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Canola variety guide for Western Australia



National
Variety
Trials
A GRDC INITIATIVE

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Introduction to WA canola

There are several herbicide tolerance systems available in WA canola varieties.

- **Triazine tolerant (TT)**; tolerant to selected triazine herbicides
- **Roundup Ready® (RR)**; tolerant to Monsanto glyphosate herbicide
- **Triazine tolerant and Roundup Ready® (TT+RR)**; tolerant to both Monsanto registered glyphosate and triazine herbicides.
- **Clearfield® (CL)**; tolerant of imidazolinone herbicides (and marketed as Clearfield®)
- **Conventional canola (CC)**; does not have extra herbicide tolerance, but is tolerant of grass selective herbicides, as are the previous types.

Both RR and TT+RR canola types are developed using single gene genetic modification (GM).

There are different canola breeding types;

- Open pollinated (OP) and
- Hybrid (Hy).

Open pollinated seed is created through self pollination. Harvested OP seed is often retained on-farm for use at sowing. Hybrid seed is produced from managed crosses between different canola parent lines and is normally purchased each year.



Current canola varieties in WA (2016)

In 2016, triazine tolerant varieties accounted for the vast majority of canola area sown in Western Australia (74%), while the area sown to Roundup Ready® varieties contracted marginally to 23% of the canola area (Table 1).

Table 1 Proportion (% of total area) of canola herbicide systems in WA (Data courtesy of CBH Group)

	2014 (%)	2015 (%)	2016 (%)
Triazine tolerant (TT)	79	72	74
Roundup Ready® (RR)	19	24	23
TT + RR	-	2	1.5
Clearfield (CL)	2	2	1.6

There are differing proportions of TT/RR over the port zones. The highest proportion of TT is in the Esperance port zone (approximately 90% TT/5% RR), followed by Albany (85/10), Kwinana (70/30) and Geraldton, where RR use is highest (40/60).

Open pollinated TT canola remains the backbone of the WA canola industry. In 2016, 71% of WA canola area was sown with open pollinated TT varieties. More intensive breeding efforts in hybrid varieties have resulted in a slight yield discount for OP varieties, but this is balanced with cheaper seed cost as farmers bulk up seed on-farm.

Just two open pollinated TT varieties accounted for 54% of the WA canola crop in 2016. ATR Bonito was the most widely grown canola variety in 2016 (38%), with ATR Stingray dropping to second place (Table 2).

ATR Gem, Thumper TT, Crusher TT and Sturt TT are older open pollinated TT canola varieties that were sown over a significant area in 2016. ATR Gem was largely grown in the Albany and Esperance port zones and the others were more localised; Thumper TT (Esperance), Crusher TT (Albany), Sturt TT (Kwinana) and ATR Snapper (Kwinana).

Hybrid TT varieties only account for 2.5% of WA canola. Hyola® 559TT was the most popular hybrid TT variety, making up 1.7% of the total WA canola area.

Hyola® 404RR and Pioneer 43Y23 (RR) remain the most widely grown Roundup Ready (RR) varieties, at 8.6 and 6.8% of WA canola area.

Of the TT+RR varieties, Holoa® 525RT® was sown over the most hectares, at 1.4% of the canola crop area.

Table 2 Proportion (% of area sown) of canola varieties sown in WA during the period 2013 to 2016 (Data courtesy of CBH Group)

Variety	Tolerance	2014	2015	2016
ATR Bonito	TT	1.9	20.1	37.7
ATR Stingray	TT	27.7	23.0	17.1
Hyola® 404RR	RR	7.0	9.6	8.6
43Y23 (RR)	RR	2.6	5.8	6.8
ATR Gem	TT	8.8	5.7	3.2
Nuseed GT- 50	RR	4.2	4.1	3.2
Thumper TT	TT	1.5	2.8	2.6
Crusher TT	TT	13.4	4.5	2.1
Sturt (TT)	TT	3.5	2.9	2.0
ATR Snapper	TT	5.6	3.7	2.0
Hyola® 559TT	TT	0.8	1.0	1.7
ATR Cobbler	TT	7.1	3.2	1.5
Hyola® 525RT®	TT+RR	-	1.3	1.4
44Y24 (RR)	RR	1.0	0.9	1.0
ATR Wahoo	TT	0.0	0.8	0.8
45Y25	RR	-	0.1	0.8
45Y88 (CL)	CL	0.2	0.5	0.7
Nuseed GT- 41	RR	0.9	1.2	0.6
Hyola® 650TT	TT	-	0.2	0.5
ATR Mako	TT	-	-	0.5
Yetna	TT	-	0.3	0.5
CB Telfer	TT	2.6	1.3	0.4
Hyola® 600RR	RR	-	0.3	0.4
Jackpot TT	TT	3.0	1.0	0.3
IH51 RR	RR	-	0.2	0.3
Thunder TT	TT	0.3	0.3	0.3

Varieties shown are > 0.25% of planned canola crop area in 2016



The National Variety Trial (NVT) scheme

This report presents the results from the WA National variety trials from 2012 to 2016. There were 207 successful canola NVT trials in WA during this period.

The long term MET analysis makes use of all the Australian NVT data (WA, NSW, Vic and SA). There were 751 trials from around Australia used in the 2012-2016 MET analysis.

The WA NVT trials comprise a mix of triazine tolerant (TT), Roundup Ready® (RR) and Clearfield® (CL) trials. TT+RR varieties are tested in the TT trials. Conventional (CC) canola is no longer included in WA NVT trials.

All trial results are available online, at nvtonline.com.au or on the NVT long term yield app.

The National Variety Trial (NVT) scheme is funded by GRDC.

Early and Mid trials

Canola NVT trials are divided into Early and Mid trials (Figure 1). The Early trials are sown in shorter season environments that may suit early maturity varieties, largely in Agzones 1, 4 and 5. While Mid trials are sown in longer season environments, that may suit mid maturity varieties, largely in Agzones 3 and 6.

Table 3 Shaded cells denote location of NVT trials 2012-2016

Agzone	Location	Trial	TT and TT+RR					RR					CL				
			2012	2013	2014	2015	2016	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
1	Eradu	Early															
	Greenough	Early															
	Mingenew	Early															
2	Badgingarra	Mid															
	Bolgart	Early & Mid															
	Buntine	Early & Mid															
	Calingiri	Early															
	Corrigin	Early & Mid															
	Cunderdin	Mid															
	Dandaragan	Mid															
	Eneabba	Mid															
	Katanning	Mid															
	Nyabing	Early															
	Wagin	Mid															
	Wickepin	Mid															
3	Kendenup	Mid															
	Kojonup	Mid															
	Muresk	Mid															
	Williams	Mid															
4	Kellerberrin	Early															
5	Hyden	Early															
	Jerramungup	Early															
	Mt. Madden	Early															
	Scaddan	Early & Mid															
6	Gibson	Early & Mid															
	Munglinup	Mid															
	Stirlings South	Mid															

Agzone 2 has a mix of both Early and Mid trials. Early and Mid trials have similar sowing times and have a similar complement of varieties.

Results from the Early and Mid series are analysed separately, requiring the results to be presented separately (Tables 5, 7 and 9).

NVT data analysis

Single site analysis

The first step of data analysis is analysing the data from each NVT site.

Herbicide tolerance trials (TT, RR or CL) at the same location were analysed together, to reduce variability in the results.

The analyses were used to examine the raw data, assess the spatial variability within trials and identify potential outliers.

Core statistics reported in this process include the trial mean (or average) yield and predicted yield for each variety in the trial.

The data for the trial mean yield and the 'single site predicted yields' are available at nvtonline.com.au under the 'Current trial results' tab.

Multi environment trial (MET) analysis

The second step is the multi environment trial (MET) analysis. A new MET analysis process was used in 2017. Data from all the trials across Australia from 2012-2016 was analysed together. The data from the single-site analyses was combined into a multi-environment trial (MET) dataset, which incorporates all raw plot data, spatial models and outliers from the single site analysis. The analysis contains all trials conducted in Australia over the past five years and

enables linkages between similar (and different) environments across the sample of geographic locations and growing seasons.

The analysis is robust because any issues with variable establishment or variable sites (for example, due to soil type or patchy insect attack) are accounted for by the linkages between environments so the predictions for those varieties affected are not impacted.

Results of all trials in Australia are combined to generate a 'long term MET predicted yield' for each variety in each trial. A long term MET predicted yield is also generated for varieties that were not actually grown in these trials. Generation of this data is particularly valuable for the canola industry, with the rapid cycling of new varieties, meaning that variety yield estimates are not penalised if the variety was not included in high yielding trials.

The MET analysis also generates Production Values (PVs) which are a measure of any yield advantage (or disadvantage) for each variety, compared with the trial mean. This is simply the predicted yield minus the average yield of each trial. This Production Value (PV) allows us to isolate and compare differences between varieties and is the most reliable way to compare varieties, when all varieties are not present in every trial.

The Production Values for varieties in WA trials are shown in Figures 2, 3 and 4. The associated Tables 5, 6 and 7 show the long term MET predicted yields, which are based on the trial data illustrated in the figures.

The long term MET predicted yields are also available at nvtonline.com.au and the LongTerm yield app.

Comparing varieties using the Production Values scatter plots

The Production Values scatter plots (Figures 2, 3 and 4) show the comparative yield results from each successful trial. Markers above the line show higher yield responses, compared with the average trial yield.

As described in the NVT analysis section, the production value (PV) describes the variety yield performance, relative to the average yield of all varieties in the trial.

The scatter charts have average trial yield along the horizontal axis and yield production value on the vertical axis. The dashed horizontal line marks where the variety yield is the same as the trial mean yield.

The scatter charts show;

- 1 Any comparative yield benefit; For example, in Figure 2, the yield production values for InVigor T 4510 are generally above average (above the dashed line), while ATR Stingray has a mixed result, with some trial results above the line and some trial results below the average.
- 2 If the yield benefit changes with increasing trial mean yield; For example, in Figure 2, the production value of InVigor T 4510 increases as the average trial yield increases, while the comparative yield of ATR Stingray decreases at higher average trial yields.
- 3 The reliability of yield for each variety; For example, in Figure 2, Hyola® 559TT has stable yield performance, with individual trial results clustered into a line, while the relative yields of ATR Stingray are more variable which is shown by the more distributed spread of results.

Oil concentration data

Oil concentrations are presented as the varietal difference compared with the average oil concentration of each trial (see Tables 5, 7 and 9). For example, in Table 5 the average oil concentration of TT trials is 43.99%. The oil for ATR Mako is -0.6 percentage points different to the mean, so the average oil for ATR Mako is 43.3%.

A single oil sample is analysed from each variety in each trial.

Relative value of yield and oil

Generally, yield impacts on crop financial value more than oil concentration. A relatively small yield increase of 100kg/ha will increase crop value by \$50/ha but a 1% increase in oil concentration will only contribute an extra \$7.50/t/ha to crop value.

The yield that is the same value as a 1% change in oil concentration (over 42%) is

- 15kg/ha for a 1t/ha crop,
- 30kg/ha for a 2t/ha crop and
- 45kg/ha for a 3t/ha crop.

Triazine tolerant and TT+RR canola varieties

New TT hybrid varieties

- **Hyola® 350TT**; Early maturity hybrid variety. Bare seed blackleg rating of R. Medium-short plant height. Bred by Pacific Seeds and marketed by Advanta Seeds. Tested in WA NVT for the first time in 2017. Preliminary data shown in report are from six trials across NSW, Vic and SA in 2016 NVT trials.
- **SF Ignite TT**; Mid maturity hybrid variety. Blackleg rating of MR, for bare seed. Bred by NPZ Australia, marketed by Seed Force.
- **DG 670 TT**; Late maturity hybrid variety. Moderately resistant blackleg rating, for bare seed. Marketed by Seednet.

No new OP hybrid TT canola varieties were released

Hybrid TT varieties withdrawn from sale; Monola 416TT, Atomic (TT) and Pioneer 45T01 (TT).

OP varieties Thumper TT, Crusher TT, Sturt (TT) and ATR Snapper are no longer available for sale. They are included in the report, since they were all grown over a significant area in 2016, and growers may still have access through retained seed.

Yield is the most important factor when deciding between commercial TT varieties, but growers in higher rainfall areas or short rotations will also need to consider blackleg resistance. Oil concentration is the third factor to consider.

Figure 2 illustrates yield performance, across the entire range of trial yields and different locations (Agzones), as well as indicating the number of WA trials. Yields from each Agzone reflect the growing conditions, where the higher rainfall zones of Agzone 3 and 6 tend to have the highest yielding trials.

Things to note from Figure 2;

- ATR Snapper and ATR Stingray have poorer performance in Agzones 3 and 6, relative to other varieties.
- The three varieties that show the most marked increase in performance value (PV) with increasing trial yields have only been in NVT trials in 2016 season (InVigor T 4510, DG 670TT, and SF Ignite TT).

Table 4 Licensees of Triazine tolerant and TT+RR varieties

Company	Variety	Release Year	Hybrid or OP
Advanta Seeds	Hyola® 350TT	2017	TT Hybrid
	Hyola® 525RT®	2014	TT+RR Hy
	Hyola® 559TT	2012	TT Hybrid
	Hyola® 650TT	2013	TT Hybrid
	Hyola® 725RT®	2015	TT+RR Hy
Agronomy for Profit	Yetna Convenient Canola	2015	TT OP
Bayer	3000TR	2016	TT+RR Hy
	InVigor T 4510	2016	TT Hybrid
Nuseed	ATR Bonito	2013	TT OP
	ATR Gem	2011	TT OP
	ATR Mako	2015	TT OP
	ATR Stingray	2010	TT OP
	ATR Wahoo	2013	TT OP
Pioneer®	44T02 (TT)	2016	TT Hybrid
Seed Force	SF Ignite TT	2017	TT Hybrid
	SF Turbine TT	2016	TT Hybrid
Seednet	DG 560TT	2016	TT Hybrid
	DG 670 (TT)	2017	TT Hybrid
No longer commercially available	ATR Snapper	2010	TT OP
	Crusher TT	2010	TT OP
	Sturt (TT)	2012	TT OP
	Thumper TT	2011	TT OP

Blackleg resistance update

OP TT; ATR Bonito and ATR Wahoo were reclassified down to MS.

Hybrid TT; The new Hyola® 350TT has a resistant (R) blackleg rating for bare seed. Hyola® 650TT is the only other variety to remain at the highest resistance level. Hyola® 559TT was reclassified down to R-MR, which is also the current rating of Pioneer 44T02 (TT). New varieties SF Ignite TT and DG 670TT have been classified as MR, the same rating as DG 560TT. InVigour T 4510 has only a MR-MS blackleg rating for bare seed, but it is rated as Resistant where Jockey® is applied.

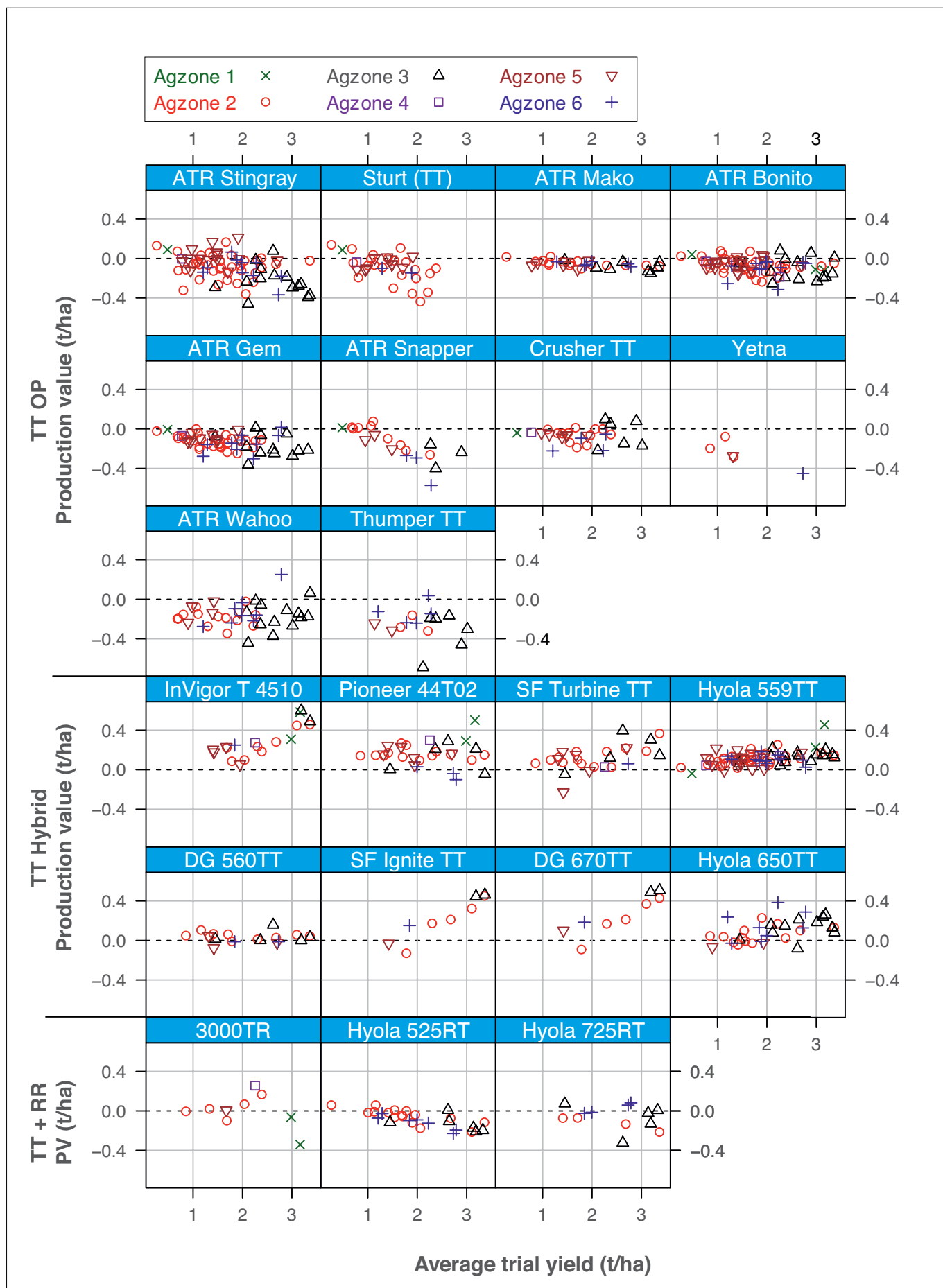


Figure 2 TT and TT+RR varieties; highest yielding varieties have highest Production Values (PVs), data from WA NVT trial 2012-2016

The long term yields from the TT Multi Environment Trials (or long term MET yields) are presented in Table 5, along with oil results and blackleg data. Several TT varieties are very well adapted and show high yields across a wide yield range. There is some evidence of a maturity response, with some long season varieties performing better at high yielding sites. There is very little difference between short and long season sites, at the same yield level.

TT OP

ATR Mako, ATR Bonito and Crusher TT are the highest yielding open pollinated TT varieties and are widely adapted across environments (Early and Mid trials) and the yield range 0.5-3t/ha. ATR Stingray also showed competitive yields, up to 2-2.5 t/ha.

ATR Mako, ATR Bonito and ATR Stingray would all be suitable for the lower rainfall areas.

Table 5 TT and TT+RR long term MET yield (% of group trial average) and Oil, of WA NVT trials 2012-2016
Varieties listed by maturity.

			Long term MET yield (% of group trial average)								Oil	Blackleg		
Average trial yield (t/ha)*			0.5 – 1	1 - 1.5		1.5 – 2		2 – 2.5		2.5 – 3	difference to mean (43.99%)	resistance rating bare seed	resistance rating +Jockey®	Group
Trial (Early = short, Mid = long season sites)^			Early	Early	Mid	Early	Mid	Early	Mid	Mid				
	Maturity	Variety												
TT OP	3	ATR Stingray	90	97	90	98	95	95	93	95	0.2	MR	-	C
		Sturt (TT)	88	93	90	94	92	92	88	90		MS-S ²⁰¹⁶	MR	C
	4	ATR Mako	95	97	98	97	97	98	96	98	-0.6	MR	-	A
		ATR Bonito	91	95	95	95	95	95	95	98	0.9	MS	-	A
		ATR Gem	85	91	90	92	91	92	93	96	0.7	MR-MS ²⁰¹⁶	-	A
		ATR Snapper	80	84	81	83	79	87	74	78	2.1	MS-S 2013	-	-
	5	Crusher TT	96	96	95	96	95	98	97	101	-1.6	MR-MS ²⁰¹⁴	-	-
		Yetna	72	80	83	81	85	85	86	87	-2.8	MS	-	-
	6	ATR Wahoo	75	84	85	85	88	87	94	96	0.2	MS	-	A
		Thumper TT	69	79	75	79	85	84	92	93		R ²⁰¹⁴		E
TT Hy	3	Hyola 350TT *NO WA trials	-	-	111	-	111	-	111	109	-0.5	R		ABDF
		InVigor T 4510	115	111	107	111	109	109	112	111	-0.8	MR-MS	R	BF
	4	44T02 (TT)	116	111	109	111	109	109	106	103	-0.5	R-MR	R	ABD
		SF Turbine TT	103	105	106	106	108	104	105	106	-1.3	MR-MS	R-MR	BF
		Hyola 559TT	108	106	107	107	106	106	105	104	0.7	R-MR	-	ABD
	5	DG 560TT	109	105	104	104	103	104	100	101	-1.1	MR	R	BF
		SF Ignite TT	-	-	99	-	103	-	107	109	-0.8	MR	R	BF
		6	DG 670TT	-	-	100	-	103	-	108	109	-1.0	MR	R
	Hyola 650TT		99	99	98	100	101	101	105	103	-0.1	R	-	ABD
	TT+RR Hy	3	3000TR	111	105	104	103	100	102	96	97	-0.5	MS-S	MR
5		Hyola 525RT	-	-	97	-	97	-	96	96	1.1	MR	-	ABD
7		Hyola 725RT	-	-	96	-	95	-	98	97	0.8	MR	-	ABD

Maturity: Information provided by licensees. Maturity Key; 3 = early, 4 = early-mid, 5 = mid, 6 = mid-late, 7 = late

Blackleg: Blackleg data provided from the GRDC 2017 Blackleg Management Guide, unless otherwise specified. Refer to this for further information. Orange shading highlights ratings of MR-MS or lower. # Jockey® seed dressing contains fluquinconazole. Blackleg rating key; R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

*Trials are grouped according to the average yield of each trial. ^Locations of early and mid series trials are shown in Figure 2.



ATR Mako would be most suitable for higher rainfall areas, due to its stronger blackleg resistance (R with Jockey®).

ATR Wahoo and ATR Gem were competitive varieties for the higher yielding, longer season environments, but their blackleg resistance rating is lower than ATR Mako.

Yetna is not competitive for yield but may be selected for its ability to tolerate some group B herbicide soil residues.

Thumper TT had a blackleg resistance rating of (R) when last tested in 2014. There is no recent data to check its resistance status.

TT hybrids

Table 5 is organised by variety maturity, rather than by yields. The new early maturity Hyola® 350TT is being tested in WA NVT for the first time in the 2017 season. However, it was in six NVT trials in 2016 (NSW, Vic and SA), and this data has been used to generate favourable long term yield predictions for the Mid trials, right up to 3.5t/ha yield range. These are promising results and it will be good to see WA data this year.

In the early-mid maturity class (4), both InVigor T4510 and Pioneer 44T02 (TT) have high yields and are very adaptable across Early/Mid trials and across high and low yielding trials. Predictions for Pioneer 44T02 are based on two years of NVT data. It has reasonable oil results and a blackleg rating of R-MR (up to R with

Jockey®), showing it to be a solid performer for situations up to 2.5t/ha. InVigor T 4510 has only been in NVT for one year but with excellent yield results, particularly in the range 2-3.5t/ha. It has MR-MS blackleg rating so blackleg pressure will need to be managed. SF Turbine TT also had good yields in this maturity class.

In the Mid (5) maturity class, Hyola® 559 TT remains the yield leader and has excellent oil results and a solid blackleg rating of R-MR. DG 560TT also showed some competitive yields. SF Ignite TT and the longer maturity DG 670TT are yield leaders for areas over 2.5t/ha. There is little to choose between the two, as they have similar oil performance and the same blackleg rating (MR).

TT+RR

The TT+RR varieties have been tested at limited NVT sites.

There are two years results for 3000TR which shows it to be adaptable across early and mid sites and across all yield ranges, even though it is an early maturity variety. 3000TR has a bare seed blackleg rating of MS-S so high blackleg pressure situations should be avoided. 3000TR is well suited to low-mid rainfall regions.

The TT+RR Hyola® varieties are well suited to the higher yielding areas with competitive yields, high seed oil concentration, blackleg resistance rating of MR, and a wide range of blackleg groups.

Roundup Ready® canola varieties

New RR varieties

- **InVigor R 3520**; early maturity hybrid, bred and sold by Bayer. Moderately Resistant (MR) blackleg rating.
- **44Y27 RR**; early-mid maturity hybrid. Bred and sold by Pioneer. MR blackleg rating.
- **DG 408RR**; early-mid maturity hybrid. Licensed by Seednet. Moderately Susceptible (MS) blackleg rating.
- **Hyola® 506RR**; mid maturity hybrid, medium-tall height. High oil %, Resistant (R) blackleg rating. Bred by Pacific seeds and sold by Advanta Seeds.

Varieties withdrawn from sale; Bayer IH30 RR, Pioneer 44Y24 (RR) and 44Y26 (RR), Nuseed GT – 50 and Monola G11

There has been little change in Roundup Ready variety use, with the top three RR varieties accounting for 81% of RR in 2016, while it was 80% for the same varieties in 2015. In 2016, Hyola® 404RR was grown over 38% of all RR area, Pioneer 43Y23 (RR) increased to 30% and GT- 50 declined to 14%.

Figure 3 shows a picture of yield performance, across the whole range of trial yields and different locations (Agzones), and the number of WA trials.

- Pioneer 43Y23 is truly adaptable across the yield spectrum with yield generally well above average.
- However, it is obvious that there are several varieties that perform particularly strongly in higher yielding situations; Pioneer 45Y25, Pioneer 44Y27, Nuseed GT-53 and Hyola® 506RR.

Table 6 Licensees of Roundup Ready varieties

Licensee	Variety	Release Year	Hybrid or OP
Advanta Seeds	Hyola® 404RR	2010	hybrid
	Hyola® 506RR	2017	hybrid
	Hyola® 600RR	2015	hybrid
Bayer	InVigor R 3520	2017	hybrid
	InVigor R 5520P	2016	hybrid
	IH51 RR + PodGuard™	2015	hybrid
Nuseed	Nuseed GT- 41	2012	hybrid
	Nuseed GT- 42	2016	hybrid
	Nuseed GT- 53	2016	hybrid
Pioneer	43Y23 (RR)	2012	hybrid
	44Y27 (RR)	2017	hybrid
	45Y25 (RR)	2015	hybrid
Seednet	DG 408RR	2017	hybrid
	DG 460RR	2016	hybrid
Not marketed	GT Cobra	2011	OP

Blackleg resistance update

New RR variety Hyola® 506RR has been classified as resistant to blackleg (R), while Nuseed GT- 53 and Nuseed GT- 42 maintain their R rating. Hyola® 404RR has been downgraded to R-MR, while Nuseed GT- 41 maintained the same R-MR rating. New varieties, InVigor R 3520 and Pioneer 44Y27 (RR) have an MR rating. Pioneer 43Y23 (RR) and Pioneer 45Y25 (RR) have both been reclassified down to MR. IH51 RR was reclassified down to MR-MS and the new DG 408RR is rated at MS bare seed and R-MR with Jockey®.

Long term MET average yields, oil and blackleg results are provided in Table 7. Varieties are listed by maturity groups. The Roundup Ready® varieties are a competitive group. Many varieties yield well but the further discussion is about those with the top yields in each category.

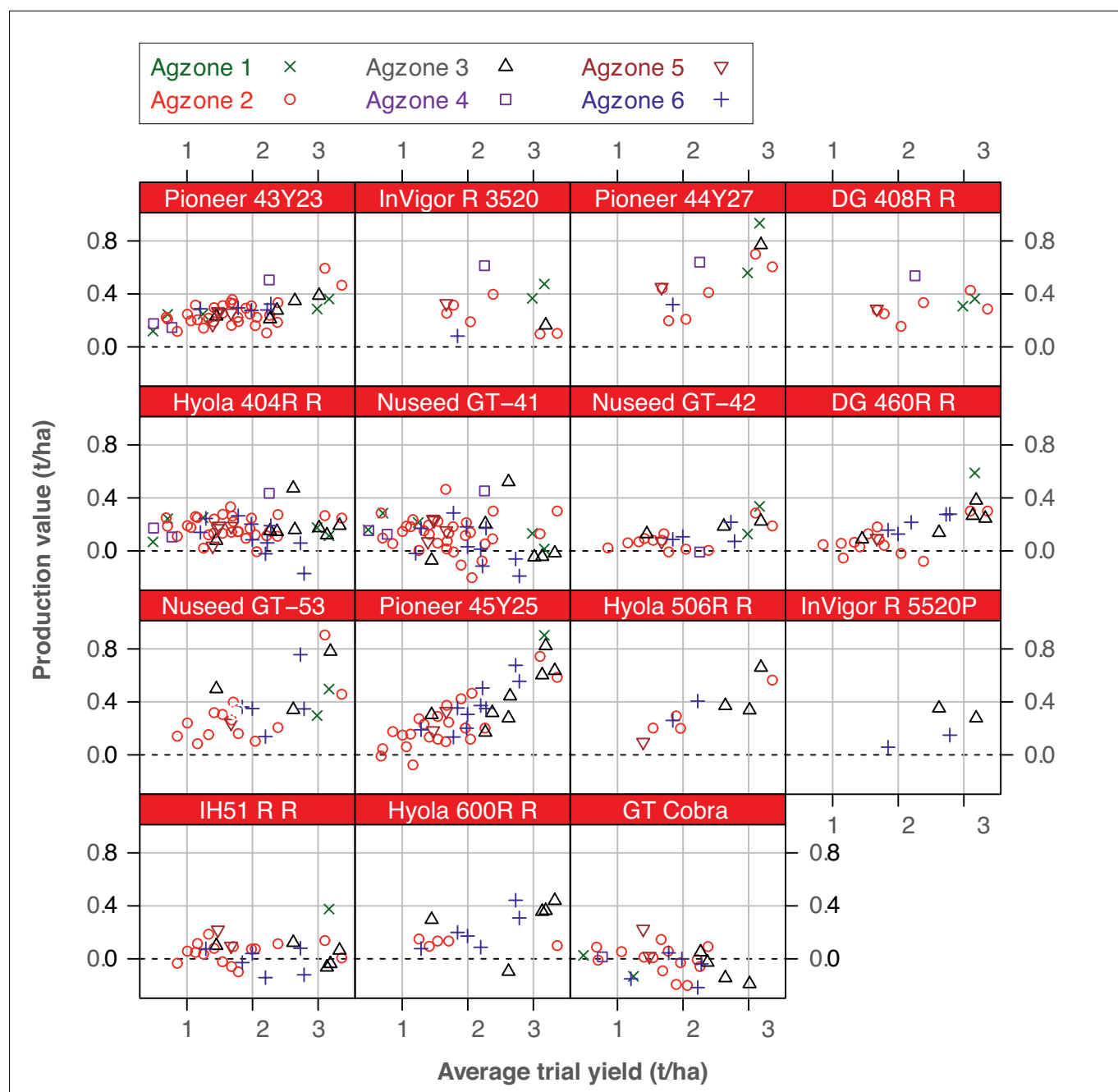


Figure 3 RR varieties; highest yielding varieties have highest Production Values (PVs), data from WA NVT trial 2012-2016

The highest yielding varieties across the yield ranges shown in Table 7 were Pioneer 44Y27 (RR) and the early Pioneer 43Y23 (RR). Both these varieties have a MR resistance rating, up to R when Jockey® is used. 44Y27 (RR) has the higher seed oil %.

The new DG 408RR is also widely adapted for yield and has exceptional oil, at 2.4% above average. However, it has a moderately susceptible (MS) blackleg rating, so would be most suitable for low blackleg pressure areas.

Other varieties that have competitive yields below 1.5t/ha are the new InVigor R 3520, Hyola® 404RR, and Nuseed GT-41. DG 408RR and Hyola® 404RR are attractive varieties due to their high oil concentration. Pioneer 43Y23 (RR), InVigor R 3520 and Pioneer 44Y27 (RR) have better blackleg ratings, so would be preferable for areas with high blackleg pressure.

There is a choice of competitive varieties for the 2–3.5t/ha yield range; mid maturity varieties Pioneer 45Y25 (RR), Nuseed GT- 53, Hyola® 506RR, early-mid varieties Pioneer 44Y27 (RR) and DG 408RR as well as the early variety, Pioneer 43Y23 (RR).

Table 7 RR long term MET yield (% of group trial average) and Oil, of WA NVT trials 2012-2016. Varieties listed by maturity

			Long term MET yield (% of group trial average)							Oil	Blackleg			
Trial average yield (t/ha)*			0.5 – 1	1 - 1.5		1.5 – 2		2 – 2.5		2.5 – 3	difference to mean (43.99%)	resistance rating bare seed	resistance rating +Jockey®	Group
Trial (Early = short, Mid = long season sites)^			Early	Early	Mid	Early	Mid	Early	Mid	Mid				
	Maturity	Variety												
RR Hy	3	Pioneer 43Y23 (RR)	122	116	121	115	116	111	110	113	-1.5	MR	R	B
		InVigor R 3520	128	120	114	119	111	114	102	103	0.6	MR	R	?
	4	Pioneer 44Y27 (RR)	127	122	120	125	117	118	114	116	0.0	MR	R	N/A
		DG 408RR	126	117	109	116	110	113	111	111	2.4	MS	R-MR	AC
		Hyola 404RR	122	113	115	111	111	109	104	105	1.4	R-MR	-	ABD
		Nuseed GT-41	121	114	109	109	107	108	101	104	-0.4	R-MR	-	ABF
		Nuseed GT-42	97	101	107	104	105	102	104	105	-0.9	R	-	ABDF
		DG 460RR	90	99	105	105	105	101	107	108	1.2	MR	R	A
	5	Nuseed GT-53	114	111	123	113	116	110	114	116	-0.6	R	-	ABDF
		Pioneer 45Y25 (RR)	111	113	114	118	112	112	116	117	0.5	MR	R	BC
		Hyola 506RR	105	105	114	106	113	104	112	114	0.5	R	-	ABD
		InVigor R 5520P			106		104		104	107	-0.4	MR	R	AC
		IH51 RR	98	106	105	105	101	102	98	100	-1.0	MR-MS	R	A
	6	Hyola 600RR	116	111	107	112	105	109	107	107	1.7	MR	-	ABD
RR OP	4	GT Cobra	88	100	98	102	98	99	96	97	-0.3	R-MR ²⁰¹⁵	-	A

Maturity: Information provided by licensees. Maturity Key; 3 = early, 4 = early-mid, 5 = mid, 6 = mid-late, 7 = late

Blackleg: Blackleg data provided from the GRDC 2017 Blackleg Management Guide, unless otherwise specified. Refer to this for further information. Orange shading highlights ratings of MR-MS or lower. # Jockey® seed dressing contains fluquinconazole. Blackleg rating key; R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

*Trials are grouped according to the average yield of each trial. ^Locations of early and mid series trials are shown in Figure 2.

Pioneer 45Y25 (RR) shows little variability in five years of NVT data with strong performance in high yielding sites (Figure 3), as well as reasonable seed oil concentration. It is well suited to high yielding environments, except when stronger blackleg resistance is needed. Nuseed GT-53 and Hyola® 506RR are suited to high rainfall environments due to their high yields and superior blackleg rating (R bare seed).

InVigor R 5520P and IH51RR offer PodGuard™ technology, and may suit growers who value reduced yield risk with delayed harvest.

GT Cobra is the only RR OP variety included in the report. GT Cobra is outclassed at every yield level, by a range of 18–39%. This is an average of approximately 140kg/ha for the 0.5–1.5t/ha range and climbs to 330 kg/ha for the 2–2.5t/ha range, or approximately \$165/ha at \$500/t.



DPIRD research officers Martin Harries and Mark Seymour

Clearfield® canola varieties

New Clearfield® varieties;

- **43Y92 (CL)**; an early-mid maturity hybrid, bred and marketed by Pioneer. It has R-MR blackleg resistance rating.

CL varieties withdrawn from sale; Pioneer 44Y87 (CL), Pioneer 4489 (CL), Pioneer 45Y88 (CL) and Archer CL.

Blackleg resistance update

Hyola® 575CL maintained its R blackleg rating. The new CL variety Pioneer 43Y92 (CL) was classified at R-MR, joining Pioneer 44Y90 (CL). Pioneer 45Y91 (CL) was classified down to MR, and Banker CL down to MR-MS.

Table 8 Licensees of Clearfield (CL) canola varieties

Licensee	Variety	Release Year	Hybrid or OP
Advanta Seeds	Hyola® 575CL	2010	hybrid
Heritage Seeds	Banker CL	2015	hybrid
Pioneer	44Y90 (CL)	2016	hybrid
Pioneer	43Y92 (CL)	2017	hybrid
Pioneer	45Y91 (CL)	2016	hybrid
Not for sale	43C80 (CL)	2008	OP

Figure 4 illustrates the performance of Clearfield® varieties in WA trials, as well as the number of WA trials and the distribution across Agzones.

- Performance values (PVs) for Hyola® 575CL are widely distributed around the average
- Performance values of the other hybrid varieties are all above average and increase with higher average trial yields.

Pioneer® 45Y88 CL remained the most popular variety to be sown, increasing from 30% in 2105 to 40% in 2016, of all Clearfield® area.

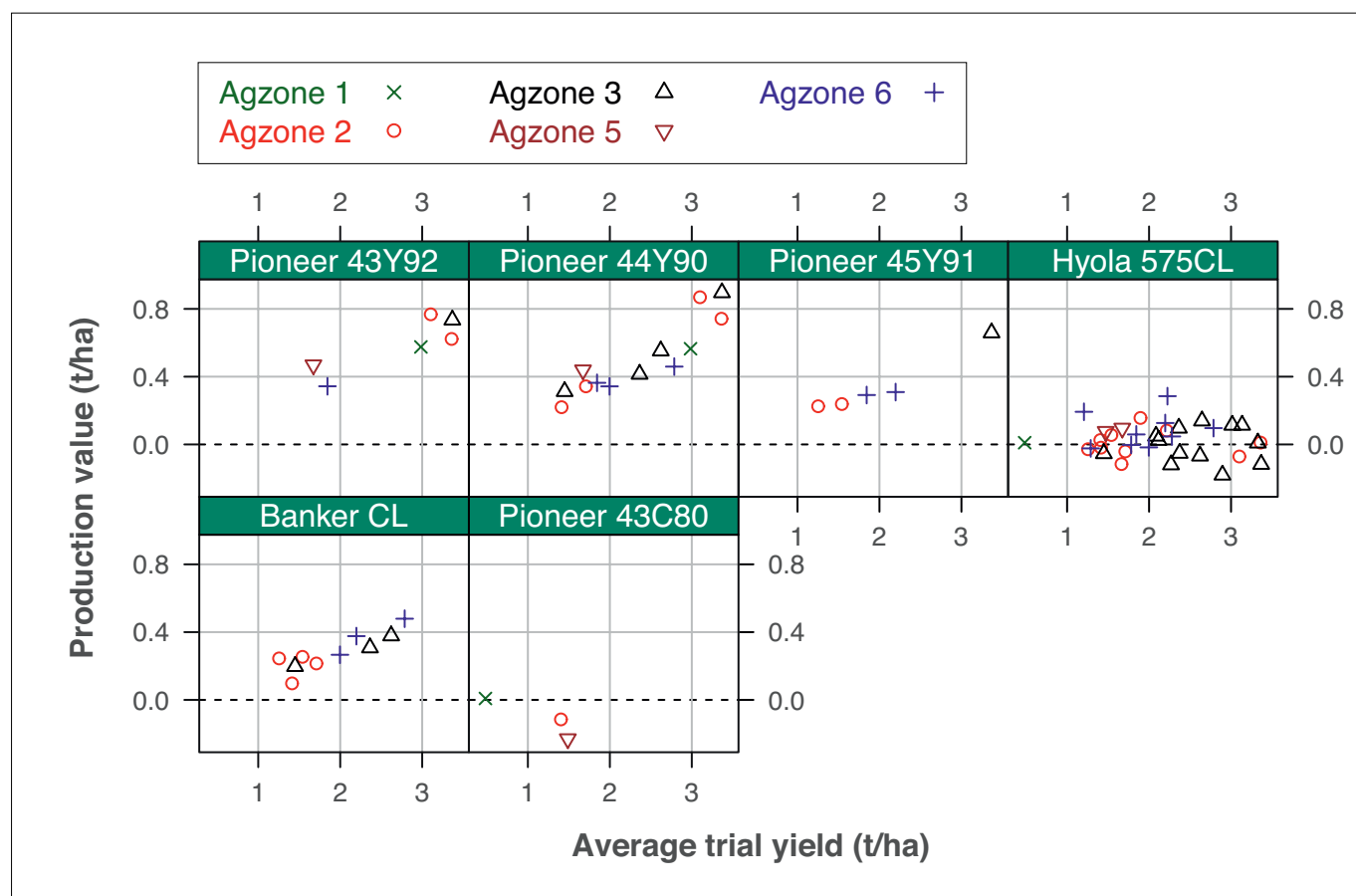


Figure 4 CL varieties; highest yielding varieties have highest Production Values (PVs), data from WA NVT trial 2012-2016

Long term MET average yields, oil and blackleg results are provided in Table 9. Clear yield leaders are the early-mid maturity variety Pioneer 44Y90 (CL), and the new early maturity Pioneer 43Y92 (CL). These varieties also have R-MR blackleg

rating for bare seed (up to R when Jockey® is applied). The blackleg group is B for 44Y90 but this data is not yet available for Pioneer 43Y92 (CL).

Table 9. CL long term MET yield (% of group trial average) and Oil, of WA NVT trials 2012-2016. Varieties listed by maturity

			Long term MET yield (% of group trial average)					Oil	Blackleg		
Average trial yield (t/ha)*			1-1.5		1.5-2	2-2.5	2.5-3	difference to mean (44.13%)	resistance rating bare seed	resistance rating +Jockey®	Group
Trial ^ (Early = short, Mid = long season sites)			Early	Mid	Mid	Mid	Mid				
Group	Maturity	Variety									
CL Hy	3	Pioneer 43Y92 (CL)	123	122	118	118	116	0.3	R-MR	R	N/A
	4	Pioneer 44Y90 (CL)	119	122	119	119	118	0.7	R-MR	R	B
	5	Pioneer 45Y91 (CL)	102	116	112	115	112	0.7	MR	R	B
	5	Hyola 575CL	103	101	101	102	100	-0.1	R	-	BF
	6	Banker CL	106	115	114	115	114	0.6	MR-MS	-	A
CL OP	3	Pioneer 43C80 (CL)	85	-	-	-	-	-0.2	MR ²⁰¹⁵	R	B

Maturity: Information provided by licensees. Maturity Key; 3 = early, 4 = early-mid, 5 = mid, 6 = mid-late, 7 = late

Blackleg: Blackleg data provided from the GRDC 2017 Blackleg Management Guide, unless otherwise specified. Refer to this for further information. Orange shading highlights ratings of MR-MS or lower. # Jockey® seed dressing contains fluquinconazole. Blackleg rating key; R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

*Trials are grouped according to the average yield of each trial. ^Locations of early and mid series trials are shown in Figure 2.



Dual purpose winter canola varieties

Some canola types are suited for dual purposes of grazing and grain production.

Dual purpose winter canola varieties are European types that contain vernalisation genes, so they will not flower until their cold requirement is met. This enables these varieties to be planted significantly earlier than current varieties and to

be safely grazed for extended periods. In some high rainfall long season environments, they are able to be sown in spring and grazed over summer and autumn before being transferred to grain production.

Table 10 Grain and Graze varieties; commercial and agronomic information

Group	Hybrid or OP	Variety	Licensee	Release Year	Maturity	2017 Blackleg rating (bare seed)	Blackleg resistance group
CL	Hy	Hyola® 970 CL	Advanta Seeds	2014	VL	R	H
	Hy	SF Edimax CL	Seed Force	2014	VL	R-MR	C



Canola seed commercialisation companies

Advanta Seeds

pacificseeds.com.au

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Nuseed

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Dale Thompson +61 (0)491 211 104

Access further NVT data from the NVT yield app or from NVT online



NVT yield app

Access long term results from the NVT yield app

See results for all varieties tested

Group results by State, region or local area

NVT yield app available from NVTonline.com.au

Winter canola varieties are not included in national variety trials.



NVT online

Access individual trial results and long term results for trial locations

Available at NVTonline.com.au

Summary of highest yielding varieties in WA NVT 2012-2016

Refer to tables 5, 7 and 9 for further detail, including environment suitability (Early or Mid).

Table 11 Highest yielding TT and TT+RR varieties from WA NVT 2012-2016, listed by maturity

	Maturity	Average trial yield (t/ha)					Oil difference to mean (43.99)	Blackleg resistance rating bare seed	Blackleg resistance rating +Jockey®	Blackleg group
		0.5-1	1-1.5	1.5-2	2-2.5	2.5-3				
TT OP	3	ATR Stingray					0.2	MR	-	C
	4	ATR Mako					-0.6	MR	-	A
		ATR Bonito					0.9	MS	-	A
						ATR Gem	0.7	MR-MS ²⁰¹⁶	-	A
	5	Crusher TT					-1.6	MR-MS ²⁰¹⁴	-	-
	6					ATR Wahoo	0.2	MS	-	A
TT Hy	3	Hyola 350TT					-0.5	R		ABDF
	4	InVigor T 4510					-0.8	MR-MS	R	BF
		Pioneer 44T02 (TT)					-0.5	R-MR	R	ABD
		SF Turbine TT					-1.3	MR-MS	R-MR	BF
	5	Hyola 559TT					0.7	R-MR	-	ABD
		DG 560TT					-1.1	MR	R	BF
						SF Ignite TT	-0.8	MR	R	BF
	6					DG 670TT	-1.0	MR	R	BF
TT+ RR Hy	3	3000TR					-0.5	MS-S	MR	B
	5	Hyola 525RT					1.1	MR	-	ABD
	7					Hyola 725RT	0.8	MR	-	ABD

Table 12 Highest yielding RR varieties from WA NVT 2012-2016, listed by maturity

	Maturity	Average trial yield (t/ha)					Oil difference to mean (44.61)	Blackleg resistance rating bare seed	Blackleg resistance rating +Jockey®	Blackleg group
		0.5-1	1-1.5	1.5-2	2-2.5	2.5-3				
RR Hy	3	Pioneer 43Y23					-1.5	MR	R	B
		InVigor R 3520					0.6	MR	R	?
	4	Pioneer 44Y27					0.0	MR	R	N/A
		DG 408RR					2.4	MS	R-MR	AC
		Hyola 404RR					1.4	R-MR	-	ABD
		Nuseed GT-41					-0.4	R-MR	-	ABF
	5	Nuseed GT-53					-0.6	R	-	ABDF
		Pioneer 45Y25					0.5	MR	R	BC
		Hyola 506RR					0.5	R	-	ABD

Table 13 Highest yielding CL varieties from WA NVT 2012-2016, listed by maturity

	Maturity	Average trial yield (t/ha)				Oil difference to mean (43.13)	Blackleg resistance rating bare seed	Blackleg resistance rating +Jockey®	Blackleg group
		1-1.5	1.5-2	2-2.5	2.5-3				
CL Hy	3	Pioneer 43Y92 (CL)				0.3	R-MR	R	N/A
	4	Pioneer 44Y90 (CL)				0.7	R-MR	R	B
	5	Pioneer 45Y91 (CL)				0.7	MR	R	B
	6	Banker CL				0.6	MR-MS	-	A