	102	98
LRPB Cobra	118	96	101	100
LRPB Phantom	109	104	97	110
LRPB Scout	109	122	104	104
LRPB Trojan	122	91	110	113
Mace	101	98	99	91
Magenta	115	117	102	112
Scepter	107	112	111	100
Shield	101	120	99	99
Wyalkatchem	80	97	98	93
Yitpi	109	99	97	112
Site Mean (t/ha)	3.50	3.59	4.84	3.74
CV (%)	7	3	3	2
LSD (%)	12	5	5	4

*Sowing Date/ Germination Rain Date

TABLE 12 2016 Mallee (main season) wheat protein (%) and screenings. Screenings expressed as % of grain below a 2 mm sieve.

	Protein (%)				Screenings (%)			
	Birchip	Hopetoun	Quambatook	Ultima	Birchip	Hopetoun	Quambatook	Ultima
Axe	11.0	12.6	9.7	12.4	0.8	1.5	2.0	2.1
Beckom	7.8	9.2	7.3	9.9	0.9	0.8	2.5	2.6
Chief CL Plus	9.9	10.7	8.8	11.7	0.8	0.9	1.3	1.7
Corack	9.8	12.2	8.6	11.7	0.6	0.6	2.0	1.5
Correll	9.2	10.5	8.3	10.8	2.2	1.7	4.1	5.1
Cosmick	7.4	8.9	8.1	10.1	2.6	1.8	2.7	2.8
Cutlass	7.9	9.7	8.3	9.9	1.6	1.2	2.1	2.4
Derrimut	8.5	9.8	9.2	10.5	1.9	1.3	4.0	4.2
DS Darwin	8.2	10.7	7.7	10.9	1.0	0.9	3.4	3.7
Elmore CL Plus	8.2	9.9	8.5	10.6	1.0	1.3	2.7	3.6
Emu Rock	9.7	11.0	9.0	10.7	5.3	2.2	4.2	4.3
Estoc	8.6	11.4	9.3	11.9	1.2	0.7	2.2	2.3
Gladius	9.9	11.8	9.4	11.0	1.2	1.3	2.6	3.4
Grenade CL Plus	9.0	11.1	8.4	10.9	0.8	1.1	2.0	2.9
Harper	8.2	10.4	8.6	10.7	3.2	1.7	3.2	3.6
Hatchet CL Plus	10.4	11.9	10.2	11.7	1.1	1.1	1.7	1.9
Impress CL Plus	13.4	14.0	10.0	12.4	0.9	1.4	3.0	3.5
Justica CL Plus	8.2	11.3	9.2	10.7	1.2	1.1	2.0	2.4
Kord CL Plus	9.6	11.2	8.5	10.6	3.4	1.8	4.0	4.3
LRPB Arrow	9.4	11.0	8.3	10.8	0.6	0.4	1.4	1.9
LRPB Cobra	8.9	11.5	7.9	11.1	1.0	1.2	3.6	3.5
LRPB Phantom	7.3	9.5	8.7	9.0	2.4	1.1	3.4	2.3
LRPB Scout	8.5	9.8	8.5	10.7	1.5	1.0	2.9	5.3
LRPB Trojan	7.6	11.2	8.4	10.3	0.7	0.5	1.7	2.2
Mace	9.0	11.1	8.5	11.4	0.9	0.7	2.7	1.9
Magenta	7.6	9.6	7.7	10.1	2.3	1.9	3.0	3.9
Scepter	7.8	10.1	7.4	10.3	1.8	1.2	3.0	4.5
Shield	9.1	10.2	9.3	11.1	3.4	1.8	4.1	5.1
Wyalkatchem	9.1	12.0	9.0	11.2	0.5	0.4	1.5	1.8
Yitpi	7.9	10.2	8.7	10.5	2.8	2.3	3.7	5.5

TABLE 13 2016 North Central and North East (main season) wheat yield (as a percentage of site mean yield).

	North Central		North East			
	Diggora	Mitiamao	Dookie	Numurkah	Wunghnu	Yarrowonga
Sowing Date*	7/5/16	20/5/16	17/5/16	28/4/16	4/5/16	18/5/16
Axe	85	89	86	76	80	79
Barham	102	100	102	91	101	108
Beckom	104	113	108	103	111	104
Cobalt	108	106	105	118	102	103
Condo	101	100	98	104	98	100
Coolah	101	93	105	105	104	107
Corack	97	103	99	85	93	85
Correll	95	102	96	92	95	102
Cosmick	104	108	103	110	103	110
Cutlass	103	105	104	109	104	107
Derrimut	101	108	94	91	97	101
DS Darwin	94	99	99	96	95	95
DS Faraday	-	-	96	-	99	102
DS Pascal	97	105	99	102	106	83
EGA Gregory	95	94	101	95	95	103
Elmore CL Plus	103	99	97	97	102	99
Emu Rock	98	104	99	94	97	82
Estoc	100	103	99	106	104	92
Gladius	101	97	96	97	90	81
Grenade CL Plus	92	95	98	97	96	93
Harper	97	103	98	95	104	99
Hatchet CL Plus	88	98	-	-	-	-
Impala	107	96	107	104	104	94
Jade	99	98	-	-	-	-
Justica CL Plus	98	97	96	99	98	91
Kord CL Plus	99	95	93	98	93	89
Lancer	-	-	96	99	98	90
LRPB Arrow	101	103	99	96	104	94
LRPB Cobra	107	108	107	105	110	101
LRPB Flanker	102	99	107	99	106	105
LRPB Gauntlet	94	88	94	94	96	94
LRPB Lincoln	99	99	99	92	93	103
LRPB Merlin	96	95	98	90	91	85
LRPB Phantom	103	102	106	100	102	104
LRPB Reliant	93	89	96	-	98	101
LRPB Scout	105	104	104	102	104	115
LRPB Spitfire	98	93	96	90	89	92
LRPB Trojan	106	105	104	113	110	108
LRPB Viking	100	102	100	105	103	108
Mace	98	99	98	86	92	90
Magenta	101	99	102	100	94	107
QAL2000	104	101	104	106	105	115
Scepter	108	111	104	105	105	110
Steel	84	87	91	75	88	94
Suntop	98	90	99	100	104	108
Tenfour	106	106	-	-	-	-
Wallup	97	95	95	90	94	91
Yitpi	94	100	95	100	90	106
Site Mean (t/ha)	8.65	5.98	7.13	8.04	6.65	5.45
CV (%)	3	3	2	4	4	6
LSD (%)	4	6	4	7	6	10

*Sowing Date/ Germination Rain Date

TABLE 14 2016 North Central and North East (main season) wheat protein (%).

	North Central		North East			
	Diggora	Mitiamo	Dookie	Numurkah	Wunghnu	Yarrawonga
Axe	12.2	12.1	10.8	14.5	12.6	11.0
Barham	9.7	10.3	8.2	12.1	9.4	9.4
Beckom	9.4	10.4	8.0	11.3	9.3	9.5
Cobalt	9.6	10.3	8.8	12.1	10.2	9.3
Condo	10.1	10.4	9.4	12.8	10.5	10.3
Coolah	10.1	10.8	8.9	11.7	9.3	9.0
Corack	11.0	11.6	9.5	13.5	11.6	9.8
Correll	10.5	10.5	9.4	12.8	10.3	9.9
Cosmick	9.9	10.5	8.0	12.4	9.6	9.5
Cutlass	10.2	10.4	8.2	12.1	9.9	9.4
Derrimut	10.0	10.2	8.7	12.3	10.0	9.6
DS Darwin	10.7	11.0	9.1	13.1	10.7	9.6
DS Faraday	-	-	8.9	-	9.6	9.2
DS Pascal	10.2	10.6	9.1	12.0	9.8	9.5
EGA Gregory	10.0	11.0	8.7	12.5	9.5	9.3
Elmore CL Plus	10.2	11.0	8.8	12.1	9.8	9.2
Emu Rock	10.8	11.3	9.1	13.0	11.0	10.2
Estoc	10.5	11.4	8.8	12.8	10.8	9.5
Gladius	10.6	11.7	9.2	13.4	10.4	10.0
Grenade CL Plus	10.9	10.9	8.6	12.5	10.1	10.1
Harper	10.3	10.9	8.8	12.7	9.9	9.7
Hatchet CL Plus	11.7	11.5	-	-	-	-
Impala	9.5	10.4	8.2	11.7	9.4	9.4
Jade	10.7	11.7	-	-	-	-
Justica CL Plus	11.0	11.3	8.7	12.4	10.1	9.8
Kord CL Plus	10.7	11.7	9.3	13.4	10.9	10.2
Lancer	-	-	9.6	12.7	10.6	10.2
LRPB Arrow	10.7	11.1	8.7	13.4	10.3	10.8
LRPB Cobra	10.1	10.8	8.5	13.3	10.5	10.0
LRPB Flanker	9.8	10.8	8.6	12.1	9.6	9.3
LRPB Gauntlet	10.4	11.0	8.8	12.0	10.0	9.8
LRPB Lincoln	10.1	10.2	8.5	12.2	9.7	9.4
LRPB Merlin	11.1	12.2	9.1	13.7	11.3	10.7
LRPB Phantom	9.8	10.4	8.8	10.9	9.3	8.9
LRPB Reliant	10.4	10.7	8.7	-	10.3	9.7
LRPB Scout	9.9	10.6	9.0	12.0	10.2	9.8
LRPB Spitfire	11.2	12.3	9.1	13.0	11.4	10.2
LRPB Trojan	9.7	10.3	8.8	11.3	9.2	9.6
LRPB Viking	10.1	10.4	8.9	12.1	10.2	9.2
Mace	10.6	11.0	8.8	13.3	10.4	10.2
Magenta	10.3	10.9	8.4	12.5	9.5	9.7
QAL2000	9.4	10.0	8.3	11.1	9.2	8.4
Scepter	9.7	10.4	8.7	12.3	10.0	9.2
Steel	11.7	11.7	9.7	13.6	11.4	11.1
Suntop	10.5	10.8	9.1	12.1	10.6	10.5
Tenfour	10.1	10.4	-	-	-	-
Wallup	11.3	11.1	9.5	12.1	11.0	10.2
Yitpi	10.0	10.4	8.8	12.2	10.7	9.4

TABLE 15 2016 North Central and North East (main season) wheat screenings (as % of grain below a 2 mm sieve).

	North Central		North East			
	Diggora	Mitiamo	Dookie	Numurkah	Wunghnu	Yarrawonga
Axe	1.5	4.3	1.5	0.4	0.3	4.5
Barham	2.7	3.0	3.1	0.7	0.7	3.5
Beckom	4.0	2.4	2.3	0.6	0.6	3.8
Cobalt	2.5	2.9	3.5	0.3	0.9	3.9
Condo	3.0	3.9	5.0	0.3	0.7	6.5
Coolah	2.2	2.1	6.1	0.5	0.8	3.3
Corack	1.4	2.0	1.7	0.2	0.6	4.1
Correll	2.6	3.1	3.0	0.7	12.0	6.6
Cosmick	3.4	3.1	3.1	0.6	0.9	4.9
Cutlass	1.8	2.2	2.8	0.5	0.9	2.1
Derrimut	2.9	2.6	3.3	1.1	1.3	4.6
DS Darwin	3.2	2.4	6.0	0.4	0.4	4.8
DS Faraday	-	-	2.7	-	0.9	4.1
DS Pascal	1.7	2.6	2.5	0.4	0.7	4.1
EGA Gregory	2.3	1.6	2.8	0.6	0.7	3.9
Elmore CL Plus	2.9	0.3	3.4	0.9	1.1	4.4
Emu Rock	4.2	3.5	5.3	0.8	1.1	6.7
Estoc	1.9	2.8	2.5	0.8	0.7	4.7
Gladius	2.3	2.7	2.3	0.4	0.5	4.3
Grenade CL Plus	1.5	3.1	3.1	0.4	0.6	3.0
Harper	4.7	3.4	3.8	2.4	1.6	5.3
Hatchet CL Plus	1.5	0.3	-	-	-	-
Impala	2.3	1.3	1.7	0.7	1.2	3.5
Jade	3.2	2.8	-	-	-	-
Justica CL Plus	1.5	2.1	1.8	0.6	0.4	3.6
Kord CL Plus	3.0	2.9	4.4	0.4	0.5	7.2
Lancer	-	-	2.5	0.5	0.7	4.0
LRPB Arrow	1.0	2.2	2.0	0.1	0.5	1.9
LRPB Cobra	2.0	2.1	2.6	0.3	8.2	5.1
LRPB Flanker	2.4	1.7	1.8	0.3	0.8	3.1
LRPB Gauntlet	3.2	2.8	3.8	0.5	0.8	6.0
LRPB Lincoln	4.4	3.1	3.7	0.8	1.0	6.5
LRPB Merlin	3.0	2.9	3.5	0.7	0.8	5.4
LRPB Phantom	3.0	2.6	2.8	0.9	1.2	4.8
LRPB Reliant	3.6	3.4	4.5	-	1.2	4.9
LRPB Scout	3.2	3.4	3.0	0.6	0.9	4.5
LRPB Spitfire	3.2	3.6	2.7	0.9	1.0	5.6
LRPB Trojan	2.0	2.4	1.7	0.3	0.7	3.5
LRPB Viking	1.8	1.8	2.0	0.4	1.1	2.4
Mace	1.7	1.9	2.3	0.5	0.5	3.3
Magenta	3.4	2.9	4.2	1.0	1.4	5.2
QAL2000	2.5	2.6	2.9	0.7	0.7	3.6
Scepter	3.3	3.5	3.5	0.5	0.8	4.0
Steel	1.8	1.8	2.1	0.4	0.7	3.2
Suntop	2.2	3.5	2.9	1.2	1.1	3.4
Tenfour	2.2	2.9	-	-	-	-
Wallup	0.8	1.3	1.0	0.9	0.3	1.4
Yitpi	4.2	3.9	3.7	0.8	1.3	5.3

TABLE 16 2016 Wimmera (main season) wheat yield (as a percentage of site mean yield).

	Brim	Corack	Horsham	Kaniva	Minyip
Sowing Date*	13/5/16	8/5/16	24/5/16	19/5/16	20/5/16
Axe	91	83	90	88	92
Barham	104	92	88	89	91
Beckom	115	92	90	106	104
Chief CL Plus	93	94	103	88	92
Corack	87	97	108	104	101
Correll	102	94	-	87	-
Cosmick	106	104	105	109	108
Cutlass	109	96	95	96	100
Derrimut	107	92	98	99	100
DS Darwin	97	97	99	103	95
Elmore CL Plus	105	92	92	97	99
Emu Rock	105	104	96	101	98
Estoc	98	98	98	100	98
Gladius	104	100	98	101	95
Grenade CL Plus	100	97	89	93	89
Harper	105	101	87	96	97
Hatchet CL Plus	95	90	99	96	100
Impala	102	93	97	88	101
Impress CL Plus	76	70	88	86	87
Jade	103	93	93	94	93
Justica CL Plus	107	100	88	99	-
Kord CL Plus	95	95	92	94	95
LRPB Arrow	100	99	107	101	110
LRPB Cobra	99	111	106	109	108
LRPB Flanker	76	93	96	85	96
LRPB Lincoln	99	92	95	90	95
LRPB Phantom	102	101	95	92	99
LRPB Scout	109	104	106	106	106
LRPB Trojan	102	106	107	110	113
LRPB Viking	87	94	96	96	100
Mace	99	107	103	99	101
Magenta	110	101	94	98	101
Scepter	104	115	107	110	109
Shield	104	89	88	95	92
Tenfour	104	108	117	112	108
Wallup	88	96	98	97	99
Wyalkatchem	95	98	102	96	102
Yitpi	104	90	96	92	98
Site Mean (t/ha)	4.30	7.05	6.99	8.33	6.74
CV (%)	4	3	3	3	4
LSD (%)	7	5	5	5	6

*Sowing Date/ Germination Rain Date

TABLE 17 Wimmera (main season) wheat protein (%) and screenings. Screenings expressed as % of grain below a 2 mm sieve.

	Protein (%)					Screenings (%)				
	Brim	Corack	Horsham	Kaniva	Minyip	Brim	Corack	Horsham	Kaniva	Minyip
Axe	11.7	13.0	11.5	11.9	10.5	2.2	0.6	6.8	0.9	0.8
Barham	9.5	11.6	10.1	11.3	9.2	5.0	2.4	8.7	2.7	1.7
Beckom	10.1	13.1	10.6	10.4	9.2	2.7	0.9	10.5	1.6	1.3
Chief CL Plus	11.5	12.4	11.2	12.5	11.2	2.4	1.3	7.4	1.2	0.7
Corack	12.3	12.2	10.8	11.4	10.1	2.1	0.6	5.8	1.6	0.3
Correll	10.7	11.4	-	12.4	-	4.2	1.5	-	2.0	-
Cosmick	9.9	11.8	9.9	11.1	9.5	3.4	1.2	7.0	1.7	2.0
Cutlass	9.8	12.8	10.0	11.3	9.1	5.1	0.9	7.5	1.9	1.0
Derrimut	10.7	11.9	10.1	11.1	9.7	4.7	1.4	9.7	2.6	1.3
DS Darwin	10.4	13.3	10.2	11.7	10.3	6.8	0.9	0.6	1.4	1.2
Elmore CL Plus	10.4	12.1	10.2	11.6	9.6	7.5	1.0	7.0	2.2	1.5
Emu Rock	11.0	11.9	11.0	11.7	9.7	4.7	1.6	10.9	3.0	1.7
Estoc	11.8	12.1	11.0	11.8	9.8	2.5	0.8	9.8	1.4	0.8
Gladius	11.2	12.4	11.2	12.4	9.8	3.5	1.3	6.2	1.3	2.0
Grenade CL Plus	11.1	13.3	11.1	11.6	10.5	3.2	1.1	7.4	1.3	0.9
Harper	10.6	13.1	10.5	11.2	9.3	7.4	1.2	9.4	3.0	2.0
Hatchet CL Plus	12.2	11.2	11.0	12.3	10.2	2.1	1.5	5.9	1.3	0.7
Impala	9.7	12.0	10.2	11.0	9.3	4.6	1.5	6.6	2.4	1.2
Impress CL Plus	13.7	12.5	12.8	13.6	12.4	3.5	0.8	9.7	1.4	0.9
Jade	11.2	11.9	11.3	12.1	10.3	6.6	0.9	8.4	1.8	1.5
Justica CL Plus	10.9	11.6	11.3	12.3	8.5	3.4	0.9	5.5	1.3	2.0
Kord CL Plus	11.7	11.6	10.8	11.9	9.6	5.2	1.3	9.0	2.0	1.1
LRPB Arrow	12.0	12.1	10.5	11.7	10.1	1.8	1.7	3.1	1.0	0.6
LRPB Cobra	11.1	12.0	10.3	11.3	9.3	3.3	1.6	7.8	1.5	0.9
LRPB Flanker	11.5	11.4	10.1	11.4	9.2	3.6	1.2	4.7	1.5	1.3
LRPB Lincoln	10.9	12.1	10.2	11.1	9.6	5.0	1.8	8.1	2.2	1.3
LRPB Phantom	10.2	12.2	10.2	11.3	8.9	4.4	1.1	6.8	3.6	1.1
LRPB Scout	11.0	11.5	10.5	11.0	9.1	5.4	3.3	6.5	2.4	0.9
LRPB Trojan	10.9	12.0	10.0	10.8	8.7	3.2	1.9	6.9	1.1	1.0
LRPB Viking	9.8	12.9	10.1	11.1	9.4	4.5	1.3	6.1	1.2	1.0
Mace	12.1	12.4	10.2	11.6	9.4	2.1	1.4	6.2	1.5	0.8
Magenta	10.2	11.6	11.0	11.9	9.2	6.6	1.6	8.9	2.3	0.7
Scepter	11.8	11.9	10.3	11.0	9.4	4.1	1.9	8.3	2.0	1.4
Shield	10.8	12.8	11.3	11.7	10.8	4.6	1.7	13.0	2.3	1.6
Tenfour	11.4	12.2	10.0	11.1	8.9	2.9	1.9	8.9	1.8	0.8
Wallup	12.5	11.2	10.8	11.9	10.1	2.0	1.4	3.7	2.0	0.6
Wyalkatchem	12.2	11.5	10.8	12.2	10.4	2.0	1.0	4.9	0.9	0.5
Yitpi	10.5	11.4	10.4	11.2	9.2	7.9	1.0	10.1	2.8	1.2

TABLE 18 2016 North East and South West (early season) wheat trials - yield, protein (%) and screenings. Yield expressed as a percentage of site mean yield. Screenings expressed as a percentage of grain below a 2 mm sieve.

Sowing Date*	Yield (%)				Protein (%)				Screenings (%)			
	North East	South West			North East	South West			North East	South West		
	Rutherglen 2/5/16	Hamilton 14/5/16	Inverleigh* 11/5/16	Streatham 21/5/16	Rutherglen	Hamilton	Inverleigh	Streatham	Rutherglen	Hamilton	Inverleigh	Streatham
Beaufort	-	115	114	114	-	8.7	11.1	8.8	-	1.0	4.7	5.0
Beckom	95	93	111	99	8.8	8.9	11.1	9.1	5.7	0.7	2.1	2.2
Bolac	100	99	100	99	9.4	9.1	11.1	8.9	5.6	0.9	2.6	2.3
Chara	103	87	84	92	9.2	9.2	12.7	9.5	3.5	0.5	1.9	1.5
Coolah	107	104	100	94	8.8	8.7	11.6	9.7	3.9	0.6	2.8	2.2
Cutlass	109	98	91	97	9.4	7.8	12.1	9.6	5.1	0.4	1.9	2.1
DS Darwin	94	-	-	-	9.7	-	-	-	3.8	-	-	-
DS Faraday	102	-	-	-	9.1	-	-	-	4.6	-	-	-
DS Pascal	95	105	102	102	10.0	9.1	11.7	9.2	3.4	0.3	2.2	1.5
EGA Gregory	89	-	-	-	8.6	-	-	-	5.0	-	-	-
EGA Wedgetail	91	92	94	93	9.5	9.4	12.2	9.2	4.0	0.5	1.7	1.4
Elmore CL Plus	98	96	83	93	9.0	9.1	12.2	9.9	5.5	1.2	4.9	2.9
Forrest	93	87	87	94	9.4	8.7	11.6	9.1	6.3	0.6	3.5	3.7
Gazelle	97	102	84	95	8.7	8.4	11.1	8.9	3.8	0.3	2.0	1.3
Kiora	102	94	91	95	8.5	8.5	11.6	9.1	6.5	0.8	1.9	1.2
LRPB Flanker	107	-	-	-	8.9	-	-	-	3.5	-	-	-
LRPB Gauntlet	87	-	-	-	9.6	-	-	-	3.5	-	-	-
LRPB Kittyhawk	93	92	89	89	8.8	9.6	11.9	9.3	6.0	0.7	3.7	2.9
LRPB Lancer	91	-	-	-	9.2	-	-	-	4.9	-	-	-
LRPB Phantom	98	98	90	95	10.3	8.8	10.8	8.8	4.8	0.6	2.4	2.9
LRPB Scout	-	89	104	94	-	9.5	11.7	9.5	-	0.6	4.4	3.2
LRPB Trojan	102	104	107	101	9.3	8.6	11.0	9.2	3.2	0.5	1.3	2.2
LRPB Viking	112	89	81	99	9.9	9.3	12.0	9.5	3.2	0.3	2.2	1.2
Manning	87	117	105	113	9.0	7.4	9.2	7.8	7.8	0.6	3.8	1.7
Preston	111	93	108	102	9.3	8.5	11.2	8.4	4.9	0.5	2.1	1.9
QAL2000	106	101	97	94	8.6	8.3	9.9	8.6	6.7	0.5	2.5	2.1
RGT Accroc	109	129	118	113	8.5	9.9	10.5	8.1	5.8	0.5	1.6	1.4
SF Adagio	105	103	118	111	8.9	8.0	11.2	8.6	6.3	0.8	2.4	2.2
SF Ovalo	103	-	-	-	9.1	-	-	-	7.8	-	-	-
SF Scenario	87	96	98	102	9.4	8.3	11.3	8.2	8.4	1.9	2.1	3.7
SQP Revenue	105	116	120	115	8.5	7.0	9.6	7.4	8.6	1.3	3.5	4.8
Sunlamb	84	-	-	-	10.2	-	-	-	5.9	-	-	-
Suntop	105	-	-	-	9.4	-	-	-	5.6	-	-	-
Site Mean (t/ha)	5.36	7.30	6.94	7.55								
CV (%)	6	4	7	4								
LSD (%)	11	6	12	6								

*Lime was surface applied at 2.5 t/ha on the 7/3/16 at Inverleigh.

South West: NVT protocols require all Harvest Width measurements to be entered as plot "centre to centre". This is slightly wider than the seeder width and accounts for the additional light, nutrients and moisture that plants have access too. A consistent approach is used for yield calculations across all NVT trials, but in HRZ trials with narrow row spacings, the edge row effect may be less evident. Mean yields may be slightly underestimated as a result of this, but the rankings and relative performance of each variety will not change.

TABLE 19 2016 South West (long season) wheat trials - yield, protein (%) and screenings.
Yield expressed as a percentage of site mean yield. Screenings expressed as a percentage of grain below a 2 mm sieve.

Sowing Date*	Yield (%)		Protein (%)		Screenings (%)	
	Hamilton 5/5/16	Streatham 27/4/16	Hamilton	Streatham	Hamilton	Streatham
Beaufort	125	123	7.9	9.1	0.6	3.2
Brennan	98	95	9.0	10.2	0.7	3.5
DS Pascal	104	107	9.9	9.1	0.1	3.1
EGA Wedgetail	90	93	9.8	9.8	0.2	0.9
Einstein	108	109	7.9	9.0	0.5	1.9
Forrest	93	91	8.7	9.4	0.4	3.2
LRPB Kittyhawk	90	85	9.6	11.0	0.2	2.0
Mackellar	106	106	8.1	9.0	1.0	3.6
Manning	123	120	7.0	8.0	0.3	2.4
Naparoo	59	70	9.3	8.4	0.3	2.1
RGT Accroc	129	122	7.8	8.2	0.2	1.0
Rudd	99	100	8.5	9.0	0.3	1.8
SF Adagio	115	118	8.5	9.4	0.4	1.3
SF Ovalo	107	111	8.6	9.2	1.4	3.5
SF Scenario	105	104	8.5	9.1	0.8	3.1
SQP Revenue	123	119	7.7	8.0	0.4	5.1
Steel	43	48	13.8	13.6	0.4	1.4
Sunlamb	89	92	10.5	10.0	0.6	2.0
Tennant	100	94	8.1	8.8	0.5	3.5
Trojan	111	104	9.9	10.5	0.2	0.9
Wylah	87	86	10.8	10.6	0.5	1.5
Site Mean (t/ha)	7.09	7.82				
CV (%)	4	5				
LSD (%)	6	9				

South West: NVT protocols require all Harvest Width measurements to be entered as plot "centre to centre". This is slightly wider than the seeder width and accounts for the additional light, nutrients and moisture that plants have access too. A consistent approach is used for yield calculations across all NVT trials, but in HRZ trials with narrow row spacings, the edge row effect may be less evident. Mean yields may be slightly underestimated as a result of this, but the rankings and relative performance of each variety will not change.

TABLE 20 Durum wheat - Kaniva, Wimmera. 2016 yield and long term yield expressed as a percentage of mean yield.
Protein (%), screenings (percentage of grain below a 2 mm sieve) and cracked grain (%).

Sowing Date*	2016				Long term predicted yield (%)		
	Yield (%) 19/5/16	Protein (%)	Screenings (%)	Cracked grain (%)	Year	2013	2014
					Mean yield (t/ha)	4.43	2.43
No. trials	1	1					
Caparoi*	50	16.0	4.6	-	2	99	94
DBA Lillaroi	93	12.1	5.4	25	-	-	-
DBA-Aurora	100	11.8	6.4	40	2	107	125
EGA Bellaroi	108	12.6	3.8	-	2	98	92
Hyperno	103	11.8	0.3	-	2	100	92
Saintly	99	11.5	4.9	-	2	102	114
Tjilkuri	89	12.8	5.8	45	2	104	104
WID802	106	12.5	5.2	20	2	103	107
Yawa	113	11.7	6.0	50	2	107	117
Site Mean (t/ha)	6.90						
CV (%)	4						
LSD (%)	7						

*Long term predicted yield - Use single site result with caution, Caparoi performance is unusual compared to other 2016 sites. There was insufficient data to predict long term yields for 2015 and 2016.

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BARLEY

REVIEW OF 2016

Season

The 2016 growing season was characterised by above average rainfall and mild temperatures across the majority of Victoria resulting in above average barley yields and good grain quality in most areas.

It was a long growing season due to sustained rainfall and mild temperatures. Lodging was an issue, especially in Compass due to continued rainfall and wind pressure on crops throughout spring, combined with high biomass. Generally frost was not an issue with only a small area in the Wimmera affected by frost in September.

Harvest was delayed by around 2 to 3 weeks due to wet and mild temperatures. The expected record harvest got underway in the northern Mallee in the last week of October, with a high number of deliveries seeing malt classification. Some concern about staining from the continued wet conditions affected areas of central Victoria.

Crops in the Mallee generally yielded between 2 and 2.5 t/ha with some crops achieving up to 4.5 t/ha. The exception were some crops in the northern Mallee which were impacted by a mid-November storm. Barley yields in other regions reached between 5 and 7 t/ha with some high nutrition and high rainfall zone crops achieving above this. Quality was good, with many achieving malt grades.

Prices in particular for feed grade barley were negatively affected by global oversupply accompanied by a reduction in demand domestically. Prices also decreased, for both feed and malt quality deliveries, as the high volume of grain began to be delivered to receival sites.

Disease and pest issues

The wet seasonal conditions favoured many foliar diseases in Victorian barley crops, with severe spot form of net blotch (SFNB) and scald common in most areas. Net form of net blotch (NFNB) impacted crops of Fairview in the South West and low levels of leaf rust were found late in the season in most areas.

SFNB and scald were most common in the Wimmera and Mallee, particularly in crops sown early into barley stubble. Scald and SFNB persisted throughout the season as wet conditions continued.

Barley leaf rust was observed across the Wimmera and Mallee during October and November due to the long growing season. However, the disease didn't develop sufficiently to cause any losses due to cool spring conditions.

Loose smut was detected at low levels in some barley crops of Hindmarsh, LaTrobe and Spartacus.

Russian wheat aphid (RWA) was a concern for barley growers in 2016. The exotic pest was first detected in South Australia in May

and subsequently confirmed present in Victoria. The pest is now considered to be present in Victoria and NSW and therefore an integrated approach to long term management should be adopted.

LOOKING FORWARD TO 2017

New varieties

Alestar is a new mid maturing feed variety, resistant to powdery mildew with good lodging tolerance. RGT Planet is a new early-late maturing feed variety, resistant to powdery mildew with elastic maturity, making it suitable for low to high rainfall regions.

Malt evaluation

At the time of publication applications to the Barley Australia malt evaluation process had been submitted for Alestar and RGT Planet. Acceptance into malt evaluation for these varieties, and the outcome of malt evaluation for SY Rattler will be updated on www.barleyaustralia.com.au in March 2017. Newly accredited malting varieties still need to gain market acceptance and growers are advised to consult with their marketer regarding the availability of segregation and pricing.

Barley Australia lists malting varieties that are preferred by its member marketing companies. These varieties are highlighted in the variety listings as "Malting barley (Preferred variety)". The level of demand for domestic and export markets in Victoria is shown in Table 3.

Disease and pest management

The green bridge will need to be managed in the lead up to the 2017 growing season to reduce inoculum levels and risk of losses due to disease, in particular leaf rust, insect pests and viruses.

Stubble-borne diseases will need to be managed due to carryover of inoculum on stubble from both 2015 and 2016 crops. There will be a significant level of SFNB and scald inoculum in many paddocks which will require proactive management. If diseased stubble is present, susceptible and very susceptible varieties should be avoided where possible. Growers will require a proactive fungicide management plan to maximise grain yields and quality.

The low levels of loose smut in Hindmarsh, LaTrobe and Spartacus in 2016 highlights that these varieties are very susceptible to loose smut. Growers should be cautious using infected seed for sowing in 2017. If retaining seed for sowing, growers should be sure to use an effective seed treatment, and check what treatment, if any, has been applied to new seed.

If there is potential for root disease issues, it is advisable to conduct a PreDicta B soil test prior to planting to avoid sowing cereals in high risk paddocks.

Russian wheat aphid

Controlling the green bridge will be key to controlling RWA in 2017 as the pest has a wide host range across numerous grass species. As with many pests and diseases, the green bridge acts as a harbour for RWA over the summer and autumn, particularly cereal volunteers, some pasture grasses and common grass weeds (including *Poa*, *Bromus*, *Hordeum*, *Lolium* and *Phalaris* spp.). Early infestations of RWA in 2016 were detected on volunteers rather than in crop, highlighting the importance of controlling the green bridge to minimise aphid population development.

Monitoring aphid populations closely and considering pest numbers before spraying will be important throughout the season in order to encourage the build-up of beneficial populations that naturally predate on the pest. Whilst economic thresholds are yet to be confirmed under Australian conditions, the current international economic threshold for spraying is when ≥ 20 per cent of plants are infested up to the start of tillering, or ≥ 10 per cent of plants are infested thereafter.

Prophylactic spraying of insecticides is strongly discouraged and growers should reconsider the need to spray where aphids are present in very low numbers. Where the risk of early RWA damage is high (early sowing, presence of volunteers, warmer environments, aphids present pre-planting) growers may consider use of permitted insecticide seed treatments to provide early control.

The GRDC will be releasing a publication entitled *Russian Wheat Aphid: Tactics for future control* to assist growers in managing RWA.

Frost

Frost susceptibility rankings are available on the NVT website in the format of relative frost values. These rankings are explained in more detail in the introductory chapter.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

- Crop Disease Au App
- NVT Long Term Yield Reports App

agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AG1160 Cereal disease guide

www.barleyaustralia.com.au

Information includes:

- List of preferred malting barley varieties
- Update status of malting barley evaluation each March

www.grdc.com.au/resources/grownotes

- GRDC GrowNotes Barley Southern Region

VARIETY DESCRIPTIONS

Varieties have been listed according to quality classification grade and in alphabetical order and not in order of preference.

Abbreviations used are:

([Ⓛ]) denotes Plant Breeders Rights apply

CCN = Cereal Cyst Nematode
 BYDV = Barley Yellow Dwarf Virus
 RLN = Root Lesion Nematode
 NFNB = Net Form of Net Blotch
 SFNB = Spot Form of Net Blotch

End Point Royalty (EPR) 2016-18 quoted \$/tonne ex-GST.

Malting barley (Preferred variety) – BAUDIN[Ⓛ]

A mid season maturing variety, Baudin is an alternative malting variety to Gairdner in 375-500 mm rainfall districts, but should not be grown in areas with greater than 500 mm due to leaf disease susceptibility. Scald SVS, SFNB MSS, NFNB MSS, powdery mildew VS and leaf rust VS. Compared to Gairdner, Baudin has superior grain plumpness in years with hot, dry spring conditions. The variety is a shorter plant type than Gairdner, less likely to lodge and has excellent head retention. Now outclassed by newer varieties due to disease susceptibility, Baudin's delivery options are limited. Released 2004. Free trade to WA. Seed available from Seednet outside WA. EPR \$3 malt, \$1 feed.

Malting barley (Preferred variety) – BULOKE[Ⓛ]

An early to mid season maturing variety best adapted to 325-450 mm rainfall districts. Moderately tall with moderately weak straw strength, similar to Gairdner, Buloke can be prone to significant head loss under unfavourable conditions post-maturation. Buloke has a similar level of tolerance to pre-harvest sprouting to Gairdner. Average grain plumpness is similar or slightly inferior to Baudin but superior to Gairdner. Scald S, SFNB S, NFNB MR, powdery mildew RMR and leaf rust S. Whilst Buloke yields well in Mallee environments; it should only be grown in CCN prone environments if the majority of other crops/varieties in the rotation are CCN resistant. In Victoria, Buloke is considered mid-season maturity, earlier than Gairdner, but later than Hindmarsh. Buloke has export malt quality similar to Baudin. Released 2005. Seed available from Seednet. EPR \$2.

Malting barley (Preferred variety) – COMMANDER[Ⓛ]

A mid maturing variety best suited to 375-500 mm rainfall districts, particularly the Wimmera Mallee. It is broadly adapted and is high yielding relative to other malting varieties under favourable spring conditions. Commander is inherently lower in grain protein content like Buloke and Scope. It has moderately weak straw and can lodge under either high yield environments or if unfavourable conditions occur between grain filling and harvest. Grain size is generally excellent compared to other varieties but it is prone to low test weights in some seasons. Commander is suitable for domestic, Chinese, and SE Asian brewing markets. Growers should consult their grain marketers regarding markets and availability of segregation for this variety. Scald VS, SFNB MSS and NFNB MS, powdery mildew MRMS# and leaf rust S. Released 2008. Seed available from Seednet. EPR \$3.80.

Malting barley – FAIRVIEW[Ⓛ]

A moderately late maturing variety best suited to 400-600 mm rainfall districts. Yields are similar to Gairdner and Commander in these districts. The grain plumpness of Fairview is superior to Gairdner. Scald VS, SFNB S, NFNB VS, powdery mildew R and leaf rust VS. Limited seed is only available under contract through GrainSearch, Geelong. Released 2008. Fairview has an export malt quality profile and is marketed via closed loop supply chain through Malteurop. EPR \$3.

Malting barley – FLINDERS[Ⓛ]

A moderately late maturing variety it is moderately short with stiff, strong straw and good head retention. It has high levels of grain plumpness and good test weights. Scald SVS, SFNB S, NFNB MR#, powdery mildew R and leaf rust MRMS. While not as high yielding as the earlier maturing LaTrobe or Compass when sown during May, the later maturity of Flinders provides growers with a higher yielding alternative to Baudin and Gairdner for earlier sowing opportunities or in the higher rainfall or irrigated environments. Developed by InterGrain. Released 2012, and accredited as malt in 2015. Free to trade. EPR \$3.80.

Malting barley (Preferred variety) – GAIRDNER

A moderately late maturing variety best suited to 400-600 mm rainfall districts. In lower rainfall districts Gairdner can yield well in seasons with favourable spring finishes, however not necessarily within malting specifications. Scald VS, SFNB S, NFNB MRMS, powdery mildew S and leaf rust MS. Gairdner is known for high screenings in a dry spring, with levels of grain plumpness generally being inferior to all other malting varieties. Gairdner is accepted by both domestic and export brewing markets. Released 1998. Free to trade. No EPR.

Malting barley – GRANGER[Ⓛ]

A mid to late maturing variety with strong straw, and good kernel plumpness and low screenings. Scald VS, SFNB SVS, NFNB MR#, powdery mildew R and leaf rust MS. Accredited as malting barley in 2013, export markets are yet to be established and growers are advised to consult with their grain marketer about segregation and pricing. Released 2013. Licenced by Nickerson's, seed available from Heritage Seeds. EPR \$2.95.

Malting barley (Preferred variety) – LATROBE[Ⓛ]

An early maturing variety for low to medium rainfall environments. A semi-dwarf plant type providing good lodging resistance and good head retention. The variety has a relatively short coleoptile and has relatively slow early growth if sown late or with poor nutrition. Good sprouting tolerance, excellent test weights and moderately good grain plumpness. Scald VS, SFNB SVS, NFNB MR, powdery mildew MRMS# and leaf rust MSS. Accredited as a malting variety in 2015, LaTrobe is currently undergoing market development with an expectation that segregation options will become more widely available for the 2017 season. Developed by InterGrain (IGB1101). Released 2014. Free to trade. EPR \$4.

Malting barley – NAVIGATOR[Ⓛ]

A mid to late maturing variety similar to Gairdner but offering higher yield potential, significantly improved physical grain quality and a good disease resistance profile with the exception of being very susceptible to leaf rust. Scald S, SFNB MRMS, NFNB MR#, powdery mildew R# and leaf rust VS. Navigator is an accredited malting variety primarily suited for use by the domestic brewing industry. Due to the current small market size for Navigator as a malting variety, growers should seek advice from their grain marketer regarding availability of segregation and pricing prior to sowing this variety and will be best suited to growers with freight advantage to local malt houses. Released 2011. Seed available from Seednet. EPR \$3.80

Malting barley (Preferred variety) – SCOPE CL[Ⓛ]

A tall, early to mid season maturing barley with moderate to high yield potential across a range of medium rainfall environments. Its disease resistance profile is very similar to Buloke with the main concern being susceptibility to some leaf rust strains. Scald SVS, SFNB MSS, NFNB MR, powdery mildew MR and leaf rust S. Scope shares the lodging, head loss, grain size and protein characteristics of Buloke. Scope is the only malting barley variety registered for the use of an appropriate imidazolinone herbicide. Accredited as malting barley in 2013, export markets are continuing to be established so growers are advised to consult with their grain marketer about segregation and pricing. Scope is expected to be accepted into those markets currently accepting Buloke. Released 2010. Seed is available from Seednet exclusively through re-sellers that have a current imidazolinone accreditation. EPR \$3.50.

Malting barley (Preferred variety) – WESTMINSTER[Ⓛ]

A mid to late maturing variety with medium to tall, stiff straw and good head retention. This variety continues to have the highest market demand of all malting barleys grown in Victoria and is an ideal fit into the higher rainfall areas in southern Victoria. Scald MRMS#, SFNB S, NFNB MR#, powdery mildew R and leaf rust MRMS. Accredited as malting barley in 2013, it's domestic demand is high and export markets are quickly being established. Growers are advised to consult with their grain marketer about segregation and pricing. Bred by Nickerson's, released 2009 and seed available from GrainSearch. EPR \$3.

NEW Feed barley – ALESTAR[Ⓛ]

Alester is a mid maturing variety, with maturity similar to Commander, suited to the medium to high rainfall regions. Elders suggest good straw strength, head retention, and test weight. Scald SVS, SFNB S, NFNB MRMS#, powdery mildew R and leaf rust MS. Bred by Elders and tested as FMBA11-2341. Seed available from Elders. EPR \$3.

Feed barley – FATHOM[Ⓛ]

An early maturing variety with broad adaption and consistently high yields in lower rainfall environments. It has very low screenings, similar to Maritime and a higher test weight than Fleet. Fathom has a long coleoptile and excellent early vigour, giving weed competitiveness and tolerance to deep planting and especially on sandy soils. Fathom is well suited to wider row spacings and is an alternative to Hindmarsh, particularly where more reliable establishment and improved early vigour are sought. Fathom is moderately tall, possesses good head loss tolerance but is prone to lodging in high yield environments. Scald MS, SFNB MR, NFNB MRMS#, powdery mildew MRMS and leaf rust MS. Released 2011. Seed available from Seednet. EPR \$2.

Feed barley – FLEET[Ⓛ]

Best suited to 325-400 mm rainfall regions as an alternative to Hindmarsh and Keel but now superseded by Fathom. Fleet has superior adaptation to deep sandy soils compared to Hindmarsh and Keel due to a relatively long coleoptile that makes Fleet more tolerant of deeper sowing. Scald SVS, SFNB MR, NFNB MRMS, powdery mildew MR and leaf rust MS. Some pathotypes of NFNB now show increased virulence on Fleet. Fleet has improved physical grain quality compared to Keel but has lower test weight than Hindmarsh. Fleet is highly prone to lodging but has good head retention. Released 2004. Seed available from Seednet. EPR \$1.50.

Feed / Food barley – HINDMARSH[Ⓛ]

An early maturing semi-dwarf variety with exceptional yield potential, especially in drier years. It is recommended for the 325-450 mm rainfall regions. Hindmarsh has a relatively short coleoptile and deep sowing should be avoided to maximise crop establishment and yield potential. Scald VS, SFNB VS, NFNB MR, powdery mildew MRMS# and leaf rust S. Hindmarsh is free threshing and has good resistance to head loss. Hindmarsh has a high test weight amongst feed varieties. It has a high demand as a Food Barley and is still sought after by the export malting markets at a price discount to other malting varieties. Released 2006. Seed available from Seednet. EPR \$1.50.

Feed barley – OXFORD

A feed variety best suited to medium to high rainfall regions (350-600 mm) and should not be planted after mid June. Under favourable spring conditions Oxford has very high yield potential. Scald SVS, SFNB SVS, NFNB S, powdery mildew R and leaf rust S. Bred by Nickerson's, released 2009. Seed available from Heritage Seeds. EPR \$2.50.

NEW Feed barley – RGT PLANET[Ⓛ]

RGT Planet is a mid flowering, early-late maturing variety, with elastic maturity making it suited from low to high rainfall regions. Seedforce suggest RGT Planet is high yielding with good straw strength, head retention, test weight and low screenings. Scald Sp, SFNB SVS, NFNB S, powdery mildew R and leaf rust MRMS. Bred by RGT Semences and tested as SFR85-014. Seed available from Seed Force. EPR \$4.

Feed barley – ROSALIND[Ⓛ]

A very broadly adapted mid maturing semi dwarf variety with good yield stability. Maturity is later than La Trobe, but earlier than Buloke. Rosalind has a similar time to flowering as La Trobe but has a much longer time to maturity. Good straw strength and head retention. Scald S, SFNB SVS, NFNB MR, powdery mildew MR# and leaf rust MR. Bred by InterGrain and tested as IGB1302. Released 2015. Seed available from Syngenta. EPR \$3.50.

VARIETIES CURRENTLY UNDERGOING MALT EVALUATION

Barley under evaluation – COMPASS[Ⓛ]

Compass is an early to mid-season maturing variety, undergoing Barley Australia malt accreditation with a decision expected in March 2018. It is closely related to Commander but is significantly higher yielding and earlier flowering with typical May sowing. Compared to Commander, Compass has improved NFNB resistance but inferior leaf rust resistance. Compass has relatively weak straw strength and is prone to lodging in high yielding environments. Compass has excellent physical grain quality with high retention and low screenings and moderate test weight. Scald SVS, SFNB MSS, NFNB MRMS, powdery mildew MRMS# and leaf rust VS. Bred by the University of Adelaide and tested as WI4593. Seed available from Seednet. EPR \$3.80.

Barley under evaluation – Spartacus CL[Ⓛ]

Spartacus is an early maturing, CCN resistant, IMI tolerant, semi-dwarf variety suited to the low to medium rainfall regions. It is undergoing Barley Australia malt accreditation with a decision expected in March 2018. It is agronomically similar to LaTrobe but has slightly improved straw strength and lodging resistance with good head retention and sprouting tolerance. Compared to Scope, it is much less itchy. It is registered for the use of an appropriate imidazolinone herbicide. Scald VS, SFNB SVS, NFNB MRMS, powdery mildew MRMS# and leaf rust MS. Seed available from Syngenta. EPR \$4.25

Barley under evaluation – SY RATTLER[Ⓛ]

SY Rattler is a late maturing variety recommended for the high rainfall, 450-600mm regions. Scald S, SFNB SVS, NFNB MR, powdery mildew R and leaf rust MR. SY Rattler is undergoing the second stage of malt and brewing evaluation with a decision expected in March 2017. Bred by Syngenta. Released in 2012. Seed available from GrainSearch. EPR \$3

TABLE 1 Barley time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April				May				June				July			
Flinders, Gairdner, GrangeR, Navigator, Oxford			>	X	X	<	<									
Alestar, Baudin, Buloke, Commander, Fathom, Scope			>	>	X	X	X	<	<							
Compass, Hindmarsh, Rosalind, LaTrobe, Spartacus, Fleet			>	>	X	X	X	X	X	<	<					
WIMMERA	April				May				June				July			
Flinders, Gairdner, GrangeR, Navigator, Oxford			>	X	X	<	<									
Alestar, Baudin, Buloke, Commander, Fathom, Scope			>	>	X	X	X	<	<							
Hindmarsh, LaTrobe, Rosalind, Spartacus, Compass, Fleet, Planet			>	>	X	X	X	X	X	<	<					
NORTH CENTRAL	April				May				June				July			
Flinders, Gairdner, GrangeR, Navigator, Oxford			>	X	X	<	<									
Alestar, Buloke, Commander, Fathom, Scope			>	>	X	X	X	<	<							
Compass, Hindmarsh, LaTrobe, Rosalind, Spartacus, Fleet, Planet			>	>	X	X	X	X	X	<	<					
NORTH EAST	April				May				June				July			
Flinders, Gairdner, GrangeR, Navigator, Oxford	>	>	X	X	X	X	<	<								
Baudin, Alestar, Buloke, Commander, Scope, Fathom			>	>	X	X	X	<	<							
Hindmarsh, LaTrobe, Rosalind, Spartacus, Compass, Fleet, Planet			>	>	X	X	X	X	X	<	<					
SOUTH WEST	April				May				June				July			
Flinders, Gairdner, GrangeR, Navigator, Oxford, Westminster	>	>	X	X	X	X	X	<	<							
Alestar, Commander, Baudin, Rosalind			>	>	X	X	X	X	X	X	<	<	<			

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 2 Barley variety disease reactions.

Variety	Leaf scald	Spot form Net Blotch	Net form Net Blotch	Powdery mildew	Leaf rust	CCN resistance	Root lesion nematode	
							<i>P. neglectus</i> resistance	<i>P. thornei</i> resistance
MALTING BARLEY								
Baudin	SVS	MSS	MSS	VS	VS	S	MSS	MSS
Buloke	S	S	MR	RMR	S	S	MRMS	MS
Commander	VS	MSS	MS	MRMS#	S	R	MRMS	MRMS
Fairview	VS	S	VS	R	VS	-	MRMS	MR
Flinders	SVS	S	MR#	R	MRMS	S	MRMS	MRMS
Gairdner	VS	S	MRMS	S	S	S	MRMS	MSS
GrangeR	VS	SVS	MR#	R	MS	R	MRMS	MRMS
LaTrobe	VS	SVS	MR	MRMS#	MSS	R	MRMS	MRMS
Navigator	S	MRMS	MR#	R#	VS	R	MRMS	MRMS
Scope	SVS	MSS	MR	MR	S	S	MRMS	MRMS
Westminster	MRMS#	S	MR	R	MRMS	-	MRMS	MS
FEED BARLEY								
Alestar	SVS	S	MRMS#	R	MS	-	MR	MR
Fathom	MS	MR	MRMS#	MRMS	MS	R	MRMS	MRMS
Fleet	SVS	MR	MRMS	MR	MS	R	MRMS	MRMS
Hindmarsh	VS	VS	MR	MRMS#	S	R	MRMS	MRMS
Oxford	SVS	SVS	S	R	MS	S	MR	MRMS
RGT Planet	Sp	SVS	S	R	MRMS	-	-	-
Rosalind	S	SVS	MR	MR#	MR	R	MS	MR
BARLEY UNDER MALT EVALUATION								
Compass	SVS	MSS	MRMS	MRMS#	VS	R	MRMS	MR
Spartacus CL	VS	SVS	MRMS	MRMS#	MS	R	MS	MRMS
SY Rattler	S	SVS	MR	R	MR	-	MR	MRMS

Varieties marked may be more susceptible if alternative strains are present.

Resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.

TABLE 3 Barley variety demand¹ for preferred malting varieties and agronomic guide.

Variety	Domestic brewing industries ²	Export brewing industries	Height	Maturity	Head loss	Plump grain rating	Lodging
MALTING BARLEY							
Baudin		medium	S	M	MR	7	R
Buloke		medium	MT	ME	MS	6	M
Commander	medium	medium	M	ME	M	8	M
Fairview			MS	ML	MR		R
Flinders			MS	ML	R	7	R
Gairdner	medium	medium	M	ML	MR	5	R
GrangeR			M	ML	MR		R
LaTrobe		medium	S-MS	E	MR	6	R-MR
Navigator			S-MS	ML	MR	7	R
Scope		medium	MT	ME	MS	6	M
Westminster	high	high	MT	ML	R		R
FEED BARLEY							
Alestar			M	M	R	8	R
Fathom			MT	VE	MR	9	MR
Fleet			M	ME	MR	8	M
Hindmarsh			S-MS	VE	MR	6	R-MR
Oxford			S-MS	L	R	6	R
RGT Planet			M	EML	R	8	R
Rosalind			MS	M	R	6-7	R
BARLEY UNDER MALT EVALUATION							
Compass		2018	M	ME	M	9	M
Spartacus CL		2018	MS	E	R	6-7	R
SY Rattler		2017	M	M	-	-	MR

¹ Demand in Victoria is determined by marketing companies who are members of Barley Australia.

² Domestic demand by Australian malting companies: malt produced may be used by the domestic brewing industry or exported.

Height; T = tall, MT = moderately tall, M = medium, MS = moderately short, S = short

Maturity; VE = very early, E = early, ME = moderately early, M = mid season, L = late

Head loss and lodging: see Table 2 for key.

Plump grain: relative scale: 1=small or unreliable grain size; 9=large or reliable grain size

TABLE 4 Barley disease guide summary.

Disease	Organism	Symptoms	Occurrence	Inoculum source	Control
FOLIAR					
Scald	<i>Rhynchosporium secalis</i>	Water soaked areas on leaves. Lesions appear grey/green then bleached with brown margins.	Years with frequent rain, and early sown crops.	Residues of barley and barley grass. Can be seed borne. Spores spread by rain splash.	Resistant varieties, clean seed, manage barley and barley grass debris. Seed and foliar fungicides
Net blotch spot form	<i>Pyrenophora teres f. maculata</i>	Dark brown spots to 10 mm, with yellow margins.	Infection from stubble especially in wet autumn conditions.	Barley and barley grass stubble, also airborne spores from infected crops.	Control barley grass and manage barley stubble. Avoid very susceptible varieties. Foliar fungicides.
Net blotch net form	<i>Pyrenophora teres f. teres</i>	Small brown spots that develop into dark brown streaks on leaf blades that have net like appearance.	Spores can be produced for over 2 years on stubble. Moist conditions, temperatures in the 15-25°C range.	Survives on infected barley and barley grass residues. Wind borne spores.	Resistant varieties, crop rotation and stubble management.
Powdery mildew	<i>Blumeria graminis f.sp. hordei</i>	White powdery spores on upper leaf surfaces, underside of leaves turn yellow to brown.	Favoured by high humidity and temperature of 15-22°C. Worse in high fertility paddocks and early sown crops.	Volunteer barley, barley grass and crop residue. Airborne spores.	Resistant varieties. Seed and foliar fungicides.
Leaf rust	<i>Puccinia hordei</i>	Small circular orange pustules on upper leaf surface.	Moist conditions with temperatures in the range 15-22°C.	Living plant hosts including barley, barley grass and Star of Bethlehem.	Use resistant varieties and control volunteer barley and barley grass over summer/autumn
Stem rust	<i>Puccinia graminis</i>	Large red-brown pustules. Rupture of leaf and stem surface.	Infection requires temperatures in the 15-30°C range and moist conditions.	Living plant hosts including volunteer cereals (wheat, barley, triticale and rye).	Use resistant varieties and control volunteer wheat, triticale and barley over summer/autumn.
BGSR (Barley grass stripe rust)	<i>Puccinia striiformis</i>	Yellow powdery pustules in stripes on the leaves	Can develop throughout the growing season.	Barley grass and susceptible barley varieties.	Avoid susceptible varieties
BYDV (Barley yellow dwarf virus)	Barley yellow dwarf virus	Yellow stripes between leaf veins, some leaves red. Sterile heads and dwarfing plants.	Virus is transmitted by aphids.	Hosts include all cereals and many grasses.	Resistant varieties. Chemical control of aphids may be suitable for high value crops.
Wirrega blotch	<i>Drechslera wirreganensis</i>	Brown blotches often with hole in centre.	Minor occurrence.	Range of grass weeds and cereal stubble.	Crop rotation. Avoid growing susceptible varieties, control grass weeds
Ringspot	<i>Drechslera campanulata</i>	Small brown rimmed spots on leaves.	Common and widespread in southern Australia.	Wide range of cereals and grass weeds. Barley seed in crop residue infected with fungus.	Crop rotation and weed control.
Halo spot	<i>Pseudoseptoria stomaticola</i>	Small white-brown lesions.	Cool, moist conditions.	Residues of barley and grasses. Rain splash.	Disease is not of economic importance.
GRAIN					
Covered smut	<i>Ustilago segetum</i> var. <i>hordei</i>	Dark, compacted heads, grain replaced by smut balls.	Spores germinate in infected grain when temperatures are between 14-25°C.	Infected seed.	Use disease free seed, resistant varieties, seed treatments.
Loose smut	<i>Ustilago tritici</i>	Dark brown powdery spores replace grain.	Moist conditions at flowering and when temperatures are between 16-22°C.	Infected seed	Use disease free seed and seed treatments. Avoid susceptible varieties.
ROOT/CROWN					
Crown rot	<i>Fusarium pseudo-graminearum</i> , <i>F. culmorum</i>	'Whiteheads' or deadheads most obvious after flowering, pink discolouration under leaf sheaths.	Most common on heavy or poorly drained soils Favoured by moist, humid conditions with temperatures between 15-30°C.	Survives in infected stubble residue for up to 2 years. Hosts include wheat, barley, triticale and some grasses.	Crop rotation, stubble removal, cultivation.
Pythium root rot (Damping off)	<i>Pythium spp.</i>	Stunted seedlings, reduced tillering, pale stunted or stubby roots with light brown tips.	Favoured by wet conditions. Increased risk where high rainfall occurs after sowing.	Spores survive in soil or plant debris for up to 5 years.	Avoid deep sowing into cold wet soils, especially when direct drilling. Ensure good nutrient levels.
Common root rot	<i>Bipolaris sorokiniana</i>	Brown discolouration of roots, sub-crown internode and crown. Plant stunting, brown spots on leaves and reduced tillers.	Scattered through crop.	Wheat, barley, triticale and rye.	Crop rotation.
Cereal cyst nematode (CCN)	<i>Heterodera avenae</i>	Yellow, stunted plants. Knotted roots.	Light soils and well structured clays where cereals are commonly grown.	Present in most soils in the southern region.	Resistant varieties, break from susceptible cereals and grasses, particularly wild oat.
Root lesion nematode	<i>Pratylenchus thornei</i> & <i>Pratylenchus neglectus</i>	Reduced tillering, ill thrift; lesions on roots, lack of branching of root system.	Favoured by cereals in rotation with chickpea, medic and vetch.	Survives as dormant nematodes in the soil.	Crop rotation using resistant crops and resistant varieties.
Take-all	<i>Gaeumannomyces graminis</i> var. <i>tritici</i> (Ggt)	Stunted or yellowing plants, 'whiteheads' at heading.	Fungus thrives under warm, damp conditions.	Fungus survives over summer in crowns and roots of wheat, barley and grass plants.	Crop rotations, at least one year free of hosts (cereals and grasses, especially barley grass). Fungicide applied to seed or fertiliser.

This table has been developed from information in the publications Wallwork H (2000) (Ed) *Cereal Root and Crown Diseases* (Grains Research and Development Corporation, SARDI) and Wallwork H (2000) (Ed) *Cereal Leaf and Stem Diseases* (Grains Research and Development Corporation, SARDI).

TABLE 5 Mallee and Wimmera barley (main season). Long term predicted yield expressed as a percentage of mean yield.

Year	Mallee						Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.12	2.30	2.40	2.01	4.73		4.33	4.18	2.34	1.70	6.87
	No. trials	7	6	7	7	6	No. trials	4	4	3	3	3
MALTING BARLEY												
Bass	33	99	102	97	96	100	16	93	97	106	101	104
Baudin	1	96	101	94	90	102	17	95	99	97	92	106
Buloke	33	101	101	102	102	97	17	98	98	104	107	97
Charger	-	-	-	-	-	-	13	106	102	102	109	94
Commander	33	101	102	100	97	101	17	103	104	95	103	99
Fairview	-	-	-	-	-	-	10	92	96	80	63	105
Flagship	26	97	99	99	99	86	14	87	92	104	113	85
Flinders	33	95	96	96	96	96	17	93	94	99	94	97
Gairdner	33	90	91	93	91	90	17	91	94	87	89	86
Granger	33	96	97	96	96	101	17	98	99	95	90	101
La Trobe	33	116	111	117	123	97	17	106	102	126	138	97
Macquarie	-	-	-	-	-	-	12	92	95	78	76	90
Navigator	-	-	-	-	-	-	11	96	100	75	67	104
Schooner	33	94	96	98	98	84	14	85	90	103	110	82
Scope	33	100	100	102	102	95	17	98	98	102	107	94
Westminster	-	-	-	-	-	-	17	90	93	77	61	100
Wimmera	10	89	95	87	82	104	14	91	95	90	73	109
FEED BARLEY												
Alestar	-	-	-	-	-	-	17	99	98	91	82	103
Barque	13	98	100	98	95	93	-	-	-	-	-	-
Explorer	-	-	-	-	-	-	3	110	105	99	98	104
Fathom	33	115	114	113	115	101	17	106	106	120	133	103
Fleet	33	107	107	105	103	100	13	105	106	103	119	97
Hindmarsh	33	116	111	119	126	94	17	105	101	129	143	94
Keel	27	112	111	113	116	94	-	-	-	-	-	-
Maltstar	-	-	-	-	-	-	17	99	100	85	71	110
Maritime	10	100	99	103	104	90	3	96	97	103	113	86
Oxford	33	85	92	81	75	110	17	94	98	79	57	115
RGT Planet	6	98	98	97	98	115	3	109	104	95	75	119
Rosalind	20	120	113	120	128	105	9	116	109	125	135	105
Skipper	13	113	111	114	117	95	7	103	103	120	137	94
BARLEY UNDER MALT EVALUATION												
Compass	33	122	114	123	130	95	17	114	109	124	152	90
Spartacus CL	20	118	114	119	127	97	9	106	103	131	144	98
SY Rattler	33	95	92	98	100	94	17	97	95	95	92	91

TABLE 6 North Central and North East barley (main season). Long term predicted yield expressed as a percentage of mean yield.

Year	North Central						North East					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		3.41	3.34	4.26	2.47	5.95		3.53	3.77	5.54	2.43	7.28
	No. trials	3	1	2	1	1	No. trials	1	1	1	1	1
MALTING BARLEY												
Bass	8	94	96	91	95	98	5	87	98	94	94	98
Baudin	8	92	95	98	96	100	5	88	96	95	88	99
Buloke	8	99	97	96	99	98	5	94	99	97	101	98
Charger	8	108	103	104	105	100	5	111	103	105	111	101
Commander	8	99	93	110	104	102	5	94	95	100	95	99
Fairview	2	87	104	103	91	99	5	100	99	99	82	101
Flagship	7	89	89	91	95	89	4	74	92	89	95	90
Flinders	8	94	101	93	95	95	5	95	100	97	97	98
Gairdner	8	89	98	102	95	92	5	91	95	97	92	94
Granger	7	98	103	100	98	100	5	102	101	100	97	101
La Trobe	8	114	98	90	106	101	5	101	103	100	120	100
Macquarie	-	-	-	-	-	-	4	92	94	98	85	95
Navigator	5	87	98	113	95	101	3	94	94	100	78	100
Schooner	7	88	91	89	93	87	4	75	92	89	95	89
Scope	8	99	98	98	100	97	5	95	98	98	102	97
Westminster	8	84	104	103	90	96	5	98	98	98	81	99
Wimmera	7	88	101	96	90	99	2	92	99	95	83	100
FEED BARLEY												
Alestar	8	98	106	102	97	100	5	108	103	102	97	102
Capstan	1	96	103	101	96	107	-	-	-	-	-	-
Explorer	1	110	107	107	105	106	1	120	106	108	108	106
Fathom	8	109	92	97	107	104	5	92	98	98	110	100
Henley	4	98	103	101	98	100	2	103	101	101	96	101
Hindmarsh	8	114	98	87	106	99	5	101	104	99	123	99
Maltstar	8	94	104	105	96	104	5	104	101	102	87	104
Oxford	8	86	104	104	91	103	5	99	99	99	77	103
RGT Planet	1	109	117	102	100	110	1	131	112	110	103	112
Rosalind	4	124	106	97	112	108	3	121	110	108	128	106
Skipper	3	108	91	95	106	99	2	90	97	97	112	97
BARLEY UNDER MALT EVALUATION												
Compass	8	120	93	102	115	102	5	104	101	104	126	99
Spartacus CL	4	115	97	87	107	101	3	100	104	99	123	100
SY Rattler	8	99	106	98	98	95	5	108	103	102	104	99

TABLE 7 South West barley (long season). Long term predicted yield expressed as a percentage of mean yield.

Year		2011	2012	2013	2014	2015	2016
Mean yield (t/ha)		3.78	4.74	4.46	6.67	5.28	7.29
	No. trials	2	1	2	3	3	3
MALTING BARLEY							
Bass	12	107	94	94	104	107	97
Baudin	1	104	102	104	101	100	103
Charger	14	108	106	111	97	94	97
Commander	14	103	96	100	99	98	97
Fairview	14	105	106	106	102	104	103
Flagship	1	88	93	85	97	99	91
Flinders	14	97	95	90	100	103	94
Gairdner	14	100	87	89	94	90	85
Granger	14	103	93	92	100	99	94
Macquarie	8	101	92	91	99	96	94
Navigator	11	91	100	93	98	97	99
Schooner	2	86	93	85	97	99	91
Vlamingh	8	91	102	102	95	97	95
Westminster	14	98	103	105	93	85	99
Wimmera	11	99	97	98	97	93	98
FEED BARLEY							
Alestar	14	100	105	101	102	103	103
Capstan	12	122	99	112	105	100	107
Explorer	9	105	98	98	104	103	105
Fathom	1	91	100	95	98	99	97
Henley	5	93	108	106	97	97	102
Maltstar	14	109	105	110	103	101	108
Maritime	8	87	94	95	89	84	88
Oxford	14	117	105	117	104	99	111
RGT Planet	3	118	107	113	107	104	115
Rosalind	9	104	105	106	105	112	106
Skipper	2	81	94	83	95	99	89
Urambie	14	98	93	90	100	100	96
BARLEY UNDER MALT EVALUATION							
Compass	12	77	105	101	91	99	88
Spartacus CL	6	86	98	93	100	109	95
SY Rattler	14	81	95	87	91	86	90

TABLE 8 2016 Mallee barley yield (as a percentage of site mean yield) and protein (%).

Location & Sowing date*	Yield (%)						Protein (%)					
	Birchip 1/5/16	Manangatang 1/5/16	Murrayville 12/5/16	Rainbow 11/5/16	Ultima 17/5/16	Walpeup 12/5/16	Birchip	Manangatang	Murrayville	Rainbow	Ultima	Walpeup
MALTING BARLEY												
Bass	94	103	119	101	81	90	11.4	11.0	12.6	11.6	9.4	12.2
Buloke	104	88	109	99	94	95	9.8	10.8	11.4	9.6	8.5	10.8
Commander	103	103	99	105	98	106	8.6	10.2	10.9	8.6	8.6	10.3
Flagship	86	94	76	94	104	106	10.4	11.6	11.0	11.0	10.3	12.0
Flinders	102	90	101	99	99	104	10.8	11.6	12.7	10.7	9.7	10.7
Gairdner	88	90	90	88	90	97	10.9	11.6	10.6	10.5	8.2	12.1
Granger	95	90	89	96	107	101	10.2	10.7	10.5	10.7	8.6	11.0
La Trobe	97	106	101	101	100	95	10.2	10.3	12.4	10.4	9.5	12.6
Schooner	84	81	84	69	88	97	10.5	11.3	13.0	11.6	10.6	12.3
Scope	105	91	107	94	97	102	10.4	11.3	12.0	10.4	9.3	11.5
FEED BARLEY												
Fathom	112	125	98	110	96	93	10.1	10.4	10.4	11.5	9.8	12.3
Fleet	99	114	97	103	97	100	9.9	11.1	12.1	11.2	9.5	10.9
Hindmarsh	100	109	100	100	103	98	9.4	9.2	12.8	11.1	9.4	12.9
Oxford	112	112	129	110	109	114	7.6	9.2	9.2	7.7	8.7	10.1
RGT Planet	120	112	112	118	123	113	7.9	8.9	10.4	8.4	7.3	10.0
Rosalind	109	107	109	106	111	97	8.9	9.5	11.2	10.8	9.7	11.6
BARLEY UNDER MALT EVALUATION												
Compass	83	97	87	101	102	105	9.8	9.8	11.7	10.4	9.3	11.0
Spartacus CL	103	111	89	100	93	87	10.2	10.2	11.4	11.3	9.6	13.1
SY Rattler	96	100	104	97	109	103	9.7	9.6	10.4	10.9	9.4	11.8
Site Mean (t/ha)	5.48	4.77	3.31	5.99	4.29	4.55						
CV (%)	5	5	5	3	4	4						
LSD (%)	8	9	8	5	6	6						

* Sowing Date / Germination Rain Date

TABLE 9 2016 Mallee barley plump grain and screenings. Plump grain is the percentage of grain above a 2.5 mm sieve and screenings the percentage below a 2 mm sieve.

	Plump Grain (%)						Screenings (%)					
	Birchip	Manan-gatang	Murrayville	Rainbow	Ultima	Walpeup	Birchip	Manangatang	Murrayville	Rainbow	Ultima	Walpeup
MALTING BARLEY												
Bass	97	94	98	97	98	90	1.1	3.0	0.6	0.3	0.3	2.1
Buloke	95	85	92	86	89	75	1.1	5.0	1.3	2.0	1.5	5.4
Commander	95	89	97	95	97	86	1.7	4.8	1.0	1.3	0.8	3.5
Flagship	95	84	91	87	86	75	1.3	6.5	1.4	1.9	2.9	6.2
Flinders	97	91	97	95	97	91	1.1	4.1	0.7	0.8	0.5	1.6
Gairdner	95	85	96	94	96	82	1.3	5.0	0.8	0.7	0.7	4.0
Granger	97	85	97	93	97	84	1.5	7.7	0.9	1.1	0.6	3.5
La Trobe	95	93	92	92	92	84	1.3	2.2	1.6	1.4	1.5	3.6
Schooner	97	82	96	94	97	88	1.4	5.6	0.8	0.8	0.5	1.6
Scope	95	87	94	89	91	81	1.2	4.3	1.3	1.5	0.8	3.5
FEED BARLEY												
Fathom	97	92	98	96	95	95	1.0	4.1	0.5	0.7	0.7	1.1
Fleet	96	90	98	94	98	93	1.8	4.4	0.6	1.1	0.4	1.5
Hindmarsh	92	90	90	92	91	86	2.8	4.0	1.7	1.7	1.4	3.4
Oxford	87	87	95	91	89	68	2.7	5.3	0.8	1.1	1.6	7.0
RGT Planet	94	88	96	95	92	86	1.8	5.4	0.9	0.8	1.1	3.1
Rosalind	95	87	95	93	92	85	1.1	5.0	0.7	0.8	1.4	4.2
BARLEY UNDER MALT EVALUATION												
Compass	98	95	98	96	98	96	0.9	2.4	0.5	0.8	0.5	0.7
Spartacus CL	94	93	93	92	93	89	1.5	2.9	1.1	1.2	1.4	2.2
SY Rattler	94	83	95	92	93	78	1.4	6.8	0.9	1.2	1.4	6.3

TABLE 10 2016 North Central, North East and Wimmera barley yield (as a percentage of site mean yield) and protein (%).

Location & Sowing date*	Yield (%)							Protein (%)						
	North Central		North East	Wimmera				North Central		North East	Wimmera			
	Charlton 8/5/16	Colbinabbin 30/5/16	Wunghnu 23/5/16	Brim 13/5/16	Horsham 24/5/16	Kaniva 19/5/16	Minyip 20/5/16	Charlton	Colbinabbin	Wunghnu	Brim	Horsham	Kaniva	Minyip
MALT BARLEY														
Bass	96	108	97	100	109	108	105	14.8	11.8	9.8	10.8	11.3	13.4	10.9
Baudin	94	102	95	103	113	76	111	14.3	11.3	9.6	10.2	10.9	13.3	10.2
Buloke	101	97	99	95	103	105	101	13.1	11.7	8.8	9.6	10.8	12.0	10.4
Charger	84	108	104	87	100	86	101	13.8	10.4	8.8	10.8	10.8	13.0	10.0
Commander	111	98	99	105	83	88	93	12.2	10.5	8.3	9.2	10.8	11.5	10.1
Fairview	-	-	84	-	108	-	106	-	-	9.7	-	10.6	-	10.2
Flinders	102	89	89	99	100	93	101	13.7	11.0	9.2	10.9	11.5	13.5	10.1
Gairdner	90	92	87	82	105	98	92	14.2	10.8	9.2	10.2	10.5	11.7	10.1
Granger	-	-	104	99	91	96	98	-	-	9.5	10.4	10.7	12.1	9.9
La Trobe	100	92	95	94	90	91	89	13.2	12.4	9.5	11.0	11.1	13.1	10.6
Navigator	96	99	104	103	90	92	96	14.1	11.5	9.0	9.4	10.8	11.9	9.7
Scope	102	84	100	94	99	100	101	12.8	11.6	9.7	9.5	10.6	12.2	10.6
Westminster	99	91	103	93	94	102	96	13.4	11.1	9.4	9.5	10.6	11.8	9.7
FEED BARLEY														
Alestar	87	107	98	98	106	100	105	13.8	11.0	8.7	9.7	10.8	12.5	9.9
Explorer	83	94	101	108	105	85	106	13.0	10.5	8.8	9.3	10.4	12.1	9.7
Fathom	120	107	103	105	107	120	102	14.3	11.9	9.2	10.6	11.7	12.5	11.0
Fleet	-	-	-	99	99	104	92	-	-	-	9.8	11.3	12.2	10.5
Hindmarsh	91	97	94	92	90	93	90	13.8	12.5	9.9	11.1	11.3	13.0	10.6
Maltstar	82	99	100	107	106	88	113	12.7	9.6	7.9	8.7	10.4	11.3	8.9
Oxford	95	101	105	109	107	92	117	13.3	10.7	8.6	8.9	10.7	11.8	8.9
RGT Planet	99	114	112	107	124	123	121	12.4	10.2	8.2	8.7	9.5	11.1	8.9
Rosalind	124	106	107	108	103	121	100	12.5	11.2	8.7	9.9	10.8	11.8	10.4
BARLEY UNDER MALT EVALUATION														
Compass	114	98	106	102	87	117	74	13.3	10.6	8.8	10.0	10.9	11.7	10.7
Spartacus CL	110	95	99	92	97	104	95	13.8	11.6	9.6	10.9	11.4	12.8	10.6
SY Rattler	81	97	99	89	73	99	88	13.4	10.8	9.5	9.8	10.6	11.9	9.6
Site Mean (t/ha)	6.28	5.93	7.31	6.01	7.44	5.97	7.17							
CV (%)	7	4	8	3	5	7	5							
LSD (%)	11	8	13	4	7	12	8							

* Sowing Date / Germination Rain Date

TABLE 11 2016 North Central, North East and Wimmera barley plump grain and screenings. Plump grain is the percentage of grain above a 2.5 mm sieve and screenings the percentage below a 2 mm sieve

	Plump grain (%)							Screenings (%)						
	North Central		North East	Wimmera				North Central		North East	Wimmera			
	Charlton	Colbinabbin	Wungahnu	Brim	Horsham	Kaniva	Minyip	Charlton	Colbinabbin	Wungahnu	Brim	Horsham	Kaniva	Minyip
MALTING BARLEY														
Bass	87	97	98	95	96	85	98	2.4	0.2	0.1	1.2	4.5	3.4	0.6
Baudin	75	98	98	93	94	51	97	7.5	1.7	0.2	1.8	2.0	19.7	0.5
Buloke	99	97	89	83	86	71	88	6.5	2.8	0.6	1.9	4.7	6.8	1.5
Charger	87	97	96	93	94	65	95	2.8	1.5	0.4	2.4	3.4	2.3	1.0
Commander	89	97	95	94	91	81	95	3.1	2.6	1.5	1.8	3.5	4.4	1.0
Fairview	-	-	93	-	92	-	93	-	-	1.2	-	1.7	-	0.7
Flagship	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flinders	98	97	98	88	96	69	98	2.7	0.3	0.4	3.3	3.2	1.8	0.6
Gairdner	76	95	93	81	92	78	88	4.9	4.3	1.2	2.4	6.0	6.6	0.9
Granger	-	-	98	92	93	86	96	-	-	0.1	2.1	2.9	2.6	0.7
La Trobe	72	91	91	89	88	72	91	3.4	3.1	0.6	3.3	4.0	4.6	1.0
Navigator	82	93	97	95	95	70	96	3.7	2.2	1.1	1.5	2.4	2.0	0.6
Schooner	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scope	87	86	91	85	80	78	90	5.2	2.3	0.5	2.5	3.1	4.0	1.0
Westminster	79	98	98	86	90	84	97	5.3	2.2	0.2	3.3	2.3	2.0	0.1
FEED BARLEY														
Alestar	85	98	97	93	93	74	94	5.6	1.2	0.3	1.2	3.6	6.2	1.3
Explorer	74	97	95	90	94	73	97	2.7	2.6	1.1	2.2	3.0	6.6	0.9
Fathom	74	98	96	94	90	84	95	2.6	0.2	0.9	1.6	4.8	1.5	0.7
Fleet	-	-	-	90	92	81	95	-	-	-	2.2	2.1	3.8	0.8
Hindmarsh	90	97	91	85	90	81	91	4.2	2.7	0.8	5.2	3.4	2.7	1.2
Maltstar	80	91	92	82	77	62	92	7.7	8.5	0.4	4.5	7.0	10.2	1.0
Oxford	77	95	91	80	83	72	94	6.0	5.0	0.2	4.0	4.3	4.3	0.8
RGT Planet	77	98	94	84	91	93	93	5.0	1.8	1.4	3.4	2.9	2.3	1.2
Rosalind	77	99	93	89	91	87	92	1.4	1.3	0.6	1.8	2.8	1.8	0.9
BARLEY UNDER MALT EVALUATION														
Compass	73	98	97	93	94	89	95	2.7	1.5	0.8	1.9	2.4	1.4	0.9
Spartacus CL	77	96	90	90	89	84	92	4.0	3.5	2.1	2.7	4.0	1.8	0.7
SY Rattler	77	98	96	86	89	83	94	6.0	2.2	0.2	3.0	3.5	2.6	1.1

TABLE 12 2016 South West (long season) barley yield (as a percentage of the site mean yield), protein (%), plump grain and screenings. Plump grain is the percentage of grain above a 2.5 mm sieve and screenings the percentage below a 2 mm sieve.

	Yield (%)			Protein (%)			Plump grain (%)			Screenings (%)		
	Hamilton 14/5/16	Inverleigh* 15/5/16	Streatham 21/5/16	Hamilton	Inverleigh	Streatham	Hamilton	Inverleigh	Streatham	Hamilton	Inverleigh	Streatham
MALTING BARLEY												
Bass	94	92	86	10.3	11.7	10.1	98	97	99	0.9	1.0	0.6
Charger	96	90	96	8.8	10.7	9.1	96	95	97	1.2	1.7	0.9
Commander	94	99	83	9.1	10.8	8.7	96	96	97	1.8	1.5	1.2
Fairview	99	103	103	9.0	10.7	9.0	97	94	97	1.1	2.0	0.7
Flinders	88	100	91	9.4	11.4	9.9	98	98	99	0.8	0.8	0.6
Gairdner	86	75	82	10.6	10.7	10.0	94	95	96	1.7	1.1	1.1
Granger	94	91	100	10.2	11.2	9.5	97	97	98	1.5	1.3	0.8
Navigator	98	91	92	9.0	10.3	9.0	98	97	98	1.0	1.1	0.9
Westminster	101	93	99	9.5	11.0	9.4	97	97	98	1.0	1.5	0.9
FEED BARLEY												
Alestar	98	106	103	9.3	10.7	8.6	97	97	98	1.0	1.0	0.7
Capstan	106	100	114	7.7	10.7	7.5	94	90	92	1.7	3.2	2.3
Explorer	104	105	95	8.8	10.2	8.3	97	94	97	1.1	2.0	1.0
Maltstar	106	107	110	8.4	10.0	8.6	95	93	97	1.5	2.5	0.9
Oxford	110	107	112	8.1	10.4	8.1	95	89	95	1.3	3.7	1.2
RGT Planet	114	116	113	8.5	10.3	8.2	96	93	97	1.5	2.4	0.9
Rosalind	102	106	103	9.7	10.2	9.1	95	94	95	1.4	1.3	1.2
Urambie	95	98	86	8.5	11.1	8.8	92	93	91	2.3	1.9	1.8
BARLEY UNDER MALT EVALUATION												
Compass	82	84	90	9.4	10.4	8.6	97	98	98	1.1	0.9	0.8
Spartacus CL	89	100	86	9.8	11.4	10.2	92	91	92	2.4	2.5	2.3
SY Rattler	91	80	95	9.5	10.1	9.2	95	93	97	1.6	2.1	1.0
Site Mean (t/ha)	8.15	6.92	6.76									
CV (%)	3	5	4									
LSD (%)	5	9	7									

*Lime was surface applied at 2.5 t/ha on the 7/3/16 at Inverleigh.

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OAT

REVIEW OF 2016

Season

Oat plantings increased significantly in 2016, reflective of strong prices at the conclusion of the 2015 season. Sustained rainfall after a good break produced high biomass crops.

Continued wet conditions and mild temperatures throughout spring hampered growers ability to get hay making underway, and achieve consistent high quality. High biomass crops resulted in high hay yields between 9 and 14 t/ha, however quality was mixed due to the wet conditions and the amount of dry matter which needed to dry down.

Disease

As with other crops, the wet conditions resulted in high disease pressure on oat crops. Red leather leaf and bacterial blight were an issue for growers in the Wimmera, Mallee and high rainfall regions. Low levels of *Septoria avenae* were also detected in all regions during 2016.

LOOKING FORWARD TO 2017

New varieties

Durack (WA02Q302-9) is a moderately tall milling variety with good lodging and shattering resistance and good early vigour bred by the National Oat Breeding Program. Durack is at least a week earlier than any other variety released from the program and suitable for low rainfall areas. Due to early maturity, it can be sown later than other varieties and still mature on time with a late break. Durack offers grain yield similar to the tall varieties Carrolup and Yallara with excellent quality.

Breeders are preparing for the release of a new grain variety 03198-18 bred by the National Oat Breeding Program with seed available to growers in 2018 through Heritage Seeds. The line is a dwarf variety slightly taller than Mitika with similar maturity and grain yield. Excellent grain quality, low screenings and a reasonable disease package are also key features.

Disease

Due to increased occurrence of red leather leaf and bacterial blight in 2016, growers should avoid back to back oat plantings as these pathogens survive on stubble.

It is important that growers understand the resistance ratings of their varieties to the diseases of importance in their region and plan management strategies accordingly. Managing the green bridge will be important after summer rain events to control pests and diseases for the coming season.

Quality

Variety selection should be based on agronomic traits, potential grain quality and marketing or end use options. Oats are grown for human consumption or animal feed as grain or hay. Grain quality traits for the milling industry include high groat per cent, high β -glucan, low screenings, and high hectolitre weight. Grain quality traits for improved animal feed include low hull lignin, high groat percentage, and high oil content, resulting in high grain digestibility. Important hay quality traits are high digestibility, high water soluble carbohydrates, low fibre and high protein.

The option of oats for hay is increasing in popularity where growers have identified it as profitable and as a tool to manage herbicide resistance and to spread risk. Variety performance for hay yield and quality is available in the Oat Newsletter at aexco.com.au. Earlier versions of the Oat Newsletter (2012-14) can be found at www.pir.sa.gov.au.

Royalties

Where applicable, growers selling oat seed or export hay will pay an End Point Royalty (EPR). An export hay EPR of \$2/tonne (ex GST) applies on all oat varieties bred by the National Oat Breeding Program. Refer to aexco.com.au for further information on hay, grain and seed royalties.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports app

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AG1160 Cereal disease guide

www.aexco.com.au

- Producing quality oat hay booklet

VARIETY DESCRIPTIONS

(D) denotes Plant Breeders Rights apply

End Point Royalty (EPR) for grain and hay and seed royalty for 2017-18 season quoted \$/tonne ex-GST.

Milling oat – BANNISTER[Ⓛ]

A dwarf milling variety with wide adaption. Compared to Mitika it is about 13cm taller and flowers 3-4 days later. Similar to Mitika for groat percentage. R to leaf rust. Very susceptible and intolerant to CCN. Bred by the National Oat Breeding Program. Released in eastern Australia in 2013 via Seednet. EPR \$2.30.

Milling oat – DUNNART[Ⓛ]

A dwarf potential milling variety with mid maturity. It is 10-15 cm taller than Mitika, Possum and Wombat. Dunnart has improved plant colour compared to Mitika and Wombat. It is MR to leaf rust, R and MT to CCN, and MR to barley yellow dwarf virus. Bred by SARDI (SV98146-26), released 2012.

NEW Milling oat – DURACK[Ⓛ]

Early maturing variety widely adaptable to low-medium rainfall zones and late planting in high rainfall regions. Good early vigour and good lodging resistance with low screenings. Resistant to CCN, S to septoria and S to bacterial blight. Bred by SARDI, released in 2016 and marketed by Heritage Seeds. EPR \$2.30.

Milling oat – MITIKA[Ⓛ]

An early maturing dwarf variety with some resistance to common rusts. Suited to high rainfall areas, it has around 73 per cent groat yield and provides excellent feed value. It is not suited to areas where CCN is a problem. Released 2005 and marketed by Heritage Seeds. EPR \$2.

Milling Oat – WILLIAMS[Ⓛ]

A tall milling oat suited to medium to high rainfall zones. It is 15cm taller than Mitika, 5cm taller than Bannister and 15cm shorter than Yallara. A higher yielding variety, similar to Bannister but with slightly inferior grain quality. Produces high screenings when grown in low rainfall areas. S to stem rust, but R to leaf rust and susceptible and intolerant to CCN. MS to Septoria. Bred by the National Oat Breeding Program (WA2332). Released 2015. Marketed by Heritage Seeds. EPR \$2.30.

Milling Oat – WOMBAT[Ⓛ]

A dwarf mid-season variety that flowers about six days later than Mitika. It is the first dwarf milling variety with CCN resistance and tolerance. Intended to replace Mitika and Possum where CCN and stem nematode are limiting yield, but may have higher screenings. Bred by SARDI (SV97181-12) released 2011 and marketed by Seednet. EPR \$2.

Milling oat – YALLARA[Ⓛ]

Medium to tall mid-season variety intended to replace Euro. S to stem rust, MS to leaf rust and MS to septoria. Resistant but intolerant to CCN. Suited to drier areas. Bred by SARDI, released in 2009 and marketed by Seednet. EPR \$2.

Hay/feed oat – MULGARA[Ⓛ]

Early to mid-season tall oat targeted as a replacement for Wintaroo but with better resistance to leaf rust and lodging. Has excellent hay colour with quality similar to Wintaroo and good grain yield and quality. Bred by SARDI, released 2009 and marketed by AEXCO. EPR \$2.

Hay/feed oat – TAMMAR[Ⓛ]

Late season tall hay oat variety for medium and high rainfall zones which provides a slightly later cutting time than Tungoo and Kangaroo. S to stem rust, MS to leaf rust, and moderately resistant and moderately tolerant to CCN. Bred by SARDI, released 2010 and marketed by AEXCO. EPR \$2.

Hay/grazing/feed oat – BRUSHER[Ⓛ]

Early to mid-season tall oat, well suited to low and medium rainfall areas. S to stem and leaf rust. Resistant but moderately intolerant to CCN. Bred by SARDI, released 2002 and marketed by AEXCO. EPR \$2.

Hay/grazing/feed oat – WINTAROO[Ⓛ]

Tall, mid-season variety for all rainfall zones. S to leaf and stem rust. Resistant and moderately tolerant to CCN. Bred by SARDI, released 2001 and marketed by AEXCO. EPR \$2.

Hay oat – FORESTER[Ⓛ]

A medium height late hay variety adapted to high rainfall and irrigated cropping regions. It has excellent lodging and shattering resistance. S to stem rust and MS to leaf rust. It has excellent hay qualities, but is moderately susceptible and intolerant to CCN. Bred by SARDI, released 2011 and marketed by AGF Seeds. EPR \$2.

Hay oat – GLIDER

A late maturing variety suited to high rainfall regions. S to stem and leaf rust. Moderately susceptible and intolerant to CCN. Bred by SARDI and released 1999.

Hay oat – KANGAROO[Ⓛ]

A mid to late season moderately tall oat. A later flowering time makes it less suited to low rainfall environments. S to rusts. Resistant and moderately tolerant to CCN. Released 2003. Bred by SARDI, marketed by AEXCO. EPR \$2.

Hay oat - TUNGOO[Ⓛ]

A medium to tall variety. S to stem rust and MS to leaf rust. Resistant and moderately tolerant to CCN. Only variety available with red leather leaf resistance. Hay yield similar to Kangaroo but grain yield poor. Released 2008. Bred by SARDI, marketed by AEXCO. EPR \$2.

TABLE 1 Oat variety agronomic guide and disease reactions.

Oat disease reactions provided by Pamela Zwer, SARDI.

	End use	Height	Maturity	Hectolitre weight	Stem Rust	Leaf Rust	CCN		BYDV	<i>Septoria avenae</i>	Bacterial blight	Red Leather Leaf
							Res	Tol				
MILLING OATS												
Bannister	M	TD	M	H	S	R	VS	I	MS	S	S	MS
Dunnart	M	TD	M	H	S	MR	R	MT	MR	MS	S	MS
Durack	M	MT	E	H	S	S	R	MIMT	MSS	S	S	MS
Mitika	M	D	E	H	S	S	VS	I	S	S	MR	S
Williams	M	T	E	H	S	R	S	I	MS	MS	R	MS
Wombat	M	D	EM	H	S	MS	R	T	MR	MS	MS	MS
Yallara	M	MT	EM	H	S	MS	R	I	MS	MS	MS	MS
HAY/GRAZING/FEED												
Brusher	H/G/F	T	EM	M	S	S	R	MI	MS	MS	MS	MS
Forester	H	MT	VL	L	S	MS	MS	MI	S	MR	MSS	MR
Glider	H	MT	L	ML	S	S	MS	I	S	MR	R	MR
Kangaroo	H	MT	ML	M	S	S	R	MT	S	MS	MS	MS
Mulgara	H	T	EM	M	MS	MS	R	MT	MS	MS	MR	MSS
Tammar	H	MT	LM	L	S	MS	MR	MT	MS	MR	MR	MS
Tungoo	H	MT	ML	L	S	MS	R	MT	MS	MR	MR	MR
Wintaroo	H/G	T	EM	M	S	S	R	MT	MS	MS	MS	MS

End use: M = milling, F = feed grain, G = grazing, H = hay Hectolitre weight: H = heavy, M = medium, L = light

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

Maturity: E = early, EM = early mid, M = mid season, ML = mid late season, LM = late mid season, L = late, VL=very late

Disease resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.

TABLE 2 Oat disease guide.

Disease	Organism	Symptoms	Occurrence	Inoculum source	Control
FOLIAR					
Leaf rust	<i>Puccinia coronata</i> f.sp. <i>avenae</i>	Small circular orange pustules on upper leaf surface.	More severe during moist conditions with temperatures between 15-22°C.	Volunteer oats and wild oats.	Resistant varieties. Control volunteer and wild oats over the summer.
Stem rust	<i>Puccinia graminis</i> f.sp. <i>avenae</i>	Large red-brown pustules, rupture in leaf surface.	Infection requires warm (15-30°C) moist conditions.	Volunteer oats and wild oats.	Resistant varieties. Control volunteer and wild oats over summer.
Septoria blotch	<i>Phaeosphaeria avenaria</i>	Dark brown purple spots on leaves, sheaths & stems. Head and grain may become infected.	Prefers cool, rainy weather, especially coastal districts.	Spores spread in autumn by raindrop splashes from oat residues.	Resistant varieties. Crop rotation, bury or graze infected stubble. Avoid early sowing in high rainfall areas.
BYDV	Barley yellow dwarf virus	Leaf tip and margins turn red with interveinal chlorosis, mottling and stunting.	Transmitted by aphids.	Hosts include all cereals and grasses, including pastures.	Resistant varieties. Chemical control of insects may be suitable for high value crops.
Halo blight	<i>Pseudomonas syringae</i> pv. <i>coronafaciens</i>	Light green, yellow or brown halo spot on leaves and sheaths. Leaves may wither and die.	Moist weather provides ideal conditions.	Bacteria on seed and crop debris are spread by rain splash, direct leaf contact, or aphids.	Avoid susceptible varieties, use clean seed in clean paddocks. Destroy infected oat stubble.
Stripe blight	<i>Pseudomonas graminis</i> f.sp. <i>striaefaciens</i>	Spots on leaves lengthen to form brown stripes on leaves & sheaths. Leaves may wither & die.	Moist weather provides ideal conditions.	Bacteria on seed and crop debris are spread by rain splash, direct leaf contact, or aphids.	Avoid susceptible varieties, use clean seed in clean paddocks, and destroy infected oat stubble.
Powdery mildew	<i>Blumeria graminis</i> f.sp. <i>avenae</i>	White powdery spores on upper leaf surfaces. Underside of leaves turn yellow to brown.	Favoured by high humidity and temperatures between 15-22°C.	Volunteer oats, oat stubble, windborne spores.	Avoid very susceptible varieties.
Red leather leaf	<i>Spermospora avenae</i>	Long reddish lesions with buff centres. Leaves may look and feel leathery.	High rainfall provides ideal conditions.	Stubble and rain splash.	Avoid susceptible varieties and rotate crops. Remove infected oat stubble.
GRAIN					
Smut	<i>Ustilage segetum</i> var. <i>hordei</i> . and <i>Ustilage avenae</i>	Grain replaced with dark brown-black powdery spores.	Moist conditions at flowering and temperatures between 15-25°C.	Air borne spores lodge in hulls, glumes or seed coats.	Clean seed and use seed treatment. Avoid susceptible varieties.
ROOT/CROWN					
Cereal cyst nematode (CCN)	<i>Heterodera avenae</i>	Yellow or pale green patches in crop. Stunted, weak plants with knotted root systems.	Can survive in soil between susceptible cereal crops for up to 2 years.	Cereals and some grasses, especially wild oats.	Resistant or tolerant varieties, crop rotation, weed control.
Stem nematode	<i>Ditylenchus dipsaci</i>	Swollen base of plant, stunted & numerous tillers.	Encouraged by moist conditions & can reproduce 4-5 times per season.	Wide host range including peas, beans, wild oats and many weeds. Nematode spread in infected hay.	Crop rotation and weed control. Avoid susceptible varieties.
Root lesion nematode	<i>Pratylenchus thornei</i> & <i>Pratylenchus neglectus</i> .	Reduced tillering, ill thrift; lack of branching of root system, lesions on roots.	Favoured by wheat in rotation with wheat, chickpea, medic and vetch.	Survives as dormant nematodes in the soil.	Crop rotation using resistant crops.

This table has been developed from information in the publications Wallwork H (2000) (Ed) Cereal Root and Crown Diseases (Grains Research and Development Corporation, SARDI) and Wallwork H (2000) (Ed) Cereal Leaf and Stem Diseases (Grains Research and Development Corporation, SARDI).

TABLE 3 Oat time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April				May				June				July			
Milling: Bannister, Dunnart, Durack, Echidna, Mitika, Yallara, Wombat				>	X	X	X	X	X	X	<	<				
Feed: Quoll				>	X	X	X	X	X	X	<	<				
Hay: Kangaroo, Mulgara, Wintaroo, Forester				>	X	X	X	X	X	X	<	<				
Grazing: Wintaroo				>	X	X	X	X	X	X	<	<				
WIMMERA	April				May				June				July			
Milling: Bannister, Dunnart, Durack, Echidna, Mitika, Possum, Yallara, Wombat					>	>	X	X	X	X	X	<	<	<		
Feed: Mulgara, Quoll					>	>	X	X	X	X	X	<	<	<		
Hay: Brusher, Glider, Kangaroo, Mulgara, Wintaroo, Forester				>	>	X	X	X	X	X	X	X	<	<	<	
Grazing: Wintaroo				>	>	X	X	X	X	X	X	X	<	<	<	
NORTH CENTRAL	April				May				June				July			
Milling: Bannister, Dunnart, Durack, Echidna, Mitika, Possum, Yallara, Wombat					>	>	X	X	X	X	X	<	<	<		
Feed: Mulgara, Quoll					>	>	X	X	X	X	X	<	<	<		
Hay: Glider, Kangaroo, Mulgara, Wintaroo, Forester				>	X	X	X	X	X	X	X	X	<	<	<	
NORTH EAST	April				May				June				July			
Milling: Bannister, Dunnart, Durack, Echidna, Possum, Yallara, Wombat					>	>	X	X	X	X	<	<				
Feed: Mulgara, Quoll, Tammar					>	>	X	X	X	X	<	<				
Hay: Glider, Mulgara, Tammar, Tungo, Wintaroo, Forester				>	X	X	X	X	X	<						
Grazing: Tungoo			>	X	X	X	<	<								
SOUTH WEST	April				May				June				July			
Milling: Bannister, Dunnart, Durack, Echidna, Mitika, Yallara, Wombat			>	X	X	X	X	X	X	X	X	<	<	<		
Possum			>	X	X	X	X	X	X	X	<					
Feed: Quoll, Tammar			>	X	X	X	X	X	X	X	X	<	<	<		
Hay: Glider, Tammar, Tungoo, Forester			>	X	X	X	X	X	X	X	X	X	<	<	<	

Varietal choice determines time to grazing or cutting for hay

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 4 North Central and North East oat. Long term predicted yield expressed as a percentage of mean yield.

Year	North Central						North East					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		3.94	3.32	4.17	0.75	5.91		3.25	4.06	3.73	2.37	6.34
	No. trials	1	2	2	2	2	No. trials	2	3	2	2	1
Bannister	9	119	117	115	111	136	10	119	120	113	95	136
Carrolup							1	102	100	100	92	96
Dunnart	9	116	111	112	106	121	10	107	111	106	91	125
Durack	8	93	97	99	111	88	8	90	92	94	107	92
Echidna	8	120	106	106	77	129	7	111	114	107	87	122
Euro	1	104	104	103	102	108	2	107	106	105	97	108
Kojonup							1	120	113	112	102	113
Mitika	9	100	101	104	109	106	10	93	98	97	110	105
Possum	9	101	106	105	114	109	10	103	104	102	107	110
Potoroo	4	117	111	113	103	125	4	108	113	106	91	127
Quoll	3	117	102	99	64	128	4	116	114	109	86	115
Wandering							1	99	113	102	77	138
Williams	9	110	118	110	117	129	10	127	122	117	97	130
Wombat	9	107	110	105	104	123	10	120	115	112	99	119
Yallara	9	99	101	101	107	89	10	98	98	99	92	97

TABLE 5 South West oat. Long term predicted yield expressed as a percentage of mean yield.

Year		2013	2014	2015	2016
Mean yield (t/ha)		1.08	5.60	3.41	6.24
	No. trials	1	2	2	1
Bannister	6	112	123	113	137
Dunnart	6	106	114	105	126
Durack	6	104	97	99	91
Echidna	6	92	114	105	123
Mitika	6	107	110	106	104
Possum	6	110	109	107	109
Potoroo	3	105	116	107	128
Quoll	1	85	109	103	115
Williams	6	115	116	112	131
Wombat	6	107	111	109	119
Yallara	6	100	92	94	99

TABLE 6 2016 oat yield and protein (%). Yield as a percentage of the site mean yield.

Location & Sowing date	Yield (%)					Protein (%)				
	North Central		North East	South West*		North Central		North East	South West*	
	Diggora 7/5/16	Eastville 10/5/16	Dookie 17/5/16	Hamilton 14/5/16	Streatham 21/5/16	Diggora	Eastville	Dookie	Hamilton	Streatham
Bannister	125	137	119	130	123	9.2	11.4	7.9	8.6	7.6
Dunnart	114	122	114	120	111	8.9	10.8	8.3	8.7	7.7
Durack	83	82	83	69	82	12.2	12.9	10.6	11.5	10.8
Echidna	114	117	110	125	112	9.8	12.2	8.5	8.8	8.8
Mitika	83	84	85	90	83	11.4	13.3	10.0	10.7	10.4
Possum	99	99	92	91	100	10.5	13.2	9.4	9.6	9.5
Potoroo	106	114	116	140	113	9.4	11.9	8.3	8.6	7.8
Williams	109	121	115	106	116	9.9	12.4	8.7	10.1	8.7
Wombat	110	113	109	109	110	9.4	12.7	8.4	8.7	8.6
Yallara	84	67	83	72	88	10.0	11.4	9.2	9.4	9.3
Site Mean (t/ha)	6.76	4.98	6.32	6.10	6.25					
CV (%)	5	3	3	4	5					
LSD (%)	7	6	5	6	9					

South West: NVT protocols require all Harvest Width measurements to be entered as plot "centre to centre". This is slightly wider than the seeder width and accounts for the additional light, nutrients and moisture that plants have access too. A consistent approach is used for yield calculations across all NVT trials, but in HRZ trials with narrow row spacings, the edge row effect may be less evident. Mean yields may be slightly underestimated as a result of this, but the rankings and relative performance of each variety will not change.

TABLE 7 2016 oat screenings (as a percentage of grain below a 2mm sieve) and test weight (kg/hectolitre).

Location & Sowing date	Screenings (%)					Test weight (kg/hectolitre)				
	North Central		North East	South West		North Central		North East	South West	
	Diggora	Eastville	Dookie	Hamilton	Streatham	Diggora	Eastville	Dookie	Hamilton	Streatham
Bannister	7.7	9.0	4.9	1.1	0.8	57	49	52	51	50
Dunnart	10.9	13.0	2.2	0.7	0.8	48	45	52	47	49
Durack	8.2	9.9	2.0	3.1	4.6	49	45	54	45	45
Echidna	11.5	15.6	8.9	1.6	1.4	52	45	52	49	50
Mitika	5.1	6.7	4.8	2.6	2.2	51	48	50	47	50
Possum	10.1	8.4	7.3	2.2	1.9	47	50	48	47	50
Potoroo	13.2	11.3	9.0	3.7	3.2	52	46	49	46	49
Williams	13.9	21.0	13.7	1.2	1.2	52	49	53	50	51
Wombat	10.5	10.5	8.3	3.1	2.8	50	51	51	49	51
Yallara	9.1	11.0	7.2	1.9	1.1	48	46	53	48	53

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TRITICALE

Triticale, a cross between wheat and cereal rye, has a niche on farms across Victoria due to several attributes. It has a reputation for tolerance to harsh soil conditions such as acid and alkaline soils and soils of low trace element fertility. It is a tall crop bred for greater straw strength which can be useful in rocky paddocks or circumstances where crops have been known to lodge.

As of 2016 triticale is no longer evaluated as part of the GRDC National Variety Trials program.

REVIEW OF 2016

Season

The area sown to triticale has declined substantially in recent years as growers favour wheat and barley. The production area continued this trend and remained low in 2016. As with most other crops, the 2016 season was conducive to good establishment, growth conditions and yields.

Disease

There were no reports of disease issues in this crop for 2016. Triticales are noted for their resistance to a range of diseases and therefore provide a good rotational option. However, growers should still have a disease management plan when growing triticale.

LOOKING FORWARD TO 2017

New varieties

There are no new triticale varieties for 2017.

Disease

When selecting varieties up to date rust resistance ratings should be consulted as previous ratings may have changed due to new rust strains becoming established. The important diseases to consider are stripe rust and CCN.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports App

agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AGO497 Growing triticale
- AG1160 Cereal disease guide

VARIETY DESCRIPTIONS

(D) denotes Plant Breeders Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

ASTUTE^(D)

A mid-season fully-awned variety suited to medium-high yielding environments an alternative to Hawkeye. Stem rust RMR, stripe rust RMR# and leaf rust RMR. Bred by AGT (as TSA0466) and registered in 2015. Marketed by AGT. EPR \$2.75.

BISON^(D)

An early to mid-season reduced awn variety best suited to low-medium yielding environments. Intended as a replacement for Rufus. Stem rust RMR, stripe rust R# and leaf rust RMR and resistant to CCN. Bred by AGT and registered 2014. Marketed by AGT. EPR \$2.75.

FUSION^(D)

A mid-season variety, fully awned grain only triticale. A moderately tall variety that yields well in dry or sudden finishes. Stem rust R, stripe rust RMR#, leaf rust RMR and resistant to CCN. Released in 2012 and marketed by AGT. EPR \$3.

GOANNA

An early to mid-season, fully awned grain only triticale. Stem rust R, stripe rust RMR#, leaf rust R and resistant to CCN. Released in 2011 by Cooper & Elleway.

KM10

A fast growing early to mid-season variety with good early production of forage. Tends to smaller grain and is ideally suited to short season environments. Stem rust R, stripe rust RMR#, leaf rust MRMS but susceptible to CCN. Released in 2014 by Cooper & Elleway.

YOWIE

A medium to tall mid-season grain variety that is fully awned and white-chaffed. Stem rust R, stripe rust MR#, leaf rust R and resistant to CCN. Released in 2010, seed available from Cooper & Elleway.

TABLE 1 Triticale variety agronomic guide and disease reaction.

Variety	Maturity	Height	Head colour	Stem rust	Stripe rust	Leaf rust	Yellow leaf spot	Septoria tritici	CCN resistance	Pratylenchus neglectus resistance	Pratylenchus thornei resistance
Astute	M	M-T	W	RMR	RMR#	RMR	MRMS	MRMS	R	RMR	MS
Bison	M	T	W	RMR	R#	RMR	MR	MR	R	R	RMR
Fusion	M	M-T	W	R	RMR#	RMR	MRMS	MR	R	R	MSS
Goanna	E-M	T	W	R	RMR#	RMR	MR	MR	R	MRMS	SVS
KM10	E-M			R	RMR#	MRMS	MRMS	MR	S	MR	MSp
Yowie	M	M-T	W	R	MR#	R	MR	RMR	R	MR	MSS

Maturity: E = early, M = mid season, L = late, VL = very late Height: M = medium, T = tall Colour: W = white, Br = brown
Disease resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.
p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.
Varieties marked may be more susceptible if alternative strains are present.

TABLE 2 Triticale time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April				May				June				July			
Bison, Fusion, KM10, Goanna, Yowie				>	>	X	X	X	X	X	<	<				
WIMMERA	April				May				June				July			
Astute, Bison, Fusion, Goanna, Yowie					>	>	X		X	X	X	X	X	<		
KM10						>	>		X	X	X	X	X	X	<	
NORTH CENTRAL	April				May				June				July			
Astute, Bison, Fusion, Goanna, Yowie					>	>	X	X	X	X	<	<				
KM10						>	>	X	X	X	<	<				
NORTH EAST	April				May				June				July			
Astute, Bison, Fusion, Goanna, Yowie					>	X	X	X	<							
SOUTH WEST	April				May				June				July			
Astute, Bison, Fusion						>	>	X	X	X	X	X	<	<		

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 3 Mallee triticale long term predicted yield expressed as a percentage of mean yield.

Note that triticale is no longer tested by NVT and there are no 2016 results.

Year		2008	2009	2010	2011	2012	2013	2014	2015
Mean yield (t/ha)		0.88	2.76	3.37	3.58	1.68	1.48	2.28	1.08
	No. trials	1	2	2	2	2	2	2	2
Astute	6	106	103	111	104	110	104	113	118
Berkshire	12	98	109	104	98	97	104	103	97
Bison	6	134	116	106	101	105	114	113	112
Bogong	15	43	91	103	111	108	104	109	111
Canobolas	15	48	98	106	103	99	99	103	97
Chopper	15	132	114	95	98	97	113	103	97
Fusion	12	155	116	104	101	107	115	114	117
Goanna	10	102	98	98	100	100	100	99	100
Hawkeye	15	125	110	107	95	98	99	102	99
Jaywick	15	109	105	108	93	96	91	97	94
KM10	4	196	130	103	82	88	104	96	86
Rufus	15	115	98	96	100	101	100	98	101
Speedee	3	111	92	74	105	98	111	90	93
Tahara	15	107	97	95	101	100	101	98	100
Tickit	5	110	101	100	99	101	100	100	101
Tobruk	1	113	82	94	110	114	101	104	123
Tuckerbox	2	104	95	98	90	89	82	83	80
Yowie	12	96	99	103	93	93	88	92	89

TABLE 4 North East triticale long term predicted yield expressed as a percentage of mean yield.

Note that triticale is no longer tested by NVT and there are no 2016 results.

Year		2008	2009	2010	2011	2012	2013	2014	2015
Mean yield (t/ha)		2.27	2.18	4.16	4.89	4.38	5.79	4.31	4.05
	No. trials	2	2	2	2	2	2	2	2
Astute	6	105	107	116	116	113	118	116	111
Berkshire	16	102	108	104	104	104	99	111	105
Bison	6	118	116	112	112	110	111	122	109
Bogong	16	76	96	106	107	105	112	110	107
Canobolas	16	81	101	104	105	105	102	110	107
Chopper	16	114	111	99	99	99	95	110	100
Crackerjack	4	90	83	95	97	91	118	89	91
Endeavour	2	120	94	94	91	97	85	73	91
Fusion	12	126	116	113	112	109	113	120	107
Goanna	10	100	98	98	98	98	99	97	98
Hawkeye	16	114	109	106	106	106	101	107	104
Jaywick	16	107	104	104	103	105	97	101	103
Rufus	16	104	98	97	97	97	99	94	96
Speedee	4	95	89	77	78	78	85	80	82
Tahara	16	101	97	96	96	96	98	94	96
Tobruk	4	98	85	100	100	96	116	86	94
Tuckerbox	14	101	91	88	87	92	82	78	91
Yowie	12	100	97	97	96	99	92	91	98
Yukuri	1	85	81	86	83	92	74	64	90

TABLE 5 South West triticale long term predicted yield expressed as a percentage of mean yield.

Note that triticale is no longer tested by NVT and there are no 2016 results.

Year		2008	2009	2010	2011	2012	2013	2014	2015
Mean yield (t/ha)		4.24	4.31	3.21	4.21	4.19	3.88	5.75	3.08
	No. trials	4	4	4	4	4	1	1	1
Abacus	9	72	76	38	93	79	121	78	72
Astute	3	120	111	138	115	124	89	115	117
Berkshire	13	107	104	106	99	104	103	108	109
Bison	3	114	111	122	105	115	93	117	119
Bogong	14	107	99	98	107	112	109	108	107
Canobolas	13	109	101	103	102	108	111	108	108
Chopper	12	96	101	87	91	93	103	105	105
Crackerjack	7	80	86	63	105	95	97	89	84
Credit	4	71	72	17	77	65	147	77	71
El Alamein	9	107	103	125	114	113	88	97	99
Endeavour	10	98	103	128	101	93	82	83	86
Fusion	10	113	111	125	106	114	87	116	117
Goanna	7	97	98	95	99	97	100	97	97
Hawkeye	23	110	108	123	103	108	93	107	109
Jaywick	13	110	107	124	103	106	94	102	105
Rufus	13	94	98	94	99	95	97	95	94
Tahara	15	92	96	88	97	93	100	95	93
Tobruk	16	92	94	97	111	103	87	90	88
Tuckerbox	19	89	95	94	93	84	100	83	84
Yowie	15	101	101	109	99	97	99	94	96
Yukuri	21	94	95	110	96	85	101	75	77

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CANOLA

REVIEW OF 2016

Season

A poor subsoil moisture profile and limited rain over summer resulted in a similar canola planting area to the 2015 season. High pulse prices at the start of the 2016 season also contributed to competition for canola ground, while uncertainty surrounding the autumn break lead to limited dry sowing. After a dry start, May rainfall enabled good germination and establishment of canola crops across Victoria.

Continued rainfall throughout the season provided ideal growing conditions and meant that canola crops continued to develop well. Waterlogging was an issue for some growers in the South West and North East, but didn't affect the majority of canola crops.

Wet conditions throughout the season also provided ideal conditions for fungal diseases, particularly blackleg and sclerotinia in some regions, however well timed fungicide applications meant disease pressure was generally well managed.

Canola yields were above average across most of the state. Yields in the northern Mallee reached 1.8-2 t/ha whilst many canola crops in the Wimmera and North Central regions achieved over 2.5 t/ha, except for some small areas which were impacted by waterlogging in October and only achieved 1-1.2 t/ha. In the high rainfall zone, crops that were not impacted by waterlogging yielded 2.5-3.5 t/ha.

Mild conditions resulted in high oil content for all canola types across Victoria.

Disease and pest issues

The prolonged wet conditions provided the ideal environment for severe blackleg leaf lesions across most Victorian canola growing regions in 2016. However, crown canker severity was much lower than expected given the severe leaf infection. This unexpected result is thought to be due to mild spring conditions, as plants were not heat or water stressed, and therefore crown cankers were not expressed as in previous seasons.

Despite the low levels of crown cankers, cultivars with Group A resistance showed higher levels of crown canker severity at maturity compared to all other resistance groups. For further information on the monitoring of resistance groups, see the NVT website.

In previous seasons, early sowing has seen the emergence of upper canopy blackleg infections. Data has shown that this upper canopy infection is due to early sowing and therefore crops elongating and flowering in late winter. This means that infection affects branches directly rather than the leaves, as occurs in later developing crops. In 2016, severe flower and pod infection were present but stem/branch infection was limited compared to 2014/2015. It appears that the cool moist spring of 2016 delayed

upper canopy branch and stem infection to post-harvest.

In 2016, infection of pods by blackleg may have caused significant yield loss by premature loss of pods or reduced seed size. Early flowering crops are at greater risk of pod infection because they have prolonged exposure to blackleg spores and periods of wet weather during pod development.

Field tolerance to triazole fungicides was detected in 2015. Although no additional monitoring was carried out in 2016, glasshouse experiments showed that the increased tolerance detected in 2015 was specific to Jockey with no cross tolerance to Impact or ProSaro, despite all three fungicides belonging to the triazole chemistry. It is recommended that growers continue to use these fungicides carefully, only when required, and annually review the integrated disease management options in the GRDC Blackleg Management Guide.

Very little White leaf spot or Downy mildew were detected in Victoria in 2016. White leaf spot was detected again at the Hamilton NVT site although less severe than in previous seasons.

Wet conditions favoured the development of sclerotinia in 2016 with the disease being detected in six of the eight disease monitoring sites across Victoria. Severity of the disease varied dramatically across sites from single plants being detected through to moderate levels of disease, which would have impacted yield to some extent.

Alternaria was detected throughout Victoria in 2016 from trace levels to moderate severity. Alternaria infection causes premature pod infection and retaining seed for sowing from infected pods can lead to seedling blight.

Aphid numbers were low in 2016 and Beet western yellows virus (BWYV) did not cause obvious damage.

LOOKING FORWARD TO 2017

New varieties

The new listings for 2017 are;

- Clearfield tolerant hybrids – 44Y90 (CL), 45Y91 (CL)
- Clearfield specialty hybrids – Victory V7001CL
- Triazine tolerant hybrids – InVigor T 4510, Pioneer 44T02 TT, SF Ignite TT
- Roundup Ready hybrids – GT-53, InVigor R 5520P
- Roundup Ready specialty hybrids & OP's – Victory V5003RR

Varieties removed this year are;

- Conventional - AV Zircon
- Clearfield - Hyola® 474CL, Hyola® 577CL, Rimfire CL, Pioneer 45Y86 (CL), Pioneer 45Y88 (CL)
- Triazine tolerant specialty hybrids - Hyola® 450TT, Monola 314TT, Pioneer Sturt TT
- Roundup Ready - DG550RR, V5002RR, IH52 RR

Disease and pest management

Looking forward to the coming season, growers need to be aware that despite lower levels of blackleg in 2016 than expected, the inoculum load for 2017 will be extreme and therefore growers should consult the Blackleg Management Guide to minimise the impact of blackleg.

Specifically, growers should ensure that they are sowing this year's canola crop at least 500 metres from last year's stubble. Sow according to the normal flowering window to avoid blackleg infection during flowering and rotate blackleg resistance groups if high levels of internal canker disease were detected in 2016.

Growers should monitor infection levels throughout the season to ensure timely fungicide application and also take paddock cuts to determine each year whether internal infection is changing over time in varieties being grown on farm or nearby.

Do not retain seed from crops that had high levels of blackleg or alternaria pod infection in 2016. If retaining seed, grade it for larger seeds which are less likely to be infected with blackleg and ensure an even and adequate treatment with an appropriate fungicide to control seedling blight.

In 2016 sclerotinia was an issue in normal high risk areas but also present in regions where sclerotinia previously had not been a cause for concern. The survival structures of sclerotinia (sclerotia) can survive in the soil for a minimum of 5 years and growers need to take this into consideration when planning rotations.

Knowledge of paddock history and presence of sclerotinia in both canola and other broadleaf crops is key to minimising inoculum build up and planning fungicide applications in high risk areas.

Beet western yellows virus and Green peach aphid

While BWYV was not an important disease in 2016, it is always important to prevent aphid build up. Growers should manage weeds over summer particularly after summer rain and sow into standing stubble. Use seed dressings that are suitable for aphid control to provide protection for the first 4-5 weeks and monitor aphid numbers throughout the season.

Slugs

Slugs can be a major problem in the high rainfall zone where stubble is retained. Canola is one of the more susceptible crops to slugs particularly at the seedling stage. Summer rain and weed growth mean it is important to implement an integrated management plan.

Mice

The spring 2016 survey suggests mouse abundance is generally low across Victoria. However, earlier than usual breeding in the North West, high yielding crops and rainfall means an abundant food supply will favour population build-up. There is a high likelihood of an outbreak in the North West of the state in autumn.

Monitoring for the presence of mice is key for canola sown into cereal stubble. Growers should closely monitor numbers and activity and act accordingly. Relatively low mice populations can have a significant impact on crop establishment and baiting should be considered if mice are present pre-sowing.

Retaining seed

Research in South Australia has shown that newly purchased commercial hybrid seed yields 7-17 per cent better than sowing retained hybrid seed (which is no longer hybrid seed). Oil content is also significantly better for newly purchased hybrid seed.

Dual purpose canola

Southern Farming Systems trials have shown that long season "dual purpose" winter hybrid canola for grazing and grain production have performed well in the high rainfall zone. In autumn, established plants were more able to weather attacks from slugs and waterlogging. While in a dry spring the more robust root system was better able to access subsoil moisture. These dual purpose hybrid varieties are sown in late spring or early-mid summer and grazed until autumn or sown in autumn or early winter. Consult the GRDC factsheet: Spring sown winter canola.

Specialty canola (HOLL)

Specialty canola hybrids have a particular trait that produces a high stability oil profile (High Oleic, Low Linoleic or 'HOLL') which offers customers extended frying life and improved shelf stability. Specialty canola may be grown under contract with a premium paid to growers when the grain meets specifications. Specialty canola typically requires additional attention to quality but is grown agronomically similarly to commodity canola.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports App

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AG0750 Growing canola
- AG1352 Blackleg of canola
- AG1354 Canola diseases

www.grdc.com.au

- GrowNotes Canola Southern Region
- FACTSHEET: Blackleg Management Guide updated in March and September.
- FACTSHEET: Resistance management strategy for the green peach aphid in Australian grains
- Tips & Tactics: Reducing aphid and virus risk in 2015

www.extensionhub.com.au

- Blackleg monitoring summaries

VARIETY DESCRIPTIONS

([Ⓛ]) denotes Plant Breeders Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

OP = Open pollinated.

Blackleg ratings: R = resistant, MR = moderately resistant, S = susceptible, p = provisional ratings - treat with caution.

est = estimate by marketing company (yet to be rated)

Resistance order from highest to lowest:

R > R-MR > MR > MR-MS > MS > MSS > S

CONVENTIONAL VARIETIES

Conventional – AV-GARNET^(Ⓛ)

Mid maturing variety of medium height. Nuseed indicate very high oil content. Blackleg rating MR-MS. Bred by Agriculture Victoria. NVT tested 2006-14. Nuseed.

Hybrid Conventional – NUSEED DIAMOND

Early maturing hybrid of medium height suited to medium rainfall zones. Blackleg rating R-MR. NVT tested 2012-16. Nuseed.

OP Conventional – SF BRAZZIL

Late maturing winter dual purpose open-pollinated variety suited to early sowing and winter grazing in very high rainfall zones. Blackleg rating R. Seed Force. EPR \$7.

Hybrid Conventional – SF SENSATION

Very late maturing winter dual purpose hybrid suited to early sowing and winter grazing in very high rainfall areas. 2015 Blackleg rating R-MR. Seed Force.

CONVENTIONAL SPECIALTY HYBRID VARIETIES**Hybrid Specialty Oil – VICTORY® V3002**

Early-mid maturing conventional specialty hybrid. Cargill indicate high yield potential and oil content. Blackleg rating R-MR. NVT tested 2011-16. Bred by Cargill. Marketed by AWB under contract.

CLEARFIELD HYBRID VARIETIES**Hybrid Clearfield – ARCHER**

Mid to late maturing hybrid, slightly longer than 46Y83, suited to mid to longer growing seasons. Heritage Seeds indicate high yield potential with high to very high oil content. Blackleg rating MR-MS. NVT tested 2011-14. Marketed by Heritage Seeds.

Hybrid Clearfield – BANKER CL

Mid maturing hybrid, later than Carbine and earlier than Archer, suited to medium rainfall areas or later sowing in high rainfall zones. Blackleg rating MR. NVT tested 2014-16. Released 2015. Marketed by Heritage Seeds.

Hybrid Clearfield – CARBINE

Early-mid maturing hybrid. High oil content. Medium plant height. Blackleg rating MS. NVT tested 2011-13. Marketed by Heritage Seeds.

Hybrid Clearfield – HYOLA® 575CL

Mid to mid-early hybrid. Adapted for low to very high rainfall zones. Medium to tall height with good vigour and excellent flowering uniformity and standability. Blackleg rating R. NVT tested 2010-16. Bred and marketed by Advanta Seeds.

Hybrid Clearfield – HYOLA® 970CL

Long season winter dual purpose hybrid. Adapted to high to very high rainfall zones (>500 mm). Advanta Seeds indicate tall with excellent early biomass and excellent flowering uniformity. High yield and oil content. Blackleg rating R. Blackleg group H. Marketed by Advanta Seeds.

Hybrid Clearfield – PIONEER® 44Y89 (CL)

Early maturing variety. Suited to low to medium rainfall zones. Robust yields under stress induced environments. Short in height with excellent standability and harvest ease. Blackleg rating R-MR. NVT tested 2013-16. Marketed by Pioneer Seeds.

NEW Hybrid Clearfield – PIONEER® 44Y90 (CL)

Early-mid maturing hybrid. Suited to low to medium rainfall zones. Pioneer indicate exceptional adaptability and yield for maturity. Blackleg rating R-MR. NVT tested 2015-16 as PHI-1502. Released 2016. Marketed by Pioneer Seeds.

NEW Hybrid Clearfield – PIONEER® 45Y91 (CL)

Mid maturing hybrid variety. Suited to medium to high rainfall zones. Unique phenology allows for early planting and grazing potential. Blackleg rating R-MR. NVT tested 2014-16 as PHI-1402. Released 2016. Marketed by Pioneer Seeds.

Hybrid Clearfield – SF EDIMAX CL

Late maturing winter dual purpose hybrid. Suited to early sowing and spring sowing in high rainfall areas. Seed Force indicate very high biomass with excellent yield and oil content. Blackleg rating R-MR. Marketed by Seed Force.

CLEARFIELD SPECIALTY HYBRID**NEW Victory® Specialty Oil – VICTORY® V7001CL**

Late maturing specialty hybrid. High yield potential and oil content. Blackleg rating R-MR. Released 2017. Bred by Cargill. Marketed by AWB under contract.

TRIAZINE TOLERANT VARIETIES**OP Triazine Tolerant – ATR-BONITO[Ⓛ]**

Early mid maturing variety for low to medium rainfall zones. Short to medium height. Alternative to ATR Stingray, ATR Gem or Hyola® 559TT. Blackleg rating MR-MS. NVT tested 2012-16. Marketed by Nuseed. EPR \$5.

OP Triazine Tolerant – ATR-GEM[Ⓛ]

Early-mid maturity. Good vigour and short to medium height. Blackleg rating MR-MS. NVT tested 2011-15. Marketed by Nuseed.

OP Triazine Tolerant – ATR-MAKO

Early-mid maturing variety for low to medium rainfall zones. Alternative to ATR Gem, ATR Stingray or Crusher. Blackleg rating MR. Released 2015 and NVT tested 2014-16. Bred and marketed by Nuseed. EPR \$5.

OP Triazine Tolerant – ATR-STINGRAY[Ⓛ]

An early maturing variety. Moderate vigour with uniform short to medium height and compact pod set. Blackleg rating MR. NVT tested 2010-16. Bred by AgSeed Research and Agriculture Victoria. Marketed by Nuseed.

OP Triazine Tolerant – ATR-WAHOO[Ⓛ]

Mid-late maturing variety for medium to high rainfall zones and irrigation. Medium height. Alternative to Crusher TT or Thumper TT. Blackleg rating MR-MS. NVT tested 2012-16. Marketed by Nuseed. EPR \$5

Hybrid Triazine Tolerant – DG 560TT

Mid maturing hybrid. Suited to medium rainfall zones. Medium height and moderate oil content. Blackleg rating MR. NVT tested 2015-16 as SFR65-008TT. Released 2015. Marketed by Seednet and Landmark.

Hybrid Triazine Tolerant – HYOLA® 559TT

Mid maturing hybrid. Suited to low through to high rainfall zones including irrigation. Good seedling vigour, medium height and excellent flowering uniformity and shatter tolerance. Very high oil content. Blackleg rating R. NVT tested 2011-16. Bred and marketed by Advanta Seeds.

Hybrid Triazine Tolerant – HYOLA® 650TT

Mid to late hybrid. Suited to high to very high rainfall zones including irrigation. Good seedling vigour, medium plant height and excellent flowering and height uniformity. High oil content. Blackleg rating R. NVT tested 2013-16. Bred and marketed by Advanta Seeds.

NEW Hybrid Triazine Tolerant – InVigor T 4510

Early-mid maturing hybrid variety. Bayer indicate highly adaptable and high yielding with an anticipated blackleg rating of MR-MS (company rating). Medium-tall plant height. NVT tested 2016 as PJTT3. Released 2016. Bayer.

NEW Hybrid Triazine Tolerant – PIONEER® 44T02 TT

Early-mid maturing hybrid suited to low to medium rainfall areas. Pioneer indicate exceptional adaptability and yield for maturity and excellent early vigour. Blackleg rating R-MR. NVT tested 2015-16 as PHT-1504. Released 2016. Marketed by Pioneer Seeds.

Hybrid Triazine Tolerant – PIONEER® 45T01 TT

Mid maturing hybrid suited to medium to high rainfall zones. Pioneer indicate excellent early vigour, medium to tall height and very high oil content. Blackleg rating MR-MS. NVT tested 2013-16. Released 2015. Pioneer Seeds.

NEW Hybrid Triazine Tolerant – SF IGNITE TT

Mid maturing hybrid. Excellent early vigour. Suited to medium to high rainfall zones. Medium height and moderate oil content. Anticipated blackleg rating MR (company rating). NVT tested 2016 as SFR65-014TT. Bred by NPZ Australia. Marketed by Seed Force.

Hybrid Triazine Tolerant – SF TURBINE TT

Early-mid maturing hybrid. Excellent early vigour. Suited to medium rainfall zones. Medium height and moderate oil content. Blackleg rating MR. NVT tested 2015-16 as SFR65-009TT. Bred by NPZ Australia. Seed Force.

TRIAZINE TOLERANT SPECIALTY VARIETIES**OP Specialty Oil – MONOLA® 314TT**

Early-mid maturity for low to medium rainfall zones. Medium height. Blackleg rating MR. NVT tested 2013-16. Marketed under contract through Nuseed.

OP Specialty Oil – MONOLA® 416TT

Early-mid maturity for low to medium rainfall zones. Blackleg rating R-MR. NVT tested 2014-16. Released 2015. Marketed under contract through Nuseed.

OP Specialty Oil – MONOLA® 515TT

Mid maturity for medium to high rainfall zones. Medium height. Blackleg rating R-MR. NVT tested 2014-16. Marketed under contract through Nuseed.

ROUNDUP READY HYBRID VARIETIES**Hybrid Roundup Ready – DG 460RR**

Mid maturing hybrid. Blackleg rating of R-MR. Medium plant height with good standing ability. High oil content. NVT tested 2014-16. Released 2016. Bred and marketed by Seednet and Landmark.

Hybrid Roundup Ready – NUSEED GT-41

Early maturing variety. Nuseed indicate high yielding with good early vigour and high oil content. Blackleg rating R-MR. NVT tested 2012-16. Marketed by Nuseed.

Hybrid Roundup Ready – NUSEED GT-42

Early-mid maturing variety. Medium height. Blackleg rating R. NVT tested 2014-16. Released 2015. Nuseed.

Hybrid Roundup Ready – NUSEED GT-50

Mid maturing variety. Nuseed indicate high yielding with good early vigour and high oil content. Blackleg rating R-MR. NVT tested 2011-16. Bred and marketed by Nuseed.

NEW Hybrid Roundup Ready – NUSEED GT-53

Mid maturing hybrid variety. High yields and high oil content. Medium-tall height. Blackleg rating R. NVT tested 2015-16 as NCH13G046. Released 2017. Nuseed.

Hybrid Roundup Ready – HYOLA® 404RR

Early to early-mid season hybrid. Suited to medium to high rainfall zones including irrigation. Medium height, excellent early vigour, flowering uniformity and oil content. Blackleg rating R. NVT tested 2010-16. Bred and marketed by Advanta Seeds.

Hybrid Roundup Ready – HYOLA® 600RR

Mid to late hybrid. Suited to high to very high rainfall zones including irrigation with early April sowings. Medium-tall height with excellent seedling vigour and flowering uniformity. Very high oil content. Blackleg rating R. NVT tested 2014-16. Bred and marketed by Advanta Seeds.

Hybrid Roundup Ready – IH30 RR

Early flowering and maturity. Suited to low to medium rainfall zones. Blackleg rating MR. NVT tested 2012-16. Bred and marketed by Bayer.

Hybrid Roundup Ready – IH51 RR

Mid maturing variety. Suited to low to medium rainfall zones. PodGuard™ technology makes it suitable for flexible windrow timing or direct heading with reduced harvest losses. Blackleg rating MR. NVT tested 2014-16. Bred and marketed by Bayer.

NEW Hybrid Roundup Ready – InVigor R 5520P

Mid to mid-late maturing hybrid variety. PodGuard™ technology makes it suitable for flexible windrow timing or direct heading with reduced harvest losses. Medium height. Blackleg rating R-MR. NVT tested 2015-16 as AN14R9012. Released 2016. Bred and marketed by Bayer.

Hybrid Roundup Ready – PIONEER® 43Y23 (RR)

Early maturing hybrid. Wide adaptation, but best suited to Mallee and Wimmera districts. Excellent vigour, high yield potential and excellent shatter tolerance. Blackleg rating R-MR. NVT tested 2011-16. Bred and marketed by Pioneer Seeds.

Hybrid Roundup Ready – PIONEER® 44Y24 (RR)

Early-mid maturing variety for medium to high rainfall zones. Medium height and high yield. Consistent over a wide range of environments and seasons. Blackleg rating R-MR. NVT tested 2011-16. Bred and marketed by Pioneer Seeds.

Hybrid Roundup Ready – PIONEER® 44Y26 (RR)

Early-mid maturing variety. Suited to medium to high rainfall zones. 2015 Blackleg rating R-MR. NVT tested 2013-15. Bred and marketed by Pioneer Seeds.

Hybrid Roundup Ready – PIONEER® 45Y25 (RR)

Mid maturing variety. Suited to medium to high rainfall zones and irrigation. Medium-tall plant height with high oil content. Blackleg rating R-MR. NVT tested 2012-16. Bred and marketed by Pioneer Seeds.

ROUNDUP READY HIGH STABILITY VARIETIES**Hybrid Roundup Ready Speciality Oil – MONOLA® G11**

Early to early-mid maturing hybrid Monola. Medium-tall plant height. Blackleg rating R-MR. NVT tested 2013-16. Released 2015. Marketed under contract through Nuseed.

OP Roundup Ready Specialty Oil – MONOLA® 513GT

Mid maturing open pollinated Monola. Medium height. Blackleg rating MR. NVT tested 2012-16. Marketed under contract through Nuseed.

NEW Hybrid Roundup Ready Specialty Oil – VICTORY® V5003RR

Mid maturing specialty hybrid variety. High yield potential and oil content. Blackleg rating R-MR. Released 2016. NVT tested 2013-2016 as 10H4061. Bred by Cargill. Marketed by AWB under contract.

DUAL-HERBICIDE TOLERANT VARIETIES**Hybrid Roundup Triazine Tolerant – 3000 TR**

Early-mid maturing hybrid suited to low-medium rainfall zones. Blackleg rating MS. NVT tested 2015-16 as PJTT1. Released 2015. Marketed by Bayer.

Hybrid Roundup Triazine Tolerant – HYOLA® 525RT®

A mid maturing hybrid. Medium height. High oil content, excellent shatter tolerance and standability. Blackleg rating R-MR. NVT tested 2013-16. Bred and marketed by Advanta Seeds.

TABLE 1 Canola time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists. Note, early season varieties are not recommended to be sown in the Wimmera, North Central and North East, but in a late sowing when soils are very wet they may be an option.

MALLEE	April				May				June				July			
Early Season			X	X	X	X	<	<	*							
WIMMERA	April				May				June				July			
Early Season								<	<	<	*	*	*	*	*	
Early-Mid Season			>	>	X	X	X	<	<	<	*	*				
Mid Season			>	X	X	X	<	<	<	<						
NORTH CENTRAL	April				May				June				July			
Early Season								<	<	<	*	*	*	*	*	
Early-Mid Season			>	>	X	X	X	<	<	<	*	*				
Mid Season			>	X	X	X	<	<	<	<						
NORTH EAST	April				May				June				July			
Early Season								<	<	<	*	*	*	*	*	
Early-Mid Season			>	>	X	X	X	<	<	<	*	*				
Mid Season			>	X	X	X	<	<	<	<						
SOUTH WEST	April				May				June				July			
Early Season								>	>	>	X	X	X	X	X	<
Early-Mid Season								>	>	>	X	X	X	<		
Mid Season				>	X	X	X	X	X	X	X	X	<	<	<	
Mid-Late Season				>	X	X	X	X	X	X	X	<	<	<	<	
NORTHERN IRRIGATION	April				May				June				July			
Early Season				X	X	X	X	<	*	*						
Early-Mid Season				>	X	X	<	<	*							
Mid Season				>	X	X	<	<	*							

>earlier than ideal (or a later maturing variety is preferred), X optimum sowing time, < later than ideal but acceptable,

* only an acceptable option if very good subsoil moisture is available at sowing.

TABLE 2 Canola disease guide.

Disease	Organism	Symptoms	Occurrence	Inoculum source	Control
Blackleg	<i>Leptosphaeria maculans</i>	Leaf lesions, which may develop into canker on stem at or near ground level, plant death.	Spores from canola stubble are released in autumn to infect leaves of the new crop.	Canola stubble.	Resistant cultivars. Avoid sowing next to last year's canola stubble. Fungicides can be used.
Sclerotinia stem rot	<i>Sclerotinia</i> spp.	White fluffy growth on the stem, causing plant parts above this point to die. Affected area greyish white, sclerotia form on and inside the stems.	Favoured by damp humid spring weather during flowering.	Survives as sclerotia in the soil.	Fungicides
Damping off	<i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp.	Pre-emergence rot and seedlings fail to emerge. Post emergent plants collapse at ground level with leaves turning orange/purple.	In soils that have not been cultivated post opening rains. During cold wet periods.	Hyphal growth in the soil.	Seed dressings. Cultivation after the break of the season.
Alternaria leaf spot and black spot	<i>Alternaria brassicae</i>	Dark target like round spots which initially appear on leaves. Can spread to stems and pods and cause pod shattering.	Infection spreads with wet humid weather during spring.	Canola stubble.	Use clean seed. Use seed dressings if seed is infected.

TABLE 3 Canola variety blackleg ratings (GRDC Blackleg Management Guide, Spring 2016). Ratings will be updated in March 2017.

Variety	Maturity	Year of release	Blackleg resistance rating bare seed	Blackleg resistance rating + Jockey®	Blackleg resistance group	Open pollinated or hybrid	Marketer
CONVENTIONAL VARIETIES							
AV-Garnet	mid	2007	MR-MS		A	open	Nuseed
Nuseed Diamond	early	2013	R-MR		A, B, F	hybrid	Nuseed
SF Brazzil	late	2013	R		B, C	open	Seed Force
CONVENTIONAL SPECIALTY VARIETIES							
Victory® V3002	early-mid	2011	R-MR	R	A, B, F	hybrid	AWB
CLEARFIELD TOLERANT VARIETIES							
Archer	mid	2012	MR-MS	R-MR	C	hybrid	Heritage Seeds
Banker CL	mid	2015	MR	R	A	hybrid	Heritage Seeds
Carbine	early-mid	2012	MS	MR	A	hybrid	Heritage Seeds
Hyola® 575CL	mid	2010	R		B, F	hybrid	Advanta Seeds
Hyola® 970CL	late	2014	R		H	hybrid	Advanta Seeds
Pioneer 44Y89(CL)	early	2014	R-MR	R	B, C	hybrid	Pioneer Seeds
Pioneer 44Y90(CL)	early-mid	2016	R-MR	R	B	hybrid	Pioneer Seeds
Pioneer 45Y91(CL)	mid	2016	R-MR	R	B	hybrid	Pioneer Seeds
SF Edimax CL	late	2014	R-MR	R	C	hybrid	Seed Force
CLEARFIELD SPECIALTY HYBRID VARIETIES							
Victory® V7001CL	late	2017	R-MR	R	A, B, F	hybrid	AWB
TRIAZINE TOLERANT VARIETIES							
ATR-Bonito	early-mid	2013	MR-MS		A	open	Nuseed
ATR-Gem	early-mid	2011	MR-MS		A	open	Nuseed
ATR-Mako	early-mid	2015	MR	R	A	open	Nuseed
ATR-Stingray	early	2011	MR		C	open	Nuseed
ATR-Wahoo	mid	2013	MR-MS		A	open	Nuseed
DG 560TT	mid	2015	MR	R	B, F	hybrid	Landmark
Hyola® 559TT	mid	2012	R		A, B, D	hybrid	Advanta Seeds
Hyola® 650TT	mid-late	2013	R		A, B, D	hybrid	Advanta Seeds
InVigor T 4510	early-mid	2016	MR-MS (est)	MR (est)	unknown	hybrid	Bayer
Pioneer 44T02 TT	early-mid	2016	R-MR	R	A, B, D	hybrid	Pioneer Seeds
Pioneer 45T01 TT	mid	2015	MR-MS	R-MR	A, B	hybrid	Pioneer Seeds
SF Ignite TT	mid	2016	MR (est)		unknown	hybrid	Seed Force
SF Turbine TT	early	2015	MR	R	B, F	hybrid	Seed Force
TRIAZINE TOLERANT SPECIALTY VARIETIES							
Monola 314TT	early-mid	2013	MR		unknown	open	Nuseed
Monola 416TT	early-mid	2015	R-MR	R	B	open	Nuseed
Monola 515TT	mid	2015	R-MR		unknown	open	Nuseed
ROUNDUP READY VARIETIES							
DG 460RR	mid	2016	R-MR	R	A	hybrid	Landmark
GT-41	early	2012	R-MR		A, B, F	hybrid	Nuseed
GT-42	early-mid	2015	R	R	A, B, D, F	hybrid	Nuseed
GT-50	mid	2012	R-MR		A, B, F	hybrid	Nuseed
GT-53	mid	2016	R	R	unknown	hybrid	Nuseed
Hyola® 404RR	early-mid	2010	R		A, B, D	hybrid	Advanta Seeds
Hyola® 600RR	mid-late	2014	R		A, B, D	hybrid	Advanta Seeds
IH30 RR	early	2013	MR	R	A, B	hybrid	Bayer
IH51 RR	mid	2014	MR		A	hybrid	Bayer
InVigor R 5520P	mid-mid late	2016	R-MR	R	A, C	hybrid	Bayer
Pioneer 43Y23 (RR)	early	2012	R-MR	R	B	hybrid	Pioneer Seeds
Pioneer 44Y24 (RR)	mid-early	2013	R-MR	R	C	hybrid	Pioneer Seeds
Pioneer 45Y25 (RR)	mid	2014	R-MR	R	B, C	hybrid	Pioneer Seeds
ROUNDUP READY SPECIALTY VARIETIES							
Monola G11	early-mid	2015	R-MR	R-MR	A, B, S	hybrid	Nuseed
Monola 513GT	mid	2012	MR		A	open	Nuseed
VICTORY V5003RR	mid	2016	R-MR	R	A	hybrid	AWB

(CONTINUED) TABLE 3 Canola variety blackleg ratings (GRDC Blackleg Management Guide, Spring 2016). Ratings will be updated in March 2017.

Variety	Maturity	Year of release	Blackleg resistance rating bare seed	Blackleg resistance rating + Jockey®	Blackleg resistance group	Open pollinated or hybrid	Marketer
ROUNDUP READY AND TRIAZINE TOLERANT							
3000 TR	early	2015	MS	MR	B	hybrid	Bayer
Hyola® 525RT®	mid	2013	R-MR		A, B, D	hybrid	Advanta Seeds
Hyola® 725RT®	mid-late	2014	R-MR		A, B, D	hybrid	Advanta Seeds

Resistance order from highest to lowest: R > R-MR > MR > MR-MS > MS > MSS > S
R = resistant, M = moderately, S = susceptible, p = provisional ratings - treat with caution.
est = estimate by marketing company (yet to be rated)

TABLE 4 Mallee IMI tolerant canola (early season). Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year		2012	2013	2014	2015	2016
Mean yield (t/ha)		1.27	0.66	0.52	0.44	2.72
	No. trials	2	2	3	1	3
Archer	4	99	91	85	83	102
Banker CL	4	98	109	96	130	133
Carbine	4	104	108	104	95	94
Hyola 474CL	10	100	108	101	114	114
Hyola 575CL	9	100	104	99	111	111
Pioneer 43C80 (CL)	2	89	54	90	80	76
Pioneer 43Y85 (CL)	7	98	87	94	83	88
Pioneer 44Y84 (CL)	4	105	109	103	88	91
Pioneer 44Y87 (CL)	8	103	107	99	94	100
Pioneer 44Y89 (CL)	8	108	132	113	118	113
Pioneer 44Y90 (CL)	4	114	156	117	128	125
Pioneer 45Y82 (CL)	2	107	125	103	103	110
Pioneer 45Y88 (CL)	2	93	75	81	89	104
Rimfire CL	4	99	91	100	90	87
Xceed Oasis CL	4	87	49	90	81	75

TABLE 5 Mallee triazine tolerant canola (early season). Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year		2012	2013	2014	2015	2016
Mean yield (t/ha)		1.27	0.66	0.52	0.44	2.72
	No. trials	2	2	3	1	3
ATR Bonito	11	94	82	97	102	97
ATR Gem	4	92	73	91	94	94
ATR Mako	1	97	91	97	98	99
ATR Stingray	11	92	82	98	113	105
CB Junee HT	2	98	92	95	98	101
CB Nitro HT	2	104	110	105	99	97
Crusher TT	2	99	93	96	92	96
Hyola 450TT	9	104	110	95	89	102
Hyola 559TT	11	104	117	101	106	111
InVigor T 4510	3	106	128	108	116	115
Monola 314TT	2	87	55	92	94	85
Monola 413TT	4	89	56	89	82	79
Monola 416TT	1	89	73	96	114	105
Monola 515TT	1	84	39	79	77	81
Pioneer 44T02 TT	4	108	130	107	109	112
Pioneer 45T01TT	3	104	108	99	89	96
Pioneer Atomic TT	4	104	108	99	89	96
Pioneer Sturt TT	4	92	75	98	104	95
SF Turbine TT	3	101	109	97	111	116
Telfer	4	89	58	103	90	70

TABLE 6 Mallee Roundup Ready canola (early season). Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year		2012	2013	2014	2015	2016
Mean yield (t/ha)		1.27	0.66	0.52	0.44	2.72
	No. trials	2	2	3	1	3
CB Status RR	4	99	95	101	96	93
GT Cobra	4	96	94	96	113	112
GT Viper	4	90	67	91	94	91
Hyola 400RR	6	108	128	111	109	106
Hyola 404RR	11	111	136	117	110	102
IH30 RR	11	112	139	121	110	99
Monola 513GT	4	96	87	98	100	96
Nuseed GT-41	7	109	134	123	118	100
Nuseed GT-42	4	100	103	98	106	109
Nuseed GT-53	1	109	132	109	111	112
Pioneer 43Y23 (RR)	11	111	142	122	122	109
Pioneer 44Y24 (RR)	11	113	148	116	119	116
Pioneer 44Y26 (RR)	4	105	116	94	96	112
Victory V5002RR	2	99	99	100	102	102
VT 525 G	4	89	43	68	46	72

TABLE 7 North Central and North East conventional canola (mid season). Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	North Central						North East					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.91	2.51	2.91	0.70	3.67		2.63	1.62	2.97	1.19	3.07
	No. trials	1	1	1	1	1	No. trials	1	1	1	1	1
AV Garnet	5	103	99	102	95	107	5	103	98	99	95	106
AV Zircon	4	100	99	101	95	90	4	102	99	98	89	95
CB Agamax	2	100	101	99	114	92	2	99	101	99	109	92
CB Tango C	2	99	98	100	97	95	2	99	98	97	96	96
Hyola 50	3	105	110	102	119	92	3	106	109	107	109	97
Hyola 635CC	2	99	109	101	89	100	1	102	108	110	90	108
Nuseed Diamond	5	108	111	101	143	106	5	103	112	110	138	102
Victory V3002	4	104	103	102	107	99	3	104	103	102	102	101

TABLE 8 South West and Wimmera conventional canola (mid season). Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	South West				Wimmera				
		2012	2013	2016		2012	2014	2015	2016
Mean yield (t/ha)		2.97	2.51	2.62		1.73	1.10	0.66	4.38
	No. trials	1	1	1	No. trials	1	1	1	1
AV Garnet	3	107	103	116	4	103	98	92	105
AV Zircon	2	96	97	92	3	98	95	93	94
CB Agamax	1	96	95	86	1	101	104	119	96
Hyola 50	2	99	104	93	2	105	107	126	99
Nuseed Diamond	2	109	108	105	4	113	120	156	111
Victory V3002	2	103	103	103	3	103	102	108	101

**TABLE 9 North Central and North East IMI tolerant canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.**

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	North Central					North East						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.20	2.03	1.76	0.70	3.75		2.70	2.04	2.95	1.71	3.12
	No. trials	2	2	2	1	2	No. trials	2	2	2	2	2
Archer	7	103	100	129	95	101	8	104	105	103	95	104
Banker CL	4	108	109	103	111	119	5	106	108	112	113	119
Carbine	4	99	99	88	106	95	4	99	96	96	102	93
Hyola 474CL	8	96	99	94	88	103	9	96	100	102	96	103
Hyola 575CL	9	95	99	96	87	101	10	95	100	101	95	102
Hyola 577CL	5	98	98	104	82	112	7	97	99	103	96	111
Pioneer 44Y84 (CL)	4	102	100	106	112	89	4	103	100	97	101	91
Pioneer 44Y87 (CL)	5	102	101	101	107	99	6	102	101	100	103	99
Pioneer 44Y89 (CL)	6	104	107	87	119	102	4	103	104	104	111	102
Pioneer 44Y90 (CL)	3	112	113	105	125	119	2	110	112	116	119	121
Pioneer 45Y86 (CL)	7	104	103	112	109	97	8	104	105	102	102	99
Pioneer 45Y88 (CL)	9	103	101	107	96	112	10	102	102	105	102	112
Pioneer 45Y91 (CL)	3	107	108	113	109	114	3	107	110	112	109	116
Rimfire CL	4	101	101	114	101	95	5	102	105	102	97	98

**TABLE 10 South West and Wimmera IMI tolerant canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.**

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	South West					Wimmera						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.38	2.47	1.97	1.52	2.76		1.93	2.76	1.12	0.66	3.57
	No. trials	2	3	1	2	3	No. trials	2	1	2	1	2
Archer	8	107	110	106	94	107	5	101	108	96	92	95
Banker CL	5	119	116	120	128	128	4	113	113	110	112	122
Carbine	5	92	92	93	104	93	2	99	93	102	108	98
Hyola 474CL	7	103	101	102	87	98	8	94	103	98	86	102
Hyola 575CL	11	101	100	101	84	95	8	93	102	97	85	100
Hyola 577CL	9	111	105	107	85	113	4	99	105	95	76	111
Pioneer 44Y84 (CL)	5	91	96	94	108	91	3	101	96	101	115	88
Pioneer 44Y87 (CL)	3	99	100	100	108	101	5	102	100	102	108	99
Pioneer 44Y89 (CL)	1	101	102	105	126	103	5	106	102	111	124	107
Pioneer 44Y90 (CL)	2	120	120	125	146	131	3	118	116	116	129	123
Pioneer 45Y86 (CL)	6	100	104	102	110	100	6	103	103	103	112	94
Pioneer 45Y88 (CL)	11	112	109	110	104	118	8	106	107	101	93	113
Pioneer 45Y91 (CL)	3	117	117	119	122	122	3	110	114	108	110	114
Rimfire CL	4	99	104	101	97	94	3	98	104	99	102	90

TABLE 11 North Central and North East triazine tolerant canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	North Central					North East						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.20	2.03	1.76	0.70	3.75		2.70	2.04	2.95	1.71	3.12
	No. trials	2	2	2	1	2	No. trials	2	2	2	2	2
ATR Bonito	9	102	97	102	102	101	10	102	95	96	101	99
ATR Gem	9	100	94	108	92	101	10	100	94	95	95	98
ATR Mako	5	101	99	101	102	98	6	101	98	97	100	97
ATR Stingray	9	94	94	71	91	102	4	93	89	93	99	97
ATR Wahoo	6	100	92	119	81	106	10	100	94	96	91	104
Bayer 3000 TR	1	101	101	93	114	92	-	-	-	-	-	-
CB Jardee HT	4	96	92	115	93	79	4	98	95	88	87	80
CB Nitro HT	3	97	99	89	110	79	4	98	98	92	98	80
Crusher TT	4	104	97	112	98	107	4	103	97	99	100	104
DG 560TT	3	102	102	94	111	99	4	102	101	100	105	99
Hyola 450TT	7	96	99	90	96	96	4	96	99	99	97	96
Hyola 525RT	7	97	98	88	99	96	8	97	96	96	99	95
Hyola 555TT	4	98	101	89	96	105	4	98	99	102	101	104
Hyola 559TT	9	102	104	96	107	102	10	101	104	104	105	103
Hyola 650TT	4	97	100	103	85	107	7	97	102	104	95	107
Hyola 656TT	4	99	99	104	92	105	4	99	100	101	98	104
Hyola 725RT	-	-	-	-	-	-	5	101	101	99	92	98
InVigor T 4510	2	104	105	104	100	115	2	103	106	110	106	116
Monola 314TT	5	94	89	90	92	85	6	95	86	84	90	81
Monola 413TT	4	92	85	96	83	84	4	93	84	81	85	79
Monola 416TT	5	95	94	85	89	101	6	95	91	93	96	97
Monola 515TT	5	87	85	100	63	91	6	89	88	87	78	88
Monola 605TT	3	86	80	91	61	89	3	87	79	79	77	83
Pioneer 44T02 TT	3	99	105	82	108	99	2	98	104	104	106	100
Pioneer 45T01TT	5	103	100	105	107	100	7	103	100	99	103	99
Pioneer Atomic TT	6	103	99	115	110	90	6	104	101	97	99	92
Pioneer Sturt TT	4	94	94	74	96	92	4	93	89	89	97	88
SF Ignite TT	2	104	101	102	94	120	2	102	100	106	105	117
SF Turbine TT	3	101	104	78	109	109	4	100	100	104	110	107
Thumper TT	3	90	87	100	58	109	4	90	88	92	83	104

TABLE 12 South West and Wimmera triazine tolerant canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	South West					Wimmera						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.38	2.47	1.97	1.52	2.76		1.93	2.76	1.12	0.66	3.57
	No. trials	2	3	1	2	3	No. trials	2	1	2	1	2
ATR Bonito	11	99	96	97	104	106	8	105	95	99	101	103
ATR Gem	11	99	96	95	91	106	8	102	95	94	88	101
ATR Mako	6	98	97	97	102	100	5	102	97	99	103	99
ATR Stingray	5	94	87	91	90	97	8	97	89	97	88	109
ATR Wahoo	11	105	100	98	80	114	3	103	98	89	73	104
Bayer 3000 TR	-	-	-	-	-	-	2	101	95	104	119	94
CB Jardee HT	5	82	88	81	76	76	3	91	89	89	93	73
Crusher TT	5	106	102	102	102	116	3	108	99	97	95	107
DG 560TT	3	98	99	100	113	100	3	103	99	105	114	101
Hyola 450TT	3	95	96	96	92	89	7	94	98	99	97	96
Hyola 525RT	9	94	93	93	95	92	6	97	94	99	99	98
Hyola 555TT	5	103	100	103	99	103	3	99	101	101	96	107
Hyola 559TT	11	102	103	105	111	101	8	102	103	105	110	103
Hyola 650TT	8	107	106	106	85	104	4	96	106	97	81	104
Hyola 656TT	5	105	103	103	94	105	3	100	102	98	90	104
Hyola 725RT	6	100	103	99	86	98	-	-	-	-	-	-
InVigor T 4510	-	-	-	-	-	-	2	106	111	105	99	116
Monola 314TT	2	81	79	77	79	81	3	93	81	90	90	86
Monola 413TT	5	80	77	74	66	79	3	90	79	85	78	83
Monola 416TT	5	96	90	92	87	99	4	97	91	95	86	105
Monola 515TT	5	89	85	82	46	81	5	83	88	80	54	86
Monola 605TT	4	83	75	73	42	81	3	84	79	77	51	89
Pioneer 44T02 TT	2	99	100	103	110	93	3	97	102	107	113	102
Pioneer 45T01TT	6	100	100	100	109	105	5	105	99	101	107	101
Pioneer Atomic TT	3	94	99	95	106	95	6	102	97	99	112	88
Pioneer Sturt TT	-	-	-	-	-	-	3	94	85	97	96	97
SF Ignite TT	3	117	109	112	107	128	2	110	106	101	89	123
SF Turbine TT	-	-	-	-	-	-	3	105	101	108	111	117
Thumper TT	5	104	93	93	52	106	2	91	95	82	45	107

TABLE 13 North Central and North East Roundup Ready canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	North Central					North East						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.20	2.03	1.76	0.70	3.75		2.70	2.04	2.95	1.71	3.12
	No. trials	2	2	2	1	2	No. trials	2	2	2	2	2
CB Frontier RR	4	97	102	90	94	105	4	96	103	105	100	105
CB Status RR	4	90	92	78	103	67	2	92	89	81	90	66
DG 460RR	3	103	104	103	101	110	4	102	104	106	104	110
DG 550RR	4	97	100	103	88	103	5	97	103	104	95	105
GT Cobra	4	99	98	87	103	100	4	99	95	96	102	97
GT Viper	4	93	89	87	89	87	4	94	87	85	91	83
Hyola 400RR	4	102	107	84	111	109	4	101	104	107	110	108
Hyola 404RR	9	104	109	82	125	100	10	103	105	105	114	101
Hyola 500RR	4	100	106	93	103	103	4	99	107	108	104	106
Hyola 504RR	1	98	105	98	93	107	4	98	108	109	100	110
Hyola 505RR	3	101	104	93	106	103	3	100	103	104	105	103
Hyola 525RT	1	97	98	88	99	96	1	97	96	96	99	95
Hyola 600RR	2	106	105	131	105	102	5	107	111	109	100	107
IH30 RR	9	103	106	85	124	91	3	103	103	101	110	93
IH50 RR	6	102	103	101	108	99	6	102	104	103	103	100
IH51 RR	5	106	103	105	117	97	6	106	102	100	107	98
IH52 RR	6	102	103	106	100	106	7	102	104	105	102	107
InVigor R 5520P	2	109	104	97	119	113	4	107	100	104	114	110
Monola 513GT	6	99	98	92	102	96	8	99	96	95	100	94
Monola G11	4	106	109	91	134	88	7	106	107	102	113	91
Nuseed GT-41	7	103	105	70	121	105	4	101	98	101	115	102
Nuseed GT-42	4	105	105	104	113	103	2	105	104	105	108	104
Nuseed GT-50	9	110	110	102	124	112	10	109	108	110	116	112
Nuseed GT-53	4	114	115	128	131	107	4	114	119	117	116	113
Pioneer 43Y23 (RR)	7	108	113	93	129	106	4	107	111	111	117	109
Pioneer 44Y24 (RR)	9	108	109	96	119	112	10	106	108	110	114	112
Pioneer 44Y26 (RR)	3	109	105	118	117	104	4	109	106	105	108	105
Pioneer 45Y22 (RR)	4	104	104	119	95	113	4	104	108	110	101	115
Pioneer 45Y25 (RR)	9	109	110	116	111	117	9	108	112	115	111	120
Victory V5002RR	7	101	101	117	94	104	7	102	105	105	97	106
Victory V5003RR	6	105	103	115	106	102	7	105	104	104	103	104

TABLE 14 South West and Wimmera Roundup Ready canola (mid season).
Long term predicted yield expressed as a percentage of mean yield.

N.B. These trials were not structured to allow comparisons between different chemistry types.

Year	South West						Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		2.38	2.47	1.97	1.52	2.76		1.93	2.76	1.28	0.66	3.57
	No. trials	2	3	1	2	3	No. trials	2	1	3	1	2
CB Frontier RR	5	104	103	105	95	99	3	95	105	103	93	105
DG 460RR	5	110	108	110	109	113	3	105	107	102	101	111
DG 550RR	5	105	105	105	86	99	3	94	106	99	86	100
GT Cobra	5	96	93	95	104	100	3	102	93	100	103	104
GT Viper	5	83	80	79	78	82	3	92	82	93	87	90
Hyola 400RR	2	107	105	109	120	108	4	105	105	108	114	114
Hyola 404RR	7	99	101	105	132	100	9	106	101	112	133	105
Hyola 500RR	5	105	107	109	106	98	4	97	109	107	105	103
Hyola 504RR	3	109	110	111	95	100	1	95	112	104	92	104
Hyola 505RR	5	103	103	105	109	101	3	101	103	105	108	104
Hyola 525RT	2	94	93	93	95	92	-	-	-	-	-	-
Hyola 600RR	6	109	116	112	107	107	4	104	113	101	105	94
IH30 RR	-	-	-	-	-	-	9	102	97	111	133	95
IH50 RR	6	100	103	103	109	99	6	101	103	104	111	99
IH51 RR	6	98	101	101	121	103	6	107	99	104	121	99
IH52 RR	8	107	108	108	104	107	6	102	107	101	99	105
InVigor R 5520P	5	109	105	109	134	125	2	117	101	104	121	120
Monola 513GT	5	94	93	93	100	95	3	100	93	100	103	98
Monola G11	4	90	98	99	135	87	-	-	-	-	-	-
Nuseed GT-41	1	99	95	101	131	106	7	108	95	110	126	115
Nuseed GT-42	2	105	106	107	120	109	2	107	104	104	116	105
Nuseed GT-50	11	112	113	116	140	122	9	116	109	109	129	116
Nuseed GT-53	5	115	125	123	145	118	3	115	120	111	139	103
Pioneer 43Y23 (RR)	5	108	111	115	142	110	9	111	110	114	137	110
Pioneer 44Y24 (RR)	11	112	111	115	133	118	9	112	109	109	123	116
Pioneer 44Y26 (RR)	6	107	110	109	125	115	3	112	106	103	120	103
Pioneer 45Y22 (RR)	5	116	116	116	103	119	3	105	114	99	93	109
Pioneer 45Y25 (RR)	10	121	121	123	126	127	8	112	118	105	112	116
Victory V5002RR	6	107	109	107	94	105	7	100	108	98	92	99
Victory V5003RR	8	105	107	106	110	108	6	106	105	100	107	100

TABLE 15 Early season canola - Mallee, 2016. Yield expressed as a percentage of the site mean yield.

	IMI tolerant			Roundup Ready		
	Birchip	Hopetoun	Ultima		Hopetoun	Ultima
Sowing Date*	1/5/16	1/5/16	1/5/16	Sowing Date*	1/5/16	1/5/16
Banker CL	113	107	117	Hyola 404RR	94	89
Hyola 474CL	91	-	92	IH30 RR	89	96
Hyola 575CL	91	82	90	Nuseed GT-42	99	103
Pioneer 44Y89 (CL)	89	89	91	Nuseed GT-53	101	-
Pioneer 44Y90 (CL)	102	104	101	Pioneer 43Y23 (RR)	102	100
				Pioneer 44Y24 (RR)	106	105
Site Mean (t/ha)	2.43	3.13	2.96	Site Mean (t/ha)	2.63	2.86
CV (%)	8	4	3	CV (%)	5	3
LSD (%)	12	6	6	LSD (%)	8	6

* Sowing Date / Germination Rain Date

TABLE 16 Early season canola - Mallee, 2016. Oil content (%).

	IMI tolerant			Roundup Ready		
	Birchip	Hopetoun	Ultima		Hopetoun	Ultima
Banker CL	44.8	44.9	44.2	Hyola 404RR	47.6	45.7
Hyola 474CL	45.6	-	43.0	IH30 RR	44.9	43.3
Hyola 575CL	45.1	44.5	43.0	Nuseed GT-42	46.5	44.5
Pioneer 44Y89 (CL)	43.0	45.7	44.5	Nuseed GT-53	47.1	-
Pioneer 44Y90 (CL)	44.3	44.2	43.2	Pioneer 43Y23 (RR)	44.0	40.9
				Pioneer 44Y24 (RR)	45.3	42.4

TABLE 17 Conventional canola (mid season) 2016. Yield expressed as a percentage of the site mean yield and oil content (%).

	Yield (%)				Oil (%)			
	North Central	North East	South West	Wimmera	North Central	North East	South West	Wimmera
	Diggora	Wunghnu	Lake Bolac	Minyip	Diggora	Wunghnu	Lake Bolac	Minyip
Sowing Date*	6/5/16	5/5/16	30/4/16	29/4/16				
AV Garnet	88	102	104	108	47.3	47.3	47.0	43.0
Nuseed Diamond	102	97	98	99	47.1	47.7	46.3	43.5
Victory V3002	-	-	79	-	-	-	45.6	-
Site Mean (t/ha)	3.73	3.24	3.05	4.81				
CV (%)	6	7	10	5				
LSD (%)	10	11	15	8				

* Sowing Date / Germination Rain Date

TABLE 18 IMI tolerant canola (mid season) 2016. Yield expressed as a percentage of the site mean yield.

	North Central		North East		South West			Wimmera
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh ¹	Lake Bolac	Minyip
Sowing Date*	29/4/16	6/5/16	5/5/16	12/5/16	6/5/16	1/5/16	30/4/16	29/4/16
Banker CL	111	100	102	101	102	110	114	95
Hyola 474CL	-	94	100	-	-	-	-	83
Hyola 575CL	88	92	88	81	95	75	76	91
Hyola 577CL	-	-	-	106	98	99	114	-
Pioneer 44Y89 (CL)	90	93	-	-	-	-	-	99
Pioneer 44Y90 (CL)	110	117	-	-	-	-	-	106
Pioneer 45Y88 (CL)	108	101	100	88	106	102	90	100
Pioneer 45Y91 (CL)	102	99	105	103	102	109	97	101
Site Mean (t/ha)	4.27	4.01	3.60	3.23	3.13	2.94	2.61	4.97
CV (%)	6	5	6	6	6	7	12	5
LSD (%)	10	9	10	10	8	12	18	8

* Sowing Date / Germination Rain Date

¹ Lime was surface applied at 5 t/ha on the 7/3/16 and incorporated at Inverleigh.**TABLE 19** IMI tolerant canola (mid season) 2016. Oil content (%).

	North Central		North East		South West			Wimmera
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh	Lake Bolac	Minyip
Banker CL	44.3	46.8	47.4	46.7	45.0	44.8	45.5	44.9
Hyola 474CL	-	46.7	46.2	-	-	-	-	43.7
Hyola 575CL	43.8	46.1	46.4	45.5	45.3	43.9	46.7	43.9
Hyola 577CL	-	-	-	46.0	45.0	45.2	48.7	-
Pioneer 44Y89 (CL)	44.4	45.6	-	-	-	-	-	43.7
Pioneer 44Y90 (CL)	44.8	47.0	-	-	-	-	-	45.3
Pioneer 45Y88 (CL)	43.1	46.0	46.2	44.9	44.1	43.9	46.3	42.3
Pioneer 45Y91 (CL)	43.2	47.1	47.5	45.8	45.7	44.1	46.5	44.2

TABLE 20 Triazine tolerant canola (mid season) 2016. Yield expressed as a percentage of the site mean yield.

	North Central		North East		South West			Wimmera	
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh ¹	Lake Bolac	Kaniva	Minyip
Sowing Date*	29/4/16	6/5/16	5/5/16	12/5/16	6/5/16	1/5/16	30/4/16	29/4/16	29/4/16
ATR Bonito	96	99	104	92	100	110	113	101	101
ATR Gem	102	96	94	97	89	98	117	93	94
ATR Mako	105	98	93	98	97	89	76	71	99
ATR Stingray	105	102	-	-	-	-	-	121	103
ATR Wahoo	-	-	95	101	108	112	121	-	-
Bayer 3000 TR	80	-	-	-	-	-	-	-	98
DG 560TT	100	93	86	97	94	90	97	90	91
Hyola 450TT	98	90	-	-	-	-	-	88	92
Hyola 525RT	88	93	97	97	88	86	66	78	91
Hyola 559TT	90	99	96	96	109	100	93	91	109
Hyola 650TT	-	-	112	106	102	91	94	-	100
Hyola 725RT	-	-	93	99	99	103	89	-	-
InVigor T 4510	118	111	117	118	-	-	-	110	115
Monola 416TT	102	104	99	85	91	86	91	93	99
Monola 515TT	88	84	81	76	77	70	59	93	75
Pioneer 44T02 TT	99	85	-	-	-	-	-	106	93
Pioneer 45T01TT	-	101	96	98	108	102	115	92	98
SF Ignite TT	118	112	116	112	122	136	128	117	112
SF Turbine TT	102	104	103	102	-	-	-	126	107
Site Mean (t/ha)	3.60	3.59	2.83	3.26	2.78	2.46	2.13	2.71	3.92
CV (%)	6	6	8	6	7	9	14	12	6
LSD (%)	12	10	13	10	9	14	22	21	10

* Sowing Date / Germination Rain Date

¹ Lime was surface applied at 5 t/ha on the 7/3/16 and incorporated at Inverleigh.**TABLE 21** Triazine tolerant canola (mid season) 2016. Oil content (%).

	North Central		North East		South West			Wimmera	
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh	Lake Bolac	Kaniva	Minyip
ATR Bonito	44.5	48.2	48.6	48.2	47.0	45.7	48.5	43.6	46.6
ATR Gem	43.0	47.4	48.6	46.6	46.0	44.8	46.9	43.3	45.4
ATR Mako	41.9	45.6	46.1	44.5	45.1	43.8	45.0	41.3	44.2
ATR Stingray	45.7	46.7	-	-	-	-	-	42.5	46.1
ATR Wahoo	-	-	48.9	46.4	46.2	45.1	47.2	-	-
Bayer 3000 TR	41.7	-	-	-	-	-	-	-	44.2
DG 560TT	40.6	43.8	44.2	44.2	43.5	42.3	43.7	40.2	42.7
Hyola 450TT	44.4	47.3	-	-	-	-	-	44.4	46.2
Hyola 525RT	44.2	48.3	44.0	46.3	46.7	45.3	45.9	42.4	45.9
Hyola 559TT	43.8	45.3	47.7	46.5	46.8	46.0	47.0	44.2	46.1
Hyola 650TT	-	-	48.1	46.8	45.7	45.1	46.5	-	45.7
Hyola 725RT	-	-	47.8	47.1	46.5	45.8	47.6	-	-
InVigor T 4510	42.8	45.9	47.3	45.5	-	-	-	41.1	45.1
Monola 416TT	45.3	46.8	47.7	46.8	45.5	45.0	45.7	41.6	46.6
Monola 515TT	43.3	45.2	47.3	45.2	44.8	45.6	46.3	42.0	44.6
Pioneer 44T02 TT	43.1	46.1	-	-	-	-	-	43.7	45.0
Pioneer 45T01TT	-	47.7	47.8	47.2	45.7	45.2	46.5	44.5	45.5
SF Ignite TT	42.5	45.4	47.9	46.3	45.2	44.2	46.8	41.6	44.9
SF Turbine TT	41.6	44.2	45.9	43.8	-	-	-	41.0	43.1

TABLE 22 Roundup Ready canola (mid season) 2016. Yield expressed as a percentage of the site mean yield.

	North Central		North East		South West			Wimmera	
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh ¹	Lake Bolac	Kaniva	Minyip
Sowing Date*	29/4/16	6/5/16	5/5/16	12/5/16	5/5/16	1/5/16	30/4/16	29/4/16	29/4/16
DG 460RR	106	110	106	106	89	97	100	124	105
Hyola 404RR	98	98	94	93	-	-	-	85	94
Hyola 600RR	-	-	-	107	90	103	96	-	-
IH30 RR	83	83	91	-	-	-	-	64	90
IH51 RR	89	92	87	86	100	103	91	92	100
IH52 RR	100	100	97	90	90	85	101	108	95
InVigor R 5520P	104	109	105	113	113	119	106	113	109
Monola G11	-	80	83	89	-	65	72	-	-
Nuseed GT-42	112	104	99	91	-	92	98	-	99
Nuseed GT-50	102	115	103	91	112	112	108	98	110
Nuseed GT-53	99	99	108	109	104	101	100	87	110
Pioneer 43Y23 (RR)	96	-	-	-	-	-	-	112	106
Pioneer 44Y24 (RR)	103	107	107	97	97	112	113	120	104
Pioneer 44Y26 (RR)	-	-	-	-	107	110	107	-	-
Pioneer 45Y25 (RR)	110	114	120	111	107	103	121	81	100
Victory V5003RR	92	95	97	93	98	93	100	92	91
Site Mean (t/ha)	3.79	3.53	2.99	3.08	3.01	2.75	2.92	2.79	4.40
CV (%)	6	6	7	6	6	8	10	11	6
LSD (%)	10	10	12	10	9	11	16	20	9

* Sowing Date / Germination Rain Date

¹ Lime was surface applied at 5 t/ha on the 7/3/16 and incorporated at Inverleigh.**TABLE 23 Roundup Ready canola (mid season) 2016. Oil content (%).**

	North Central		North East		South West			Wimmera	
	Charlton	Diggora	Wunghnu	Yarrowonga	Hamilton	Inverleigh	Lake Bolac	Kaniva	Minyip
DG 460RR	48.7	47.5	48.8	47.7	47.4	46.3	47.0	46.2	46.8
Hyola 404RR	46.5	48.7	49.2	48.1	-	-	-	39.9	47.7
Hyola 600RR	-	-	-	47.8	48.0	46.4	49.7	-	-
IH30 RR	43.1	46.2	46.7	-	-	-	-	43.5	45.1
IH51 RR	42.4	45.5	44.7	44.8	44.8	42.0	45.5	42.6	43.8
IH52 RR	43.4	44.5	45.1	45.4	45.4	43.7	45.1	42.4	42.6
InVigor R 5520P	44.2	46.2	47.8	48.2	46.6	43.7	47.2	44.7	46.0
Monola G11	-	48.6	49.1	47.4	-	45.8	48.5	-	-
Nuseed GT-42	43.2	46.1	46.0	46.2	-	41.8	44.7	-	44.5
Nuseed GT-50	44.2	46.3	46.7	47.4	46.4	43.2	46.1	42.3	44.7
Nuseed GT-53	44.2	45.9	45.8	46.3	44.9	44.7	45.4	37.2	44.1
Pioneer 43Y23 (RR)	41.6	-	-	-	-	-	-	42.9	44.5
Pioneer 44Y24 (RR)	42.8	45.9	46.9	47.0	42.0	43.5	44.4	42.5	44.2
Pioneer 44Y26 (RR)	-	-	-	-	45.9	45.3	47.7	-	-
Pioneer 45Y25 (RR)	44.3	46.7	47.0	47.4	46.6	44.6	47.8	41.6	45.4
Victory V5003RR	44.5	46.7	47.8	45.4	46.4	43.4	46.7	43.4	45.7

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FIELD PEA

REVIEW OF 2016

Season

Despite low rainfall throughout 2015, high prices at the start of the season meant field pea production areas in 2016 remained similar to 2015. The early dry start in the Mallee delayed growth at the beginning of the season, but a decent break and continued rainfall resulted in good early vigour. Continued rainfall throughout the growing season and mild temperatures supported growth with many crops achieving excellent yields.

The extremely high rainfall in September and early October resulted in a late blackspot infection, and significant waterlogging issues for some growers, particularly on heavier soil types. There were some issues with frosting of crops particularly lower in the landscape.

Commercial crops which were not impacted by blackspot yielded well. In the Mallee, commercial crops consistently reached 2 to 3 t/ha whilst in the South West yields ranged from 2 to 4 t/ha. In trials, the standout variety was PBA Pearl (a white pea), yielding on average 4 per cent better than any other lines. The later maturing Kaspas also performed well in the soft season and PBA Wharton showed good promise, likely aided by its resistance to powdery mildew and boron tolerance.

Despite late blackspot infections the visual quality of grain was very good except where crops were severely infected.

Disease and insects

Despite the relatively early sowing, initial ascochyta blight infections, commonly known as blackspot, were low to moderate. However, above average spring rainfall and cool to mild temperatures resulted in high levels of late blackspot infection during the flowering and podding phases in Wimmera and Mallee field pea crops. This resulted in widespread issues with foliar, flower and pod infection, reduced yield potential and failed crops in some cases. Severe infections caused seed discolouration and reduced seed quality and will impact vigour if retained seed is used to sow crops in 2017.

Downy mildew was prevalent early in the season and widespread in Victoria. Powdery mildew was also widespread throughout the season and may have contributed to the extensive blackspot infections.

Timely warning messages of heliothis flights were broadcast to various regions and along with wet conditions resulted in no grub damage to field pea crops.

LOOKING FORWARD TO 2017

New varieties

There are no new pea varieties for 2017.

OZP1101 seed will be available for sowing in 2018. OZP1101 is a mid to late flowering semi-dwarf field pea variety. This potential release has high yield potential and produces 'Kaspa type' grain. It possesses superior bacterial blight resistance to other 'Kaspa type' releases and will be marketed toward areas that are particularly prone to this disease. OZP1101 will need to be managed for blackspot, PSbMV and powdery mildew in disease prone areas.

Disease

It is important to source seed that is tested free of pea seed borne mosaic virus (PSbMV).

Due to the incidence of late blackspot infection it is important to source healthy field pea seed from disease free crops or seed that has been certified for sowing in 2017. Seed retained from the 2016 harvest may also be affected by blackspot and growers are encouraged to check the germination of harvested grain. This can include discoloured seed that has reduced vigour and increased susceptibility of the new crop to blackspot. New crops should not be planted within 500m of field pea stubble. Check sowing dates for disease risk using Blackspot Manager. Field pea seed should be treated with a thiram-based fungicide to reduce seedling infection followed by a foliar fungicide application at 6 to 9 nodes. Growers should also maintain a rotation of at least 3 years between field pea crops.

Seed dressings are a simple and cost effective way to protect emerging crops from insect attack in the early growth stages. Seed treatments are a cheap and effective method for suppressing some diseases though growers need to be aware that the P-Pickle-T seed treatment has caused phytotoxic responses in treated field peas, particularly white and blue types. Also, fungicide seed treatments do not combine well with rhizobium bacteria used for inoculation. Likewise, growers should consider the use of fungicides to control powdery mildew when applying insecticides at early pod stage, particularly if mildew is present.

Growers in bacterial blight prone regions should update to the more resistant varieties PBA Aura and PBA Percy. PBA Percy has higher tolerance to this disease than PBA Aura, but both are significantly lower risk than other varieties. In addition, growers should try to avoid sowing infected seed and extend crop rotations from infected paddocks. When bacterial blight occurs, growers should minimise in crop traffic. Sowing into heavy cereal stubble appears to increase the disease severity and should be avoided in frost prone regions.

Marketing

The majority (between 70-90%) of field pea grain is exported as whole peas (not split) for human consumption to key markets of India, Bangladesh, Malaysia and Sri Lanka. The balance is exported as split peas or sold domestically for stockfeed. The market demands for field pea vary according to type where there are four classes – Dun, Dun ‘Kaspa’, white and blue peas.

Over 90 per cent of Australian production is from dun types (i.e. grain that has a coloured seed coat) of which more than 85 per cent is now ‘Kaspa type’ (e.g. Kaspa, PBA Gonyah, PBA Twilight and PBA Wharton). ‘Kaspa type’ grain is preferred for snack food in southern India over other pea grain types and attracts a price premium. Growers of ‘Kaspa type’ grain for export should avoid sowing seed contaminated with Parafield or other dun types to avoid potential downgrading.

Most field pea markets in India traditionally buy the ‘Kaspa type’ as it is easier to remove the seed coat from a round seed over a dimple seed shape (e.g. PBA Oura). There are markets in India and Sri Lanka that will buy the Dun type field pea. White field pea markets are further developing into China and Sri Lanka and growers of the high yielding PBA Pearl should ensure they have access to traders of these white peas.

Domestically all field pea ‘Dun’ and ‘Kaspa’ varieties are sought after for the splitting market including PBA Twilight, PBA Oura, PBA Wharton, PBA Percy and PBA Gonyah.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports app

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- Growing field pea
- AG1347 Pulse disease guide

www.pulseaus.com.au

Pulse Australia information on growing pulses including:

- Field pea disease management strategy

VARIETY DESCRIPTIONS

([Ⓛ]) denotes Plant Breeders Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Semi-dwarf dun seeded – KASPA^(Ⓛ)

A late flowering, semi-dwarf field pea which produces spherical dun type grain. Kaspa is the bench mark for field peas with its broad adaption and high yield potential. Kaspa is better suited to longer growing season environments. Kaspa is MR to downy mildew (Parafield strain) but will need to be managed for blackspot, bacterial blight, PSbMV, powdery mildew and downy mildew (Kaspa strain) in disease prone areas. Kaspa has fair lodging resistance at maturity and pods are resistant to shattering. Released 2002. Seednet. EPR \$2.

Semi-dwarf dun seeded – PBA COOGEE^(Ⓛ)

A dual-purpose pea that can be left for grain production or cut early for forage in the case of drought or frost. A mid-late flowering and mid maturing conventional trailing dun pea similar to Parafield, but with increased early growth, more branching and longer vines. A long season variety with high plant biomass by early to mid-spring. It is resistant to powdery mildew, but will need to be managed for blackspot, bacterial blight and downy mildew. It has high tolerance to soil boron and salinity. Released 2013. Seednet. EPR \$2.60.

Semi-dwarf dun seeded – PBA GUNYAH^(Ⓛ)

An early flowering, semi-dwarf field pea which produces Kaspa type grain. PBA Gonyah is broadly adapted and has high yield potential. PBA Gonyah is better suited to shorter growing season environments. Resistant to downy mildew (Parafield strain). PBA Gonyah will need to be managed for blackspot, bacterial blight, PSbMV, BLRV and powdery mildew in disease prone areas. PBA Gonyah has fair lodging resistance at maturity and pods are resistant to shattering. Released 2010. Seednet. EPR \$2.50.

Semi-dwarf dun seeded – PBA OURA^(Ⓛ)

An early to mid-flowering, semi-dwarf, erect growing field pea which produces Australian dun type grain. PBA Oura has high yield potential and is broadly adapted. PBA Oura is MRMS to bacterial blight and was released for regions prone to this disease. PBA Oura is MR to downy mildew (Parafield strain) and BLRV, but will need to be managed for blackspot, PSbMV and powdery mildew. PBA Oura has fair lodging resistance at maturity and has moderate non-sugar-pod resistance to shattering. Released 2011. Seednet. EPR \$2.60.

Semi-dwarf white seeded – PBA PEARL^(Ⓛ)

An early to mid flowering, semi-dwarf field pea. PBA Pearl has high yield potential and is broadly adapted. It produces medium white grain that can be marketed for human consumption or for stockfeed. PBA Pearl has good resistance to bean leaf roll virus and downy mildew (Parafield strain). It is MS to bacterial blight and will need to be managed for blackspot, PSbMV, powdery mildew and downy mildew (Kaspa strain) in disease prone areas. PBA Pearl has good lodging resistance at maturity and has moderate non-sugar-pod resistance to shattering. Released 2012. Seednet. EPR \$2.70.

Semi-dwarf dun seeded – PBA TWILIGHT^(Ⓛ)

An early flowering, semi-dwarf field pea which produces ‘Kaspa type’ grain. PBA Twilight is broadly adapted and has high yield potential. Better suited to short growing season environments. PBA Twilight is resistant to downy mildew (Parafield strain). It will need to be managed for bacterial blight, blackspot, PSbMV, powdery mildew and downy mildew, in disease prone areas. PBA Twilight has fair lodging resistance at maturity and pods are resistant to shattering. Released 2010. Seednet. EPR \$2.50.

Semi-dwarf dun seeded – PBA WHARTON[Ⓛ]

An early-mid flowering, semi-dwarf field pea which produces 'Kaspa type' grain. PBA Wharton is widely adapted across short to medium growing season environments and is a suitable variety for crop topping when sowing is delayed. PBA Wharton is resistant to powdery mildew, PSbMV and BLRV. It will need to be managed for blackspot and bacterial blight and downy mildew (Parafield and Kaspa strain). PBA Wharton has improved tolerance to soil boron and sugar-pod resistance to shattering. Released 2013. Seednet. EPR \$2.60.

Semi-dwarf blue seeded – EXCELL[Ⓛ]

An early to mid-season flowering, semi-dwarf pea which produces medium sized, spherical, smooth blue seed suitable for premium human consumption markets. Excell has lower grain yield potential compared to new variety releases and is best suited to medium rainfall environments of Victoria and southern NSW. Excell is moderately resistant to downy mildew (Parafield strain). Excell will need to be managed for blackspot, bacterial blight, PSbMV and powdery mildew in disease prone areas. Excell has good lodging resistance. Pods are susceptible to shattering. Released 1998. Can be freely marketed.

Tall field pea – MORGAN[Ⓛ]

A tall, late flowering, semi-leafless pea, which produces small Australian dun type grain. Morgan has lower grain yield potential than other varieties, but was released for the lower rainfall regions of Central and Western NSW as a dual-purpose pea that could be used for forage in drought years. Morgan is MR to downy mildew (Parafield strain). Morgan will need to be managed for blackspot, bacterial blight, PSbMV, powdery mildew, downy mildew (Kaspa strain) and BLRV in disease prone areas. Has moderate non-sugar-pod resistance to shattering. Grain size is small and less suitable for human consumption markets. Released 1998. Hart Bros Seeds.

Tall field pea – PARAFIELD[Ⓛ]

A tall, mid-season flowering pea, which produces large Australian dun type grain. Parafield has lower yield potential compared to recent variety releases. PBA Percy is now a superior option for growers wanting to grow a conventional dun field pea. Parafield will need to be managed for all diseases in disease prone areas. Parafield has poor lodging resistance and will require specialised pea pickup fronts for harvesting. Has moderate non-sugar-pod resistance to shattering. Released 1998. Can be freely marketed.

Tall field pea – PBA HAYMAN[Ⓛ]

A new type of field pea bred for forage use such as hay or silage production or for manuring. This variety grows vigorously and produces large quantities of dry matter over spring. Total dry matter produced is significantly greater than regular field pea varieties (20% more than Morgan) and comparable to vetch. PBA Hayman produces leafy plants with a high number of basal branches that grow vigorously. Plants have very long vines (can be over 3m) that remain semi-erect to maturity. PBA Hayman flowers very late in the growing season and is resistant to powdery mildew. It produces small pods and very small seed that will reduce the cost of sowing. The grain is soft seeded and therefore suitable for cropping rotations with other broad leaf crops. Grain yield potential can vary but is generally between 30 to 80% of a normal field pea crop and is suitable for stockfeed. Developed by PBA. Released 2013. Seednet.

Tall field pea – PBA PERCY[Ⓛ]

A very early flowering and maturing conventional pea (similar to Parafield) which produces Australian dun type grain. PBA Percy has high yield potential and is broadly adapted. PBA Percy is MR to bacterial blight and was released for regions prone to this disease. PBA Percy will need to be managed for blackspot, PSbMV, downy and powdery mildew and BLRV. PBA Percy has poor lodging resistance and will require specialised pea pickup fronts for harvesting. Released 2011. Seednet. EPR \$2.60.

Tall field pea – STURT

A tall, early to mid-season flowering pea, which produces medium to small, spherical, smooth white seed. Sturt is broadly adapted, but is best suited to low rainfall environments and has higher tolerance to frost at podding. Sturt will need to be managed for bacterial blight, blackspot, PSbMV, BLRV, powdery mildew and downy mildew in disease prone areas. Sturt has poor lodging resistance and will require specialised pea pickup fronts for harvesting. Has moderate non-sugar-pod resistance to shattering. Released 2004. Premier Seeds.

TABLE 1 Field pea variety agronomic guide.

Variety	Plant habit	Plant vigour, Early season	Flowering time	Maturity time	Plant lodging resistance at maturity	Pod shattering at maturity	Boron tolerance	Salinity tolerance
YELLOW OR BLUE PEA GRAIN TYPE								
Excell	SD-SL	high	early	early-mid	good	S: NSP	S	S
PBA Hayman	Multi-branched	moderate	very late	very late	poor	MR: NSP	MS	MS
PBA Pearl	SD-SL	moderate	early-mid	early-mid	good	MR: NSP	MS	MS
Sturt	C	high	early-mid	mid	poor	MR: NSP	S	MS
KASPA GRAIN TYPE								
Kaspa	SD-SL	moderate	late	mid	fair-good	R: SP	S	S
OZP1101	SD-SL	high	mid-late	mid	good	R: SP	S	S
PBA Gonyah	SD-SL	high	early-mid	early	fair-good	R: SP	S	SMS
PBA Twilight	SD-SL	high	early	early	fair-good	R: SP	S	S
PBA Wharton	SD-SL	moderate	early-mid	early	fair-good	R: SP	MT	MT
AUSTRALIAN DUN GRAIN TYPE								
Morgan	Tall-SL	high	late	late	poor-fair	MR: NSP	S	S
Parafield	C	high	mid	mid	poor	MR: NSP	S	MS
PBA Coogee	C	high	mid-late	mid	poor	MR: NSP	T	MT
PBA Oura	SD-SL	moderate	early-mid	early	fair-good	MR: NSP	MS	S
PBA Percy	C	high	early	early	poor	MR: NSP	S	MT

SD=semi-dwarf, C=conventional, SL= semi-leafless, S=susceptible, MS=moderately susceptible, MR=moderately resistant, R=resistant, SP=sugar pod type pod, NSP=non sugar pod type, I=intolerant, MI=moderately intolerant

TABLE 2 Field pea time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April			May			June			July			
	>	>	>	X	X	X	X	<	<	<			
PBA Coogee, PBA Hayman													
Kaspa, Parafield, PBA Gonyah, PBA Oura, PBA Percy, PBA Twilight, PBA Wharton, Sturt													
WIMMERA													
PBA Hayman													
Kaspa, Parafield, PBA Coogee, PBA Gonyah, PBA Oura, PBA Percy, PBA Twilight, PBA Wharton, Sturt.													
NORTH CENTRAL													
PBA Coogee, PBA Hayman													
Kaspa, Parafield, PBA Gonyah, PBA Oura, PBA Percy, PBA Twilight, PBA Wharton, Sturt.													
NORTH EAST													
PBA Hayman													
Kaspa, Parafield, PBA Coogee PBA Gonyah, PBA Oura, PBA Percy, PBA Twilight, PBA Wharton, Sturt.													
SOUTH WEST													
Kaspa, PBA Coogee PBA Gonyah, PBA Hayman, PBA Oura, PBA Percy, PBA Twilight, PBA Wharton													
SOUTH WEST spring sowing													
Above varieties for spring sowing													

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable, * if conditions allow (e.g. raised beds, dry season, non-waterlogging paddocks).

TABLE 3 Field pea variety disease guide.

Variety	Blackspot (Ascochyta)	Bacterial blight (Field rating)	Downy mildew (Kaspa strain)	Downy mildew (Parafield strain)	Powdery mildew	PSbMV virus	BLRV virus (Field rating)	<i>Pratylenchus neglectus</i>	<i>Pratylenchus thornei</i>
YELLOW OR BLUE PEA GRAIN TYPE									
Excell	MS	S	S	MR	S	-	-	-	-
PBA Hayman	Sp	MRp	-	RMR	R	-	-	-	-
PBA Pearl	MS	MS	S	R	S	S	R	MRMS	MRMS
Sturt	MS	MS	S	MS	S	S	MS	MSp	MR
KASPA GRAIN TYPE									
Kaspa	MS	S	S	MR	S	S	S	MRMS	MRMS
OZP1101	MS	MRMSp	MS	R	S	S	S	MRMS	MRMS
PBA Gonyah	MS	S	S	R	S	S	S	MR	MRMS
PBA Twilight	MS	S	S	R	S	S	S	MRMSp	MRMS
PBA Wharton	MS	S	S	MS	R	R	R	MRMSp	MRp
AUSTRALIAN DUN GRAIN TYPE									
Morgan	MS	MS	S	MR	S	S	Sp	RMRp	MRp
Parafield	MS	MS	S	S	S	S	S	MRMS	MRp
PBA Coogee	S	MRMSp		Sp	R	-	Sp	MRMSp	MRp
PBA Oura	MRMSp	MRMS	MRMS	MR	S	S	MR	MRMSp	MRMSp
PBA Percy	MS	MR	S	S	S	S	S	MRMS	RMRp

PSbMV = pea seed borne mosaic virus, BLRV = bean leaf roll virus

Resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.

TABLE 4 The most suitable field pea varieties for Victorian cropping regions for grain production (Ticked).

	Southern Wimmera	Northern Wimmera	Southern Mallee	Northern Mallee	South West
YELLOW/WHITE OR BLUE PEA GRAIN TYPE					
Excell		✓	✓		
PBA Hayman	✓	✓	✓	✓	✓
PBA Pearl	✓	✓	✓	✓	✓
Sturt	✓	✓	✓	✓	
KASPA GRAIN TYPE					
Kaspa	✓	✓			✓
PBA Gonyah	✓	✓	✓		✓
PBA Twilight			✓	✓	
PBA Wharton	✓	✓	✓	✓	✓
AUSTRALIAN DUN GRAIN TYPE					
Morgan			✓	✓	
Parafield				✓	
PBA Coogee	✓	✓	✓	✓	✓
PBA Oura	✓	✓	✓	✓	✓
PBA Percy	✓	✓	✓	✓	

TABLE 5 Field pea disease guide.

Disease	Organism	Symptoms	Occurrence	Hosts	Control
Ascochyta blight (Blackspot)	<i>Mycosphaerella pinodes</i> , <i>Phoma pinodella</i> , <i>Ascochyta pisi</i>	Most obvious on stems and lower leaves. Purplish-black discolouration of lower stem. Dark brown spotting of pods and leaves. Blackening of stem base and upper tap root.	Common in all pea growing regions; most crops are affected to some extent. Favoured by wet conditions. Most damage in early sown crops.	Peas and most legumes.	Crop rotation. Later sowing. Fungicidal seed dressings. Disease free seed.
Bacterial blight	<i>Pseudomonas syringae</i> pv. <i>pisi</i> , <i>P. syringae</i> pv. <i>syringae</i>	Water-soaked spots on leaflets and stipules. Yellowish brown fan-shaped lesion on stipules.	Sporadic in wetter regions. Most severe in early sown crops already damaged by frost or heavy rain.	Peas.	Crop rotation. Late sowing. Disease free seed.
Downy mildew	<i>Perenospora viciae</i>	Brown blotches on upper leaf surface. Underside of leaves covered by masses of fluffy 'mouse-grey' spores.	Sporadic in all regions. Damage most severe in wetter districts.	Peas.	Resistant varieties. Fungicidal seed dressings.
Powdery mildew	<i>Erysiphe polygoni</i>	Leaves covered by a film of powdery white spores. Infected plants have a blue-white colour.	Can occur in most regions towards the end of the season. Most common in late-sown crops.	Peas.	Resistant varieties. Avoid late sowing. Foliar fungicide application at flowering is an economic option for disease prone areas.
Septoria leaf blotch	<i>Septoria pisi</i>	Straw coloured blotches on leaves, stems and tendrils. Pin-head size black spots within lesions.	Present in most pea growing regions. Damage most severe on short, semi-leafless cultivars.	Peas.	Destroy crop residue. Most varieties are moderately susceptible. Crop rotation.
VIRUS DISEASES					
PSbMV	Pea seedborne mosaic virus	Downward curling of leaves, mosaic, stunting.	Present in all pea growing regions.	Host range limited to <i>Fabaceae</i>	This virus is highly seed borne in peas. Virus free seed is recommended
BLRV	Bean leaf roll virus	Yellowing and stunting	Present in all pea production areas.	Host range limited to <i>Fabaceae</i>	Managing aphids and weeds, resistant varieties.

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

Year	Mallee					Wimmera						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		1.74	1.78	0.96	0.49	1.95		2.19	3.60	2.04	0.41	2.64
	No. trials	5	5	4	5	5	No. trials	1	3	5	2	3
MALTING BARLEY												
Excell	5	75	78	-	-	36	1	-	81	76	-	74
Kaspa	24	96	103	68	79	92	14	97	95	87	75	109
Morgan	3	97	91	92	96	85						
Parafield	14	94	85	84	97	81	7	97	88	81	84	84
PBA Gonyah	23	98	96	87	102	95	14	98	97	97	97	99
PBA Oura	24	97	89	121	149	95	14	100	98	98	128	83
PBA Pearl	24	99	102	129	152	109	14	101	104	100	130	95
PBA Percy	23	98	85	111	153	102	12	98	96	93	122	83
PBA Twilight	20	97	91	88	110	86	12	99	95	97	103	92
PBA Wharton	24	98	89	111	113	84	14	102	97	104	115	84
Sturt	9	99	96	118	126	106	3	100	99	93	109	91
Yarrum	3	94	93	96	116	77						

TABLE 7 2016 field pea yield and grain weight (g/100 seeds) in NVT and Victorian breeding (B) trials. Yield expressed as a percentage of the site mean yield.

	Yield (%)					Grain weight (g/100 seeds)			
	Mallee			Wimmera		Mallee			Wimmera
	Birchip	Rainbow	Ultima	Horsham (B)	Tarranyurk	Birchip	Rainbow	Ultima	Minyip
Sowing Date	20/5/16	11/5/16	17/5/16	1/5/16	31/5/16				
Excell	-	-	-	63	-	-	-	-	-
Kaspa	91	81	83	111	104	19.4	19.9	24.2	23.3
Parafield	88	80	57	-	76	14.3	14.0	12.9	20.2
PBA Gonyah	91	85	106	104	94	22.7	22.2	23.2	22.2
PBA Oura	90	108	89	109	94	21.7	21.6	22.5	22.7
PBA Pearl	108	114	118	100	108	20.9	19.6	20.8	21.4
PBA Percy	111	101	101	87	77	23.4	22.0	26.7	24.3
PBA Twilight	-	-	-	91	-	-	-	-	-
PBA Wharton	90	71	76	85	100	20.0	17.3	20.3	20.6
Sturt	-	-	-	113	-	-	-	-	-
Site Mean (t/ha)	3.25	3.13	2.83	2.66	3.40				
CV (%)	11	10	6	9	8				
LSD (%)	17	16	11	18	13				

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LENTIL

REVIEW OF 2016

Season

Sowing lentils got underway early in 2016, with early sowing becoming the new normal for lentil growers. Lentil production area continued to expand further north in the Mallee in 2016 in response to successful production and record high prices throughout the 2015 harvest.

A warm early window led to high biomass and early vigour across all lentil growing areas however, continued cool and wet conditions into spring led to later flowering and maturity. The early break and consistent rainfall led to good pod fill conditions. Frost was not an issue for many lentil growers, however a number of Wimmera growers experienced frosts lower in the landscape which reduced flowering, pod set and yields. Waterlogging in September impacted lentil crops on heavier soils in lower lying areas, and was the major yield limiting factor throughout Victoria as crops were unable to recover in waterlogged areas. The extremely high rainfall in September also resulted in significant infection of botrytis grey mould in susceptible varieties.

Harvest was general 2-4 weeks later than normal for most growers, despite early sowing. Record yields were observed in some areas, despite high disease pressure, particularly in the Mallee with some crops exceeding 3 t/ha. Generally, yields were 2-3 t/ha in the Mallee and 2.5-3.5 t/ha in the Wimmera, although reports of crops greater than 4 t/ha were apparent. Record prices subsided throughout the season, but remained high and in combination with high yields meant lentils were a very profitable pulse crop for many growers in 2016.

Disease and insects

The extended period of cool, wet conditions during the 2016 season resulted in high pressure from foliar fungal diseases in pulse crops.

Unusually, botrytis grey mould (BGM) was a significant disease in 2016, having a large impact on yield in unprotected susceptible varieties (rated MRMS or lower). Some lentil varieties which have been developed for drier areas, such as PBA Bolt (rated S), were impacted by particularly aggressive BGM infection. PBA Jumbo2 has a high level of resistance to BGM (RMR), and testing in multiple years of BGM epidemics in SA trials has found this resistance to be reliable and durable. There were instances of a low level of mould in some PBA Jumbo2 crops in 2016. However, wet conditions meant BGM infections were exacerbated by presence of other fungal pathogens such as sclerotinia.

Fungicide shortages due to high disease pressure on all pulse crops, particularly carbendazim, made disease management difficult at times for growers who were taken by surprise by the

seasonal conditions. Growers need to balance the risk of BGM susceptibility against the proven advantages of these varieties in dry seasonal conditions.

Wet conditions also resulted in an increased number of sclerotinia infections, and waterlogged plants showed signs of root diseases like Pythium. Virus and aphid activity was low in 2016.

LOOKING FORWARD TO 2017

New varieties

There are no new lentil varieties for 2017.

Disease

Increased inoculum from a high disease pressure season means stubble management is vital for the reduction of both BGM and ascochyta inoculum from the 2016 crop. Growers should avoid sowing downwind of and at least 500 metres from the previous year's lentil stubble.

Where there is high risk of BGM growers using susceptible varieties need to apply fungicides before canopy closure. Variety choice, delayed time of sowing and wider row spacing can assist in minimising BGM. Growers with significant levels of BGM in 2016 lentil crops are advised to use a thiram-based seed dressing on seed to be planted in 2017 to protect against botrytis seedling rots.

Ascochyta blight can manifest rapidly and depending on the variety sown, should be factored into management plans for 2017. PBA Flash has the highest level of susceptibility among the lentil varieties and is therefore not a recommended variety for the Wimmera region. There has been evidence of the beginning of changes in pathogen virulence in SA, with *Aschochyta lentis* isolates found which can infect PBA Hurricane XT, PBA Ace and PBA Bolt in controlled environment tests. It is not expected that a large change in the susceptibility of these varieties will be seen in Victoria in 2017. Nevertheless, crops of PBA Hurricane XT should be monitored for the presence of foliar ascochyta lesions during the 2017 season, if conditions are conducive, and plan for a possible fungicide spray pre-canopy closure and/or during podding.

To develop a suitable virus management strategy it is important to test seed for cucumber mosaic virus (CMV) and alfalfa mosaic virus (AMV) if symptoms were observed in the seed crop. Aphids multiply rapidly in lentil crops. Seed treatment, an early insecticide application, continued monitoring and action may be needed to avoid rapid aphid build up and virus spread both within the crop and to nearby chickpea crops. Thin crop stands are more attractive to aphids. Control of Heliothis and Etiella to prevent damage to grain remains important.

Marketing

The majority of Australian production is exported, with Sri Lanka being the largest buyer in recent years. Turkey and the Middle East are also important customers.

Variety purity is critical in lentils with a restriction of 1 per cent maximum contamination by different varieties. This is of particular concern when growing varieties with different seed coat colour and/or different cotyledon colour. Be aware of the potential for contamination from volunteer or 'escaped' lentils in paddocks when changing to new varieties with different seed coat colours i.e. PBA Flash to PBA Bolt.

Some lentil varieties also have normal genetic variation in coat colour. A change to lentil standards has now enabled a one per cent maximum "contrasting seed coat colours" to be added to assist in the delivery and marketing of varieties like PBA Blitz, PBA Herald-XT and PBA Hurricane XT that have low levels of genetic variation in their seed coat colours.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au app
- NVT Long Term Yield Reports app

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- Growing lentil
- AG1347 Pulse disease guide

www.pulseaus.com.au

Pulse Australia information on growing pulses including:

- Lentil disease management strategy

VARIETY DESCRIPTIONS

([Ⓛ]) denotes Plant Breeders Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Red lentil – ALDINGA

Aldinga has a large seed with good milling characteristics. Aldinga is MRMS to foliar ascochyta blight but MS to seed infection. It is MS to BGM and lodges more than other varieties. It has been a preferred variety for some farmers using no till systems. Released 1994. AFCA. No market restrictions.

Red lentil – NIPPER^(Ⓛ)

Nipper is a mid-season variety with a small seed size and grey seed coat. Nipper is MRMS to foliar ascochyta blight, MR to seed ascochyta and RMR to BGM. It is also R to the exotic disease Fusarium wilt, has improved salinity tolerance and generally lodges less than other varieties. Nipper is well established in markets, and has attracted a premium price in some years. Released 2005. Seednet. EPR \$5.

Red lentil – NUGGET

Nugget is a mid-season variety with a medium size seed and a grey seed coat. It is MRMS to ascochyta blight and BGM. Nugget is not grown much anymore as it has now been superseded by PBA Ace and PBA Bolt. Released 1999. Heritage Seeds. EPR \$5.

Red lentil – PBA ACE^(Ⓛ)

PBA Ace is a medium sized, mid-season red lentil with grey seed that has been the highest yielding across all areas, though it can be lower yielding in dry years or high temperatures. PBA Ace is best suited to longer season areas replacing Nugget and PBA Jumbo. R to ascochyta and MRMS to BGM. Intolerant to salinity and boron. High milling quality. Released 2012. PB Seeds. EPR \$5.

Red lentil – PBA BLITZ^(Ⓛ)

PBA Blitz is a medium sized red lentil with a grey seed coat that is early flowering and is suited to short growing seasons. It has improved early vigour and an erect growth habit which is suited to no-till and inter-row sowing. PBA Blitz is MR to foliar ascochyta, MRMS to seed ascochyta and MR to BGM. PBA Blitz is intolerant of soil boron and salinity. It has demonstrated similar but generally improved milling characteristics compared to Nugget. Released 2010. PB Seeds. EPR \$5.

Red lentil – PBA BOLT^(Ⓛ)

PBA Bolt is a medium sized red lentil with grey seed, adapted to the Mallee and northern Wimmera. While similar to PBA Flash with early-mid maturity and improved salinity tolerance, it is better in the southern Mallee as it is MR to foliar ascochyta blight and RMR to seed ascochyta blight. Its susceptibility to BGM makes it less suited to medium-high rainfall areas in wetter years and with early sowing. Like PBA Flash, PBA Bolt is a good variety for timely crop topping to control weeds. An erect habit and good lodging resistance make it easier to harvest in dry conditions. Released 2012. PB Seeds. EPR \$5.

Red lentil – PBA FLASH^(Ⓛ)

PBA Flash is an early-mid maturing, high yielding red lentil with a medium seed size and is suited to all current lentil growing areas but particularly shorter season growing areas. It has improved tolerance to boron and salinity compared to Nugget, which along with its height and erectness, has contributed to its popularity in the Mallee. Like PBA Bolt, PBA Flash is a good variety for timely crop topping to control weeds. It is MS to foliar and seed ascochyta blight, and MRMS to BGM. PBA Flash has improved standing ability at maturity relative to other lentil varieties which may make it more prone to pod drop in windy environments, timely harvest is required. It is well suited to medium red lentil grain markets, particularly for splitting. Released 2009. PB Seeds. EPR \$5.

Red lentil – PBA HERALD XT^(Ⓛ)

PBA Herald XT is a small red seeded lentil best adapted to longer growing seasons with medium to higher rainfall. It has improved tolerance to imazethapyr with an interim permit for pre or post-emergent application to August 2017. It has improved tolerance to the herbicide flumetsulam plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. *It is important to note that growers must adhere to product label rates, plant back periods and all label directions for use.* PBA Herald XT has been outclassed by the new PBA Hurricane XT. PBA Herald XT is R to foliar and seed ascochyta and RMR to BGM. Disease resistance will assist in achieving high grain quality. Released 2011. PB Seeds. EPR \$5.

Red lentil – PBA HURRICANE XT[Ⓛ]

PBA Hurricane XT is a small red seeded lentil with mid flowering and mid-late maturity. It has tolerance to imazethapyr with an interim permit for pre or post-emergent application to August 2017. It has improved tolerance to the herbicide flumetsulam plus reduced sensitivity to some sulfonylurea and imidazolinone herbicide residues. *It is important to note that growers must adhere to product label rates, plant back periods and all label directions for use.* PBA Hurricane XT is the highest yielding small red lentil available in Australia and has improved yields over PBA Herald XT, Nipper and Nugget, but lower than PBA Ace. It is MR to foliar ascochyta, RMR to seed ascochyta and MRMS to BGM. Released 2013. PB Seeds. EPR \$5.

Red lentil – PBA JUMBO[Ⓛ]

PBA Jumbo is a high yielding large seeded red lentil with a grey seed coat. It is mid flowering with a maturity similar to Nugget. Suited to no-till inter-row sowing into standing stubble. It is MRMS to foliar ascochyta blight and S to seed ascochyta and MS to BGM. Tolerance to soil boron is similar to PBA Flash. PBA Jumbo is suited to medium to high rainfall regions where it produces uniform larger seed size for the premium large red split markets, but will be outclassed by PBA Jumbo2. Released 2010. PB Seeds. EPR \$5.

Red lentil – PBA JUMBO2[Ⓛ]

PBA Jumbo2 is the highest yielding large seeded red lentil, approximately 10 per cent higher than PBA Jumbo. It is a direct replacement for Jumbo and Aldinga. It has a similar seed size to Jumbo and Aldinga with a grey seed coat. It is mid flowering and has a maturity similar to PBA Jumbo. It is well suited to no-till inter-row sowing into standing stubble. It is R to ascochyta and RMR to BGM. Tolerance to soil boron is similar to PBA Flash. PBA Jumbo2 is suited to medium to high rainfall regions where it produces uniform larger seed size well suited to premium large red split markets. Released 2014 (CIPAL1203). PB Seeds. EPR \$5.

Green lentil – BOOMER

Boomer is a large seeded green lentil that is tall, bulky and vigorous but can lodge when growing conditions are favourable. Sowing early can increase lodging and result in smaller seed. Boomer is MR to foliar ascochyta blight and MRMS to seed ascochyta blight and BGM. Early harvest is important to prevent shattering and produce good coloured seed. Boomer is expected to be superseded by PBA Giant. Released 2005. Seednet. EPR \$5.

Green lentil – PBA GIANT[Ⓛ]

The largest seeded green lentil in Australia with an average seed diameter of 5.8 millimetres (about 7 g/100 seeds). PBA Giant is broadly adapted but is best-suited to the medium rainfall lentil growing regions. It has similar yield and improved shattering resistance to Boomer, though timely harvest is still required to minimise shattering. It is more susceptible to lodging at maturity than Boomer. It is MR to foliar ascochyta, and MS to seed ascochyta and BGM. Released 2014 (CIPAL1207). PB Seeds. EPR \$5.

Green lentil – PBA GREENFIELD[Ⓛ]

The highest yielding green lentil variety with yields similar to PBA Ace. PBA Greenfield is a medium-sized green lentil broadly adapted but best-suited to the medium rainfall lentils growing regions. It has improved tolerance to salinity and resistance to shattering, although timely harvest is still required. It is MRMS to foliar and seed ascochyta and MR to BGM. Released 2014 (CIPAL1104). PB Seeds. EPR \$5.

TABLE 1 Lentil time of sowing guide.

Take variety flowering and maturity status into account when choosing a sowing date. In the Wimmera, the highest yields are from sowing in early May to mid June. However early sowing increases the risk of yield and quality losses from Botrytis grey mould and ascochyta blight. Early sowing also increases the likelihood of crop lodging. This table is a guide only and has been compiled from experimental data and observations of the breeder and local departmental agronomists.

MALLEE/Northern WIMMERA	April				May				June			
Aldinga, Boomer, Nugget, PBA Ace, PBA Bolt, PBA Blitz, PBA Flash, PBA Greenfield, PBA Giant, PBA Hurricane XT, PBA Jumbo, PBA Jumbo 2			>	>	X	X	X	<				
WIMMERA												
Aldinga, Boomer, Nipper, Nugget, PBA Ace, PBA Bolt, PBA Blitz, PBA Flash, PBA Greenfield, PBA Giant, PBA Herald XT, PBA Hurricane XT, PBA Jumbo, PBA Jumbo 2					>	X	X	X	X	X	<	

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 2 Lentil variety agronomic guide (may vary with sowing time and location).

Variety	Grain type	Seed coat	Seed size (%)*	Flowering time	Maturity	Lodging	Shattering	Salinity	Boron
SMALL RED SEED									
Nipper	red	grey	75-80	mid/late	mid	MR	MR	MT	I
PBA Herald XT	red	grey	75	mid/late	mid/late	MRMS	MR	I	I
PBA Hurricane XT	red	grey	85	mid	mid/late	MR	R	I	I
MEDIUM RED SEED									
Nugget	red	grey	100	mid	mid/late	MS	R	I	I
PBA Ace	red	grey	100	mid	mid	MRMS	MRMS	I	I
PBA Blitz	red	grey	115-120	early	early	MR	MR	I	I
PBA Bolt	red	grey	100	early/mid	early/mid	R	R	MI	MI
PBA Flash	red	green	100-110	early/mid	early/mid	MR	MR	MI	MI
LARGE RED SEED									
Aldinga	red	green	120	mid	mid	S	MRMS	MI	I
PBA Jumbo	red	grey	120	mid	mid	MS	MR	I	MI
PBA Jumbo2	red	grey	120	mid	mid	MRMS	R	I	MI
MEDIUM GREEN LENTIL									
PBA Greenfield	yellow	green	130	mid	mid/late	MS	MR	MI	I
LARGE GREEN LENTIL									
Boomer	yellow	green	150	mid	mid/late	S	S	I	MI
PBA Giant	yellow	green	170	mid	mid/late	MS	MRMS	I	MI

R = resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible, I=intolerant, MT= moderately tolerant, MI= moderately intolerant.
* ratings relative to Nugget. Can flower and mature relatively earlier if sown early.

TABLE 3 Disease rating for current lentil varieties.

No variety with a Resistant rating is immune to disease, and fungicide application may be required under severe disease pressure.

Variety	Ascochyta blight Foliar	Ascochyta blight Seed/pod	Botrytis grey mould (BGM)	<i>Pratylenchus neglectus</i> (provisional)	<i>Pratylenchus thornei</i> (provisional)
SMALL RED SEED					
Nipper	MRMS	MR	RMR	RMRp	MRp
PBA Herald XT	R	R	RMR	MRMSp	MRp
PBA Hurricane XT	MR	RMR	MRMS	MRMSp	MRp
MEDIUM RED SEED					
Nugget	MRMS	MRMS	MRMS	MRMSp	MRp
PBA Ace	R	R	MRMS	MRp	MRp
PBA Blitz	MR	MRMS	MR	MRMSp	MRp
PBA Bolt	MR	RMR	S	MRp	MRp
PBA Flash	MS	MS	MRMS	MSp	MRp
LARGE RED SEED					
Aldinga	MRMS	MS	MS		
PBA Jumbo	MRMS	S	MS	MRp	MRp
PBA Jumbo2	R	R	RMR	MSp	MRp
MEDIUM GREEN LENTIL					
PBA Greenfield	MRMS	MRMS	MR		
LARGE GREEN LENTIL					
Boomer	MR	MRMS	MRMS		MRp
PBA Giant	MR	MS	MS	MRp	MRp

Resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very

TABLE 4 Lentil disease guide.

Disease	Organism	Symptoms	Occurrence	Hosts	Control
Ascochyta blight	<i>Ascochyta lentis</i>	Leaves: small, round, whitish grey lesions with brown margins. Lesions contain small black fruiting bodies of the fungus. Lesions can also form on stems causing premature death. Pod infection can ultimately result in dark discolourations on seed.	Common in all lentil growing regions in southern Australia. All varieties except Northfield and Nipper are at risk of seed infection by ascochyta blight. Damage is most likely in wet seasons.	Lentils – seed, stubble and self sown plants.	Fungicidal seed dressings. Resistant varieties. Foliar fungicides. Crop rotation. Avoid early sowing.
Botrytis grey mould	<i>Botrytis cinerea</i> and <i>Botrytis fabae</i>	Leaves: white, round lesions/spots without black fruiting bodies as in ascochyta blight. Stems: Pale brown grey lesions form on stems that are covered with fluffy grey mould. Botrytis grey mould can cause branches to die and cause discoloured and shrivelled seed. In severe cases large brown patches can form in the crop.	Most likely to occur in dense, lodged crops when there is frequent rain late in spring.	Most legumes including chickpeas, faba bean and vetch.	Fungicidal seed dressings. Low plant density. Avoid early sowing. Foliar fungicides. Crop rotation. Resistant varieties.
VIRUS DISEASES					
AMV	Alfalfa mosaic virus	Tip necrosis. Young leaves are pale green, small, twisted and distorted. A faint mosaic pattern may appear.	Prevalent in lentil production regions with high aphid numbers	Wide host range including most pulses, some horticultural plants and weeds	Virus free seed, management of weeds, resistant varieties.
CMV	Cucumber mosaic virus	Yellowing, stunting. Young leaves are pale green, small, twisted and distorted. A faint mosaic pattern may appear.	Common in all lentil growing areas with high aphid numbers	Wide host range including most pulses, some horticultural plants and weeds	Virus free seed, management of weeds, resistant varieties.
BWYV	Beet western yellows virus	Yellowing, stunting. Produces the most severe symptoms of the all the viruses. Patches of crop resemble root disease or herbicide residue damage.	Present in all lentil production areas with high aphid numbers.	Wide host range including most pulses, some horticultural plants and weeds	Managing weeds and aphids, resistant varieties.

TABLE 5 Long term predicted lentil yield expressed as a percentage of mean yield.

Year	Mallee					Wimmera						
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		0.83	1.24	0.70	0.29	2.88		2.11	2.44	1.34	0.29	2.72
	No. trials	5	4	3	4	4	No. trials	2	4	2	2	4
Aldinga	3	103	98	104		90	4	98	87	95	93	97
Boomer	5	89	81	67	63	78	8	93	84	77	81	99
Digger	2	81	83				2	89	93			
Nipper	18	67	72	61	54	87	12	79	90	81	74	91
Northfield	5	81	79	75	69	74	6	85	84	81	81	89
Nugget	20	97	93	85	81	84	14	97	94	90	88	89
PBA Ace	20	117	108	102	97	93	14	110	97	98	100	102
PBA Blitz	18	66	74	78	107	107	12	83	90	85	105	118
PBA Bolt	20	114	112	126	123	96	14	105	101	110	110	97
PBA Bounty	3	103	105	94	92	102	6	104	109	103	95	87
PBA Flash	20	97	100	105	113	100	14	97	101	103	105	95
PBA Giant	7	103	94	93	90	83	10	100	86	88	95	104
PBA Greenfield	7	99	95	84	85	103	10	103	97	91	96	111
PBA Herald XT	20	73	71	76	60	74	14	78	77	78	77	101
PBA Hurricane XT	20	102	101	107	100	96	14	99	97	101	100	101
PBA Jumbo	20	90	88	66	77	92	14	99	95	83	89	96
PBA Jumbo2	20	101	102	97	108	119	14	106	106	102	109	117

TABLE 6 2016 lentil yield in NVT and Victorian breeding (B) trials. Yield expressed as a percentage of the site mean yield.

Sowing Date	Mallee				Wimmera		
	Beulah (B)	Curyo (B)	Rainbow	Ultima	Horsham (B)	Rupanyup (B)	Tarranyurk
	17/5/16	6/5/16	11/5/16	17/5/16	23/5/16	12/5/16	31/5/16
Nipper	70	91	-	-	86	100	-
Nugget	82	82	92	83	113	101	93
PBA Ace	101	102	93	97	123	105	100
PBA Blitz	106	95	-	-	114	105	-
PBA Bolt	97	82	96	109	95	87	93
PBA Flash	92	91	108	124	70	82	97
PBA Giant	77	89	-	-	98	87	-
PBA Greenfield	87	93	-	-	115	99	-
PBA Herald XT	83	82	78	51	87	99	82
PBA Hurricane XT	96	105	105	97	109	101	106
PBA Jumbo	81	88	80	105	125	98	96
PBA Jumbo2	110	114	129	120	122	112	111
Site Mean (t/ha)	3.35	2.98	3.00	2.13	3.40	3.89	2.57
CV (%)	7	9	6	4	10	6	6
LSD (%)	13	16	10	8	17	12	10

TABLE 7 2016 lentil grain weight (g/100 seeds) in NVT trials.

	Mallee		Wimmera
	Rainbow	Ultima	Tarranyurk
	Nugget	3.58	3.30
PBA Ace	3.81	3.70	3.98
PBA Bolt	3.43	3.81	4.18
PBA Flash	4.32	3.89	4.60
PBA Herald XT	2.61	2.62	2.70
PBA Hurricane XT	2.91	2.99	3.24
PBA Jumbo	3.91	3.94	4.62
PBA Jumbo2	4.36	3.84	4.50

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FABA

Faba beans have a range of colours and sizes which meet different market requirements and are identified by different names. Small to medium seeded types (*Vicia faba* var. *minor* and var. *equina*) may be called faba bean or tickbean and are commonly used for human consumption and animal feed. Large seed types (*V. faba* var. *major*) may be called broad bean and are used more commonly as a dry broad bean or as a green bean for human consumption.

REVIEW OF 2016

Season

The majority of faba bean crops were sown on time by the second week of May and as with all pulse crops, warm conditions and a good autumn break resulted in good early growth.

Above average rainfall and tall crops with high biomass created ideal conditions for disease, and chocolate spot caused significant issues for growers. Waterlogging particularly in the South West and on heavier soils in the Wimmera also caused issues despite faba beans being the most tolerant of waterlogging of all the pulses. The continued cool, wet conditions also meant high biomass crops did not set many early pods relative to their biomass.

Despite issues with disease and waterlogging, favourable conditions resulted in high yields across most faba bean growing regions and growers still found faba beans profitable despite low prices. Grain quality was also generally good despite the high disease pressure as many growers managed to protect pods at the critical times.

The 2016 season produced the largest faba bean crop on record. The total area sown to faba beans is continuing to grow with improved understanding of agronomy and disease management along with excellent commodity prices in previous seasons.

Disease and insects

Chocolate spot caused significant issues for growers who missed early fungicide sprays prior to canopy closure or were not able to purchase product in a timely fashion. In addition, it was difficult to get good penetration into the thick canopy with fungicide.

Although chocolate spot was the key issue, cercospora and sclerotinia were also seen in faba bean crops across Victoria in 2016.

Ascochyta pathotype 2 has been identified on some faba bean crops, particularly in South Australia in the last two seasons. This new pathotype has not been observed in Victoria, but crops and trials are being monitored for its presence. Pathotype 1 is widely distributed in the Southern Region. PBA Samira and Nura are resistant to both pathotypes.

Aphid and virus damage were limited.

LOOKING FORWARD TO 2017

New varieties

There are no new faba bean varieties for 2017.

Inoculation

Faba beans are very responsive to inoculation and this is particularly important on acid soils (pH<6).

Pod set

Sowing early does not necessarily result in greater pod set, but wider row spacing may help sunlight to penetrate the canopy and increase podding. Faba beans should be sown in areas away from canola paddocks to avoid bees being diverted to the stronger odour of canola and also away from field pea crops which are susceptible to pea seed borne mosaic virus (PSbMV) to minimise aphid transmission of viruses.

Disease

High disease pressure in 2016 means there will be a high carry-over of disease inoculum into 2017. Growers need to select paddocks which have not had faba beans for at least 4 years and new crops should be planted at least 500 metres from last year's crop. Growers should source clean seed where possible.

Growers need to be prepared for a shift in virulence as the new strain of ascochyta spreads from South Australia to Victoria (see Pathotype 2 in Table 3). To minimise the risk of yield loss and retain grain quality, growers are encouraged to use strategic fungicide applications and regularly monitor crops for symptoms.

If 2017 provides good sowing conditions with adequate rainfall during the grain fill period, it is highly recommended that growers spray bean crops for disease control. The 6-8 week and 15 week growth stages are important timing to minimise ascochyta blight, cercospora leaf spot and chocolate spot in order to maximise yield and harvest disease-free seed. All current varieties are susceptible to cercospora leaf spot. Prompt harvest when the crop is initially ripe is also important to retain grain quality.

In 2017, *Pratylenchus thornei* root lesion nematode resistance ratings have been provided. Most faba bean varieties are moderately susceptible to *Pratylenchus thornei* and will increase nematode densities in most seasons. Susceptible varieties will increase nematode densities or maintain them at levels which will cause yield loss in subsequent intolerant varieties. Resistant varieties will reduce nematode densities or maintain them at low levels. PBA Samira is the most resistant variety tested and will maintain nematode densities at low levels. If faba beans are used in rotation with crops or varieties that are MRMS or better, nematodes should not become an issue. For detailed information consult the definitions on the NVT website.

Marketing

Faba beans grown in Australia are predominately exported to the human consumption export market of the Middle East and North Africa. Egypt is the largest single market, taking over two thirds of Australian exports. These markets demand high visual quality standards to meet market specifications.

Since 2014, Australia has competed with the United Kingdom and the European Union, for market share of the North African market. In 2015, with historically high prices being paid globally for faba beans, the Baltic States, Eastern Europe and North America entered the international faba bean market for the first time. These emerging global suppliers are also targeting the Middle Eastern market that Australia, the United Kingdom and European Union have traditionally supplied.

The relatively small market demand from the Middle East and Northern Africa is consistent and has been for the last 10 years. If there is a surplus of product produced globally, expect to see a downward slide in price. There is however growing demand for faba bean as stock feed and in the aquaculture market as they are suitable for grinding for pellet production.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports App

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- AG0083 Growing faba bean
- AG1347 Pulse disease guide

www.pulseaus.com.au

Pulse Australia has detailed information on growing pulses.

VARIETY DESCRIPTIONS

([Ⓛ]) denotes Plant Breeders Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Broad bean – AQUADULCE

Tall late flowering broad bean with some tolerance to waterlogging as well as iron and manganese deficiencies. Best suited to high rainfall districts (>450mm). MS to both ascochyta blight pathotypes, chocolate spot and rust. Released 1982.

Broad bean – PBA KAREEMA^(Ⓛ)

PBA Kareema is a direct replacement for Aquadulce. PBA Kareema requires a long growing season similar to Aquadulce and rainfall greater than 450mm. It is RMR to ascochyta blight (P1) and MS to chocolate spot. PBA Kareema is only recommended for the South West region. Released 2009. PGG Wrightson Seeds. EPR \$4.

Faba bean – FARAH^(Ⓛ)

Farah is similar to Fiesta. It has good resistance to ascochyta blight pathotype 1, but is susceptible to pathotype 2. The yield of Farah is similar to Fiesta across southern Australia and performs best in medium rainfall environments. Released 2004. Heritage Seeds. EPR \$3.

Faba bean – FIESTA VF

A medium sized bean, Fiesta has good yields and wide adaptation throughout southern Australia. It has good seedling vigour and is of medium height. Fiesta is MRMS to ascochyta blight (P1) but S to P2 and S to chocolate spot. Released 1998.

Faba bean – NURA^(Ⓛ)

Nura is shorter than Fiesta and Farah and less likely to lodge, however the bottom pods are closer to the ground. Nura is RMR to both pathotypes of ascochyta blight, MS to chocolate spot and rust. Nura needs to be sown early as it flowers about seven days later than Fiesta, but it matures at a similar time. Released 2005. Seednet. EPR \$3.

Faba bean – PBA RANA^(Ⓛ)

Relatively late flowering and maturing variety suited to higher rainfall, long season regions. Seed is larger than current varieties and is considered high quality by the major Egyptian market. Resistant to ascochyta blight (P1), but MRMS to P2 and MS to chocolate spot. Seednet. EPR \$3.50.

Faba bean – PBA SAMIRA^(Ⓛ)

A high yielding variety with wide adaptation. Excellent disease resistance and later flowering means it can take advantage of late rainfall in longer season environments. Seed is slightly larger than Fiesta and Farah and is suited to Middle East markets. Resistant to both pathotypes of ascochyta blight, MRMS to chocolate spot and MS to rust. Developed by PBA (as AF05069-2). Released 2015. Seednet. EPR \$3.50.

Faba bean – PBA ZAHRA^(Ⓛ)

A higher yielding, later flowering and maturing variety that has performed very well in longer season environments. Seed is larger than Fiesta and Farah and similar to PBA Rana and should be suited to Middle East markets. Good overall response to diseases, resistant to ascochyta blight (P1), but MRMS to P2, MRMS to chocolate spot. Developed by PBA (as AF05095-1). Released 2016. Seednet. EPR \$3.50.

TABLE 1 Faba bean time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists

MALLEE	April			May				June			
Farah, Fiesta, PBA Samira		>	X	X	X	<	<				
WIMMERA											
Aquadulce, Farah, Fiesta, Nura, PBA Samira, PBA Zahra		>	>	X	X	X	X	<	<		
NORTH CENTRAL - 1 week earlier for irrigation											
Aquadulce, Farah, Fiesta, Nura, PBA Samira, PBA Zahra		>	>	X	X	X	X	<	<		
NORTH EAST											
Aquadulce, Farah, Fiesta, Nura, PBA Samira, PBA Zahra			>	X	X	X	<				
SOUTH WEST											
Aquadulce, PBA Kareema, Farah, Fiesta, PBA Rana, PBA Samira, PBA Zahra			>	>	X	X	X	X	<	<	<

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 2 Faba bean disease guide.

Disease	Organism	Symptoms	Occurrence	Hosts	Control
Ascochyta blight	<i>Ascochyta fabae</i>	Large, light tan to grey lesions on leaves. Small black fruiting bodies develop within lesions. Centres of lesions may fall out, leaving holes in leaves. Sunken lesions on stem similar in colour to leaf lesions. Brown-black discolouration of grain.	Common in all faba bean growing areas in southern Australia. Most severe in wet seasons. Spores spread by wind and rain. Infected seed.	Faba bean, vetch.	Foliar fungicides. Resistant varieties. Crop rotation. Control volunteer plants. Clean seed.
Chocolate spot	<i>Botrytis fabae</i> <i>Botrytis cinerea</i>	Passive phase: small chocolate covered spots scattered over leaves. Aggressive phase: tissue around spots turns dark grey and black. Leaves die and blacken.	Occurs in all areas where beans are grown. Disease usually becomes established in late winter and becomes more severe as day temperatures increase during spring. Spores spread by wind and rain. Can destroy unprotected crops in wet seasons.	Faba bean, vetch, lentil, chickpea.	Foliar fungicides. Resistant varieties. Crop rotation. Control volunteer plants.
Cercospora leaf spot	<i>Cercospora zonata</i>	Irregular black lesions, with a distinct margin on the leaf. Easily confused with Ascochyta or Chocolate spot but distinguished by the concentric pattern within lesions.	Occurs in all areas where beans are grown.	Faba bean, vetch.	Foliar fungicides.
Rust	<i>Uromyces viciae-fabae</i>	Numerous small, orange-brown rust pustules, surrounded by a light yellow halo on the leaves of infected plants.	Most prevalent in northern Australia. Crops usually affected late in the season.	Faba bean, vetch.	Foliar fungicides. Crop rotation. Control volunteer plants.
Sclerotinia stem rot	<i>Sclerotinia trifoliorum</i> var. <i>fabae</i> , <i>Sclerotinia sclerotiorum</i>	Infection usually begins close to ground level and slimy wet rot extends into stem and down into the roots. Plants easily pulled from soil and have blackened base covered with cottony, white fungus growth. Usually isolated plants that suddenly wilt and collapse. Sclerotia on surface and within stem turn from white to black.	Rapid development of disease in wet, cool conditions. Foliar form of disease spread by air-borne spores. Fungus survives in the soil for many years.	Wide host range.	Crop rotation. Lower seeding rates, wider row spacing and good weed control.
Stem nematode	<i>Ditylenchus dipsaci</i>	Patches of malformed and stunted plants with curling leaves and water-soaked spots. Stem may die back, turning reddish-brown colour.	Most severe in wet seasons. Nematode can survive many years in seed, straw or soil.	Faba bean, pea, oat, wild oat. Infected seed straw or soil.	Seed test. Crop rotation.
VIRUS DISEASES					
SCSV	<i>Subterranean clover stunt virus</i>	Stunting, tip yellowing, small and thick leaves.	Prevalent in all bean growing areas, symptoms appear early on faba bean.	Sub clover, faba bean, lupin, lentil, chickpea, lucerne, soybean.	Managing aphids and weeds.
BLRV	<i>Bean leaf roll virus</i>	Interveinal yellowing, leaf rolling, stunting, leathery leaves.	Occurs in all bean growing areas.	The host range is limited to <i>Fabaceae</i> .	Managing aphids through seed dressing and weed control.
PSbMV	Pea seedborne mosaic virus	Can be symptomless or systemic dark and light green leaf mottle, leaf margins upright leaf blade reduced in size. Seeds have brown rings or line patterns on surface.	Occurs in all bean growing areas.	Host range is limited to <i>Fabaceae</i>	Virus free seed is recommended. Managing aphids.

TABLE 3 Faba bean variety disease guide.

Variety	Ascochyta blight Pathotype 1 (P1)	Ascochyta blight Pathotype 2 (P2)	Chocolate spot	Cercospora	Rust	PSbMV seed staining	<i>Pratylenchus thornei</i>
Aquadulce	MS	MS	MS	S	MS	S	-
PBA Kareema	RMR	MRMS	MS	S	MRMS	S	-
Farah	RMR	S	S	S	S	S	MS
Fiesta VF	MRMS	S	S	S	S	S	MS
Nura	RMR	RMR	MS	S	MS	VS	MS
PBA Rana	R	MRMS	MS	S	MS	MR	MS
PBA Samira	R	RMR	MRMS	S	MS	S	MRMS
PBA Zahra	R	MRMS	MRMS	S	MS	S	MS

Resistance order from best to worst: R > RMR > MR > MRMS > MS > MSS > S > SVS > VS.

p = provisional ratings - treat with caution. R = resistant, M = moderately, S = susceptible, V = very.

TABLE 4 Faba bean variety agronomic guide.

Variety	Seed size	Seed colour	Plant height	Flowering time	Maturity	Lodging
Aquadulce	large	light buff	tall	late	mid-late	MS
PBA Kareema	large	light brown	tall	late	late	MS
Farah	medium	light brown -brown	medium	early-mid	early-mid	MS
Fiesta VF	medium	light brown -brown	medium	early-mid	early-mid	MS
Nura	small-med	light buff	short	mid	early-mid	MR
PBA Rana	med-large	light brown	med/tall	mid	mid	MR
PBA Samira	medium	light brown	medium	mid	mid	MR
PBA Zahra	med-large	light brown	med/tall	mid	mid-late	MR

Lodging resistance – see key used in Table 3

TABLE 5 North Central and North East faba bean. Long term predicted yield expressed as a percentage of mean yield.

Year	North Central						North East				
		2012	2013	2014	2015	2016		2012	2013	2014	2015
Mean yield (t/ha)		3.54	6.10	5.30	5.39	6.19		3.53	3.91	2.00	1.59
	No. trials	1	1	1	1	1	No. trials	1	1	1	1
Farah	5	84	94	95	112	87	4	104	103	106	100
Fiesta VF	5	87	95	95	109	91	4	105	106	105	99
Nura	5	93	92	98	107	87	4	100	91	102	95
PBA Nasma	1	98	112	101	97	105	-	-	-	-	-
PBA Rana	1	102	92	90	86	99	4	99	91	97	89
PBA Samira	5	103	99	104	106	103	4	109	103	105	101
PBA Warda	-	-	-	-	-	-	1	90	101	94	107
PBA Zahra	5	99	97	104	112	102	4	113	107	109	102

TABLE 6 South West and Wimmera faba bean. Long term predicted yield expressed as a percentage of mean yield.

Year	South West						Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016
Mean yield (t/ha)		4.76	3.37	2.47	2.95	5.58		1.62	3.64	1.50	0.67	3.48
	No. trials	1	1	1	1	1	No. trials	5	5	5	2	3
Aquadulce	2	61	104	96	81	102	-	-	-	-	-	-
Doza	-	-	-	-	-	-	1	96	92	96	100	96
Farah	5	103	113	103	98	100	20	99	97	98	113	98
Fiesta VF	5	109	116	102	100	98	13	98	97	99	113	100
Fiord	-	-	-	-	-	-	1	106	96	110	144	115
Nura	5	86	120	98	90	117	20	97	97	93	95	90
PBA Kareema	2	70	104	95	86	102	-	-	-	-	-	-
PBA Nasma	-	-	-	-	-	-	1	105	102	110	117	116
PBA Rana	5	103	124	97	96	106	20	89	91	91	93	95
PBA Samira	5	111	126	95	100	114	18	101	105	102	94	103
PBA Warda	-	-	-	-	-	-	1	104	101	105	107	104
PBA Zahra	5	118	135	96	101	115	18	102	105	103	100	105

TABLE 7 2016 faba bean yield and grain weight (g/100 seeds) in NVT and Victorian breeding (B) trials. Yield expressed as a percentage of the site mean yield.

	Yield (%)						Grain weight (g/100 seeds)	
	North Central	South West	Wimmera				Wimmera	
	Kerang (B)	Lake Bolac (B)	Horsham (B)	Kaniva	Kaniva (B)	Wonwondah	Kaniva	Wonwondah
Sowing Date*	28/4/16	22/4/16	28/4/16	29/4/16	19/4/16	29/4/16		
Doza	-	-	98	-	-	-	-	-
Farah	89	101	83	112	110	96	74.3	75.0
Fiesta VF	110	96	74	101	-	94	77.7	69.9
Fiord	-	-	106	-	-	-	-	-
Nura	83	112	105	73	64	79	78.7	69.7
PBA Nasma	92	-	92	-	-	-	-	-
PBA Rana	-	94	94	109	101	95	93.9	77.1
PBA Samira	108	114	110	90	94	108	81.7	76.7
PBA Warda	-	-	108	-	-	-	-	-
PBA Zahra	95	106	88	100	90	104	87.0	75.0
Site Mean (t/ha)	6.20	5.58	4.17	2.70	2.47	3.74		
CV (%)	6	10	9	10	10	11		
LSD (%)	10	15	15	15	18	18		

* Sowing Date / Germination Rain Date

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LUPIN

There are two species of lupin used in broadacre crop production, the more commonly grown narrow-leaved lupins (*Lupinus angustifolius*) and the large seeded broad-leaved types (*Lupinus albus*). Narrow-leaved types have been generally used as a high protein stock feed either for sale or supplementary feeding on-farm, but more recently are being promoted as a food ingredient. The albus types may fit into human food and aquaculture markets as well as high protein stock feed markets, however are the less preferred lupin for stock feed manufacturing. Albus lupins are also more susceptible to dry conditions than narrow leaf lupins.

REVIEW OF 2016

Season

There was a slight increase in area planted to lupins in 2016 due to strong prices throughout 2015. Despite limited summer rainfall, a solid autumn break provided conditions which produced high early biomass, with crops supported by consistent rainfall throughout the season.

As with most crops, this season resulted in good lupin yields except for those crops impacted heavily by disease. A mild finish allowed good pod set and grain fill. Many growers achieved yields above the long term average and there were no reported issues with quality. The high biomass from vigorous early growing plants meant that lupins made a good contribution to soil nitrogen for 2017.

Rain after crop maturity and before harvest can impact on germination and vigour of seed. Due to the continued wet conditions at the end of 2016, growers should get seed tested for low germination rates if they are retaining seed for sowing. Grading is also recommended to ensure impurities are removed and to maintain uniform seed size.

Disease

Brown leaf spot was present in lupin crops early in the season however didn't cause great concern for growers.

Sclerotinia collar rot (*Sclerotinia minor*) symptoms appeared late in the season with infections appearing at the base of the main stems as a result of continual cool, wet conditions. Infections were common in areas with a strong history of canola and lupins in the rotation and poor broadleaf weed control. The disease significantly impacted yields where infection was severe.

Lupin anthracnose was detected in NSW in 2016. Testing of suspect samples from Victoria confirmed that Victoria remains free of anthracnose.

Cucumber mosaic virus was found in a number of lupin samples.

LOOKING FORWARD TO 2017

New varieties

There are no new lupin varieties available for 2017.

Disease

Most narrow-leaved varieties are susceptible to brown leaf spot. Fungicide seed dressings and agronomic management are required to reduce the impact of this disease, particularly on, or adjacent to paddocks with lupin history.

Sclerotinia can survive for several years in the soil so paddocks that were infected with Sclerotinia in 2016 need to be managed accordingly. All broadleaf crops are susceptible to Sclerotinia and cereals provide the best disease break to limit levels of inoculum increasing in the soil. Lupin seed harvested from infected crops will need to be well cleaned to screen out sclerotes. This seed should be avoided for re-planting in 2017 as resulting crops will have reduced vigour and poor germination.

Virus diseases remain a potential issue for 2017 and the use of more resistant varieties is recommended where viruses occur regularly. Seed testing is recommended to confirm freedom from CMV, particularly in crops or regions where the disease was seen in crop. Avoid sowing lupins adjacent to legume crops or pasture (e.g. lucerne) to reduce virus risk as this is the major source of BYMV in lupins. Jenabillup, Quilinock and PBA Jurien offer the best available resistance to BYMV and black pod syndrome among currently available narrow leaved varieties. Monitoring and managing aphids in crop may have limited impact on BYMV and CMV management.

Most current varieties have resistance to phomopsis, slowing development of the fungus and reducing toxin production. However, when significant rainfall occurs on plants as they mature or after harvest, disease development and toxin production can still occur. Care must be taken when grazing lupin stubbles or feeding infected seed to avoid lupinosis.

Anthrachnose is present in WA and SA commercial lupin crops. The disease was detected and eradicated from six NSW paddocks in 2016. Lupin anthracnose is highly seed transmitted and it is therefore important that seed is obtained from reputable sources to prevent accidental introduction into Victoria. Seed dressings are recommended to reduce the risk of seedborne anthracnose infections. Albus lupin varieties are very susceptible to anthracnose and are at greatest risk. Standard hygiene practice should apply when dealing with equipment, material or people from infected states.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports App

agriculture.vic.gov.au/agriculture/grains-and-other-crops

- Growing lupin
- AG1347 Pulse disease guide

www.pulseaus.com.au

Pulse Australia has detailed information on growing pulses.

VARIETY DESCRIPTIONS

([‡]) denotes Plant Breeder Rights apply

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Narrow leaf lupin – JENABILLUP[‡]

Tall mid flowering narrow leaf lupin with early vigour. A high yielding variety that is MR to lodging and more suited to the medium to higher rainfall areas. It has a longer flowering window compared to Mandelup, making it less suitable for crop topping. It is MR to aphid colonisation and has the best tolerance available in narrow leaf varieties for both brown leaf spot (MRMS), BYMV and black pod syndrome (MR). It has poor anthracnose (S) and stem phomopsis (MS) tolerance but has good pod phomopsis resistance (R). Poor tolerance of foliar Metribuzin. Released 2007. Seednet. EPR \$2.30.

Narrow leaf lupin – JINDALEE

Tall, mid flowering and late maturing variety suited to early sowing in high rainfall, long season areas. Does not handle a dry finish, and because of its vernalisation requirement can flower too late in warmer areas. Susceptible to anthracnose but resistant to phomopsis. Medium size speckled seed with medium seed alkaloid levels. Developed by NSW DPI. Released 2000.

Narrow leaf lupin – MANDELUP[‡]

A tall, early flowering and maturing variety with high yield suited to low to medium rainfall zones. Suitable for crop topping. Mandelup may lodge in high rainfall zones. Good disease resistance package being MR to anthracnose, R to stem phomopsis, MRMS to pod phomopsis and MS to brown spot and CMV seed transmission. MR to aphids but less tolerant than PBA Jurien or Wonga. Good tolerance to Metribuzin. Pod shatter with delayed harvest and poorer seed germination rate and establishment with rain before harvest have been issues with Mandelup. Released 2004. Heritage Seeds are the commercial partner for this variety. Seednet. EPR \$2.30.

Narrow leaf lupin – PBA BARLOCK[‡]

PBA Barlock is an early variety with slightly later flowering and maturity than Mandelup with a greater yield potential, reduced lodging and good resistance to pod shatter. Resistant to aphids. Strong disease resistance profile, R to anthracnose and pod phomopsis, MR to stem phomopsis and CMV and MS to brown leaf spot. Similar Metribuzin tolerance to that of Mandelup and better than Wonga. Released 2014. Seednet. EPR \$2.50

Narrow leaf lupin – PBA GUNYIDI[‡]

PBA Gunyidi is a slightly later flowering and maturing variety than Mandelup. PBA Gunyidi has proven widely adapted to a range of environments, and is considered an alternative to Mandelup, but with greater resistance to pod shattering. It is not as tall as Mandelup, and generally considered comparable to it for yield. MR

to aphids. Strong disease resistance profile, MR to anthracnose, R to phomopsis and MS to brown leaf spot. It is only available in limited supply in eastern Australia and likely to be adopted only by those who are dissatisfied with Mandelup. Developed by PBA. Released 2011. Seednet. EPR \$2.50.

Narrow leaf lupin – PBA JURIE[‡]

An early maturing, early flowering variety, flowering slightly earlier than PBA Barlock. Very strong aphid (R) and disease resistance profile being resistant to anthracnose, phomopsis and grey spot and having tolerance of BYMV and black pod syndrome similar to Jenabillup. PBA Jurien is similar in height to Mandelup and is MS to lodging in high rainfall regions. Tolerance to Metribuzin is better than Mandelup. The seed size is similar to Mandelup and the alkaloid content is similar to PBA Gunyidi. Some reduced seed germination has been experienced when rain before harvest has affected seed quality. Developed by PBA. Released 2015 (WALAN2385). Seednet. EPR \$2.50.

Narrow leaf lupin – QUILNOCK[‡]

SVS to anthracnose. It is early flowering for low to medium rainfall areas. Poorer phomopsis resistance than most varieties, MRMS to stem phomopsis and MS to pod phomopsis. Poor tolerance to Metribuzin. Released 1999. Limited quantities grown in eastern states due to anthracnose susceptibility. DAFWA. EPR \$0.95.

Narrow leaf lupin – WONGA

Very good disease resistance profile, resistant to anthracnose, phomopsis and CMV seed transmission with medium height and lodging resistance. Best suited to medium rainfall districts, particularly when resistance to anthracnose and phomopsis is required. Very poor tolerance of Metribuzin. Released 1997.

Albus lupin – KIEV MUTANT

Once the most widely grown albus variety, but now superseded. It is of moderate height, grows vigorously, flowers early but matures late compared with narrow leaf lupins. Requires rainfall higher than 450mm to yield well. Does not handle waterlogged conditions. Alkaloid testing of seed is required. Very susceptible to anthracnose

Albus lupin – LUXOR[‡]

A newer release to replace Kiev Mutant, but with resistance to Pleiochaeta root rot. Slightly taller than Kiev Mutant and suitable for low to medium rainfall regions and high rainfall regions where Pleiochaeta root rot is a problem. Very susceptible to anthracnose. Luxor is 100 per cent sweet and should not be grown within 2 km of other albus varieties to avoid bitter contamination. Released 2008. Seednet. EPR \$2.80.

Albus lupin – ROSETTA

A release selected for improved yield and Pleiochaeta root rot resistance compared to Kiev Mutant. It is late flowering, making it suitable for medium and higher rainfall regions although has compared well with other albus varieties in the Mallee. It is tall and 100 per cent sweet, so should not be grown near other albus varieties. Very little is grown in the eastern states. Released 2007.

Bitter, large seeded albus lupin - LUPINI bean

Varieties are Lago Azzurro, Mount Beauty and Murphy. They must be grown in complete isolation from sweet albus varieties due to the high alkaloid content of the seed and the potential to cross or contaminate sweet albus varieties. Disease profiles relatively untested, although likely to be susceptible to anthracnose. Production is for a niche market.

TABLE 1 Optimal lupin sowing times for rainfall zones and soil types.

Rainfall zone	Optimum sowing time	
Average mm per year	Sands	Shallow sand over clay, sandy loams, loams
Below 350 mm	mid-April to early May	late April to early May
350 - 450 mm	early to mid-May	mid May
Above 450 mm	mid May	late May

TABLE 2 Lupin variety agronomic and disease guide.

	Flowering time	Height	Lodging	Pod shattering	Drought tolerance	Aphid resistance	Brown leaf spot	Pleiochaeta root rot	CMV seed transmit	Anthracnose	Phomopsis	
											Stem	Pod
Narrow leaf												
Jenabillup	M	T	MR	MS	MR	MR	MRMS	R	MRMS	S	MS	R
Jindalee	M-L	M	R	MR	MS		MRMS	R	MS	S	R	R
Mandelup	VE	T	MS	MS	MR	MR	MS	R	MS	MR	R	MRMS
PBA Barlock	E	M	MR	R		R	MS		MR	R	MR	R
PBA Gunyidi	VE	M	MS	R	MR	MR	MS	R	MRMS	MR	R	R
PBA Jurien	VE	T	MS	MR		R	MS		MRMS	R	R	MR
Quilinoack	E	S	MS	MR	MR	MS	MRMS	R	MS	SVS	MRMS	MS
Wonga	E-M	M	MR	R	MS	R	MS	R	R	R	R	R
Albus lupin												
Kiev Mutant	E	M	R		MS	S	MS	VS	Immune	VS	MR	S
Luxor	E-M	M-T	R		MS	S	MR	R	Immune	VS	MR	S
Rosetta	M-L	T	R		MS	S	MR	MR	Immune	VS	MR	S

Flowering time; VE=very early, E=early, M=mid, L=late

Height; S=short, M=medium, T=tall

Lodging and disease reactions; R = Resistant RMR = Resistant to moderately resistant MR = Moderately resistant MRMS = Moderately resistant to moderately susceptible MS = Moderately susceptible MSS = Moderately susceptible to susceptible S = Susceptible SVS = Susceptible to very susceptible VS = Very susceptible

TABLE 3 Lupin sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April			May			June			July		
Narrow leaf												
Jenabillup, Mandelup, PBA Barlock, PBA Gunyidi, PBA Jurien, Quilinoack, Wonga		>	X	X	X	X	<	<				
Albus lupin												
Kiev Mutant, Luxor, Rosetta		>	X	X	X	X	<	<				
WIMMERA	April			May			June			July		
Narrow leaf												
Jenabillup, Mandelup, PBA Barlock, PBA Gunyidi, PBA Jurien, Quilinoack, Wonga		>	>	X	X	X	X	<	<			
Albus lupin												
Kiev Mutant, Luxor, Rosetta		>	>	X	X	X	X	<	<			
NORTH CENTRAL	April			May			June			July		
Narrow leaf												
Jenabillup, Jindalee, Mandelup, PBA Barlock, PBA Gunyidi, PBA Jurien, Quilinoack, Wonga		>	>	X	X	X	X	<	<			
Albus lupin												
Kiev Mutant, Luxor, Rosetta		>	>	X	X	X	X	<	<			
NORTH EAST	April			May			June			July		
Narrow leaf												
Jenabillup, Jindalee, Mandelup, PBA Barlock, PBA Gunyidi, PBA Jurien, Quilinoack, Wonga		>	>	X	X	X	X	<	<			
Albus lupin												
Kiev Mutant, Luxor, Rosetta		>	>	X	X	X	X	<	<			
SOUTH WEST	April			May			June			July		
Narrow leaf												
Jenabillup, Jindalee, PBA Barlock, PBA Gunyidi, PBA Jurien, Quilinoack, Wonga		>	X	X	X	X	<	<				
Albus lupin												
Kiev Mutant, Luxor, Rosetta		>	X	X	X	X	X	<	<			

>earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 4 Lupin disease guide.

Disease	Organism	Symptoms	Occurrence	Inoculum source	Control
FUNGAL DISEASES					
Brown leaf spot	<i>Pleiochaeta setosa</i>	Dark spots on cotyledons leaves and pods, often web like on leaves, infected leaves drop off, lesions may girdle stem.	Very common but losses usually minor in dry areas, yield loss can be significant in cool damp areas.	Spores survive in soil and lupin trash. Rain splash and windblown rain spread the disease.	Fungicide seed dressings, crop rotation, variety selection, early sowing, sow into cereal stubble.
Pleiochaeta root rot	<i>Pleiochaeta setosa</i>	Browning and rotting of tap and lateral roots, seedling plant death.	Serious reduction in lupin plant density and vigour.	Spores in soil infecting roots usually at seedling stage.	Minimum 4 year rotation between lupins, sowing 4-5 cm deep to avoid spore layer, fungicide seed dressings.
Rhizoctonia	<i>Rhizoctonia spp.</i>	Bare patches in crop, spear tipped root ends or hypocotyl rot and stain.	Root rot can be severe in distinct patches, reduces stand density, favoured by minimum tillage, wet soils and mild conditions.	Soil borne infection with wide host range, survives as fungal fragments in soil and plant debris.	Tillage prior and during sowing below seed depth, rotation has no effect.
Anthraxnose	<i>Colletotrichum lupini</i>	Dark brown lesions containing pink/orange spore masses on stems, pods and occasionally leaves. Lesions cause bending and twisting of stems and pods and occur in crook of bend.	Severe infections can result in severing of stems or total pod abortion resulting in complete crop failure.	Seed-borne infection. Spread in crop by rain splash and wind.	Clean seed and machinery, resistant varieties, fungicide seed dressings.
Sclerotinia	<i>Sclerotinia sclerotiorum</i>	White fungal growth containing black sclerotia in upper stem, branches or colonising pods. Stem death above lesion. Sclerotia contaminating harvested seed.	Most common in higher rainfall or wetter regions, particularly in canola growing regions.	Sclerotia survive in soil and trash for several years. Wide host range in broad leaf crops.	Avoid lupins following broad leaf crops or pasture (particularly canola). <u>No</u> variety resistance.
VIRUS DISEASES					
CMV	Cucumber mosaic virus	Leaves are pale, bunched, and down curled with faint mosaic pattern.	Early widespread infection severely reduces yield. Minor infections prevent use of harvested grain as seed.	Seed borne infection in narrow leaf lupin, aphid vectored in crop.	Sow clean seed, use a seed test, high sowing rates and cereal barriers around crops reduce aphid transmission.
BYMV	Bean yellow mosaic virus	Brown necrotic streaks as plant dies back from growing point of stem, shepherd crook of stem, pods blackened and flat, leaves yellow, plants wilt and die.	Can be severe in higher rainfall areas, usually transmitted from pasture.	Aphid vectored, many hosts (including pasture legumes), seed borne in <i>L. albus</i> .	High plant density, cereal barrier, control weed and volunteer lupins, avoid sowing adjacent to legume pastures.

TABLE 5 Long term predicted lupin yield expressed as a percentage of mean yield.

Year	Mallee					North Central			
		2012	2013	2014	2015		2012	2013	2014
Mean yield (t/ha)		0.81	0.96	1.04	0.91		1.78	2.53	2.33
	No. trials	2	2	2	2	No. trials	1	1	1
Coromup	4	99	69	89	82	3	101	86	92
Danja	2	89	75	96	75				
Jenabillup	8	99	93	100	98	3	110	95	96
Jindalee	2	76	72	80	74				
Mandelup	8	113	110	120	98	3	105	99	95
PBA Barlock	8	113	95	103	104	3	107	99	108
PBA Gunyidi	8	100	106	98	102	3	96	104	106
PBA Jurien	8	118	99	106	104	3	103	101	112
Quilinock	8	94	90	102	96				
Wonga	8	101	79	94	86	3	98	90	95

TABLE 6 Mallee 2016 lupin yield and grain weight (g/100 seeds). Yield expressed as a percentage of the site mean yield.

Sowing Date	Walpeup 12/5/16	
	Yield (%)	Seed weight (g/100 seeds)
Coromup	98	12.8
Jenabillup	85	11.6
Mandelup	105	12.3
PBA Barlock	94	12.0
PBA Gunyidi	104	11.0
PBA Jurien	87	12.2
Quilinock	92	11.6
Wonga	88	11.3
Site Mean (t/ha)	1.68	
CV (%)	5	
LSD (%)	9	

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CHICKPEA

REVIEW OF 2016

Season

The area planted to chickpeas in 2016 decreased due to concerns regarding changes to the ascochyta blight pathogen. Above average May rainfall and warm temperatures led to good early vigour and biomass production.

The season was a challenge for chickpea crops with high disease pressure and low temperatures impacting grain yields. Good winter rainfall and ongoing mild conditions meant ascochyta blight was seen relatively early and growers adopted a vigorous fungicide management program which minimised yield loss.

Continued cool wet conditions in spring and high biomass crops resulted in abortion of early flowers and pods in the Wimmera and southern Mallee. However, the long growing season provided an extended period suitable for pod set late in the season. Slightly drier and warmer conditions in the central and northern Mallee meant that growers in these areas achieved good pod set.

Growers achieved yields between 1.5-2 t/ha with some crops in the Wimmera reaching 3 t/ha. There were no issues with quality and high grain prices meant that chickpeas were one of the most profitable crops in 2016.

Early sowing (within the sowing window, see Table 1) remains an important management technique for chickpeas, although consideration of cold temperatures in spring, frost risk and diligent disease management is required for success.

Disease and insects

The 2016 season provided ideal conditions for fungal diseases across all pulse crops. The major issue for Victorian chickpea growers was the change in virulence of the ascochyta blight pathogen leaving all current varieties susceptible to foliar infection of the disease. Growers responded well to this change and timely fungicide application prior to rainfall events allowed growers to minimise the impact of the disease.

Botrytis grey mould (BGM) and sclerotinia also caused growers concern as canopies stayed moist and warmer than normal throughout the season. Fungicide availability towards the end of the season due to high disease pressure and therefore high demand caused issues for some growers, however most appeared to manage the disease pressure successfully.

Virus incidence was low in 2016 chickpea crops.

LOOKING FORWARD TO 2017

New varieties

There are no new varieties adapted to the southern growing region being released for 2017. The desi chickpea, PBA Seamer was released for northern chickpea growers. PBA Seamer is not recommended for Victorian chickpea growing regions where yield is lower than currently recommended varieties.

Disease

Management of fungal diseases remains an important priority at sowing, particularly with the amount of inoculum present due to high disease pressure in 2016. Source seed from a paddock where disease was not detected or was well managed and treat properly with a fungicide seed dressing to minimise ascochyta blight and botrytis seedling diseases. Seed testing is a valuable tool to determine the presence of diseases or viruses, and the germination rate and vigour of seed for sowing. Seed testing is highly recommended to ensure seed is healthy and disease free for sowing in 2017.

Sow into a paddock more than 500 metres away from last year's chickpea crop to reduce the risk of ascochyta and 500 metres from last year's chickpea and lentil crops to reduce the impact of BGM. Growers should note that all desi varieties grown in Victoria are susceptible to BGM.

Due to a virulence change in the ascochyta blight pathogen in southern Australia all current chickpea varieties are now rated susceptible or moderately susceptible to foliar ascochyta blight infection. A proactive fungicide spray should be applied to all varieties 6 to 8 weeks' post sowing. For moderately susceptible (MS) varieties, fungicide sprays will be required ahead of rain events and 3 to 4 of these strategic applications may be required to offer ongoing protection. For susceptible (S) varieties, regular fungicide sprays every 2 to 3 weeks ahead of rain events will be required throughout the growing season. Regular monitoring of chickpea crops will help to identify early infections of both ascochyta and BGM and enable timely application of foliar fungicides to reduce the impact of disease on crops.

Most chickpea varieties are susceptible to root lesion nematode (*Pratylenchus thornei*) and will increase nematode densities in most seasons. In the southern region, avoiding the most susceptible varieties should reduce nematode multiplication if resistant crops or varieties are used in rotation. Resistant varieties will reduce nematode densities or maintain them at low levels. Susceptible varieties will increase nematode densities or maintain them at levels which will cause yield loss in subsequent intolerant varieties.

Abiotic stress such as waterlogging, herbicides and their residues can increase susceptibility to disease. Growers need to consult

with cropping advisors to maintain an awareness of the products and rates registered for use on chickpeas and the plant back time for chemicals used previously, taking into consideration the amount of rainfall received to aid in moving residues through soil.

MORE INFORMATION

www.nvtonline.com.au

Detailed NVT trial results and links to variety information.

www.nvtonline.com.au/apps

- Crop Disease Au App
- NVT Long Term Yield Reports app

www.agriculture.vic.gov.au/agriculture/grains-and-other-crops

- Growing chickpea
- AG1347 Pulse disease guide

www.pulseaus.com.au

Pulse Australia has detailed information on growing pulses including:

- Chickpea disease management strategy

VARIETY DESCRIPTIONS

([Ⓛ]) denotes Plant Breeders Rights apply.

End Point Royalty (EPR) 2017-18 quoted \$/tonne ex-GST.

Desi type – AMBAR^(Ⓛ)

MS to ascochyta, strategic fungicide applications (2-4 sprays) required throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Ambar is an early flowering and maturing variety suitable for short season environments. Seed is smaller than Howzat and PBA Slasher but has a uniform grain size and tan-brown colour that assists marketing. Released 2012. Heritage Seeds. EPR \$4.

Desi type – HOWZAT

S to ascochyta blight, will require regular strategic application of fungicides (every 2-3 weeks) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Initially prostrate rather than erect, standing ability improves towards maturity. Mid flowering with tan grain of medium size. The variety has excellent adaptation to most chickpea growing regions. Released 2000. Australian Agricultural Crop Technologies.

Desi type – NEELAM^(Ⓛ)

MS to ascochyta, strategic fungicide applications (2-4 sprays) required throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of AB on emerging seedlings. Mid flowering and mid maturing variety. Seed is smaller than Howzat and PBA Slasher. Released 2012. Heritage Seeds. EPR \$4.

Desi type – PBA MAIDEN^(Ⓛ)

S to ascochyta blight, will require regular strategic application of fungicides (every 2-3 weeks) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Large angular seed size, yellow-tan in colour, is suitable for the whole seed market. Early-mid flowering and mid maturity. Growers are advised to investigate delivery and marketing options prior to growing this variety due to its unique and favourable seed characteristics. Released 2013. Seednet. EPR \$4.

Desi type – PBA SLASHER^(Ⓛ)

MS to ascochyta, strategic fungicide applications (2-4 sprays) required throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on

emerging seedlings. PBA Slasher has mid flowering and maturity. Seed is medium size tan-brown which has excellent milling quality, suitable for both split and whole seed markets. Released 2009. Seednet. EPR \$4.

Desi type – PBA STRIKER^(Ⓛ)

S to ascochyta blight, will require regular strategic application of fungicides (every 2-3 weeks) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Excellent adaptation to short season environments due to early flowering and maturity. Medium seed size with excellent milling quality. Released 2012. Seednet. EPR \$4.

Kabuli type – ALMAZ^(Ⓛ)

MS to ascochyta blight, strategic fungicide applications (2-4 sprays) required throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Almaz will require at least 3 fungicide applications to be successfully grown in Victorian growing conditions. Seed size is similar to PBA Monarch (8-9 mm) but smaller than Genesis™ Kalkee. Yield is lower than PBA Monarch. Best adapted to the traditional kabuli growing areas. Released 2005. Seednet. EPR \$6.50.

Kabuli type – GENESIS™ 079

Genesis™ 079 is now S to ascochyta blight and will require strategic application of fungicides throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of AB on emerging seedlings. It is a high yielding, small seeded type (6-7mm) with relatively high yields in short season environments. Genesis™ 079 is the earliest flowering and maturing kabuli variety available. Released 2009. Australian Agricultural Crop Technologies. EPR \$5.

Kabuli type – GENESIS™ 090

Genesis™ 090 is now MS to ascochyta blight and will require strategic fungicide applications (2-4 sprays) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of AB on emerging seedlings. Genesis™ 090 has a small seed (7-8 mm), approximately 1 mm smaller than Almaz or PBA Monarch. It has the potential to be grown as a good alternative to desi chickpeas or as a higher yielding but lower value alternative (smaller seed) to kabuli's such as Almaz, PBA Monarch and Genesis™ Kalkee. Released 2005. Australian Agricultural Crop Technologies. EPR \$5.

Kabuli type – GENESIS™ KALKEE

MS to ascochyta blight and will require strategic fungicide applications (2-4 sprays) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Seed size is larger than Kaniva and Almaz (predominantly 9 mm) with an erect plant habit. Released 2012. Australian Agricultural Crop Technologies. EPR \$5.

Kabuli type – PBA MONARCH^(Ⓛ)

S to ascochyta, will require regular strategic application of fungicides (every 2-3 weeks) throughout the growing season. Treat seed with a thiram based fungicide to prevent seed transmission of ascochyta on emerging seedlings. Particularly suited to shorter season environments. Medium seed size (8-9 mm) is larger than Genesis™ 090 and similar to Almaz. Highest yielding medium sized kabuli. A semi-spreading plant similar to PBA Slasher with some susceptibility to lodging particularly when biomass is high. Released 2013. Seednet. EPR \$6.50.

TABLE 1 Chickpea time of sowing guide.

This table is a guide only and has been compiled from observations of the breeder and local departmental agronomists.

MALLEE	April				May				June				July			
Desi																
Ambar, PBA Maiden, PBA Slasher, PBA Striker			>	>	X	X	X	<	<	<	<					
Kabuli																
Genesis 079, Genesis 090, PBA Monarch			>	>	X	X	X	<	<	<	<					
WIMMERA	April				May				June				July			
Desi																
Ambar, PBA Maiden, PBA Slasher, PBA Striker					>	X	X	X	X	X	<	<	<	<		
Kabuli																
Genesis 079, Genesis 090					>	X	X	X	X	X	<	<	<	<		
Almaz, Genesis Kalkee, PBA Monarch						>	>	X	X	X	X	<	<	<		
NORTH CENTRAL	April				May				June				July			
Desi																
Ambar, PBA Maiden, PBA Slasher, PBA Striker			>	>	X	X	X	<	<	<	<					
Kabuli																
Genesis 079, Genesis 090, PBA Monarch			>	>	X	X	X	<	<	<	<					

> earlier than ideal, X optimum sowing time, < later than ideal but acceptable

TABLE 2 Chickpea variety agronomic guide.

Variety	Ave 100 seed wt. (g)	Seed size group	Early growth	Flowering	Maturity	Height	Lodging resistance
DESI							
Ambar	16	small	poor-mod	early	early	short-mid	MS
Howzat	20	medium	poor-mod	mid	mid	mid	MS
Neelam	17	medium	mod	mid	mid	short-mid	MS
PBA Maiden	24	med-large	mod	mid	mid	short-mid	MS
PBA Slasher	18	medium	poor-mod	mid	mid	short-mid	MS
PBA Striker	22	medium	good	early	early	short-mid	MS
KABULI							
Almaz	38	medium	mod	mid-late	late	mid-tall	MR
Genesis 079	24	small	good	early	early	short	MR
Genesis 090	31	small	good	mid	mid-late	mid	MR
Genesis Kalkee	45	large	good	late	late	tall	R
PBA Monarch	40	medium	poor-mod	early	early	mid	MS

TABLE 3 Chickpea variety disease guide.

* Due to observations of foliar ascochyta blight infection on previously resistant chickpeas in commercial crops in SA and Victoria in 2015 and 2016 all varieties are now rated as S or MS to foliar ascochyta blight infection. All chickpea crops will need to be monitored for ascochyta during the growing season and sprayed if disease is detected to prevent spread to pods.

Variety	Botrytis grey mould	Ascochyta blight Foliage /Stem*	Ascochyta blight Pod	Pratylenchus thornei
DESI				
Ambar	S	MS	S	
Howzat	MS	S	S	MSp
Neelam	S	MS	S	
PBA Maiden	S	S	S	
PBA Slasher	S	MS	S	MRMS
PBA Striker	S	S	S	
KABULI				
Almaz	S	MS	S	VS
Genesis 079	S	S	S	MR
Genesis 090	S	MS	S	MS
Genesis Kalkee	S	MS	S	MS
PBA Monarch	S	S	S	MS

R = Resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, p = provisional

TABLE 4 Chickpea disease guide summary.

Disease	Organism	Symptoms	Occurrence	Hosts	Control
FUNGAL DISEASES					
Ascochyta blight	<i>Ascochyta rabiei</i> .	Pale brown lesions on leaves, stems and pods. Lesions may have a grey centre containing small black fruiting bodies. Infected stems wither and break.	Occurs in all regions. Affects both kabuli and desi types. Most severe in spring.	Chickpea.	Fungicide seed dressing, foliar fungicides, rotation, avoid susceptible varieties, avoid early sowing.
Botrytis grey mould	<i>Botrytis cinerea</i> .	Poor emergence and death of young plants. Soft rot at the base of the stem. Grey mould growth on leaves, stems and pods. Lodging of plants in dense crops. Discolouration of seed with grey mould.	Occurs in all regions. Affects both kabuli and desi types. Most severe in wet seasons. Dense crops are more likely to be affected.	Chickpea, most pulses, including lentil and faba bean.	Fungicide seed dressings, lower plant densities, avoid early sowing.
Sclerotinia	<i>Sclerotinia sclerotiorum</i> .	Scattered dead plants within a crop. Cottony white fungal growth on the lower stems of dead plants. Soft rot and white mould on stems and pods.	Occurs in all chickpea growing regions. Most severe in wet seasons where chickpea is planted in fields recently cropped to chickpea.	Most pulses, oilseeds and broadleaf weeds.	Crop rotation. (Seed dressings of no benefit.)
Damping-off	<i>Pythium</i> spp.	Poor crop establishment under wet conditions. Seed rotting in the ground. Sudden death of young seedlings.	Problem in all regions, particularly in soils that become very wet just after sowing. More severe on kabuli than desi chickpea.	Chickpea, most pulses.	Fungicide seed dressings, avoid poorly drained soils.
Phytophthora	<i>Phytophthora megasperma</i> .	Plants suddenly wither and die, particularly after waterlogging. Dark brown to black discolouration of the tap root.	Most serious disease in northern Australia. May be a problem in poorly drained soils in southern Australia under wet conditions.	Chickpea, lucerne.	Resistant varieties.
Phoma blight	<i>Phoma medicaginis</i> var. <i>pinodella</i> .	Blackening of the stem near ground level. Dark, tan coloured lesions on leaves, stems and pods.	Common in most chickpea growing regions. Most severe in wet seasons.	Most legumes.	Crop rotation.
Root lesion nematode	<i>Pratylenchus thornei</i> and <i>Pratylenchus neglectus</i> .	Ill-thrift, lack of branching of root system, small dark stripes on roots.	Favoured by wheat in rotation with chickpea, medic and vetch.	Wheat, chickpea, medic, vetch, narbon bean.	Crop rotation (predictive soil test available).
VIRUS DISEASES					
AMV	Alfalfa mosaic virus	Tip necrosis. The leaves and stems of desi varieties become red/brown. The leaves and stems of kabuli varieties turn yellow.	Occurs in all chickpea growing areas. Seasons and districts with major aphid flights.	Wide host range including most pulses, some horticultural plants and weeds	Virus-free seed Resistant varieties
CMV	Cucumber mosaic virus	Yellowing, stunting, offshoots. The leaves and stems of desi varieties become red/brown. The leaves and stems of kabuli varieties turn yellow.	Prevalent in chickpea growing regions. Seasons and districts with major aphid flights.	Very wide host range, including most pulses, pastures, horticultural crops and weeds	Virus-free seed Resistant varieties
BWV	Beet western yellows virus	Yellowing, stunting, offshoots. The internal tissues of the main stem at the base turn brown.	Occurs in all chickpea growing areas. Seasons and districts with major aphid flights.	Very wide host range, including most pulses, brassicas and weeds	Managing aphids and weeds, resistant varieties

TABLE 5 Desi chickpea. Long term predicted yield expressed as a percentage of mean yield.

Year	Mallee					Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2016
Mean yield (t/ha)		0.87	1.15	0.71	0.28	1.51		1.11	1.52	0.83	1.94
	No. trials	3	4	4	4	2	No. trials	3	3	3	2
Ambar	14	84	105	101	103	136	8	100	103	90	115
Genesis 079	17	93	101	111	102	127	11	100	90	99	97
Genesis 090	17	98	88	93	77	96	11	91	122	104	128
Genesis 509	3	95	94	83	83	89	7	93	121	95	124
Genesis 836	3	100	98	96	94	90	7	97	92	97	90
Howzat	3	105	99	104	102	91	7	101	88	103	84
Neelam	17	98	108	108	116	130	9	108	124	105	129
PBA Boundary	3	104	99	97	99	84	7	99	93	100	88
PBA HatTrick	3	103	98	97	96	86	7	98	94	100	91
PBA Maiden	17	99	102	108	107	114	11	103	98	102	100
PBA Seamer	2	99	94	88	85	84	3	94	109	98	109
PBA Slasher	17	97	105	109	111	126	11	105	109	103	114
PBA Striker	17	103	112	119	128	127	11	112	92	105	91

TABLE 6 Kabuli chickpea. Long term predicted yield expressed as a percentage of mean yield.

Year	Mallee					Wimmera					
		2012	2013	2014	2015	2016		2012	2013	2014	2016
Mean yield (t/ha)		0.87	1.09	0.72	0.27	1.51		1.11	1.52	1.07	1.94
	No. trials	3	3	3	3	2	No. trials	3	3	2	2
Almaz	14	74	89	70	66	109	10	84	103	77	118
Genesis 079	14	100	118	119	137	134	10	116	89	97	89
Genesis 090	14	101	103	102	110	114	10	106	119	100	120
Genesis 114	6	91	95	76	77	86	8	92	102	81	104
Genesis 425	-	-	-	-	-	-	6	102	108	99	106
Genesis Kalkee	14	101	100	90	92	86	10	98	101	92	98
PBA Monarch	14	112	114	119	131	108	10	115	95	106	87

TABLE 7 2016 Desi chickpea yield and grain weight (g/100 seeds) in NVT and Victorian breeding (B) trials. Yield expressed as a percentage of the site mean yield.

Sowing date	Yield (%)				Grain weight (g/100 seeds)		
	Mallee		Wimmera		Mallee		Wimmera
	Birchip 20/5/16	Rainbow 11/5/16	Horsham (B) 31/5/16	Tarranyurk 31/5/16	Birchip	Rainbow	Tarranyurk
Ambar	118	119	104	99	16.4	16.8	18.5
Genesis 079	106	100	114	107	22.8	22.2	25.7
Genesis 090	79	71	142	110	28.1	25.6	29.7
Genesis 509	-	-	150	-	-	-	-
Genesis 836	-	-	92	-	-	-	-
Howzat	-	-	80	-	-	-	-
Neelam	110	115	152	108	17.6	17.6	19.8
PBA Boundary	-	-	61	-	-	-	-
PBA HatTrick	-	-	93	-	-	-	-
PBA Maiden	97	82	89	105	24.3	24.0	26.0
PBA Seamer	-	-	107	-	-	-	-
PBA Slasher	96	109	132	110	19.7	17.9	21.9
PBA Striker	97	103	85	85	22.7	22.2	23.8
Site Mean (t/ha)	1.85	1.61	2.00	1.64			
CV (%)	4	5	15	7			
LSD (%)	7	9	26	13			

TABLE 8 2016 Kabuli chickpea yield and grain weight (g/100 seeds) in NVT and Victorian breeding (B) trials. Yield expressed as a percentage of the site mean yield.

Sowing date	Yield (%)				Grain weight (g/100 seeds)		
	Mallee		Wimmera		Mallee		Wimmera
	Birchip 20/5/16	Rainbow 11/5/16	Horsham (B) 1/6/16	Tarranyurk 31/5/16	Birchip	Rainbow	Tarranyurk
Almaz	97	99	107	103	32.5	32.1	34.7
Genesis 079	126	122	83	87	22.8	23.4	24.1
Genesis 090	95	108	125	101	26.7	28.7	29.1
Genesis 114	-	-	107	-	-	-	-
Genesis 425	-	-	98	-	-	-	-
Genesis Kalkee	62	77	92	90	40.9	38.3	40.9
PBA Monarch	101	96	56	88	38.4	39.2	42.1
Site Mean (t/ha)	1.48	1.45	2.44	1.64			
CV (%)	5	6	12	7			
LSD (%)	8	9	21	12			

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NVT apps

National
Variety
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The NVT LONG-TERM YIELD REPORTS provide Australian growers and advisers with the best available tool for making variety selection decisions based on crop yield. Information is available for all cropping regions in Australia for 10 crops: wheat, barley, canola, oats, triticale, chickpeas, field peas, faba beans, lentils and lupins.



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.