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# 2019 **Wheat** **variety sowing guide** for Western Australia



WESTERN AUSTRALIA



National  
Variety  
Trials  
A GRDC INITIATIVE

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Abbreviations used are:

- CCN = Cereal cyst nematode
- RLN = Root lesion nematode
- PM = Powdery mildew
- YLS = Yellow leaf spot
- FNI = Falling Number Index
- AH = Australian Hard (min. protein 11.5%)
- APW = Australian Premium White (min. protein 10%)
- APWN = Australian Premium White Noodle
- ANW = Australian Standard Noodle (protein 9.5–11.5%)
- FEED = Australian Feed
- EPR = End Point Royalty 2017-18 quoted \$/tonne ex-GST
- CL = Clearfield

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# 2019 **Wheat** **variety sowing guide** **for Western Australia**

Edited by

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Brenda Shackley and Dion Nicol  
Department of Primary Industries and Regional Development.

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## Georgia Trainor

When deciding whether to implement a new variety into your farming system, it is important to determine whether the change will provide an advantage. A new variety should:

- have better or equal yield, grain quality and/or disease traits
- provide diversity or risk mitigation
- suit current market requirements.

## Georgia Trainor

**Devil** is a short-mid season, Australian Hard (AH) wheat variety from InterGrain. Devil was included in the national variety trials for the first time in 2017. Its yields in 2017 were very similar to Scepter (within 1-3 percent) across all Agzones (Tables 2 to 10). Devil is moderately resistant to stripe rust, moderately resistant to moderately susceptible to the older leaf rust pathotype but susceptible to very susceptible to the latest leaf rust pathotype.

**Illabo** is a dual purpose winter wheat for grazing and grain production from AGT. Its maturity is 3 days quicker than EGA Wedgetail. Until this variety's quality is classified for WA it will be delivered as a feed wheat. Illabo is moderately resistant to stripe rust, moderately resistant to powdery mildew and resistant to flag smut.

**Kinsei** is a mid-long season variety, released by Intergrain, with the classification of Australian Standard Noodle (ANW). InterGrain recommend Kinsei to noodle growers in the southern areas of the state who are looking for a variety that is longer to mature than Zen and for growers looking for a variety of different maturity to spread frost risk. Kinsei was included in the NVT for the first time in 2017, where it yielded slightly less than Ninja (except in Agzone 1), but out-yielded both Zen and Calingiri.

**Razor CL Plus** is an Australian Standard White (ASW) Clearfield variety released by AGT in early 2018. This variety provides an imidazolinone weed control option for growers in problem paddocks that generally produce low protein crops. Information from the breeder suggests that Razor CL Plus yields higher than Grenade CL Plus (another AGT Clearfield variety with APW grading). In its first year in the NVT, Razor CL Plus had a similar yield to Mace and Chief CL Plus.

Another two varieties released in 2018 by InterGrain are **Sheriff CL Plus** and **Vixen**. At the time of publication, Sheriff CL Plus is a feed variety in WA and seed is not available for the 2019 season. Vixen, a high yielding AH variety will be available to WA growers for the 2020 season if seed becomes available.

For more information on these varieties, contact the breeder (contact details at the end of this document).

## Variety classification

Source: Wheat Quality Australia (WQA).

The following class changes will apply in 2018:

- Carnamah: AH to APW
- Halberd: APW to ASW
- Spear: APW to ASW

To allow varietal control for maintaining product quality for the premium Japanese Udon noodle market, the classification of APWN is now a new segregation in 2018 for the following AH and APW varieties: Chief CL Plus, Devil, EGA Bonnie Rock, Envoy, King Rock, LRPB Scout, Mace, Westonia and Wyalkatchem.

## What should I grow and when?

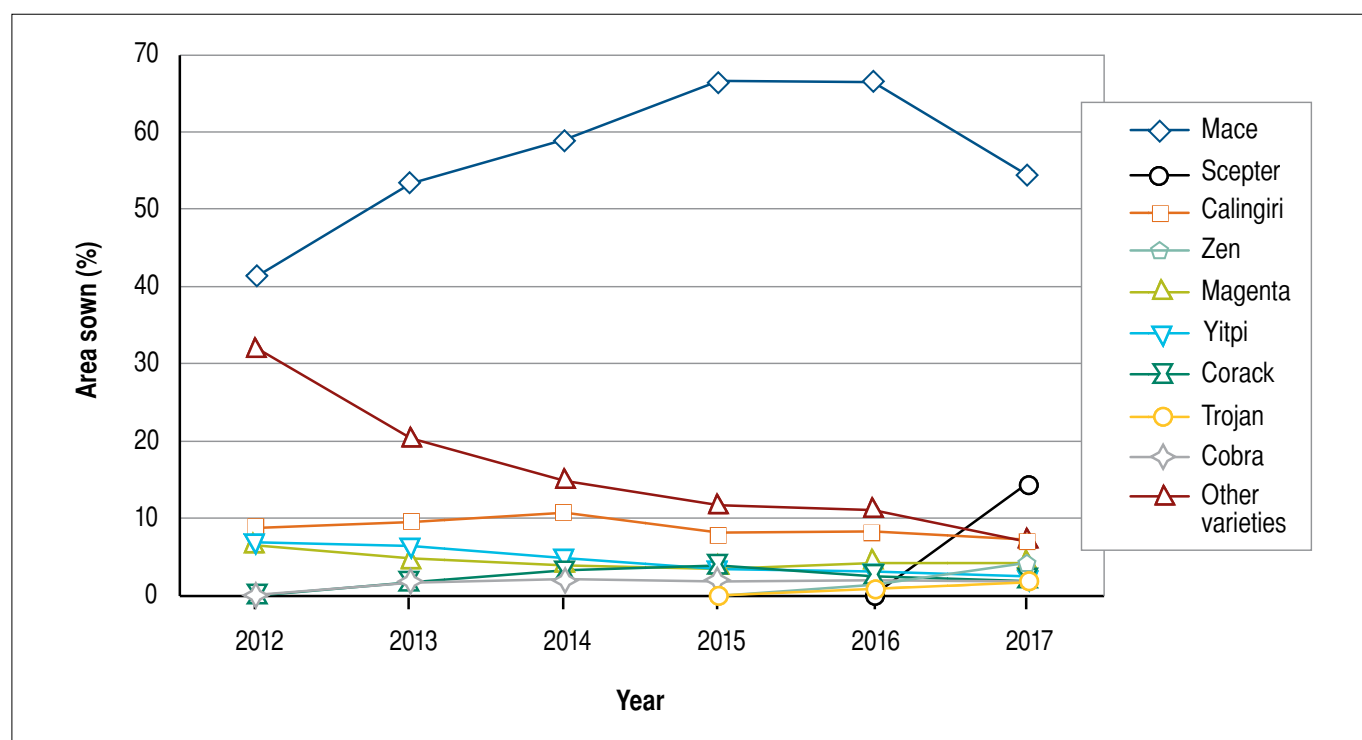
**Dion Nicol and Georgia Trainor**

Since its release in 2008, Mace has become dominant in wheat plantings across Australia. The adoption of this variety was at the expense of older competing varieties such as Wyalkatchem, Westonia and Carnamah that were replaced due to Mace's better yields, AH classification, stronger disease and sprouting tolerance. 2015 saw the introduction of Scepter which has similar agronomic characteristics to Mace but has an average yield advantage of around 8 and 10 per cent. This increase in yield

is far greater than the yield advantage Mace had over its key rival Wyalkatchem. In the coming years, Scepter looks set to replace Mace as the dominant variety and is already the second most planted wheat variety in Western Australia (Figure 1).

With the superior yield performance of Scepter over three years of NVT, what else should be grown and why? Diversifying into another variety should provide a measurable change in risk or opportunity. It is important to consider yield performance in your environment and if its maturity matches the targeted sowing time, the variety's grain quality classification and its value, disease risk profile and sprouting risk (FNI). Another essential annual activity is to review variety's disease ratings as these may have changed due to new pathogens.

To assist with the comparison of varieties, Tables 1-4 provide a snapshot of yields, disease ratings, falling number index and relative maturity of varieties across yield groups, quality classifications and maturity. Notable varieties are compared with Scepter and Mace to assist in variety selection. Preferred agronomic characteristics and disease traits will vary in priority based on the pressure in the target environment.



**Figure 1** Estimated area sown (% state plantings) of wheat varieties in Western Australia between 2012 and 2017.

Source: CBH Group

## AH and APW short-mid season varieties

While a number of varieties released in the last five years can out-yield Mace, they are generally inferior to Scepter in agronomic package and/or yield (Table 1). The yield advantage of Scepter has been consistent in many environments and a wide range of yield potentials (Figure 2a). The newly released variety Devil is an AH short-mid maturity wheat released by InterGrain. While there is only one year of data currently available on this variety, yield performance in the 2017 NVT was similar to Scepter.

## CL Plus wheats

Wheat varieties denoted with 'CL Plus' identifies them as varieties with two resistance genes for Imidazolinone herbicides and are registered for spraying with label rates of Intervix®. Prior to the release of Chief CL Plus, Clearfield® wheat varieties were significantly behind the elite varieties in yield. Chief CL Plus (APW) has continued to perform well, remaining competitive

with Mace in the NVT and far out-yields previous CL Plus varieties (Figure 2b). Chief CL Plus also has a good overall agronomic package with good disease ratings (except for stripe rust) and a sound falling number index. Two new releases, Razor CL Plus and Sheriff CL Plus, have performed similarly to Chief CL Plus in NVT yield data to date. However, Razor CL Plus is ASW and Sheriff CL Plus will be delivered as a feed variety until further quality information becomes available.

## Mid-long season varieties

Mid-long maturity wheats are important for early sowing or providing frost risk management. This is evident by the stability of the area sown to longer season varieties over the past five years (Figure 1). Although most NVT are sown in May, which suits short-mid and mid maturing wheats, a number of mid-long maturities are still competitive. For example, Cutlass, Magenta, LRPB Trojan are on average yielding similarly to Mace. The differences in traits of the various

**Table 1** Summary of wheat variety traits comparing Scepter with four top yielding AH and APW short-mid season wheat varieties. (Source: NVT Online)

Variety	Scepter	Devil	LRPB Havoc	Hydra	Mace
Grade	AH	AH	AH	APW	AH
Yield (% Scepter)	100%	98%^	93%	93%	92%
Yield (% Mace)	108%	106%^	101%	101%	100%
Maturity	Short-mid	Short-mid	Short-mid	Short-mid	Short-mid
Falling no. index	5	–	3	3	5
Stem Rust	MRMS	MSSp	S	MS	MRMS
Stripe Rust	MR*	MRp	MR	MS	RMR*
Leaf rust (old Lr76 pathotype)	MR#	MRMS#	RMR	MS#	MSS
Leaf rust (new Lr104 pathotype)	MSS	SVSp	S	S	MS#
Powdery mildew	S	–	MSp	S	MSS
Yellow spot	MRMS	MRMSp	MRMSp	MRMS	MRMS

^– Single year data only. For other symbol definitions see the disease rating table

**Table 2** Summary of wheat variety traits comparing Scepter with CL Plus wheat varieties. (Source: NVT Online)

Variety	Scepter	Razor CL Plus	Chief CL Plus	Grenade CL Plus	Impress CL Plus
Grade	AH	ASW	APW	APW	APW
Yield (% Scepter)	100%	93%^	91%	82%	78%
Yield (% Mace)	108%	100%^	99%	89%	85%
Maturity	Short-mid	Short	Mid	Short-mid	Short-mid
Falling no. index	5	–	4	5	2
Stem Rust	MRMS	MRMS	MR	MR	MR
Stripe Rust	MR*	RMR	S	RMR	MSS
Leaf rust (old Lr76 pathotype)	MR#	RMR#	R	MS#	R
Leaf rust (new Lr104 pathotype)	MSS	S	R*	S	R*
Powdery mildew	S	Sp	MSSp	MSS	SVS
Yellow spot	MRMS	MS	MRMS	S	MRMS

^– Single year data only. For other symbol definitions see the disease rating table

**Table 3** Summary of wheat variety traits comparing Scepter with five top yielding AH and APW mid-long season wheat varieties. (Source: NVT Online)

Variety	Scepter	Kinsei	Cutlass	Magenta	LRPB Trojan	Yitpi
Grade	AH	ANW	APW	APW	APW	AH
Yield (% Scepter)	100%	94%^	92%	91%	90%	87%
Yield (% Mace)	108%	101%^	100%	99%	97%	94%
Maturity	Short-mid	Mid-long	Mid-long	Mid-long	Mid-long	Mid-long
Falling no. index	5	4p	4	3	5	5
Stem Rust	MRMS	MSSp	R	RMR	MRMS	S
Stripe Rust	MR*	MRMSp	RMR*	MS	MR	MRMS
Leaf rust (old Lr76 pathotype)	MR#	MR#	R*	R*	MR#	MSS
Leaf rust (new Lr104 pathotype)	MSS	SVSp	R*	RMR*	MR	S
Powdery mildew	S	–	S	MRMS	S	MRMS
Yellow spot	MRMS	MSp	MSS	(MR)	MSS	SVS

^– Single year data only. For other symbol definitions see the disease rating table

**Table 4** Summary of wheat variety traits comparing Scepter with noodle wheat varieties. (Source: NVT Online)

Variety	Scepter	Ninja	Kinsei	Zen	Calingiri
Grade	AH	ANW	ANW	ANW	ANW
Yield (% Scepter)	100%	98%	94%^	93%	87%
Yield (% Mace)	108%	106%	101%^	101%	94%
Maturity	Short-mid	Mid	Mid-long	Mid-long	Mid-long
Falling no. index	5	4	4p	3	4
Stem Rust	MRMS	SVS	MSSp	S	S
Stripe Rust	MR*	MS	MRMSp	MRMS	S
Leaf rust (old Lr76 pathotype)	MR#	MS#	MR#	MRMS#	MS#
Leaf rust (new Lr104 pathotype)	MSS	S	SVS	S	S
Powdery mildew	S	SVS	–	S	S
Yellow spot	MRMS	MRMS	MSp	MRMS	MSS

^– Single year of NVT data only. For other symbol definitions see the disease rating table

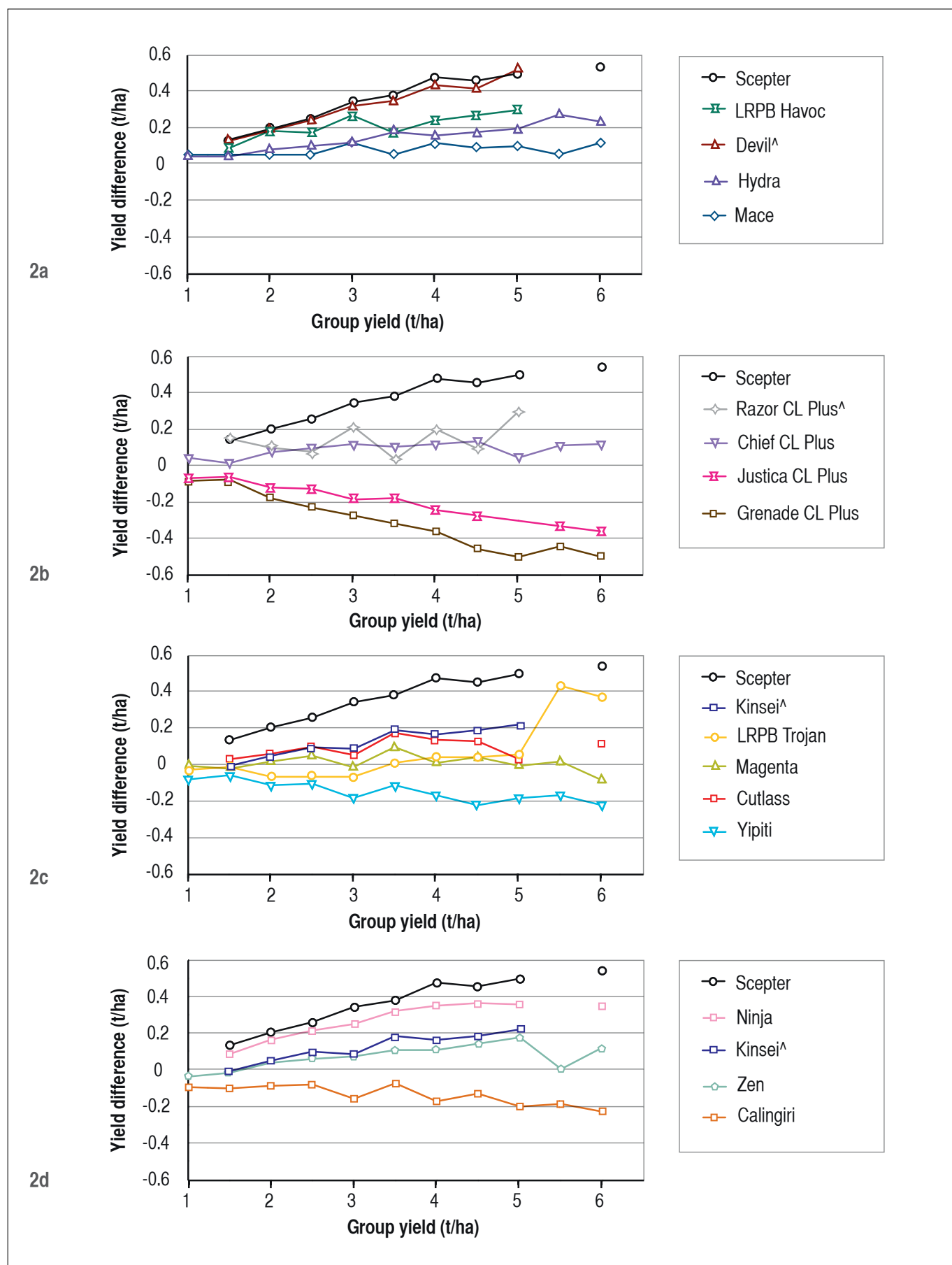
varieties suggest regional preferences should be expected. For example, the foliar disease resistance package of Magenta is strong, particularly for yellow leaf spot and powdery mildew, but its falling number index rating is 3 which deems it risky to grow where sprouting may be a higher risk. Cutlass is superior to Yitpi in yield and quite yield stable for a longer maturing wheat (best of longer maturities in below 4 tonne group yield sites) (Figure 2c). Cutlass is very strong for rust resistance but susceptible to powdery mildew and MSS for yellow leaf spot which although is an improvement over Yitpi, it is not suited to high disease pressure (SVS to yellow spot). LRPB Trojan has a FNI of 5 which is slight better than Cutlass so may be suited where sprouting is a concern and yield potential is very high. The recently release, Kinsei, has performed very well in 2017 NVT, although more seasons are needed to determine its yield stability and its susceptibility to powdery mildew is not yet known. Refer to Tables 19 and 20 for yield

performance with early sowing. DS Pascal also presents a longer maturing option with leading powdery mildew and pre-harvest sprouting tolerance, although it has had limited NVT testing for yield comparisons.

## ANW

Ninja has been the second highest yielding milling wheat after Scepter in the NVT between 2015–17 (Table 4). It has improved yields over all other ANW varieties (Figure 2d). Ninja has a marginally shorter maturity than Zen and Calingiri. Ninja is highly susceptible to powdery mildew and stem rust and should be actively monitored and managed. Zen's disease ratings are only marginally better and it has a lower falling number index and is inferior in yield to Ninja. The newly released, longer maturing ANW, Kinsei, has performed very well for yield in the single year of NVT data and is longer maturing than Calingiri and Zen.





**Figure 2a–d** Variation from site mean yield of selected varieties against group yield of NVT sites in comparison to Scepter. a Short-mid maturity AH and APW varieties, b. Clearfield (CL Plus) varieties, c. Mid-long maturity varieties and d. ANW varieties <sup>^</sup>indicates one year of data only. Source: Long term yield reporter [nvtonline.com.au](http://nvtonline.com.au)



# Variety performance in Agzones and suggested planting times

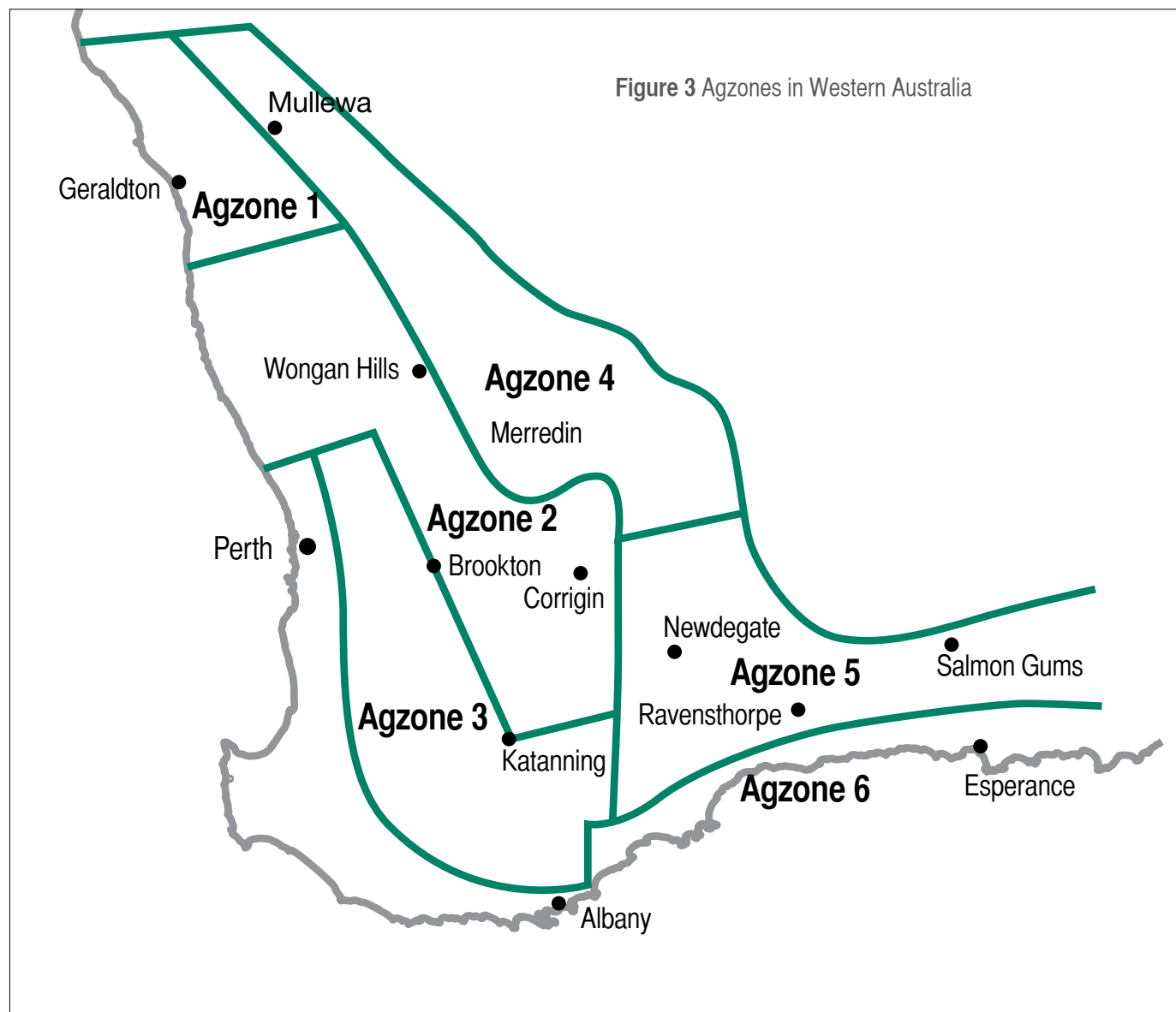
Christine Zaicou-Kunesch

The data resulting from NVT trials can be used to assess the relative performance of one variety against another each season. However, there is value in assessing a variety's yield in the NVT over a number of years to provide insight into the stability of its performance across a number of seasons. Many of the recently released varieties have been in NVT since 2015 and there are some varieties which have performed similarly or better than Mace over a number of seasons (Tables 5a-10a). It is important to note that a large proportion of NVT trials are sown in May. This may influence the relative performance of varieties with longer maturities than Mace. A new variety should have better or equal yield and disease traits, provide diversity or risk mitigation and suit the

current market requirements. Visit [app.nvtonline.com.au](http://app.nvtonline.com.au) to assess the performance of varieties relative to the site mean at locations relevant to your business.

## Suggested sowing times

A suggested planting time for varieties within each Agzone has been developed (Tables 5b-10b) to support variety decisions. The suggestions are based on the knowledge of the varieties, their performance in NVT and agronomy trials and risk factors to production within each Agzone. The output has been developed in consultation with breeding companies and researchers. Refer to the maturity class of a variety to assess the suggested sowing time for varieties not listed in the table.



**Table 5a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 1, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	2.11	2.04	2.32	4.18	2.79
Grade	Variety	Maturity	No. of trials	6	5	6	5	4
AH	Bremer <sup>(b)</sup>	mid	26	99	92	107	98	104
	Devil <sup>(b)</sup>	short-mid	4	–	–	–	–	106
	EGA Bonnie Rock <sup>(b)</sup>	short	17	93	95	95	–	–
	Emu Rock <sup>(b)</sup>	short	26	88	96	89	97	90
	LRPB Cobra <sup>(b)</sup>	short-mid	26	97	95	103	99	102
	LRPB Havoc <sup>(b)</sup>	short-mid	9	–	–	–	105	102
	Mace <sup>(b)</sup>	short-mid	26	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	15	–	–	110	107	108
	Tungsten <sup>(b)</sup>	mid-long	15	–	–	100	94	100
	Yitpi <sup>(b)</sup>	mid-long	26	90	85	98	94	103
APW	Corack <sup>(b)</sup>	short-mid	26	96	103	95	99	96
	Chief CL Plus <sup>(b)</sup>	mid	14	–	99	–	99	105
	Cutlass <sup>(b)</sup>	mid-long	15	–	–	108	97	108
	Grenade CL Plus <sup>(b)</sup>	short-mid	26	86	88	90	90	96
	Hydra <sup>(b)</sup>	short-mid	26	103	96	108	101	105
	Impress CL Plus <sup>(b)</sup>	short-mid	26	96	97	93	86	92
	Justica CL Plus <sup>(b)</sup>	mid-long	22	91	88	96	93	–
	LRPB Arrow <sup>(b)</sup>	mid	15	–	–	104	101	104
	LRPB Scout <sup>(b)</sup>	mid	26	89	92	98	99	101
	LRPB Trojan <sup>(b)</sup>	mid-long	20	–	92	101	98	103
	Magenta <sup>(b)</sup>	mid-long	26	103	89	110	97	108
	Westonia	short	17	94	96	97	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	26	99	96	101	97	103
ANW	Calingiri	mid-long	26	97	85	105	94	108
	Kinsei <sup>(b)</sup>	mid-long	4	–	–	–	–	110
	Ninja <sup>(b)</sup>	mid	15	–	–	112	104	109
	Supreme <sup>(b)</sup>	short-mid	26	95	93	98	96	99
	Zen <sup>(b)</sup>	mid-long	26	103	93	109	101	107
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	4	–	–	–	–	92
	Site mean yield (t/ha)			2.07	1.91	2.39	4.10	2.85

**Table 5b** Suggested sowing time of varieties in Agzone 1, Western Australia

	April	May				June	
Agzone 1	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Calingiri, Cutlass, Magenta, LRPB Trojan, Zen							
Mid: Bremer, Chief CL Plus, Ninja							
Short-mid: Hydra, LRPB Havoc, Mace, Scepter							
Short: Emu Rock							

Key

Best bet	More risk
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**Table 6a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 2, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	3.32	2.68	2.45	3.68	3.68
Grade	Variety	Maturity	No. of trials	16	16	14	8	16
AH	Bremer <sup>(b)</sup>	mid	70	97	93	100	93	94
	Devil <sup>(b)</sup>	short-mid	16	–	–	–	–	105
	EGA Bonnie Rock <sup>(b)</sup>	short	46	95	95	92	–	–
	Emu Rock <sup>(b)</sup>	short	70	92	96	92	98	93
	LRPB Cobra <sup>(b)</sup>	short-mid	70	100	100	99	102	94
	LRPB Havoc <sup>(b)</sup>	short-mid	24	–	–	–	101	104
	Mace <sup>(b)</sup>	short-mid	70	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	38	–	–	109	111	106
	Tungsten <sup>(b)</sup>	mid-long	38	–	–	93	99	90
	Yitpi <sup>(b)</sup>	mid-long	70	88	93	91	102	89
APW	Corack <sup>(b)</sup>	short-mid	70	99	102	98	98	100
	Chief CL Plus <sup>(b)</sup>	mid	40	–	100	–	97	100
	Cutlass <sup>(b)</sup>	mid-long	38	–	–	98	109	93
	Grenade CL Plus <sup>(b)</sup>	short-mid	70	84	90	86	92	88
	Harper <sup>(b)</sup>	mid-long	68	91	96	91	100	91
	Hydra <sup>(b)</sup>	short-mid	70	104	102	103	104	97
	Impress CL Plus <sup>(b)</sup>	short-mid	70	92	88	89	75	91
	Justica CL Plus <sup>(b)</sup>	mid-long	54	89	92	91	97	–
	LRPB Arrow <sup>(b)</sup>	mid	38	–	–	101	101	100
	LRPB Scout <sup>(b)</sup>	mid	70	93	98	95	105	92
	LRPB Trojan <sup>(b)</sup>	mid-long	54	–	99	96	102	90
	Magenta <sup>(b)</sup>	mid-long	70	100	98	99	106	92
	Westonia	short	46	96	97	93	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	70	96	98	98	97	98
ANW	Calingiri	mid-long	70	91	91	94	98	91
	Kinsei <sup>(b)</sup>	mid-long	16	–	–	–	–	99
	Ninja <sup>(b)</sup>	mid	38	–	–	107	110	103
	Supreme <sup>(b)</sup>	short-mid	70	96	96	95	100	93
	Zen <sup>(b)</sup>	mid-long	70	99	97	103	101	99
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	16	–	–	–	–	101
	Site mean yield (t/ha)			3.25	2.60	2.40	3.68	3.47

**Table 6b** Suggested sowing time of varieties in Agzone 2, Western Australia

	April	May				June	
Agzone 2	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Calingiri, Cutlass*, LRPB Trojan, Magenta, Yitpi*, Zen							
Mid: Bremer, Chief CL Plus, Ninja							
Short-mid: Hydra, LRPB Havoc, Mace, Scepter							
Short: Emu Rock							

\* Southern districts for frost management

Key

Best bet	More risk
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**Table 7a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 3, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	5.32	4.71	3.93	3.12	4.38
Grade	Variety	Maturity	No. of trials	5	5	6	3	4
AH	Bremer <sup>(b)</sup>	mid	23	98	99	95	96	97
	Devil <sup>(b)</sup>	short-mid	4	–	–	–	–	112
	EGA Bonnie Rock <sup>(b)</sup>	short	16	96	94	97	–	–
	Emu Rock <sup>(b)</sup>	short	23	93	92	96	98	90
	LRPB Cobra <sup>(b)</sup>	short-mid	23	103	99	94	103	100
	LRPB Havoc <sup>(b)</sup>	short-mid	7	–	–	–	100	103
	Mace <sup>(b)</sup>	short-mid	23	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	13	–	–	103	112	113
	Tungsten <sup>(b)</sup>	mid-long	13	–	–	91	97	92
	Yitpi <sup>(b)</sup>	mid-long	23	97	94	81	105	93
APW	Corack <sup>(b)</sup>	short-mid	23	100	100	103	98	98
	Chief CL Plus <sup>(b)</sup>	mid	12	–	102	–	97	100
	Cutlass <sup>(b)</sup>	mid-long	13	–	–	88	108	101
	DS Pascal <sup>(b)</sup>	mid-long	7	–	–	–	94	84
	Grenade CL Plus <sup>(b)</sup>	short-mid	23	91	91	86	93	84
	Harper <sup>(b)</sup>	mid-long	23	99	95	86	101	92
	Hydra <sup>(b)</sup>	short-mid	23	105	100	96	105	103
	Impress CL Plus <sup>(b)</sup>	short-mid	17	87	88	–	71	76
	Justica CL Plus <sup>(b)</sup>	mid-long	19	94	92	86	99	–
	LRPB Arrow <sup>(b)</sup>	mid	13	–	–	97	104	103
	LRPB Scout <sup>(b)</sup>	mid	23	101	99	89	108	100
	LRPB Trojan <sup>(b)</sup>	mid-long	23	104	102	91	105	101
	Magenta <sup>(b)</sup>	mid-long	23	104	96	86	107	99
	Westonia	short	16	98	94	96	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	23	100	101	96	99	98
ANW	Calingiri	mid-long	23	98	96	83	101	94
	Kinsei <sup>(b)</sup>	mid-long	4	–	–	–	–	106
	Ninja <sup>(b)</sup>	mid	13	–	–	98	110	109
	Supreme <sup>(b)</sup>	short-mid	23	98	94	92	100	93
	Zen <sup>(b)</sup>	mid-long	23	101	101	94	104	104
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	4	–	–	–	–	101
	Site mean yield (t/ha)			5.32	4.57	3.67	3.15	4.25

**Table 7b** Suggested sowing time of varieties in Agzone 3, Western Australia

	April	May				June	
Agzone 3	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Calingiri, Cutlass, Kinsei, LRPB Trojan, Magenta, Yitpi, Zen							
Mid: Bremer, Chief CL Plus, Ninja							
Short-mid: Hydra, LRPB Havoc, Mace, Scepter							

Key

Best bet	More risk
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**Table 8a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 4, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	2.20	1.52	2.07	3.17	2.30
Grade	Variety	Maturity	No. of trials	8	8	9	4	9
AH	Bremer <sup>(b)</sup>	mid	38	99	79	100	93	92
	Devil <sup>(b)</sup>	short-mid	9	–	–	–	–	104
	EGA Bonnie Rock <sup>(b)</sup>	short	25	96	98	97	–	–
	Emu Rock <sup>(b)</sup>	short	38	96	108	96	97	93
	LRPB Cobra <sup>(b)</sup>	short-mid	38	101	97	105	96	93
	LRPB Havoc <sup>(b)</sup>	short-mid	13	–	–	–	107	98
	Mace <sup>(b)</sup>	short-mid	38	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	22	–	–	110	108	107
	Tungsten <sup>(b)</sup>	mid-long	22	–	–	102	89	90
	Yitpi <sup>(b)</sup>	mid-long	38	96	88	98	91	92
APW	Corack <sup>(b)</sup>	short-mid	38	99	108	99	99	101
	Chief CL Plus <sup>(b)</sup>	mid	21	–	93	–	97	98
	Cutlass <sup>(b)</sup>	mid-long	22	–	–	108	95	95
	Grenade CL Plus <sup>(b)</sup>	short-mid	38	92	92	91	87	91
	Harper <sup>(b)</sup>	mid-long	22	–	–	98	90	93
	Hydra <sup>(b)</sup>	short-mid	37	103	97	107	100	95
	Impress CL Plus <sup>(b)</sup>	short-mid	38	93	93	89	83	86
	Justica CL Plus <sup>(b)</sup>	mid-long	29	96	91	95	90	–
	LRPB Arrow <sup>(b)</sup>	mid	22	–	–	101	100	101
	LRPB Scout <sup>(b)</sup>	mid	38	98	95	102	95	94
	LRPB Trojan <sup>(b)</sup>	mid-long	30	–	91	104	91	93
	Magenta <sup>(b)</sup>	mid-long	38	103	91	106	96	92
	Westonia	short	25	97	101	99	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	38	99	93	97	95	100
ANW	Calingiri	mid-long	38	98	78	98	89	91
	Kinsei <sup>(b)</sup>	mid-long	9	–	–	–	–	100
	Ninja <sup>(b)</sup>	mid	22	–	–	109	105	102
	Supreme <sup>(b)</sup>	short-mid	38	99	99	100	96	93
	Zen <sup>(b)</sup>	mid-long	38	101	83	102	100	98
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	9	–	–	–	–	99
	Site mean yield (t/ha)			2.20	1.42	2.11	3.05	2.15

**Table 8b** Suggested sowing time of varieties in Agzone 4, Western Australia

	April	May				June	
Agzone 4	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Calingiri, Cutlass*, Magenta, LRPB Trojan, Yitpi*, Zen							
Mid: Chief CL Plus, Ninja							
Short-mid: Corack, LRPB Havoc, Mace, Scepter, Supreme							
Short: Emu Rock							

\* Southern districts for frost management.

Key

Best bet	More risk
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**Table 9a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 5, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	3.38	2.71	3.37	2.97	3.36
Grade	Variety	Maturity	No. of trials	6	6	6	3	5
AH	Bremer <sup>(b)</sup>	mid	26	92	92	91	92	89
	Devil <sup>(b)</sup>	short-mid	5	–	–	–	–	110
	EGA Bonnie Rock <sup>(b)</sup>	short	18	92	92	92	–	–
	Emu Rock <sup>(b)</sup>	short	26	94	96	95	98	94
	LRPB Cobra <sup>(b)</sup>	short-mid	26	98	98	94	104	98
	LRPB Havoc <sup>(b)</sup>	short-mid	8	–	–	–	96	102
	Mace <sup>(b)</sup>	short-mid	26	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	14	–	–	106	114	112
	Tungsten <sup>(b)</sup>	mid-long	14	–	–	88	98	95
	Yitpi <sup>(b)</sup>	mid-long	26	92	95	82	106	91
APW	Corack <sup>(b)</sup>	short-mid	26	102	102	102	100	102
	Chief CL Plus <sup>(b)</sup>	mid	14	–	98	–	96	99
	Cutlass <sup>(b)</sup>	mid-long	14	–	–	89	111	104
	Grenade CL Plus <sup>(b)</sup>	short-mid	26	89	92	83	93	87
	Harper <sup>(b)</sup>	mid-long	26	94	97	85	103	94
	Hydra <sup>(b)</sup>	short-mid	26	99	99	95	104	101
	Impress CL Plus <sup>(b)</sup>	short-mid	20	85	84	–	65	83
	Justica CL Plus <sup>(b)</sup>	mid-long	21	90	93	84	98	–
	LRPB Arrow <sup>(b)</sup>	mid	14	–	–	97	104	100
	LRPB Scout <sup>(b)</sup>	mid	26	97	100	91	110	96
	LRPB Trojan <sup>(b)</sup>	mid-long	26	97	99	91	108	95
	Magenta <sup>(b)</sup>	mid-long	26	94	96	85	106	97
	Westonia	short	18	93	93	91	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	26	98	99	94	99	97
ANW	Calingiri	mid-long	26	90	93	81	99	89
	Kinsei <sup>(b)</sup>	mid-long	5	–	–	–	–	105
	Ninja <sup>(b)</sup>	mid	14	–	–	99	111	108
	Supreme <sup>(b)</sup>	short-mid	26	94	96	90	100	95
	Zen <sup>(b)</sup>	mid-long	26	97	98	94	102	96
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	5	–	–	–	–	102
	Site mean yield (t/ha)			3.22	2.61	3.09	2.97	3.20

**Table 9b** Suggested sowing time of varieties in Agzone 5, Western Australia

	April	May				June	
Agzone 5	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Calingiri, Cutlass, Magenta, LRPB Trojan, Yitpi, Zen							
Mid: Bremer, Chief CL Plus, Ninja							
Short-mid: Corack, Hydra, LRPB Havoc, Mace, Scepter							
Short: Emu Rock							

Key

Best bet	More risk
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**Table 10a** Long term predicted yield expressed as a percentage of Mace's mean yield in Agzone 6, Western Australia.  
(Source: NVT Online)

			Year	2013	2014	2015	2016	2017
			Mace Yield (t/ha)	3.83	2.94	4.33	3.95	4.24
Grade	Variety	Maturity	No. of trials	3	3	3	2	1
AH	Bremer <sup>(b)</sup>	mid	12	102	98	99	96	93
	Devil <sup>(b)</sup>	short-mid	1	–	–	–	–	110
	EGA Bonnie Rock <sup>(b)</sup>	short	9	95	90	89	–	–
	Emu Rock <sup>(b)</sup>	short	12	88	87	92	100	95
	LRPB Cobra <sup>(b)</sup>	short-mid	12	102	92	101	105	100
	LRPB Havoc <sup>(b)</sup>	short-mid	3	–	–	–	98	100
	Mace <sup>(b)</sup>	short-mid	12	100	100	100	100	100
	Scepter <sup>(b)</sup>	short-mid	6	–	–	112	110	111
	Tungsten <sup>(b)</sup>	mid-long	6	–	–	91	102	96
	Yitpi <sup>(b)</sup>	mid-long	12	90	85	89	107	98
APW	Corack <sup>(b)</sup>	short-mid	12	99	97	99	99	100
	Chief CL Plus <sup>(b)</sup>	mid	6	–	105	–	97	98
	Cutlass <sup>(b)</sup>	mid-long	6	–	–	97	111	106
	DS Pascal <sup>(b)</sup>	mid-long	3	–	–	–	99	90
	Grenade CL Plus <sup>(b)</sup>	short-mid	12	85	83	82	97	91
	Harper <sup>(b)</sup>	mid-long	12	92	86	89	104	98
	Hydra <sup>(b)</sup>	short-mid	12	106	99	103	105	102
	Impress CL Plus <sup>(b)</sup>	short-mid	9	91	93	–	74	79
	Justica CL Plus <sup>(b)</sup>	mid-long	11	89	88	87	101	–
	LRPB Arrow <sup>(b)</sup>	mid	6	–	–	102	102	102
	LRPB Scout <sup>(b)</sup>	mid	12	96	87	99	110	101
	LRPB Trojan <sup>(b)</sup>	mid-long	12	101	86	101	108	100
	Magenta <sup>(b)</sup>	mid-long	12	101	94	96	108	102
	Westonia	short	9	96	88	90	–	–
	Wyalkatchem <sup>(b)</sup>	short-mid	12	100	100	96	98	98
ANW	Calingiri	mid-long	12	96	92	90	102	96
	Kinsei <sup>(b)</sup>	mid-long	1	–	–	–	–	105
	Ninja <sup>(b)</sup>	mid	3	–	–	–	109	108
	Supreme <sup>(b)</sup>	short-mid	6	94	–	–	102	97
	Zen <sup>(b)</sup>	mid-long	9	103	–	102	102	100
ASW	Razor CL Plus <sup>(b)</sup>	short-mid	1	–	–	–	–	101
	<b>Site mean yield (t/ha)</b>			<b>3.79</b>	<b>2.77</b>	<b>4.20</b>	<b>4.03</b>	<b>4.16</b>

**Table 10b** Suggested sowing time of varieties in Agzone 6, Western Australia

	April	May				June	
Agzone 6	wk4	wk1	wk2	wk3	wk4	wk1	wk2
Mid-long: Cutlass, DS Pascal, Harper, LRPB Trojan, Yitpi							
Mid: Bremer, Chief CL Plus							
Short-mid: Mace and Scepter							

Key

Best bet	More risk
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## Disease update

Manisha Shankar and Geoff Thomas

- Plan ahead. Be aware of your variety's disease package so you can plan your disease management.
- Choose your variety wisely. Don't plant a susceptible crop into a high disease risk paddock.
- Diversify your wheat varieties as well as your crop type.

When selecting a wheat variety to implement into the farming system, it is important to consider not only the yield or potential grade but the disease resistance of each variety (Table 14). Higher resistance ratings decrease disease incidence, severity and subsequent yield losses. Avoiding susceptible or very susceptible varieties, where possible, significantly reduces chances of disease outbreaks and requirements for in-season management. Understanding the likelihood of disease occurring in your paddocks is vital so that preparations can be made ahead of time to monitor and manage the crop depending on its susceptibility. For example, Magenta is resistant to leaf rust but moderately susceptible to stripe rust; in this instance, your understanding of the varieties susceptibility would assist you when monitoring for symptoms of rust in your paddock.

For disease to spread from season to season there needs to be a presence of inoculum carried over from last season, favourable seasonal conditions and a susceptible host crop to become infected. **Depending on the disease in question, inoculum carry over can be on infested stubble or trash, on a green bridge, in seed or soil borne (Table 11).**

When deciding what to sow in each paddock, consideration should be given to residue from the previous crops and whether it could be a host for disease. If the paddock's rotation is wheat on wheat, avoid selecting varieties that are highly susceptible to stubble borne diseases. For example, it is not advisable to sow Yitpi, which is rated susceptible to very susceptible to yellow leaf spot, onto wheat stubble. Diversifying wheat

**Table 11** Examples of wheat diseases carried over from different inoculum sources

Inoculum carryover source	Disease
Infested stubble or trash	Yellow leaf spot, nodorum blotch, powdery mildew and crown rot.
Green bridge	Rusts, mildews and viruses.
Seed	Loose smut.
Soil borne	Root lesion nematode, rhizoctonia, flag smut and common bunt.





**Table 12** Suggested minimum resistance for wheat varieties in different disease risk areas to common diseases

Disease risk*	Stem rust	Stripe rust	Leaf rust	Yellow leaf spot	Nodorum blotch
Low risk	MSS	MS	MS	MSS	MSS
Medium risk	MS	MRMS	MRMS	MS	MS
High risk	MR	MR	MR	MRMS	MRMS

\*Determined by taking into account factors such as disease history in previous years, presence and amount of primary inoculum and prevailing weather conditions (temperature, rainfall and relative humidity).

varieties across your enterprise will reduce the likelihood of a disease taking hold of all wheat on your property and requiring management at the same time.

Table 12 provides suggested minimum resistance for wheat varieties in three different disease risk profiles to five common diseases. This table is a useful guide of what to expect when selecting a suitable variety in problem paddocks.

Over the last five years, Mace has become the most popular variety in the state with over 50% of wheat area sown to this variety over the last five seasons. If substituting a new variety for Mace, growers need to consider the strengths and weakness of a variety and any altered management that may be required. For example, if adopting Scepter growers need to be mindful of its powdery mildew rating of susceptible. Where varieties are known to be susceptible to powdery mildew and disease risk is present, use seed dressing or in-furrow fungicides and monitor the crop to ensure early detection followed by

timely fungicide application. Along with this, diversification of varieties will reduce the risk of whole farm infection, especially when there are a few key varieties being sown across a district. Diversification also reduces the risk associated with the emergence of a new pathotype that could render a significant proportion of a farm or region susceptible, requiring region wide management responses.

Recent incursions of wheat leaf rust pathotypes detected during 2013 and 2015 are now important in Western Australia. The 2013 pathotype (76-1,3,5,7,9,10,12 +Lr37) (syn. Lr76 pathotype) represented the first occurrence of virulence for the resistance genes *Lr13*, *Lr17a*, *Lr17b*, and *Lr26* in the west. The 2015 pathotype (104-1,3,4,6,7,8,10,12 +Lr37) (syn. new Lr104 pathotype) posed much the same threat but in addition carried virulence for the resistance genes *Lr1*, *Lr12*, *Lr15*, *Lr28* and *Lr27+31* but lacked virulence for *Lr26*. It is expected that this pathotype will quickly spread to be the dominant

**Table 13** Crown rot predicted yield loss for 13 commonly grown wheat varieties in Western Australia.

(Source: GRDC national crown rot epidemiology and management program DAN00175)

Variety	Resistance rating	# trials	Year/s	Categorised yield loss
Justica CL Plus <sup>Ⓓ</sup>	S	6	2014-2016	high (>20%)
Wyalkatchem <sup>Ⓓ</sup>	S	6	2014-2016	high (>20%)
Magenta <sup>Ⓓ</sup>	MSS	6	2014-2016	high (>20%)
Mace <sup>Ⓓ</sup>	S	6	2014-2016	high (>20%)
LRPB Cobra <sup>Ⓓ</sup>	S	6	2014-2016	moderate (10-20%)
Calingiri	S	6	2014-2016	moderate (10-20%)
Harper <sup>Ⓓ</sup>	S	6	2014-2016	moderate (10-20%)
Westonia	S	6	2014-2016	moderate (10-20%)
Corack <sup>Ⓓ</sup>	S	6	2014-2016	moderate (10-20%)
Yitpi <sup>Ⓓ</sup>	S	4	2014-2015	moderate (10-20%)
LRPB Trojan <sup>Ⓓ</sup>	MS	6	2014-2016	moderate (10-20%)
Scepter <sup>Ⓓ</sup>	Sp	2	2016	moderate (10-20%)
Emu Rock <sup>Ⓓ</sup>	MS	6	2014-2016	low (<10%)

Crown rot yield loss information was provided by Daniel Huberli along with Miriam Connor and Kris Gajda from DPIRD with funding from the GRDC. Ratings were collected and provided as weighted average yield loss to fusarium crown rot in inoculated trials at Merredin and Wongan Hills between 2014 and 2016.

**Table 14** Disease resistance ratings for wheat varieties grown in Western Australia

Variety	Grade	Nodorum blotch	Septoria tritici blotch	Yellow spot	Stem rust	Stripe rust	Leaf rust (old Lr76 pathotype)	Leaf rust (new Lr104 pathotype)	Powdery mildew	Flag smut
Arrino	ANW	MS	MS	MSS	SVS	S	VS	VS	MR	MSS
Bremer <sup>(b)</sup>	AH	MS	S	MSS	MR	MR*	MR	MR*	SVS	MSS
Calingiri	ANW	MSS	S	MSS	S	S	MS#	S	S	RMR
Carnamah	APW	MS	S	MS	MRMS	SVS	MS	MSS#	S	MSS
Chief CI Plus <sup>(b)</sup>	APW	MSp	Sp	MRMS	MR	S	R	R*	MSSp	SVS
Clearfield Stl <sup>(b)</sup>	APW	MRMS	MSS	MSS	RMR	S	VS	VS	S	MS
Corack <sup>(b)</sup>	APW	MSS	S	(MR)	MR	MS	S	SVS	SVS	MRMS
Cutlass <sup>(b)</sup>	APW	MRMS	MSS	MSS	R	RMR*	R	R*	S	MS
Devil <sup>(b)</sup>	AH	–	–	MRMSp	MSSp	MRp	MRMS#	SVSp	–	–
DS Pascal <sup>(b)</sup>	APW	MRMS	MS	MRMS	MSS	RMR	MR	MS	R	S
EGA Bonnie Rock <sup>(b)</sup>	AH	MSS	SVS	MRMS	S	VS	SVS	SVS	S	S
EGA Eagle Rock <sup>(b)</sup>	AH	MS	MSS	S	MR	MSS	MR	MRMS#	MSS	S
Emu Rock <sup>(b)</sup>	AH	SVS	S	MRMS	MS	MRMS	S	SVS	S	R
Fortune <sup>(b)</sup>	ANW	MSS	MRMS	MS	MS	MS	MR	MRMS#	MS	R
Frame <sup>(b)</sup>	APW	MS	MS	S	MRMS	MS	MSS	S	MS	RMR
GBA Sapphire <sup>(b)</sup>	AH	MS	MRMS	MSS	MR	MSS	RMR*	RMR*	MSS	MRMS
Grenade CL Plus <sup>(b)</sup>	APW	MSS	MSS	S	MR	RMR	MS#	S	MSS	MR
Halberd	ASW	S	S	S	SVS	MS	MS	S	SVS	MRMS
Harper <sup>(b)</sup>	APW	MS	MSS	S	MS	RMR	MRMS#	S	MSS	RMR
Hydra <sup>(b)</sup>	APW	MSS	MS	MRMS	MS	MS	MS#	S	S	VS
Illabo <sup>(b)</sup>	Feed	MRMSp	MRp	MS	MRMS	RMR	MS#	S	MRp	R
Impress CL Plus <sup>(b)</sup>	APW	MSS	MSS	MRMS	MR	MSS	R	R*	SVS	MSS
Justica CL Plus <sup>(b)</sup>	APW	MS	SVS	S	MR	RMR*	MSS	SVS	MSS	RMR
King Rock <sup>(b)</sup>	AH	MSS	S	MRMS	MRMS	RMR*	MS#	S	S	SVS
Kinsei <sup>(b)</sup>	ANW	–	–	MSp	MSSp	MRMSp	MR#	SVSp	–	–
Longsword <sup>(b)</sup>	Feed	MRMSp	MRMSp	MRMS	MR	RMR	MR	MSS	MRMSp	Rp
LRPB Arrow <sup>(b)</sup>	APW	MS	S	MRMS	S	S	S	SVS	SVS	MS
LRPB Cobra <sup>(b)</sup>	AH	MRMS	MSS	MRMS	RMR	MSS	MR	MR	MSS	MS
LRPB Havoc <sup>(b)</sup>	AH	MRMSp	MRMSp	MRMSp	S	MR	RMR	S	MSp	MS
LRPB Scout <sup>(b)</sup>	APW	SVS	S	SVS	MRMS	RMR*	R#	MS	MS	MR
LRPB Trojan <sup>(b)</sup>	APW	MS	MSS	MSS	MRMS	MR	MR#	MR	S	SVS
Mace <sup>(b)</sup>	AH	MS	S	MRMS	MRMS	RMR*	MS#	MSS	MSS	S
Magenta <sup>(b)</sup>	APW	MRMS	MRMS	(MR)	RMR	MS	R*	RMR*	MRMS	MSS
Ninja <sup>(b)</sup>	ANW	MS	MS	MRMS	SVS	MS	MS#	S	SVS	MR
Razor CL Plus <sup>(b)</sup>	ASW	MSSp	SVSp	MS	MRMS	RMR	RMR#	S	Sp	R
Scepter <sup>(b)</sup>	AH	MRMS	Sp	MRMS	MRMS	MR*	MR#	MSS	S	MSS
Stiletto	APW	MS	MSS	MSS	MR	MSS	VS	VS	MSS	MS
Supreme <sup>(b)</sup>	ANW	S	MS	MS	MRMS	MR*	RMR	RMR*	MS	MSS
Tammarin Rock <sup>(b)</sup>	AH	MSS	S	SVS	S	MS	MSS	MSS#	MSS	RMR
Tungsten <sup>(b)</sup>	AH	MRMS	MSS	MSS	MS	RMR	MS#	MS#	MSS	RMR
Westonia	APW	MSS	SVS	MSS	SVS	VS	MS	MS	S	SVS
Wyalkatchem <sup>(b)</sup>	APW	MSS	S	(MR)	MS	S	MSS	S	SVS	SVS
Yitpi <sup>(b)</sup>	AH	MS	MRMS	SVS	S	MRMS	MSS	S	MRMS	MR
Zen <sup>(b)</sup>	ANW	MRMS	S	MRMS	S	MRMS	MRMS#	S	S	MS

**Table 14** Disease resistance ratings for wheat varieties grown in Western Australia (cont.)

Variety	Grade	Common bunt	RLN ( <i>P. quasitereoides</i> )	RLN ( <i>P. neglectus</i> )	CCN	Crown rot
Arrino	ANW	MS	S	S	–	–
Bremer <sup>(b)</sup>	AH	RMR	–	SVS	MRMS	S
Calingiri	ANW	MRMS	S	SVS	–	S
Carnamah	APW	MS	SVS	VS	S	–
Chief Cl Plus <sup>(b)</sup>	APW	MRp	–	MSp	–	MSSp
Clearfield Stl <sup>(b)</sup>	APW	MS	–	S	–	–
Corack <sup>(b)</sup>	APW	MSS	MSS	MSS	RMR	S
Cutlass <sup>(b)</sup>	APW	Sp	–	MSS	MSS	Sp
Devil <sup>(b)</sup>	AH	–	–	–	–	–
DS Pascal <sup>(b)</sup>	APW	SVS	–	S	MS	S
EGA Bonnie Rock <sup>(b)</sup>	AH	MS	S	SVS	S	–
EGA Eagle Rock <sup>(b)</sup>	AH	MRMS	S	MSS	S	–
Emu Rock <sup>(b)</sup>	AH	S	MRMS	MSS	S	MSS
Fortune <sup>(b)</sup>	ANW	MR	Sp	S	–	S
Frame <sup>(b)</sup>	APW	MS	–	MSS	MR	–
GBA Sapphire <sup>(b)</sup>	AH	MS	VSp	S	S	–
Grenade CL Plus <sup>(b)</sup>	APW	SVS	–	MSS	R	S
Halberd	ASW	S	–	–	S	–
Harper <sup>(b)</sup>	APW	MSS	–	S	MRMS	S
Hydra <sup>(b)</sup>	APW	VS	–	S	S	S
Illabo <sup>(b)</sup>	Feed	MSp	–	S	MS	MSSp
Impress CL Plus <sup>(b)</sup>	APW	RMR	–	MRMS	MS	S
Justica CL Plus <sup>(b)</sup>	APW	SVS	SVSp	S	MS	S
King Rock <sup>(b)</sup>	AH	MSS	–	MSS	MS	S
Kinsei <sup>(b)</sup>	ANW	–	–	–	–	–
Longsword <sup>(b)</sup>	Feed	RMR	–	MRMS	–	Sp
LRPB Arrow <sup>(b)</sup>	APW	RMR	–	MRMS	MS	S
LRPB Cobra <sup>(b)</sup>	AH	SVS	MSp	MSS	MS	S
LRPB Havoc <sup>(b)</sup>	AH	RMRp	–	S	–	Sp
LRPB Scout <sup>(b)</sup>	APW	MSS	S	S	–	S
LRPB Trojan <sup>(b)</sup>	APW	S	MRMSp	MSS	MS	MS
Mace <sup>(b)</sup>	AH	MR	MRMS	MS	MRMS	S
Magenta <sup>(b)</sup>	APW	S	MSS	MSS	S	MSS
Ninja <sup>(b)</sup>	ANW	RMR	–	S	MS	S
Razor CL Plus <sup>(b)</sup>	ASW	RMR	–	–	–	–
Scepter <sup>(b)</sup>	AH	MS	–	S	MRMS	S
Stiletto	APW	MS	MRMS	MS	S	–
Supreme <sup>(b)</sup>	ANW	SVS	–	MSS	S	MSS
Tammarin Rock <sup>(b)</sup>	AH	MR	SVSp	MS	–	–
Tungsten <sup>(b)</sup>	AH	S	–	MSS	–	S
Westonia	APW	S	S	SVS	S	Sp
Wyalkatchem <sup>(b)</sup>	APW	RMR	MSS	MRMS	S	S
Yitpi <sup>(b)</sup>	AH	S	MS	MSS	MR	S
Zen <sup>(b)</sup>	ANW	MR	–	MRMS	S	S

#### 2018 Disease Ratings index key

VS = Very susceptible, SVS = Susceptible to very susceptible, S = Susceptible, MSS = Moderately susceptible to susceptible, MS = Moderately susceptible, MRMS = Moderately resistant to moderately susceptible, MR = Moderately resistant, RMR = Resistant to moderately resistant, R = Resistant. No score '–' = no rating is currently available. p = Provisional assessment. \* = Some races in eastern Australia can attack these varieties. These include races with Yr17 virulence for stripe rust and races with Lr24 virulence for leaf rust. # = May be more susceptible to the new Lr104 leaf rust pathotype. ( ) = Higher disease at some sites. Combined RLN ratings from DPIRD, SARDI, AgVic and USQ data. CCN ratings from SARDI data. R=resistant - nematode numbers will decrease when this variety is grown. MR = Moderately resistant - nematode numbers will slightly decrease when this variety is grown. MS = Moderately susceptible - nematode numbers will slightly increase when this variety is grown. S = Susceptible - nematode numbers will increase greatly when this variety is grown. Crown rot ratings from SARDI, USQ and DPI NSW data.



wheat leaf rust pathotype in WA. Many cultivars are now more susceptible than before. New leaf rust ratings in the disease table (Table 14) are based on 2017 eastern states consensus ratings and on testing done at Carnarvon in 2018 especially for older varieties not tested under the NVT system.

In 2016, the DPIRD and GRDC national crown rot epidemiology and management program released relative yield losses in WA from crown rot for 13 commonly grown wheat varieties (Table 13). These new ratings provide information on the predicted average yield loss of these varieties based on trials conducted in Wongan Hills and Merredin between 2014 and 2016. Overall, Emu Rock had the lowest yield loss with Justica CL

Plus being the highest. This information is useful for situations where there may be the need to sow wheat into cereal stubble infected with high levels of crown rot. In this situation, choosing a variety with low to moderate yield loss, such as Emu Rock or LRPB Trojan, would reduce the risk of yield loss from crown rot infections.

For more information

- Crop diseases - forecasts and management ([agric.wa.gov.au/n/2319](http://agric.wa.gov.au/n/2319)).
- Wheat disease ratings at [agric.wa.gov.au](http://agric.wa.gov.au)
- Download the 'Australian Field Crop Disease Guide App'





## Variety management – Agronomy

Christine Zaicou-Kunesch, Jeremy Curry and Brenda Shackley

### Frost management

- Variety choice and time of sowing are still the most reliable way of reducing yield losses from frost.
- Select varieties adapted to your region and then match to the appropriate sowing time to ensure the variety flowers in the optimum flowering period.
- Sowing the correct variety early can lengthen the growing season and deliver increased yields. However, when sowing early, it is critical to choose a variety which flowers during the optimum flowering window ([agric.wa.gov.au/n/68](http://agric.wa.gov.au/n/68)).
- Consider using multiple varieties (with different flowering times and maturities) to target flowering throughout the optimal flowering period for your location.
- All wheat varieties are susceptible to frost however, their risk profile during flowering can differ.
- The Frost Performance Values provided on the National Variety Trial website ([nvtonline.com.au](http://nvtonline.com.au)) gives an indication of a variety's risk to frost damage during flowering.

### Grain weight, seeding rates and plant establishment

Measuring a variety's seed weight and adjusting seeding rates accordingly will reduce the risk of reduced plant density leading to a reduced yield potential. If a variety has a larger seed weight, there are fewer seeds in each kilogram of seed. At lower seeding rates there will be less seeds per m<sup>2</sup> and fewer plants will establish. Although varieties have inherently different seed size (Table 16), factors such as nutrition and growing conditions (for example rainfall, heat, frost) will determine the seed weight of a seed source from season to season.

The seed weight, germination percentage of the grain and efficiency of seeding will influence the seeding rate required to establish the target plant density (Table 15). Although 80% can be used as a standard estimate, efficiency of seeding is influenced by factors such as soil moisture, temperature, plant density and sowing depth. If the seed has a lower germination percentage, the calculated seeding rate will increase. To determine the 1000 seed weight, count and weigh

1000 seeds of a graded sample. A germination test can be completed at a seed testing service or an estimate can be determined by counting the number of seeds that germinate after being stored in a dark cupboard on moistened cotton wool for seven days.

**Table 15** The calculated seeding rate (kg/ha) at different target plant densities (plants/m<sup>2</sup>) and seed weights

	Target plant density (plants/m <sup>2</sup> )		
	120	150	200
1000 seed weight (g)	Seeding rate (kg/ha)		
34	52	65	87
36	55	69	92
38	58	73	97
40	61	77	102
42	64	80	107
44	67	84	112
46	70	88	117
Germination (%)	98	98	98
Establishment (%)	80	80	80
Seed rate (kg/ha) =	$\frac{(1000 \text{ seed weight} \times \text{target density})}{(\text{germination} \times \text{establishment} / 100)}$		

Adapted from 'Wheat seed weight – differs between varieties' (<https://agric.wa.gov.au/n/6279>)

### Coleoptile length and seeding depth

The longer the coleoptile length of a variety, the better the chance of establishment if seeding depth increases. The ability to establish wheat crops from seed placed deeper in the soil could be useful in situations where the soil surface is dry but the subsoil is moist. Varieties will have inherently different coleoptile lengths. An index value for coleoptile length (Table 16) replaces reporting of a varieties coleoptile length as short, medium or long.

- Review the coleoptile index to compare varieties and gauge the risk of reduced emergence if the seeding depth is greater than the coleoptile index.
- The majority of current wheat varieties have a coleoptile index of 6-7cm. Sowing the seed into moist soil at 2-4cm is preferred.
- Varieties with longer coleoptile indexes include Cutlass (7.3), Harper (8.1), Magenta (7.5), Scout (7.3) and Yitpi (7.8).

- If dry seeding, increase the seed rate as there is the risk of staggered emergence with a false break.
- The impact of deep sowing on grain yield depends on growing season conditions and whether low crop density can be compensated through increases in other yield components such as tiller number, grains per ear and grain weight.

## **Grain quality: Pre-harvest sprouting and Falling Number Index**

Falling Number Index (FNI) ratings reflect the risk of a variety exhibiting a low falling number at harvest when pre-harvest sprouting occurs (Table 16). Research\* is conducted annually to test newly released varieties against a set of control varieties while controlling for important differences in maturity. A variety with a higher Falling Number Index is of a lower risk of being downgraded due to low falling number than a variety with a lower Falling Number Index. The ratings developed through this research are also validated against other field data and grain dormancy (Germination Index) values.

**The Falling Number Index is designed to inform growers of the relative differences between wheat varieties in their risk of exhibiting a low falling number at harvest. A higher FNI reflects a lower risk of downgrading due to low falling number.**

Pre-harvest sprouting occurs when grain is exposed to rainfall prior to harvest and the grain within the head begins to germinate, a process that is detrimental to the quality of the end-product. The Falling Number test is the standard test for determining pre-harvest sprouting damage in a crop, with a falling number of below 300 indicating grain unsuitable for receipt in most milling grades.

**Wheat varieties differ significantly in the level of pre-harvest sprouting damage that will occur under harvest rainfall.**

The risk of a particular variety showing pre-harvest sprouting damage is complex and controlled by a number of factors such as grain dormancy, the timing and duration of rainfall after maturity and physical attributes of the varieties head and grain. The falling number index aims to encompass these factors that influence falling number at harvest and reflect the relative risk of varieties. While any variety exposed to enough rainfall in the paddock will sprout, choosing

varieties with higher Falling Number Index ratings is another way to limit the risk of downgrading due to falling number.

The pre-harvest sprouting tolerance of Mace has enabled its widespread adoption across WA, even into areas of high PHS risk; this is reflected in its FNI of 5. A variety with a FNI of less than 4 is not advised for sowing into high risk areas (such as the south coast), while the recently released, DS Pascal, has leading pre-harvest sprouting tolerance as reflected in its FNI of 7.

**Pre-harvest sprouting susceptibility is a complex trait that is determined by the interaction of both genetic and environmental factors.**

Grain dormancy has been a key focus of breeders in developing varieties with greater sprouting resistance. Varieties differ in their grain dormancy. For example, a dormant variety will not germinate, even under favourable conditions, until the dormancy wears off (days to months later).

The physical attributes of the head and grain (presence/absence of awns, tightness of glumes etc.) can also reduce pre-harvest sprouting susceptibility by limiting the water uptake of the grain. These traits are particularly evident when comparing the sprouting resistance of varieties with very little grain dormancy that will readily germinate if water is taken up by the grain.

Not only do varieties differ in their dormancy and physical features, but environmental conditions at particular stages of grain filling and maturation can influence dormancy, reduce falling number even in the absence of rainfall, and impact on overall susceptibility to pre-harvest sprouting.

The longer a crop is left in the paddock after reaching maturity, the higher the likelihood of exposure to rainfall and the greater the impact of this rainfall on pre-harvest sprouting of the crop.

**Timely harvesting is crucial in limiting pre-harvest sprouting damage.**

\*: Outcome of the co-investment by DPIRD and GRDC in the Tactical Wheat agronomy project (DAW00249).

**Table 16** Classification and agronomy traits for wheat varieties

Variety	Grade	Black point	Falling number index	Seed weight (mg)	# trials for seed weight	Coleoptile Index (cm)
Arrino	ANW	MS	2	–	–	6.8
Bremer <sup>(b)</sup>	AH	MRMS	5	40	125	6.8
Calingiri	ANW	MS	4	40	125	6.4
Carnamah	APW	MS	2	37	18	7.4
Chief Cl Plus <sup>(b)</sup>	APW	MS	4	45	55	–
Clearfield Stl <sup>(b)</sup>	APW	MRMS	6	36	18	6.8
Corack <sup>(b)</sup>	APW	S	4	42	125	6.8
Cutlass <sup>(b)</sup>	APW	MS	4	35	51	7.3
DS Pascal <sup>(b)</sup>	APW	MS	7	34	8	6
EGA Bonnie Rock	AH	MR	4	36	111	6.6
EGA Eagle Rock <sup>(b)</sup>	AH	MS	6	–	–	–
Emu Rock <sup>(b)</sup>	AH	MSS	2	42	125	6.5
Eradu	APW	SVS	2	–	–	–
Fortune <sup>(b)</sup>	ANW	MS	2	36	111	6.4
Frame <sup>(b)</sup>	APW	MS	5	–	–	7.9
GBA Sapphire <sup>(b)</sup>	AH	MS	5	36	1	7.0
Grenade CL Plus <sup>(b)</sup>	APW	MSS	5	38	125	6.6
Halberd	ASW	MS	5	–	–	–
Harper <sup>(b)</sup>	APW	MRMS	5	35	92	8.1
Hydra <sup>(b)</sup>	APW	MS	3	37	124	6.9
Impress CL Plus <sup>(b)</sup>	APW	S	2	46	118	6.8
Justica CL Plus <sup>(b)</sup>	APW	MSS	5	35	116	6.7
King Rock <sup>(b)</sup>	AH	MRMS	4	37	18	6.3
Kinsei <sup>(b)</sup>	ANW	–	4p	–	–	–
LRPB Arrow <sup>(b)</sup>	APW	MRMS	5	38	51	6.5
LRPB Cobra <sup>(b)</sup>	AH	MSS	2	36	125	6.6
LRPB Havoc <sup>(b)</sup>	AH	MS	3	36	14	–
LRPB Scout <sup>(b)</sup>	APW	S	6	38	125	7.3
LRPB Trojan <sup>(b)</sup>	APW	MS	5	39	98	–
Mace <sup>(b)</sup>	AH	MRMS	5	39	125	6.9
Magenta <sup>(b)</sup>	APW	MSS	3	39	125	7.5
Ninja <sup>(b)</sup>	ANW	MRMS	4	38	48	–
Scepter <sup>(b)</sup>	AH	MS	5	41	51	6.6
Supreme <sup>(b)</sup>	ANW	MSS	4	34	119	5.7
Tungsten <sup>(b)</sup>	AH	MRMS	3p	36	51	6.3
Westonia	APW	MS	2	39	111	7
Wyalkatchem <sup>(b)</sup>	APW	MS	3	40	125	6.4
Yitpi <sup>(b)</sup>	AH	MS	5	38	125	7.8
Zen <sup>(b)</sup>	ANW	MRMS	3	40	122	6.6

Note:

- Coleoptile lengths (cm) are based on predicted mean length of main season sown wheats at 55 NVT during 2007 and 2015. Screening of varieties is undertaken as part of the National Variety Trials project.
- Seed weight (mg)- calculated from the average 1000 grain weight of a variety in 143 NVT between 2012 and 2017.
- Black point causes a darkening at the embryo end of the seed. It is not a disease but a physiological response to certain humid conditions. Black point ratings are provided through the NVT project and based on the research of Dr H Wallwork at the Field Crop Pathology Unit (SARDI).

## Flowering time and maturity of varieties

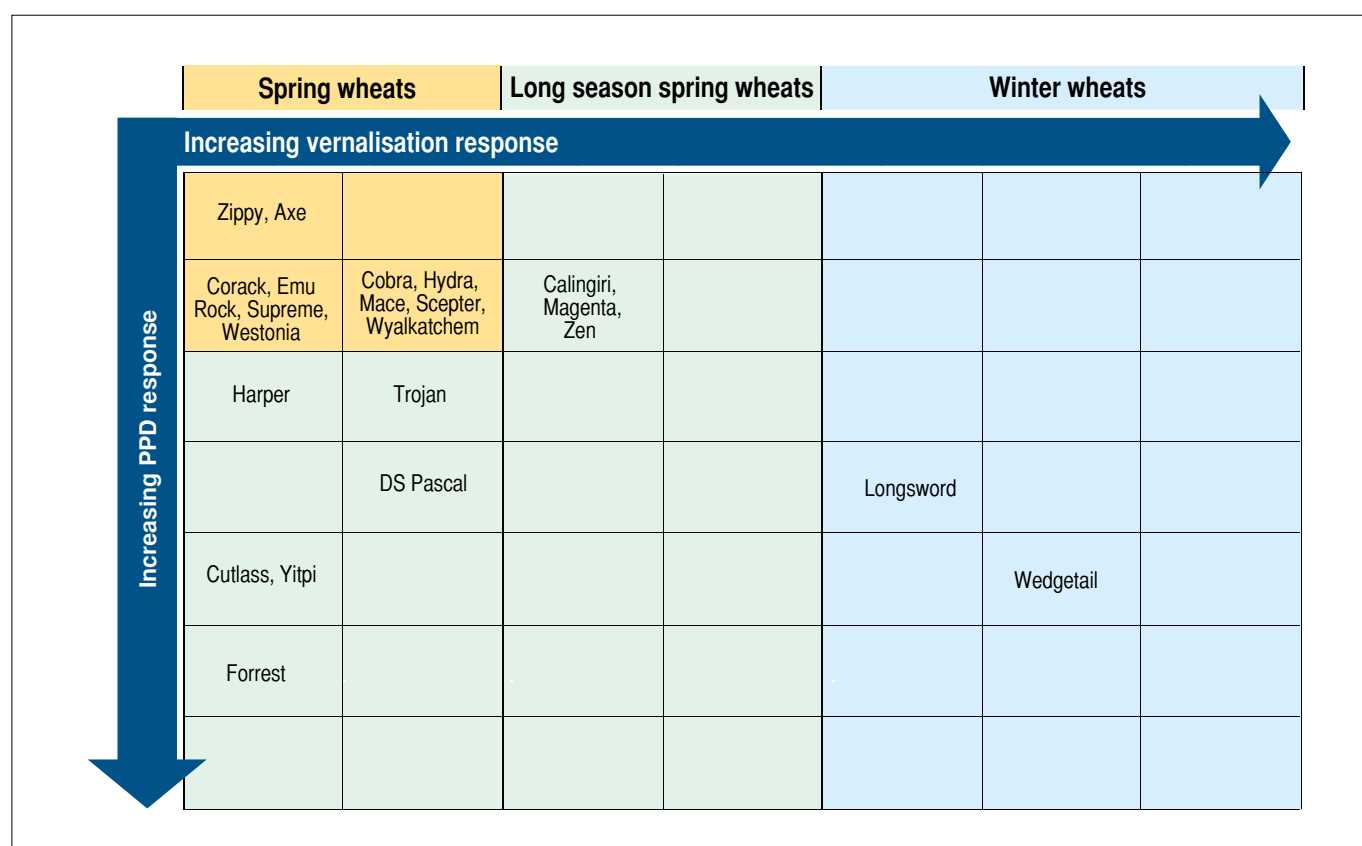
- Varieties are broadly classified into maturity categories of short, short to mid, mid and mid to long in WA based on how long they take to flower.
- There are longer maturing spring wheats and winter wheats but these are not commonly grown in WA.
- The majority of wheat varieties grown in WA have a very low response to vernalisation and photoperiod, hence are suitable for mid-May sowings.
- Varieties with a higher response to vernalisation (Magenta) or photoperiod (Yitpi) can be sown from late April as their maturity is delayed.
- Flowering dates change with sowing date, location and from season to season due to differences in temperatures experienced.

Temperature is the main parameter that controls when a variety will flower in a particular season. As temperatures increase the plant develops more rapidly. The relative maturity of varieties is mainly controlled by particular responses to

vernalisation (cold temperatures), photoperiod (day length) and basic vegetative period (BVP) (accumulated temperature).

Varieties can be grouped according to their response to these parameters which provides information to explain why varieties flower at different times in the year and at different times from season to season. Varieties grouped with a similar vernalisation or photoperiod response in Figure 4 are likely to flower at a similar time.

Mace is classified as short to mid maturity and Tables 17 and 18 show how other varieties compare over selected NVT trial locations and DPIRD's trials in 2017. Scepter is slightly longer in maturity than Mace with the difference varying between 0 to 4 days depending on the location, with the more northern (Mullewa) and southern (Gibson) locations showing the biggest difference. In 2017, Chief CL Plus was on average four days longer than Mace in the NVT trials, compared to no difference in cooler season of 2016. Ninja was similar to Mace in the 2017 NVTs, while Zen was similar to Calingiri. LRBP Havoc was shown to be similar to Mace in 2017.



**Figure 4** Estimated response of some WA wheat varieties to vernalisation and photoperiod (PPD). Note: These categories are estimations, developed to show how varieties may respond to comparison to others given the different temperatures experienced from season to season and with sowing time



Table 18 shows the large spread in the number of days to flowering after Mace that mid-long to mid-winter wheats can provide, particularly when sown in April. With higher vernalisation and/or photoperiod requirement, flowering is delayed; hence the winter wheat EGA Wedgetail can flower between 16-77 days after Mace depending on the location and the sowing time. Varieties which have a higher photoperiod requirement (e.g. Forrest) will take longer to flower relative to Mace in the more southern areas, while varieties with a higher vernalisation response (e.g. EGA Wedgetail) take longer to flower in the northern and southern areas as the cold requirement may not be satisfied. Some varieties can flower earlier

or later depending on when their vernalisation requirements are met during the season (for example, LRPB Trojan and Magenta).

Temperatures will vary with season, causing discrepancies between the data obtained in controlled environment trials (Figure 4) and field data (Table 17 and 18). It is important to consider data from various trials as the genetic control of flowering is complex.

Knowledge of a variety's maturity (determined by the response to vernalisation and photoperiod) is essential in order to match sowing date and variety to ensure grain yields are optimised.

**Table 17** Number of days to flowering after/before Mace on selected NVT trials in 2017

Variety	Maturity	Eradu	Cunderdin	Kojonup	Average
		Sown 20 May	Sown 26 May	Sown 26 May	
Emu Rock <sup>Ⓛ</sup>	Short	-7	-7	-8	-7
Tenfour <sup>Ⓛ</sup>	Short	-2	-3	-8	-4
Corack <sup>Ⓛ</sup>	Short-mid	-2	-3	-1	-2
Devil <sup>Ⓛ</sup>	Short-mid	-3	-2	-2	-2
Hydra <sup>Ⓛ</sup>	Short-mid	1	0	-5	-1
Supreme <sup>Ⓛ</sup>	Short-mid	-1	-1	1	0
LRPB Cobra <sup>Ⓛ</sup>	Short-mid	-1	0	1	0
Cobalt <sup>Ⓛ</sup>	Short-mid	1	0	1	1
LPBR Havoc <sup>Ⓛ</sup>	Short-mid	1	0	0	0
Impress CL Plus <sup>Ⓛ</sup>	Short-mid	1	-1	2	1
Grenade CL Plus <sup>Ⓛ</sup>	Short-mid	3	0	2	2
Scepter <sup>Ⓛ</sup>	Short-mid	4	0	2	2
Wyalkatchem <sup>Ⓛ</sup>	Short-mid	2	0	3	2
Ninja <sup>Ⓛ</sup>	Mid	1	0	2	1
LRPB Arrow <sup>Ⓛ</sup>	Mid	2	0	3	2
LRPB Scout <sup>Ⓛ</sup>	Mid	7	2	1	3
Chief CL Plus <sup>Ⓛ</sup>	Mid	5	4	3	4
Bremer <sup>Ⓛ</sup>	Mid	7	6	3	5
LRPB Trojan <sup>Ⓛ</sup>	Mid-long	6	6	3	5
Magenta <sup>Ⓛ</sup>	Mid-long	3	7	4	5
Zen <sup>Ⓛ</sup>	Mid-long	4	8	3	5
Kinsei <sup>Ⓛ</sup>	Mid-long	2	8	4	5
Harper <sup>Ⓛ</sup>	Mid-long	–	7	4	6
Calingiri	Mid-long	7	7	4	6
Yitpi <sup>Ⓛ</sup>	Mid-long	5	9	6	7
Tungsten <sup>Ⓛ</sup>	Mid-long	7	9	5	7
DS Pascal <sup>Ⓛ</sup>	Mid-long	–	–	8	8
Cutlass <sup>Ⓛ</sup>	Mid-long	12	9	6	9
Mace's date of flowering in 2017		24-Aug	11-Sep	26-Sep	
Mace's date of flowering predicted by Flower Power.		17-Aug	9-Sep	28-Sep	

**Table 18** Number of days to flowering (50%) before/after Mace for selected varieties at DPIRD's Capturing the best sowing opportunities for wheat trials sown at four locations from mid-April to late May in 2017

Variety	Maturity	Mullewa				Merredin		
		13-Apr	26-April	10-May	25-May	13-Apr	26-April	25-May
Emu Rock <sup>(b)</sup>	Short	–	–	-9	-11	–	–	-1
Hydra <sup>(b)</sup>	Short-mid	–	-3	0	-1	–	-3	0
LPBR Havoc <sup>(b)</sup>	Short-mid	–	1	1	1	–	0	-1
Scepter <sup>(b)</sup>	Short-mid	–	3	3	2	–	1	2
Chief CL Plus <sup>(b)</sup>	Mid	–	7	8	4	–	3	2
LRPB Trojan <sup>(b)</sup>	Mid-long	14	11	12	6	9	4	3
Magenta <sup>(b)</sup>	Mid-long	14	11	10	8	16	7	9
Kinsei <sup>(b)</sup>	Mid-long	13	11	12	6	20	8	5
Yitpi <sup>(b)</sup>	Mid-long	15	12	13	10	12	7	6
Cutlass <sup>(b)</sup>	Mid-long	16	11	15	10	13	9	10
DS Pascal <sup>(b)</sup>	Mid-long	21	13	15	11	19	9	6
Forrest <sup>(b)</sup>	Very Long	49	34	32	23	36	22	16
Longsword <sup>(b)</sup>	Fast winter	68	53	45	30	40	23	10
EGA Wedgetail <sup>(b)</sup>	Mid winter	77	61	53	39	43	26	16
Mace's date of flowering in 2017	Short-mid	29-Jun	20-Jul	4-Aug	26-Aug	1-Aug	19-Aug	13-Sep
Mace's date of flowering predicted by Flower Power			16-Jul	7-Aug	21-Aug		5-Aug	8-Sep

Variety	Maturity	Katanning				Esperance			
		13-April	27-April	11-May	29-May	13-April	27-April	10-May	25-May
Emu Rock <sup>(b)</sup>	Short	–		-4	-3	–		-5	-6
Hydra <sup>(b)</sup>	Short-mid	–	-6	-1	-2	–	-4	-1	0
LPBR Havoc <sup>(b)</sup>	Short-mid	–	3	-1	0	–	0	-1	-2
Scepter <sup>(b)</sup>	Short-mid	–	2	2	1	–	3	3	4
Chief CL Plus <sup>(b)</sup>	Mid	–	3	4	2	–	7	8	3
LRPB Trojan <sup>(b)</sup>	Mid-long	17	9	5	6	14	12	11	6
Magenta <sup>(b)</sup>	Mid-long	10	10	5	8	13	12	11	8
Kinsei <sup>(b)</sup>	Mid-long	7	6	5	9	5	11	10	8
Yitpi <sup>(b)</sup>	Mid-long	15	8	6	7	24	18	16	10
Cutlass <sup>(b)</sup>	Mid-long	17	12	5	8	27	18	14	11
DS Pascal <sup>(b)</sup>	Mid-long	17	12	7	9	20	18	15	11
Forrest <sup>(b)</sup>	Very Long	48	29	20	22	64	37	32	25
Longsword <sup>(b)</sup>	Fast winter	48	24	15	12	58	29	25	16
EGA Wedgetail <sup>(b)</sup>	Mid winter	55	30	19	19	66	37	29	24
Mace's date of flowering in 2017	Short-mid	31-Jul	28-Aug	11-Sep	23-Sep	18-Jul	23-Aug	1-Sep	15-Sep
Mace's date of flowering predicted by Flower Power			29-Aug	14-Sep	26-Sep		19-Aug	2-Sep	13-Sep

## Wheat for early sowing

### Key messages

- Selected winter wheats were competitive with Cutlass (mid-long maturing spring wheat) when sown in mid-April.
- Winter wheats are often known as “dual purpose” because of their suitability for grazing and recover grain at harvest.
- The fast winter wheat Longsword was released in 2017 (deliverable as Feed). Illabo released in 2018 will be a feed wheat until its quality has been classified for WA.

In 2017, NVT conducted a series of ‘early season’ wheat trials in Western Australia. This series along with the DPIRD time of sowing trial series ‘Capturing the best sowing opportunities for wheat in WA’, aims to evaluate the performance of longer maturing varieties in Western Australia.

### Early season NVT

In 2017 the ‘early season’ NVT series was generally sown in late April. At these sowing dates, the mid-long spring types such as Cutlass and Kinsei were generally higher yielding than the winter wheats such as Longsword and EGA Wedgetail (Table 19). Except for Longsword at Ogilvie and York, the winter wheats yielded significantly lower than Cutlass.

### DPIRD tactical wheat agronomy trials

DPIRD’s research in 2017 involved a series of time of sowing trials at four locations in Western Australia, with sowing dates from mid-April to mid June. At the mid-April sowing time, the winter wheats EGA Wedgetail and LRPB Kittyhawk were yield competitive with Cutlass on the heavier soil type at Mullewa and where frost was an issue at Katanning (Table 18). It is likely that crown rot reduced the yield of the longer maturing varieties on the heavier soil type at Merredin. Forrest and Longsword were competitive with Cutlass sown mid-April at Mullewa and Gibson. However, EGA Wedgetail and LRPB Kittyhawk were not competitive with Cutlass at Gibson. Despite the opportunity afforded with longer maturing wheats, in many cases they did not outyield short-mid to mid-long maturing varieties sown at late April or in May.

Winter wheats are also known as ‘dual purpose’, as they remain in a vegetative stage for a longer period of time, allowing the opportunity to graze the crop and recover grain at harvest. All wheat varieties have the potential to be grazed, however, winter wheats have a longer window of opportunity (as shown in Figure 5) and the time when the plant changes from vegetative growth is more predictable than the spring types.

**Table 19** Performance of longer maturing varieties expressed as percentage of Cutlass, sown in late April at three NVT sites in WA during 2017

\*: Irrigated on the 23rd April to establish

Variety	Site and sowing date		
(order of maturity)	Ogilvie	Eneabba	York
	20-April*	20-April	24-April
LRPB Trojan <sup>(b)</sup>	97	85	110
Magenta <sup>(b)</sup>	91	85	106
Kinsei <sup>(b)</sup>	101	102	105
Yitpi <sup>(b)</sup>	85	84	101
DS Pascal <sup>(b)</sup>	97	91	88
Longsword <sup>(b)</sup>	111	86	91
LRPB Kittyhawk <sup>(b)</sup>	90	58	68
EGA Wedgetail <sup>(b)</sup>	76	58	71
Cutlass <sup>(b)</sup> (t/ha)	3.83	3.34	4.23
Isd (%)	7	10	9
CV (%)	4.1	5.8	5.4

**Table 20** Performance of varieties expressed as a percentage of Cutlass, sown mid-April to early May at four DPIRD sites in WA during 2017

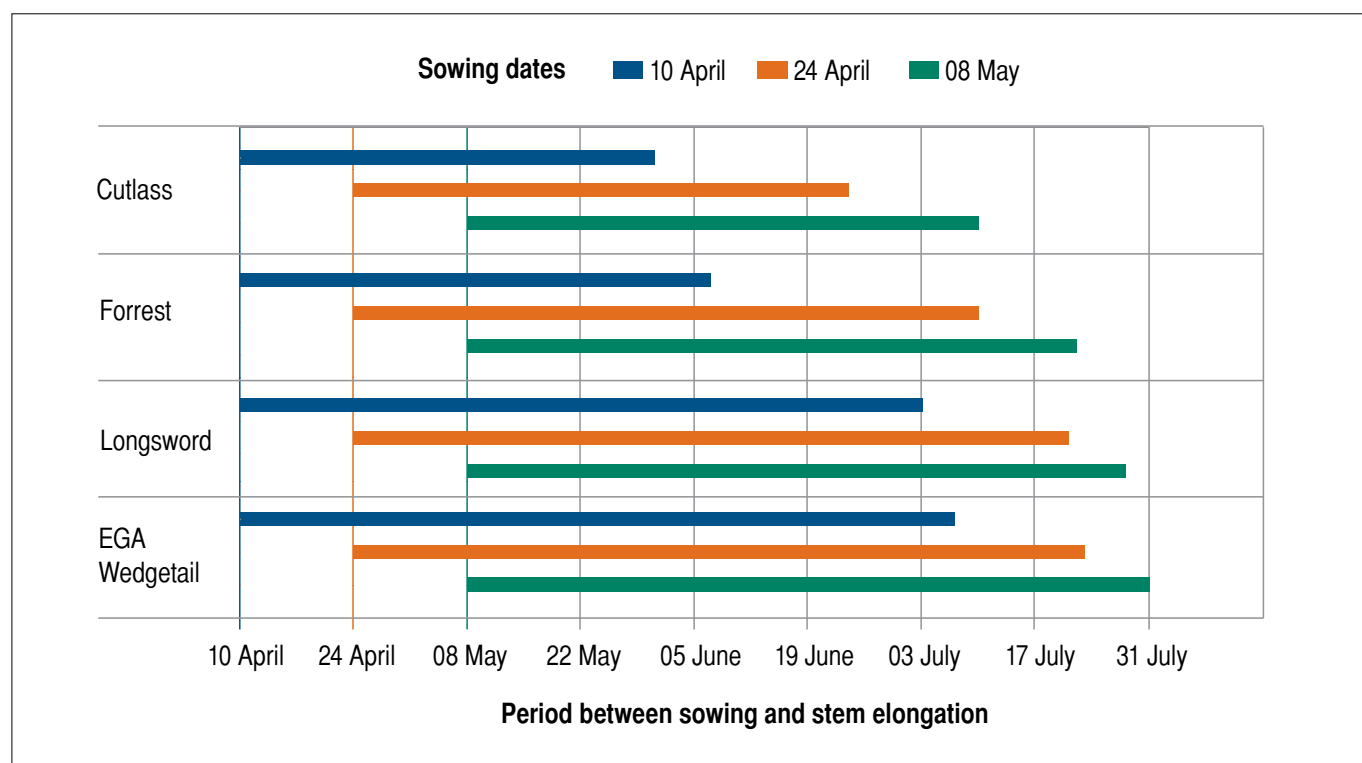
Variety (order of maturity)	Mullewa <sup>1</sup>			Merredin <sup>2</sup>			Katanning <sup>3</sup>			Gibson <sup>4</sup>		
	13-Apr	26-Apr	10-May	13-Apr	26-Apr	10-May	13-Apr	27-Apr	11-May	13-Apr	27-Apr	10-May
Scepter <sup>(b)</sup>	78	90	88	79	87	94	91	87	94	100	104	97
LRPB Trojan <sup>(b)</sup>	76	89	94	105	99	96	73	87	78	95	103	98
Magenta <sup>(b)</sup>	91	103	102	97	103	94	72	92	95	101	99	95
Kinsei <sup>(b)</sup>	94	106	100	95	103	108	81	91	101	105	107	102
Yitpi <sup>(b)</sup>	92	94	90	96	93	92	92	90	93	92	99	91
DS Pascal <sup>(b)</sup>	94	99	97	91	96	83	55	82	78	100	93	93
Forrest <sup>(b)</sup>	107	113	104	84	81	72	165	83	63	95	91	80
Longsword <sup>(b)</sup>	114	119	104	77	81	84	118	94	80	96	87	89
LRPB Kittyhawk <sup>(b)</sup>	100	99	100	82	77	80	111	67	46	80	76	76
EGA Wedgetail <sup>(b)</sup>	104	101	87	80	73	78	125	84	70	86	80	77
<b>Cutlass<sup>(b)</sup> (t/ha)</b>	<b>2.73</b>	<b>2.86</b>	<b>3.46</b>	<b>4.13</b>	<b>4.32</b>	<b>4.27</b>	<b>1.46</b>	<b>3.19</b>	<b>3.48</b>	<b>5.47</b>	<b>5.58</b>	<b>5.82</b>
Isd (%) within TOS	7	7	6	15	10	13	25	20	13	10	9	7

1: To ensure germination 21mm of irrigation was applied. Early moisture stress was experienced but adequate rain and cool conditions in spring was beneficial for the later sowings.

2: A total of 70mm was applied to the trial in 10mm allotments across the sowing period. Crown rot was detected in the trial even after fallow.

3: A total of 16.5mm of water was applied before/after the mid-April sowing, while only 9mm was applied to the late April sowing. Site experienced high levels of frost damage.

4: 12.5mm was applied after sowing for the mid-April sowing only.



**Figure 5** Length of vegetation stage (sowing to start of stem elongation or Z30) in response to sowing time for Cutlass, Forrest, Longsword and EGA Wedgetail at Katanning in 2018



## Variety descriptions of selected longer maturing white wheat varieties

Recently, there have been a number of winter wheats released for Australian conditions.

**EGA Wedgetail** is APW quality. A mid-winter wheat, developed for early sowing and suitable for early winter grazing. Release in 2002 by NSW Agriculture. EPR (ex GST) is \$1.45 per tonne.

**Forrest** is ASW quality. This variety is a long season spring type wheat, suitable for early sowing. Released in 2011 by Advantage Wheats. EPR (ex GST) is \$3.50 per tonne.

**Longsword** is a fast winter wheat of Feed quality with Mace as a parent, approximately 3-9 days earlier maturity than EGA Wedgetail (Table 20). Released in 2017 by AGT. EPR (ex GST) is \$2.75 per tonne.

**Kittyhawk** is Feed quality by default in WA. A mid winter wheat with similar maturity to EGA Wedgetail. Developed for early sowing and suitable for early winter grazing. Release in 2016 by LongReach. EPR (ex GST) is \$4.25 per tonne.

**Illabo** was released in 2018 – refer to page 4 and table 16 for details.

The description below in Table 21 provides further details on the longer maturing varieties tested in DPIRD ‘Capturing the best sowing opportunities for wheat’ trials.

**Table 21** Blackpoint and disease summary of selected winter and long spring white wheats

Variety	Blackpoint	Stem Rust	Stripe rust	Leaf rust (old Lr76 pathotype)	Leaf rust (new Lr104 pathotype)	Noderum blotch	Septoria tritici blotch	Yellow leaf spot	CCN	Crown rot
EGA Wedgetail <sup>Ⓛ</sup>	MS	MRMS	MS	MS	MSS	MRMS	MSS	MSS	S	S
Forrest <sup>Ⓛ</sup>	MRMS	RMR	RMR	MR	S	MR	–	MRMS	S	SVS
Longsword <sup>Ⓛ</sup>	MS	MR	RMR	MR	MSS	MRMS <sub>p</sub>	MRMS <sub>p</sub>	MRMS	–	Sp
Kittyhawk <sup>Ⓛ</sup>	MRMS	MRMS	RMR	MR	MS	MR	MR	MRMS	S	SVS



# Herbicide tolerance

Dr Harmohinder Dhammu

Varieties differ in their tolerance to herbicides because of differences in any combination of morphological and physiological characters and/or internal ear development stages. The level of tolerance amongst varieties varies with the rate of herbicide, the environmental conditions when the herbicide is applied and the stage of the crop growth. The risk of crop damage from a herbicide should be balanced against the potential yield loss from both the weed competition and the number of weed seeds returning to the soil seed bank.

## Safe use of herbicides

### Gallery® 750 Dry Flowable (isoxaben)

Gallery® 750 (Group O) at 70-140 g/ha is registered on wheat, barley and triticale as a pre-emergent to early post-emergent (up to first node stage) herbicide for control of wild radish. It has a very limited post-emergent activity on only very small weeds. A trial conducted at Mullewa on a red loam/ sandy loam soil (pH CaCl<sub>2</sub> 5.8 and OC 0.75%) during 2014 indicates that Gallery® at the label rate applied at the 3-4 leaf stage of wheat was tolerated well by Bonnie Rock, Calingiri, Cobra, Corack, Mace and Wyalkatchem with good crop safety margin. Isoxaben is also one of the components in X-Pand® herbicide (100g a.i./ha) that is registered as an early post-emergent on wheat, barley and triticale. Gallery is a soil active herbicide and has long residual activity in soils. Careful attention should be paid to replanting intervals for broadleaf crops grown after wheat on which Gallery® is applied. According to the Gallery® label, if you use it at 70-140 g/ha as pre or post-emergent in cereals, then the plant back period for lupins is nine months and for canola is 22 months along with more than 300mm rainfall in total. For more details, please see the Gallery® label. (APVMA approval number: 47333/106011).

### Sakura® 850 WG (pyroxasulfone)

Sakura® 850 WG (Group K) at 118g/ha is registered as a pre-emergent herbicide on bread wheat (not durum wheat) for the control of annual ryegrass, barley grass, silver grass, toad rush and annual phalaris. Crop damage can occur if Sakura® becomes concentrated in the planting row, or if the herbicide moves to the depth of the crop seed. This response is similar to other soil active residual pre-emergent herbicides and can occur if the herbicide moves in to the furrow following heavy rainfall soon after sowing. For detail please see the Sakura® label.

### Trifluralin, trifluralin + oryzalin, pendimethalin and tri-allate

Ensure sown seed is placed below the herbicide treated soil band when using trifluralin, trifluralin + oryzalin (for example, Yield®) pendimethalin (for example, Stomp®) and tri-allate (for example, Avadex®) otherwise severe root retardation may result. Surface crusting may exacerbate emergence problems. Old seed with reduced vigour, varieties with short coleoptiles, and seed dressings that reduce coleoptile length should be avoided. If sowing with knife points, and using higher label rates, ensure that treated soil does not get thrown, blown or washed into the furrows.

### Diuron and metolachlor

There are reports that Diuron at 1.0L + Dual® (metolachlor 720g/L) at 0.5L/ha cause more crop damage on lighter than heavier soil types. If using knife point and press wheels to sow the crop, apply this mixture pre plant only (0-7 days before sowing) as knife points can leave the furrows/ slots open. Crop damage can result if herbicide is washed into the furrows. If using a 'full cut' seeding system, that leaves a relatively smooth surface, this mixture can be applied post plant pre-emergent within 3-4 days of planting.

## Metribuzin

Metribuzin (Group C) at 75g a.i./ha as an early post-emergent is registered on all wheat varieties for control of toad rush (*Juncus bufonius*). However, metribuzin at 150g a.i./ha as a pre-emergent herbicide is registered only on metribuzin tolerant wheat varieties Blade and EGA Eagle Rock for suppression/control of annual ryegrass, barley grass, brome grass, wild radish, capeweed, doublegee, etcetera. To achieve good control of annual ryegrass and barley grass, trifluralin 480g a.i./ha can also be mixed with the recommended rate of metribuzin. A two way mix of metribuzin 150g a.i./ha (for example, Lexone® 200g/ha) with Diuron® 1.0L or Stomp® 330E (pendimethalin) 1.0L or three way mix with Diuron 1.0L and Dual Gold® (s-metolachlor) 250mL/ha was safe on EGA Eagle Rock and Blade. Any weeds that escape, especially brome grass after pre-emergent metribuzin application could possibly be controlled or suppressed, by the application of Monza® (sulfosulfuron) at 25g/ha at 2–3 leaf or Atlantis® (mesosulfuron) at 330mL/ha at 3–4 leaf stage of the crop.

## Talinor® (bicyclopyrone + bromoxynil)

Talinor®, a contact herbicide (Group H and C) for post-emergent control of a range of broadleaf weeds like Wild Radish, Capeweed, Doublegee, Fumitory, Bifora, volunteer canola and legumes, is recently registered on wheat (not durum wheat) and barley. Talinor® at higher label rates could cause transient leaf bleaching or interveinal yellowing and Mace appears to show more intense symptoms than other wheat varieties. To minimise the risk of these symptoms and possible yield loss, apply this herbicide between mid-morning and mid-afternoon to a healthy and actively growing crop. Stress, from high temperatures, drought or frost will reduce the crops' ability to effectively metabolise the herbicide. Barley shows much greater tolerance than wheat. Please read Talinor® label for more details.

## Chlorsulfuron and triasulfuron

Where marginal zinc and copper deficiency conditions exist, chlorsulfuron (for example, Glean®) and triasulfuron (for example, Logran®) may aggravate such deficiencies.

## Safe timing for phenoxy application

Wheat varieties are sensitive to phenoxy herbicides during ear development and between flag leaf emergence and soft dough. MCPA, 2,4-D and dicamba are the main phenoxy herbicides used in wheat. The timing of their application is much more critical than for other herbicides because they often produce morphological abnormalities in both the vegetative parts and ears of wheat plants and could result in grain yield loss.

Wheat tolerance to these herbicides depends on the stage of ear development. Wheat is most sensitive to phenoxy herbicides at the double ridge/floral initiation stage of ear development. At this stage, cells change from producing leaves and begin to form the ear. The embryonic ear continues to form until the 'terminal spikelet' stage is reached.

It is safe to apply phenoxy herbicides after terminal spikelet stage (for example, once floral initiation is complete and nodes are detected) and before flag leaf emergence.

Spraying advice is based on leaf and tiller development. Different varieties become safe to phenoxy spray at slightly different growth stages. Long season varieties take longer to reach the safe stage.

To use higher rates of MCPA amine (2.0L/ha) and 2,4-D amine 625 (1.3L/ha) in Bonnie Rock, Cobra, Corack, Emu Rock, King Rock, Mace, Westonia, Wyalkatchem, and Zippy apply these herbicides at Z15–Z16 (5–6 leaves on the main stem); in Carnamah, EGA Eagle Rock, Magenta, Scout, Stiletto, and Yitpi at Z16–Z17, and in Endure, Calingiri and Spear at Z17–Z18. At these stages floral initiation will be completed in the above varieties.

Do not apply these phenoxy herbicides between flag leaf emergence and the soft dough stage on any variety.



A rough rule of thumb, if you can feel three nodes in the stem then the next leaf is the flag. Application of 2,4-D formulations between flag leaf emergence and soft dough stage cause significant yield reductions through damage to pollen production.

Generally MCPA amine is safer than 2,4-D amine especially on later developing varieties.

Dicamba (and mixtures with 2,4-D or MCPA) should not be applied after Zadoks 30 (pseudo-stem elongation, that is, first node not yet above soil surface).

Research indicates that caution should be used if applying phenoxy herbicides in dry seasons when there is moisture stress. Calingiri wheat was found to be more sensitive to phenoxy herbicides than the other varieties under moisture stress conditions.

There are wild radish populations with confirmed resistance to phenoxy herbicides so it is important to

- rotate the phenoxies with other herbicides or
- apply as a mix with other herbicides at full rates to keep these herbicides working.

## Waterlogging and crop safety

A number of products, including Group A and B herbicides are tolerated by wheat because they are metabolised within the seedling. If a seedling's growth is retarded by waterlogging, cold or any other factor, its metabolism is reduced, and toxic levels of herbicide can accumulate within the plant. There were also many examples of trifluralin reducing emergence when the paddocks were waterlogged. It is suspected that this was due to increased uptake by the coleoptile from the wet soil. If there is any chance of extreme waterlogging just after seeding, crop damage is more likely and growers should consider using safer products, or spraying post-emergence.

For more information on the herbicide tolerance of wheat varieties, including a comprehensive list of varieties and herbicides, visit the DPIRD webpage [agric.wa.gov.au/wheat/wheat-herbicide-tolerance-information](http://agric.wa.gov.au/wheat/wheat-herbicide-tolerance-information).



## Factsheets

Bremer <sup>Ⓛ</sup>						
AH						
Comments						
A mid maturing AH variety which was released in 2015. The strength of this variety is that it is moderately resistant to leaf (both strains), stem and stripe rust however it's susceptible to very susceptible to powdery mildew. Bremer has useful blackpoint rating. It maintains falling number after pre-harvest rain similar to Yitpi and Mace. Yields in each agzone have not consistently exceeded Mace.						
Yield (% of Mace)	2013	2014	2015	2016	2017	
Agzone 1	99	92	107	98	104	
Agzone 2	97	93	100	93	94	
Agzone 3	98	99	95	96	97	
Agzone 4	99	79	100	93	92	
Agzone 5	92	92	91	92	89	
Agzone 6	102	98	99	96	93	
Disease Resistance			Adult rating			
Nodorum blotch			MS			
S. tritici blotch			S			
Yellow spot			MSS			
Stem rust			MR			
Stripe rust			MR*			
Leaf rust (new Lr104 pathotype)			MR*			
Leaf rust (old Lr76 pathotype)			MR			
Powdery mildew			SVS			
Flag smut			MSS			
Common bunt			RMR			
RLN ( <i>P. quasitereoides</i> )			–			
RLN ( <i>P. neglectus</i> )			SVS			
CCN			MRMS			
Crown rot			S			
Agronomic traits						
Coleoptile length (cm)			6.8			
Crown rot yield loss			–			
Black point			MRMS			
Falling number index			5			
Maturity			Mid			
Herbicide tolerance information						
Has shown no sensitivity to a range of pre and post-emergent herbicides / herbicide mixtures at higher than label rates applied at label recommended timings, in small plot screening herbicide tolerance trials conducted at Katanning during 2014 and 2015. Do not apply phenoxy herbicides like MCPA and 2,4-D between flag leaf emergence and the soft dough stage.						
Variety information						
Pedigree		DM02-25-SB02-167/Correll// Mace				
Breeder/Seed licensee		AGT				
Access to seed		AGT Affiliates, retailers, or Seed Sharing				
EPR (\$/t, excl GST)		\$3.25				

Emu Rock <sup>Ⓛ</sup>					
AH					
Comments					
Short maturing AH wheat best suited mid to late sowings in low rainfall environments. Useful tolerance to crown rot. Large grain size. Amongst most susceptible varieties to nodorum blotch. Susceptible to low falling numbers after pre harvest rain, hence not suited to areas that experience pre-harvest rainfall. Consistently lower yielding than Mace and many other varieties with similar characteristics.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	88	96	89	97	90
Agzone 2	92	96	92	98	93
Agzone 3	93	92	96	98	90
Agzone 4	96	108	96	97	93
Agzone 5	94	96	95	98	94
Agzone 6	88	87	92	100	95
Disease Resistance			Adult rating		
Nodorum blotch			SVS		
S. tritici blotch			S		
Yellow spot			MRMS		
Stem rust			MS		
Stripe rust			MRMS		
Leaf rust (new Lr104 pathotype)			SVS		
Leaf rust (old Lr76 pathotype)			S		
Powdery mildew			S		
Flag smut			R		
Common bunt			S		
RLN ( <i>P. quasitereoides</i> )			MRMS		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			S		
Crown rot			MSS		
Agronomic traits					
Coleoptile length (cm)			6.5		
Crown rot yield loss			Low (<10%)		
Black point			MSS		
Falling number index			2		
Maturity			Short		
Herbicide tolerance information					
Low crop safety margin for diuron + MCPA amine at label rate applied at the 3 to 4 leaf stage.					
Variety information					
Pedigree		96W657-37/Kukri			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$3.50			

LRPB Cobra <sup>Ⓛ</sup>					
AH					
Comments					
LRPB Cobra is an AH variety with a Westonia background which has yielded well in most NVT grown on acid soils. Performs well in high yielding environments. Cobra is susceptible to low falling number after pre-harvest rain. This variety is moderately resistant to both strains for leaf rust.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	97	95	103	99	102
Agzone 2	100	100	99	102	94
Agzone 3	103	99	94	103	100
Agzone 4	101	97	105	96	93
Agzone 5	98	98	94	104	98
Agzone 6	102	92	101	105	100
Disease Resistance			Adult rating		
Nodorum blotch			MRMS		
S. tritici blotch			MSS		
Yellow spot			MRMS		
Stem rust			RMR		
Stripe rust			MSS		
Leaf rust (new Lr104 pathotype)			MR		
Leaf rust (old Lr76 pathotype)			MR		
Powdery mildew			MSS		
Flag smut			MS		
Common bunt			SVS		
RLN ( <i>P. quasitereoides</i> )			MSp		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			MS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.6		
Crown rot yield loss			Moderate (10-20%)		
Black point			MSS		
Falling number index			2		
Maturity			Short-Mid		
Herbicide tolerance information					
Low crop safety margin for diuron + MCPA amine and Aptitude <sup>®</sup> (carfentrazone + metribuzin) + MCPA amine at label rates applied at the 3 to 4 leaf stage. May have low crop safety margin for Talinor <sup>®</sup> (cyclopyrone + bromoxynil) at label rates and timings.					
Variety information					
Pedigree		Westonia/W29			
Breeder/Seed licensee		LongReach Plant Breeders			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$3.50			

LRPB Havoc <sup>Ⓓ</sup>					
AH					
Comments					
LRPB Havoc is the latest Australian Hard variety to be released by LongReach. In 2016 and 2017 NVT the variety yielded well in comparison to Mace. This variety is suitable in situations where an earlier maturing variety is needed. Havoc has a low falling number index rating. It's important for growers of Havoc to take note of this varieties' leaf rust ratings, it is susceptible to the latest strain of leaf rust but resistant to moderately resistant to the older strain of leaf rust.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	—	—	—	105	102
Agzone 2	—	—	—	101	104
Agzone 3	—	—	—	100	103
Agzone 4	—	—	—	107	98
Agzone 5	—	—	—	96	102
Agzone 6	—	—	—	98	100
Disease Resistance			Adult rating		
Nodorum blotch			MRMS <sub>p</sub>		
S. tritici blotch			MRMS <sub>p</sub>		
Yellow spot			MRMS <sub>p</sub>		
Stem rust			S		
Stripe rust			MR		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			RMR		
Powdery mildew			MS <sub>p</sub>		
Flag smut			MS		
Common bunt			RMR <sub>p</sub>		
RLN ( <i>P. quasitereoides</i> )			—		
RLN ( <i>P. neglectus</i> )			S		
CCN			—		
Crown rot			Sp		
Agronomic traits					
Coleoptile length (cm)			—		
Crown rot yield loss			—		
Black point			MS		
Falling number index			3		
Maturity			Short-Mid		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		Mace/LPB07-0980			
Breeder/Seed licensee		LongReach Plant Breeders			
Access to seed		Seed associate and farmer to farmer			
EPR (\$/t, excl GST)		\$4.00			

Mace <sup>Ⓛ</sup>					
AH					
Comments					
Mace is a high yielding AH variety with a Wyalkatchem background. Previously the benchmark variety for yield in WA, it has been very popular and is widely planted. In the coming years, the area sown to Mace will superseded by Scepter due to its superior yield potential. Mace has been popular due to its ability to adapt to a range of regional conditions and soil types. Mace has performed well in pre-harvest rainfall conditons due to it's falling number index of 5.					
Yield (t/ha of Mace)	2013	2014	2015	2016	2017
Agzone 1	2.11	2.04	2.32	4.18	2.79
Agzone 2	3.32	2.68	2.45	3.68	3.68
Agzone 3	5.32	4.71	3.93	3.12	4.38
Agzone 4	2.20	1.52	2.07	3.17	2.30
Agzone 5	3.38	2.71	3.37	2.97	3.36
Agzone 6	3.83	2.94	4.33	3.95	4.24
Disease Resistance			Adult rating		
Nodorum blotch			MS		
S. tritici blotch			S		
Yellow spot			MRMS		
Stem rust			MRMS		
Stripe rust			RMR*		
Leaf rust (new Lr104 pathotype)			MSS		
Leaf rust (old Lr76 pathotype)			MS#		
Powdery mildew			MSS		
Flag smut			S		
Common bunt			MR		
RLN ( <i>P. quasitereoides</i> )			MRMS		
RLN ( <i>P. neglectus</i> )			MS		
CCN			MRMS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.9		
Crown rot yield loss			High (>20%)		
Black point			MRMS		
Falling number index			5		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive to pre-emergent Boxer Gold <sup>®</sup> (s-metolachlor + prosulfocarb) <sup>®</sup> , Sakura <sup>®</sup> (pyroxasulfone), trifluralin, and post-emergent Achieve <sup>®</sup> (tralkoxydim), Ally <sup>®</sup> (metsulfuron) and Jaguar <sup>®</sup> (bromoxynil + diflufenican) at label rates and timing of application. May also have low crop safety margin for Terbyne <sup>®</sup> Xtreme <sup>®</sup> (terbuthylazine), Aptitude <sup>®</sup> (carfentrazone + metribuzin) + MCPA, diuron + MCPA, Flight <sup>®</sup> EC (picolinafen + bromoxynil + MCPA), Talinor <sup>®</sup> (cyclopyrone + bromoxynil) and 2,4-D amine at label rates and timings.					
Variety information					
Pedigree		Wyalkatchem/Stylet// Wyalkatchem			
Breeder/Seed licensee		AGT			
Access to seed		AGT Affiliates, retailers, or Seed Sharing			
EPR (\$/t, excl GST)		\$3.00			

Scepter <sup>b</sup>					
AH					
Comments					
Scepter, an AH variety released in 2015, was the highest yielding variety in the NVT over the past three years. This variety is moderately resistant to the old strain of leaf rust but moderately susceptible to the latest strain. Due to the expected increase in the area sown to this variety, it is important that growers of Scepter keep an eye out for leaf rust and apply appropriate control measures where possible. Scepter appears to have a similar pre-harvest sprouting tolerance to Mace, but its powdery mildew and black point ratings are poorer than Mace (which is one of its parents). Due to a consistent increase in yield, grain protein is on average lower for this variety, additional nitrogen will benefit the yield and protein performance of this variety.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	–	–	110	107	108
Agzone 2	–	–	109	111	106
Agzone 3	–	–	103	112	113
Agzone 4	–	–	110	108	107
Agzone 5	–	–	106	114	112
Agzone 6	–	–	112	110	111
Disease Resistance			Adult rating		
Nodorum blotch			MRMS		
S. tritici blotch			Sp		
Yellow spot			MRMS		
Stem rust			MRMS		
Stripe rust			MR*		
Leaf rust (new Lr104 pathotype)			MSS		
Leaf rust (old Lr76 pathotype)			MR#		
Powdery mildew			S		
Flag smut			MSS		
Common bunt			MS		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			S		
CCN			MRMS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.6		
Crown rot yield loss			Moderate (10-20%)		
Black point			MS		
Falling number index			5		
Maturity			Short-Mid		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		RAC1480/2*Mace			
Breeder/Seed licensee		AGT			
Access to seed		AGT Affiliates, retailers, or Seed Sharing			
EPR (\$/t, excl GST)		\$3.25			

Yitpi <sup>Ⓛ</sup>					
AH					
Comments					
Yitpi has been the Western Australian industry standard for early sowing because of its longer maturity and maintenance of falling number after pre-harvest rain. Yitpi has a long coleoptile but is very susceptible to yellow spot. This variety has been lower yielding than Mace in the NVT across the last five years.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	90	85	98	94	103
Agzone 2	88	93	91	102	89
Agzone 3	97	94	81	105	93
Agzone 4	96	88	98	91	92
Agzone 5	92	95	82	106	91
Agzone 6	90	85	89	107	98
Disease Resistance			Adult rating		
Nodorum blotch			MS		
S. tritici blotch			MRMS		
Yellow spot			SVS		
Stem rust			S		
Stripe rust			MRMS		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MSS		
Powdery mildew			MRMS		
Flag smut			MR		
Common bunt			S		
RLN ( <i>P. quasitereoides</i> )			MS		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			MR		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			7.8		
Crown rot yield loss			Moderate (10-20%)		
Black point			MS		
Falling number index			5		
Maturity			Mid-Long		
Herbicide tolerance information					
May be sensitive to Flight <sup>®</sup> EC (picolinafen + bromoxynil + MCPA) and Talinor <sup>®</sup> (cyclopyrone + bromoxynil) at label rates applied at the 3 to 4 and 6 to 7 leaf stages, respectively. May also have low crop safety margin for pre-emergent Boxer Gold <sup>®</sup> (s-metolachlor + prosulfocarb) <sup>®</sup> , Sakura <sup>®</sup> (pyroxasulfone) and Terbyne <sup>®</sup> Xtreme <sup>®</sup> (terbuthylazine), and post-emergent Aptitude <sup>®</sup> (carfentrazone + metribuzin) + MCPA amine and 2,4-D amine at label rates and timing of application.					
Variety information					
Pedigree		C8MMC8HMM/Frame			
Breeder/Seed licensee		SeedNet			
Access to seed		SeedNet			
EPR (\$/t, excl GST)		\$1.00			

Chief CL Plus <sup>Ⓛ</sup>					
APW					
Comments					
Chief CL Plus is an APW imidazolinone tolerant variety which was released in 2016. This variety was the highest yielding APW imidazolinone tolerant variety in its three years of NVT trial data with yields which were competitive with Mace. Potential as a imi wheat on wheat option as the variety has good yellow spot resistance. Chief CL Plus is resistant to both pathotypes of leaf rust. Registered for label rate applications of Intervix <sup>®</sup> herbicide.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	–	99	–	99	105
Agzone 2	–	100	–	97	100
Agzone 3	–	102	–	97	100
Agzone 4	–	93	–	97	98
Agzone 5	–	98	–	96	99
Agzone 6	–	105	–	97	98
Disease Resistance			Adult rating		
Nodorum blotch			MS <sub>p</sub>		
S. tritici blotch			Sp		
Yellow spot			MRMS		
Stem rust			MR		
Stripe rust			S		
Leaf rust (new Lr104 pathotype)			R*		
Leaf rust (old Lr76 pathotype)			R		
Powdery mildew			MSS <sub>p</sub>		
Flag smut			SVS		
Common bunt			MR <sub>p</sub>		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			MS <sub>p</sub>		
CCN			–		
Crown rot			MSS <sub>p</sub>		
Agronomic traits					
Coleoptile length (cm)			–		
Crown rot yield loss			–		
Black point			MS		
Falling number index			4		
Maturity			Mid		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		Wyalkatchem derivative			
Breeder/Seed licensee		InterGrain			
Access to seed		Intergrain Seed Club Members or Seed Retailers			
EPR (\$/t, excl GST)		\$4.25			



Corack <sup>Ⓟ</sup>					
APW					
Comments					
Corack is an APW variety with a Wyalkatchem background which is suitable for sowings from mid-May. Corack is useful for planting where resistance to CCN, stem rust and yellow spot is required. Corack is less suitable to higher rainfall zones because of its susceptibility to black point and powdery mildew. This variety is susceptible to very susceptible to the latest pathotype of leaf rust. Similar yields to Mace however has been surpassed for yield by other varieties such as Scepter.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	96	103	95	99	96
Agzone 2	99	102	98	98	100
Agzone 3	100	100	103	98	98
Agzone 4	99	108	99	99	101
Agzone 5	102	102	102	100	102
Agzone 6	99	97	99	99	100
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			S		
Yellow spot			(MR)		
Stem rust			MR		
Stripe rust			MS		
Leaf rust (new Lr104 pathotype)			SVS		
Leaf rust (old Lr76 pathotype)			S		
Powdery mildew			SVS		
Flag smut			MRMS		
Common bunt			MSS		
RLN ( <i>P. quasitereoides</i> )			MSS		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			RMR		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.8		
Crown rot yield loss			Moderate (10-20%)		
Black point			S		
Falling number index			4		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive to label rates of Triathlon <sup>®</sup> (bromoxynil + diflufenican + MCPA) applied at the 3 to 4 leaf stage and Jaguar (bromoxynil + diflufenican) applied at the 6 to 7 leaf stage. Registered low crop safety margin for diuron + MCPA amine and Talinor <sup>®</sup> (cyclopyrone + bromoxynil) at label rates and timing of application.					
Variety information					
Pedigree		Wyalkatchem/Silverstar A// Wyalkatchem			
Breeder/Seed licensee		AGR			
Access to seed		AGT Affiliates, retailers, or Seed Sharing			
EPR (\$/t, excl GST)		\$3.00			

Cutlass <sup>(b)</sup>					
APW					
Comments					
Cutlass, a variety which provides growers with a longer season APW option. Over the last three years, Cutlass has outyielded Yitpi, another longer maturing variety commonly grown in WA and has yielded similar to Mace in the NVT. Cutlass has a very useful triple rust resistance rating, MSS to yellow spot and a poor powdery mildew rating (compared to Yitpi's SVS). DPIRD led research has found that Cutlass is more susceptible to sprouting than Yitpi.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	–	–	108	97	108
Agzone 2	–	–	98	109	93
Agzone 3	–	–	88	108	101
Agzone 4	–	–	108	95	95
Agzone 5	–	–	89	111	104
Agzone 6	–	–	97	111	106
Disease Resistance			Adult rating		
Nodorum blotch			MRMS		
S. tritici blotch			MSS		
Yellow spot			MSS		
Stem rust			R		
Stripe rust			RMR*		
Leaf rust (new Lr104 pathotype)			R		
Leaf rust (old Lr76 pathotype)			R*		
Powdery mildew			S		
Flag smut			MS		
Common bunt			S		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			MSS		
Crown rot			Sp		
Agronomic traits					
Coleoptile length (cm)			7.3		
Crown rot yield loss			–		
Black point			MS		
Falling number index			4		
Maturity			Mid-Long		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		RAC1316/2*Fang			
Breeder/Seed licensee		AGT			
Access to seed		AGT Affiliates, retailers, or Seed Sharing			
EPR (\$/t, excl GST)		\$3.00			

DS Pascal					
APW					
Comments					
DS Pascal is a mid-long maturing APW wheat variety. The outstanding characteristic of DS Pascal is its ability to maintain falling numbers after pre-harvest rain, which along with its resistance to powdery mildew, makes it an attractive option particularly for high rainfall areas. DS Pascal is resistant to powdery mildew, moderately resistant leaf rust (old strain) and resistant to moderately resistant to stripe rust. It is moderately susceptible to the latest strain of leaf rust and yellow spot. It was included in the 2016 and 2017 NVT in Agzone 3 and 6 however it generally yielded lower than Mace and is susceptible to crown rot. Despite this variety's generally lower yields, it may have a fit where sprouting and stubble borne diseases are an issue or as a longer season option.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	—	—	—	—	—
Agzone 2	—	—	—	—	—
Agzone 3	—	—	—	94	84
Agzone 4	—	—	—	—	—
Agzone 5	—	—	—	—	—
Agzone 6	—	—	—	99	90
Disease Resistance			Adult rating		
Nodorum blotch			MRMS		
S. tritici blotch			MS		
Yellow spot			MRMS		
Stem rust			MSS		
Stripe rust			RMR		
Leaf rust (new Lr104 pathotype)			MS		
Leaf rust (old Lr76 pathotype)			MR		
Powdery mildew			R		
Flag smut			S		
Common bunt			SVS		
RLN ( <i>P. quasitereoides</i> )			—		
RLN ( <i>P. neglectus</i> )			S		
CCN			MS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.0		
Crown rot yield loss			—		
Black point			MS		
Falling number index			7		
Maturity			Mid-Long		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		FAWWON105/CFR00-687-55			
Breeder/Seed licensee		Seednet / DOW Seeds			
Access to seed		Seed retailers			
EPR (\$/t, excl GST)		\$4.25			

Grenade CL Plus <sup>Ⓛ</sup>					
APW					
Comments					
Grenade CL Plus is an APW imidazolinone tolerant variety released in 2014. This variety has not out-yielded Justica CL Plus or Chief CL Plus in the majority of NVT. An advantage of this variety is its resistance to CCN and has a decent falling number index rating. Registered for Intervix <sup>®</sup> use.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	86	88	90	90	96
Agzone 2	84	90	86	92	88
Agzone 3	91	91	86	93	84
Agzone 4	92	92	91	87	91
Agzone 5	89	92	83	93	87
Agzone 6	85	83	82	97	91
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			MSS		
Yellow spot			S		
Stem rust			MR		
Stripe rust			RMR		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MS#		
Powdery mildew			MSS		
Flag smut			MR		
Common bunt			SVS		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			R		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.6		
Crown rot yield loss			–		
Black point			MSS		
Falling number index			5		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive or have low crop safety margin for Hoegrass <sup>®</sup> 375 (diclofop-methyl) 200 mL + Achieve <sup>®</sup> (tralkoxydim) 200 g/ha applied at Z12-Z13.					
Variety information					
Pedigree		Gladius/4/RAC1268*2/3/ Janz*2/Wilg4/11A			
Breeder/Seed licensee		AGT			
Access to seed		AGT Affiliates or retailers			
EPR (\$/t, excl GST)		\$3.80			

Hydra <sup>Ⓛ</sup>					
APW					
Comments					
Hydra is an APW variety with a Bonnie Rock and Strzelecki background. Performs well in a broad range of environments and has a short to mid maturity. However, there are indications of screenings risk and susceptibility to low falling number after harvest rainfall. Hydra has a useful blackpoint rating but has a generally poorer disease resistance package compared with other varieties in the same grade and yield capacity.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	103	96	108	101	105
Agzone 2	104	102	103	104	97
Agzone 3	105	100	96	105	103
Agzone 4	103	97	107	100	95
Agzone 5	99	99	95	104	101
Agzone 6	106	99	103	105	102
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			MS		
Yellow spot			MRMS		
Stem rust			MS		
Stripe rust			MS		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MS#		
Powdery mildew			S		
Flag smut			VS		
Common bunt			VS		
RLN ( <i>P. quasitereoides</i> )			—		
RLN ( <i>P. neglectus</i> )			S		
CCN			S		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.9		
Crown rot yield loss			—		
Black point			MS		
Falling number index			3		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive to or have low crop safety margin for Affinity <sup>®</sup> (carfentrazone) + MCPA amine and Ally <sup>®</sup> at label rates and timing of application.					
Variety information					
Pedigree		Strzelecki/2* Bonnie Rock			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$3.85			

Impress CL Plus <sup>Ⓛ</sup>					
APW					
Comments					
An APW imidazolinone tolerant Wyalkatchem type. This variety has not out-yielded Justica CL Plus or Chief CL Plus in the majority of NVT trials. Large grain size. Impress is susceptible to very susceptible to powdery mildew, susceptible to blackpoint and has a very low falling number index rating after pre-harvest rainfall. This variety is resistant to both strains of leaf rust.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	96	97	93	86	92
Agzone 2	92	88	89	75	91
Agzone 3	87	88	–	71	76
Agzone 4	93	93	89	83	86
Agzone 5	85	84	–	65	83
Agzone 6	91	93	–	74	79
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			MSS		
Yellow spot			MRMS		
Stem rust			MR		
Stripe rust			MSS		
Leaf rust (new Lr104 pathotype)			R		
Leaf rust (old Lr76 pathotype)			R		
Powdery mildew			SVS		
Flag smut			MSS		
Common bunt			RMR		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			MRMS		
CCN			MS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.8		
Crown rot yield loss			–		
Black point			S		
Falling number index			2		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive to or have low crop safety margin for Affinity <sup>®</sup> (carfentrazone) + MCPA amine and Ally <sup>®</sup> at label rates and timing of application.					
Variety information					
Pedigree		Wyalkatchem derivative			
Breeder/Seed licensee		InterGrain			
Access to seed		InterGrain Seedclub member or seed retailer			
EPR (\$/t, excl GST)		\$4.10			

Justica CL Plus <sup>Ⓓ</sup>					
APW					
Comments					
A mid–long maturing APW imidazolinone tolerant with Spear background. This variety generally has a higher yield than Impress CL Plus and Grenade CL Plus but yields lower than Chief CL Plus in NVT across the state. Contact AGT to find out about seed availability.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	91	88	96	93	–
Agzone 2	89	92	91	97	–
Agzone 3	94	92	86	99	–
Agzone 4	96	91	95	90	–
Agzone 5	90	93	84	98	–
Agzone 6	89	88	87	101	–
Disease Resistance			Adult rating		
Nodorum blotch			MS		
S. tritici blotch			SVS		
Yellow spot			S		
Stem rust			MR		
Stripe rust			RMR*		
Leaf rust (new Lr104 pathotype)			SVS		
Leaf rust (old Lr76 pathotype)			MSS		
Powdery mildew			MSS		
Flag smut			RMR		
Common bunt			SVS		
RLN ( <i>P. quasitereoides</i> )			SVSp		
RLN ( <i>P. neglectus</i> )			S		
CCN			MS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.7		
Crown rot yield loss			High (>20%)		
Black point			MSS		
Falling number index			5		
Maturity			Mid-Long		
Herbicide tolerance information					
Low crop safety margin for diuron + MCPA amine at label rate applied at Z13-Z14 (3-4 leaves on the main stem) and 2,4-D LVE 680 applied at Z15-Z16. Do not apply phenoxy herbicides like MCPA and 2,4-D between flag leaf emergence and the soft dough stage.					
Variety information					
Pedigree		Gladius/4/RAC1268*2/3/ Janz*2/Wilg4/11A			
Breeder/Seed licensee		AGT			
Access to seed		AGT Affiliates or Seed Sharing			
EPR (\$/t, excl GST)		\$3.55			

LRPB Trojan <sup>(b)</sup>					
APW					
Comments					
Trojan is an APW variety with a maturity between Yitpi and Mace. Trojan has a longer coleoptile and has been reasonably popular in higher rainfall areas. Trojan has a falling number rating with pre-harvest rain of 5 which is similar to Mace. Trojan has a useful blackpoint rating and is moderately resistant to both leaf rust strains and to stripe rust but is susceptible to powdery mildew and moderately susceptible to yellow spot.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	–	92	101	98	103
Agzone 2	–	99	96	102	90
Agzone 3	104	102	91	105	101
Agzone 4	–	91	104	91	93
Agzone 5	97	99	91	108	95
Agzone 6	101	86	101	108	100
Disease Resistance			Adult rating		
Nodorum blotch			MS		
S. tritici blotch			MSS		
Yellow spot			MSS		
Stem rust			MRMS		
Stripe rust			MR		
Leaf rust (new Lr104 pathotype)			MR		
Leaf rust (old Lr76 pathotype)			MR#		
Powdery mildew			S		
Flag smut			SVS		
Common bunt			S		
RLN ( <i>P. quasitereoides</i> )			MRMSp		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			MS		
Crown rot			MS		
Agronomic traits					
Coleoptile length (cm)			–		
Crown rot yield loss			Moderate (10-20%)		
Black point			MS		
Falling number index			5		
Maturity			Mid-Long		
Herbicide tolerance information					
May be sensitive to post-emergent 2,4-D LVE 680 and have low crop safety margin for Aptitude® (carfentrazone + metribuzin) + MCPA and diuron + MCPA at label rates and timing.					
Variety information					
Pedigree		LPB 00LR000041/Sentinel3R			
Breeder/Seed licensee		LongReach Plant Breeders			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$4.00			



Magenta <sup>Ⓛ</sup>						
APW						
Comments						
Magenta, an APW variety suitable for early to mid sowing opportunities. This variety has a good disease package so it's suitable for wheat on wheat situations and has a long coleoptile. Magenta has a low falling number index and is susceptible to blackpoint, so is not suited to the south coast or areas that experience regular harvest rainfall.						
Yield (% of Mace)	2013	2014	2015	2016	2017	
Agzone 1	103	89	110	97	108	
Agzone 2	100	98	99	106	92	
Agzone 3	104	96	86	107	99	
Agzone 4	103	91	106	96	92	
Agzone 5	94	96	85	106	97	
Agzone 6	101	94	96	108	102	
Disease Resistance			Adult rating			
Nodorum blotch			MRMS			
S. tritici blotch			MRMS			
Yellow spot			(MR)			
Stem rust			RMR			
Stripe rust			MS			
Leaf rust (new Lr104 pathotype)			RMR*			
Leaf rust (old Lr76 pathotype)			R*			
Powdery mildew			MRMS			
Flag smut			MSS			
Common bunt			S			
RLN ( <i>P. quasitereoides</i> )			MSS			
RLN ( <i>P. neglectus</i> )			MSS			
CCN			S			
Crown rot			MSS			
Agronomic traits						
Coleoptile length (cm)			7.5			
Crown rot yield loss			High (>20%)			
Black point			MSS			
Falling number index			3			
Maturity			Mid-Long			
Herbicide tolerance information						
May be sensitive to Sakura <sup>®</sup> (pyroxasulfone), Cheetah <sup>®</sup> Gold (diclofop + sethoxydim + fenoxaprop), Velocity <sup>®</sup> (bromoxynil + pyrosulfotole), Velocity <sup>®</sup> (bromoxynil + pyrosulfotole) <sup>®</sup> + Ecopar <sup>®</sup> (pyraflufen-ethyl) and Jaguar <sup>®</sup> (bromoxynil + diflufenican) at label rates and timing of application. May also have low crop safety margin for Boxer Gold <sup>®</sup> (s-metolachlor + prosulfocarb) 2.5L/ha applied pre-emergent.						
Variety information						
Pedigree		Carnamah/Tammin-18				
Breeder/Seed licensee		InterGrain				
Access to seed		Free to trade				
EPR (\$/t, excl GST)		\$3.00				

Wyalkatchem <sup>Ⓛ</sup>					
APW					
Comments					
Wyalkatchem is an APW variety with a Machete background. This variety has a good resistance to yellow spot. Wyalkatchem has tolerance to acidic soils and low screenings. Wyalkatchem has a short coleoptile length. It has a lower resistance to powdery mildew resistance and has a low falling number index rating with pre-harvest rain.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	99	96	101	97	103
Agzone 2	96	98	98	97	98
Agzone 3	100	101	96	99	98
Agzone 4	99	93	97	95	100
Agzone 5	98	99	94	99	97
Agzone 6	100	100	96	98	98
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			S		
Yellow spot			(MR)		
Stem rust			MS		
Stripe rust			S		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MSS		
Powdery mildew			SVS		
Flag smut			SVS		
Common bunt			RMR		
RLN ( <i>P. quasitereoides</i> )			MSS		
RLN ( <i>P. neglectus</i> )			MRMS		
CCN			S		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.4		
Crown rot yield loss			High (>20%)		
Black point			MS		
Falling number index			3		
Maturity			Short-Mid		
Herbicide tolerance information					
Has shown sensitivity to post-emergent Hoegrass <sup>®</sup> 375 (diclofop-methyl) 200 mL + Achieve <sup>®</sup> (tralkoxydim) 200 g/ha, Velocity <sup>®</sup> (bromoxynil + pyrosulfotole) <sup>®</sup> 670 mL/ha and 2,4-D amine 700 1.5 L/ha at label recommend timings. May be sensitive to pre-emergent diuron + Dual Gold <sup>®</sup> (s-metolachlor), and post-emergent Glean <sup>®</sup> (chlorsulfuron), Hoegrass <sup>®</sup> (diclofop- methyl), Affinity <sup>®</sup> (carfentrazone) + MCPA, Ally <sup>®</sup> (metsulfuron), Buctril <sup>®</sup> MA (bromoxynil + MCPA), Flight <sup>®</sup> EC (picolinafen + bromoxynil + MCPA), Jaguar <sup>®</sup> (bromoxynil + diflufenican), 2,4-D ester 800 and dicamba at label rates and timing of application. Low crop safety margin for Talinor <sup>®</sup> (cyclopyrone + bromoxynil) at maximum label rate and timing of application. May also have low crop safety margin for Boxer Gold <sup>®</sup> (s-metolachlor + prosulfocarb), Sakura <sup>®</sup> (pyroxasulfone), Crusader <sup>®</sup> (pyroxysulam) + Lontrel <sup>®</sup> (clopyralid) and Tigrex <sup>®</sup> (diflufenican + MCPA) at label rates and timing.					
Variety information					
Pedigree		Machete/W84-129*504			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$1.92			

Calingiri					
ANW					
Comments					
Calingiri has remained a popular mid to long maturing ANW. Its yields are potentially superseded by Zen, Ninja and Kinsei and some growers are replacing Calingiri with these varieties. Calingiri is susceptible to the latest leaf rust incursion and MS to the old leaf rust incursion.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	97	85	105	94	108
Agzone 2	91	91	94	98	91
Agzone 3	98	96	83	101	94
Agzone 4	98	78	98	89	91
Agzone 5	90	93	81	99	89
Agzone 6	96	92	90	102	96
Disease Resistance			Adult rating		
Nodorum blotch			MSS		
S. tritici blotch			S		
Yellow spot			MSS		
Stem rust			S		
Stripe rust			S		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MS#		
Powdery mildew			S		
Flag smut			RMR		
Common bunt			MRMS		
RLN ( <i>P. quasitereoides</i> )			S		
RLN ( <i>P. neglectus</i> )			SVS		
CCN			—		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.4		
Crown rot yield loss			Moderate (10-20%)		
Black point			MS		
Falling number index			4		
Maturity			Mid-Long		
Herbicide tolerance information					
Has shown sensitivity to pre-emergent Glean® (chlorsulfuron) at 12.5g/ha and Sakura® (pyroxasulfone) at 118g/ha, and post-emergent Jaguar® (bromoxynil + diflufenican) at 1L/ha, Affinity® (carfentrazone) 100 g + MCPA amine 500 0.5L/ha and Diuron 500 0.35L + MCPA amine 500 0.4L/ha applied at the label recommended timing. May be sensitive to pre-emergent Boxer Gold® (s-metolachlor + prosulfocarb) and post-emergent Eclips® (metosulam), Velocity® (bromoxynil + pyrosulfotole), Ally® (metsulfuron), Buctril® MA (bromoxynil + MCPA), Tigrex® (diflufenican + MCPA), Talinor® (cyclopyrone + bromoxynil), MCPA amine and 2,4-D amine 700 at label recommended rates and timings.					
Variety information					
Pedigree		Chino/Kulin//Reeves			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		nil			

Ninja <sup>b</sup>					
ANW					
Comments					
Ninja a noodle wheat variety released by InterGrain in 2016 with a Calingiri and Wyalkatchem background. Ninja is the highest yielding ANW variety and out-yielded Mace in the 2016 and 2017 NVT's and because of this, it is likely that Ninja will take over some of the area previously sown to older noodle varieties. This variety is very susceptible to susceptible to stem rust, powdery mildew and the new incursion of leaf rust. However it has a very useful blackpoint rating.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	–	–	112	104	109
Agzone 2	–	–	107	110	103
Agzone 3	–	–	98	110	109
Agzone 4	–	–	109	105	102
Agzone 5	–	–	99	111	108
Agzone 6	–	–	–	109	108
Disease Resistance			Adult rating		
Nodorum blotch			MS		
S. tritici blotch			MS		
Yellow spot			MRMS		
Stem rust			SVS		
Stripe rust			MS		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MS#		
Powdery mildew			SVS		
Flag smut			MR		
Common bunt			RMR		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			S		
CCN			MS		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			–		
Crown rot yield loss			–		
Black point			MRMS		
Falling number index			4		
Maturity			Mid		
Herbicide tolerance information					
Herbicide tolerance information is not available for this variety. As information becomes available, it will be added.					
Variety information					
Pedigree		Calingiri/Wyalkatchem			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$4.00			

Supreme <sup>Ⓓ</sup>					
ANW					
Comments					
Supreme is an Arrino derivative with improved yield and disease resistance. Supreme is premium quality noodle and is well regarded by international customers because of this. Supreme is a lower yielding noodle variety compared to Zen, Ninja and Kinsei. A strength of this variety is its triple rust resistance package and the best powdery mildew rating of the noodle wheats. It has a very short plant height.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	95	93	98	96	99
Agzone 2	96	96	95	100	93
Agzone 3	98	94	92	100	93
Agzone 4	99	99	100	96	93
Agzone 5	94	96	90	100	95
Agzone 6	94	—	—	102	97
Disease Resistance			Adult rating		
Nodorum blotch			S		
S. tritici blotch			MS		
Yellow spot			MS		
Stem rust			MRMS		
Stripe rust			MR*		
Leaf rust (new Lr104 pathotype)			RMR*		
Leaf rust (old Lr76 pathotype)			RMR		
Powdery mildew			MS		
Flag smut			MSS		
Common bunt			SVS		
RLN ( <i>P. quasitereoides</i> )			—		
RLN ( <i>P. neglectus</i> )			MSS		
CCN			S		
Crown rot			MSS		
Agronomic traits					
Coleoptile length (cm)			5.7		
Crown rot yield loss			—		
Black point			MSS		
Falling number index			4		
Maturity			Short-Mid		
Herbicide tolerance information					
May be sensitive to Glean® (chlorsulfuron) and recorded low crop safety margin for Affinity® (carfentrazone) + MCPA amine at label rates and timing of application. Do not apply phenoxy herbicides like MCPA and 2,4-D between flag leaf emergence and the soft dough stage.					
Variety information					
Pedigree		LoPh-Nyabing.3*Calingiri/4* VPM Arrino			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$3.85			

Zen <sup>db</sup>					
ANW					
Comments					
A noodle variety with a Calingiri and Wyalkatchem background. From the data available, Zen's yield is in most areas superseded by Ninja and Kinsei. Zen is very susceptible to powdery mildew and the new pathotype of leaf rust. Useful blackpoint rating but has a poor falling number rating.					
Yield (% of Mace)	2013	2014	2015	2016	2017
Agzone 1	103	93	109	101	107
Agzone 2	99	97	103	101	99
Agzone 3	101	101	94	104	104
Agzone 4	101	83	102	100	98
Agzone 5	97	98	94	102	96
Agzone 6	103	–	102	102	100
Disease Resistance			Adult rating		
Nodorum blotch			MRMS		
S. tritici blotch			S		
Yellow spot			MRMS		
Stem rust			S		
Stripe rust			MRMS		
Leaf rust (new Lr104 pathotype)			S		
Leaf rust (old Lr76 pathotype)			MRMS#		
Powdery mildew			S		
Flag smut			MS		
Common bunt			MR		
RLN ( <i>P. quasitereoides</i> )			–		
RLN ( <i>P. neglectus</i> )			MRMS		
CCN			S		
Crown rot			S		
Agronomic traits					
Coleoptile length (cm)			6.6		
Crown rot yield loss			–		
Black point			MRMS		
Falling number index			3		
Maturity			Mid-Long		
Herbicide tolerance information					
Has shown no sensitivity to a range of pre and post-emergent herbicides / herbicide mixtures at higher than label rates applied at label recommended timings, in small plot screening herbicide tolerance trials conducted at Katanning during 2014 and 2015. Do not apply phenoxy herbicides like MCPA and 2,4-D between flag leaf emergence and the soft dough stage.					
Variety information					
Pedigree		Calingiri/Wyalkatchem			
Breeder/Seed licensee		InterGrain			
Access to seed		Free to trade			
EPR (\$/t, excl GST)		\$3.85			

## Price difference by class

Chris Carter, AEGIC

To assess the value of different varieties, the best method is to compare gross margins. The gross margin calculations used for the comparison must include the EPR on that variety, difference in yield and where applicable the difference in expected price.

When making the comparison, consider whether a variety is likely to achieve its listed class. If an AH variety is unlikely to reach the right protein level, then don't use the AH price in your gross margins. Use the right price for the grade you would expect to achieve. You might be better off growing a lower yielding AH that make the grade 70% of the time, than a slightly higher yielding variety that only makes the AH grade 30% of the time.

To assist in making this comparison, Table 22 provides the expected spread of prices for common grades relative to APW1. The median values are the expected spread to APW, based on prices of grain priced Free-In-Store (FIS) Kwinana, adjusted to 2018 dollars.

**Table 22** Percentiles of APW1 Prices, and the spread between APW1 and other common grades, for the period Sept 2014- July 2018. Difference quoted as FIS Kwinana \$AUD 2018 (July). (Source AEGIC)

	25 percentile	Median	75 percentile
APW1	\$269	\$283	\$302
APW2	-\$12	-\$7	-\$3
Difference to APW1			
AGP1	-\$28	-\$24	-\$19
ASW1	-\$17	-\$13	-\$7
AH1	\$3	\$13	\$20
ANW1	\$8	\$20	\$65

## End point royalties

Varieties with a plant breeder rights (PBR) are subject to end point royalties (Table 23). For a full variety list, see [varietycentral.com.au](http://varietycentral.com.au).

Arrino, Calingiri, Carnamah and Westonia do not have PBR.

If you are looking for varieties without an EPR, consider whether they perform when compared to modern varieties, which might have a higher yield that makes up for the EPR.





**Table 23** Wheat varieties (subject to End Point Royalties EPR) Seed distribution arrangements for 2018/19

Wheat variety	Variety owner	Royalty manager (EPR collector)	EPR rate \$/tonne (ex-GST)	Seed distribution for 2018/19	Grower to grower sales permitted
Bremer <sup>(b)</sup>	AGT	AGT	\$3.25	AGT Affiliates, retailers, or Seed Sharing	Yes*
Chief CI Plus <sup>(b)</sup>	InterGrain	InterGrain	\$4.25	InterGrain Seed Club Members or seed retailers	No
Clearfield Stl <sup>(b)</sup>	InterGrain	InterGrain	\$1.12	InterGrain Seed Club Members or seed retailers	Yes
Corack <sup>(b)</sup>	AGT	AGT	\$3.00	AGT Affiliates, retailers, or Seed Sharing	Yes *
Cutlass <sup>(b)</sup>	AGT	AGT	\$3.00	AGT Affiliates, retailers, or Seed Sharing	Yes *
Devil <sup>(b)</sup>	InterGrain	InterGrain	\$3.50	InterGrain Seed Club Members or seed retailers	No
DS Pascal <sup>(b)</sup>	DOW Seeds	SeedNet	\$4.25	SeedNet	No
EGA Bonnie Rock <sup>(b)</sup>	InterGrain	InterGrain	\$2.50	Free to Trade	Yes
EGA Eagle Rock <sup>(b)</sup>	InterGrain	InterGrain	\$2.50	Free to Trade	Yes
EGA Wedgetail <sup>(b)</sup>	NSW I&I	SeedNet	\$1.45	SeedNet	No
Emu Rock <sup>(b)</sup>	InterGrain	InterGrain	\$3.50	Free to Trade	Yes
Forrest <sup>(b)</sup>	HRZ Wheats	SeedNet	\$3.50	SeedNet	No
Fortune <sup>(b)</sup>	InterGrain	InterGrain	\$3.00	Free to Trade	Yes
GBA Sapphire <sup>(b)</sup>	GBA	COGGO Seeds	\$3.00	COGGO Seeds	No
Grenade CL Plus <sup>(b)</sup>	AGT	AGT	\$3.80	AGT Affiliates or retailers	No
Harper <sup>(b)</sup>	InterGrain	InterGrain	\$3.80	Free to Trade	Yes
Hydra <sup>(b)</sup>	InterGrain	InterGrain	\$3.85	Free to Trade	Yes
Impress CL Plus <sup>(b)</sup>	InterGrain	InterGrain	\$4.10	InterGrain Seed Club Members or seed retailers	No
Justica CL Plus <sup>(b)</sup>	AGT	AGT	\$3.55	AGT Affiliates, or retailers	No
King Rock <sup>(b)</sup>	InterGrain	InterGrain	\$3.00	Free to Trade	Yes
Kinsei <sup>(b)</sup>	InterGrain	InterGrain	\$4.00	InterGrain Seed Club Members or seed retailers	No
LRPB Arrow <sup>(b)</sup>	LPB	Pacific Seeds	\$3.00	Associate (PacSeeds) or Retailer of your choice in all states	No
LRPB Cobra <sup>(b)</sup>	LPB	Pacific Seeds	\$3.50	Associate (PacSeeds) or Retailer of your choice in all states	Yes **
LRPB Havoc <sup>(b)</sup>	LPB	Pacific Seeds	\$4.00	Associate (PacSeeds) or Retailer of your choice in all states	Yes **
LRPB Scout <sup>(b)</sup>	LPB	Pacific Seeds	\$2.80	Associate (PacSeeds) or Retailer of your choice in all states	Yes **
LRPB Trojan <sup>(b)</sup>	LPB	Pacific Seeds	\$4.00	Associate (PacSeeds) or Retailer of your choice in all states	Yes **
Mace <sup>(b)</sup>	AGT	AGT	\$3.00	AGT Affiliates, retailers, or Seed Sharing	Yes*
Magenta <sup>(b)</sup>	InterGrain	InterGrain	\$3.00	Free to Trade	Yes
Ninja <sup>(b)</sup>	InterGrain	InterGrain	\$4.25	InterGrain Seed Club Members or seed retailers	Yes
Scepter <sup>(b)</sup>	AGT	AGT	\$3.25	AGT Affiliates, retailers, or Seed Sharing	Yes*
Supreme <sup>(b)</sup>	InterGrain	InterGrain	\$3.85	Free to Trade	Yes
Tammarin Rock <sup>(b)</sup>	InterGrain	InterGrain	\$2.50	Free to Trade	Yes
Tenfour <sup>(b)</sup>	Elders	Elders	\$3.00	Elders	No
Tungsten <sup>(b)</sup>	Elders	Elders	\$3.00	Elders	No
Wyalkatchem <sup>(b)</sup>	InterGrain	InterGrain	\$1.92	Free to Trade	Yes
Yitpi <sup>(b)</sup>	ARI	SeedNet	\$1.00	SeedNet	No
Zen <sup>(b)</sup>	InterGrain	InterGrain	\$3.85	Free to Trade	Yes
Zippy <sup>(b)</sup>	InterGrain	InterGrain	\$3.00	Free to Trade	Yes

Note: \*: through AGT Seed Sharing ([www.agtbreeding.com.au/sourcing-seed/seed-sharing](http://www.agtbreeding.com.au/sourcing-seed/seed-sharing)).

Note: \*\*: only growers who have purchased seed from a registered source will be permitted to trade seed. Selling growers must have purchased directly from a reseller or an associate to be able to sell to other farmers.

**Table 24** Percentage of planned area sown to wheat varieties for the 2011/12 to 2017/18.

Data from CBH Group. Varieties with less than 0.06% of total crop area in 2017/18 season are not included

Variety	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
	%	%	%	%	%	%	%
Mace <sup>(b)</sup>	18.0	41.4	53.4	59.1	66.7	66.5	54.5
Scepter <sup>(b)</sup>						0.1	14.6
Calingiri	8.5	8.6	9.5	10.8	8.1	8.2	7.3
Zen <sup>(b)</sup>					0.0	1.3	4.3
Magenta <sup>(b)</sup>	9.5	6.5	4.7	3.8	3.5	4.1	4.0
Yitpi <sup>(b)</sup>	9.8	7.0	6.3	4.9	3.4	3.0	2.5
Corack <sup>(b)</sup>		0.1	1.6	3.2	4.0	2.4	1.8
LRPB Trojan <sup>(b)</sup>					0.1	0.9	1.8
LRPB Cobra <sup>(b)</sup>		0.2	1.7	2.2	1.8	1.9	1.7
Wyalkatchem <sup>(b)</sup>	22.7	14.5	7.7	5.0	3.3	2.9	1.2
Bremer <sup>(b)</sup>					0.0	0.6	0.6
Harper <sup>(b)</sup>				0.1	0.6	0.8	0.5
Carnamah	3.6	1.9	1.3	0.8	0.6	0.6	0.4
Emu Rock <sup>(b)</sup>		0.0	0.3	0.4	0.6	0.6	0.4
Impress CL Plus <sup>(b)</sup>					0.0	0.5	0.4
Stiletto	4.4	2.9	2.2	1.7	1.0	0.7	0.4
EGA Bonnie Rock <sup>(b)</sup>	3.3	2.6	1.6	0.9	0.9	0.7	0.4
Arrino	2.4	1.4	0.8	0.6	0.4	0.5	0.3
Westonia	3.2	2.6	1.5	0.9	0.8	0.5	0.3
Cutlass <sup>(b)</sup>						0.0	0.2
Grenade CL Plus <sup>(b)</sup>				0.0	0.2	0.2	0.2
Hydra <sup>(b)</sup>					0.0	0.1	0.2
Spear	1.0	0.7	0.5	0.6	0.4	0.3	0.2
Ninja <sup>(b)</sup>							0.2
Machete	0.2	0.1	0.2	0.3	0.2	0.3	0.1
Justica CL Plus <sup>(b)</sup>	0.0	0.5	1.0	1.1	1.0	0.8	0.1
Clearfield Stl <sup>(b)</sup>	1.4	0.9	0.4	0.3	0.2	0.1	0.1
Supreme <sup>(b)</sup>					0.0	0.1	0.1
King Rock <sup>(b)</sup>	0.2	0.4	0.2	0.2	0.2	0.2	0.1
Halberd	0.6	0.4	0.5	0.4	0.2	0.2	0.1
Fortune <sup>(b)</sup>	1.1	0.6	0.4	0.3	0.2	0.1	0.1
EGA Eagle Rock <sup>(b)</sup>	1.3	0.9	0.5	0.4	0.2	0.1	0.1
GBA Sapphire <sup>(b)</sup>	1.3	0.9	0.4	0.3	0.1	0.1	0.1
Frame <sup>(b)</sup>	0.3	0.2	0.2	0.2	0.2	0.1	0.1
LRPB Scout <sup>(b)</sup>	0.2	0.4	0.5	0.2	0.2	0.1	0.1
Blade <sup>(b)</sup>	0.2	0.1	0.1	0.0	0.1	0.0	0.1

## Classification

**Source: Wheat Quality Australia**

Classification of varieties involves comparing new varieties for 30 or more quality parameters with a group of control varieties grown at the same time and place over a minimum of three seasons. Quality characteristics assessed during variety classification are more comprehensive than those possible at the point of receipt. This process delivers classes of Australian wheat with distinct quality attributes and processing virtues. Wheat varieties grown in WA are primarily either premium hard wheats or specialty wheats.

### Premium Hard wheats

#### Australian Hard (AH)

High and mid-protein selected white-grained wheats, AH is ideal for European pan and hearth breads, Middle Eastern style flat breads, yellow alkaline noodles, dry white salted noodles and steamed products.

#### Australian Premium White (APW)

Mid-protein hard white wheats, APW is ideal for the production of a variety of noodle types, including Hokkien, instant and fresh noodles, and Middle Eastern and sub-continental flat breads and Chinese steamed bread. APW wheat is also widely used as blending wheat in a range of baking processes internationally and is the mainstay of the domestic baking industry.

#### Australian Standard White (ASW)

ASW is a highly versatile medium to low-protein white wheat representing excellent value for straight milling or blending purposes. This multi-purpose wheat is used in the production of a wide range of products including Middle Eastern, sub-continental flat breads, European-style breads and rolls and Chinese steamed bread.

### Specialty wheats

#### Australian Noodle Wheat (ANW)

Varieties in this class are particularly suited to the manufacture of the Japanese udon-style noodle. For udon manufacture, flours are generally milled to a patent flour extraction to produce a maximum ash level of 0.36–0.40% with minimal bran contamination, as bran specks result in a visually unappealing final product. Whilst being produced largely in WA, ANW is also segregated in the eastern states.

#### Australian Premium White Noodle (APWN)

APWN is mainly used in an export blend with ANW for a range of white salted and instant noodle types in specific Asian markets but its inherent processing characteristics are fully compatible with those of APW. APWN is currently grown only in WA.



# Essentials for a successful wheat crop

Christine Zaicou-Kunesch

## Pre-season

### Rotation

- Canola based rotations provide a disease break for the following wheat crop and alternative weed control options.
- Legume based rotation provides more nitrogen through nitrogen fixation and a disease break. They also provide alternative weed control.
- Continuous wheat rotations are not recommended on sandy and sandy earth soils because of disease risk. Avoid sowing varieties with a similar disease package. Some weeds may be difficult to control in crop so may need to delay seeding to manage weeds pre-seeding.

### Soil testing

- Soil testing is important to develop fertiliser and liming strategies.
- Soil pH: Sample and test the soil every 3-4 years at 10-20 and 20-30cm as well as the topsoil. Aim to maintain pH<sub>Ca</sub> at or above 5.5 in the topsoil and 4.8 in the subsurface. Apply lime if the pH falls below targets.
- Nutrient testing: Develop a plan to monitor nutrient status of paddocks over a number of seasons. Take soil samples at 0-10cm depth. Target deeper soil sampling on targeted paddocks such as sandy soils.

### Variety selection

Choose varieties wisely.

- A new variety should have better or equal yield and disease traits, provide diversity or risk mitigation and suit the current market requirements.
- Review the performance of varieties in the NVT over a number of years of testing and suggested planting time within each Agzone to support variety decisions.

## Seeding

### Sowing time

- Match a variety's sowing time to its maturity.
- The aim is to maximise yield and minimise risks of leaf disease, frost during flowering and/or terminal drought/heat stress during grain fill.
- Use the Flower Power tool to predict wheat flowering times of different varieties and the risk of frost or heat stress at a range of locations in WA.

### Nutrition

- Potassium (K): The critical range for Colwell K on sandy soils, sandy loams and duplex soils is 32-52, 45-52 and 35-45mg/kg respectively. Top dressing can generally correct a deficiency in the crop.
- Phosphorus (P): Check soils P status as maintenance rates at seeding may only be required.
- Nitrogen (N): Develop the nitrogen strategy by considering the crops potential yield, soil test results and other rotational, soil type and rainfall information. Nitrogen can be applied at seeding (separated from the seed) and/or with post emergence applications.
- Micro nutrients: Monitor the crop within the season and tissue test to identify deficiencies to micro nutrients.

### Sowing depth

- Majority of current wheat varieties have a coleoptile index of 6-7cm. Seeding into moisture at 2-4cm is preferred. A few varieties have a longer coleoptile index.
- If dry seeding, increase the seed rate as there is the risk of staggered emergence with a false break.



## Seed rate

- Target 50 plants/m<sup>2</sup> for every tonne per hectare, that is, target at least 100 plants/m<sup>2</sup> if expected yield is 2t/ha.
- Adjust seed rate for grain weight as varieties have inherently different grain weights and vary these from season to season.
- Increase plant densities for weed competition.

## In crop

### Weed management

Relying solely on herbicides for weed control is not sustainable because of the herbicide resistance risk. Consider the 'Big 6', which are simple to follow and apply (adapted from [Weedsmart.org.au](http://Weedsmart.org.au))

1. Rotate crops and pastures.
2. Double knock – to preserve glyphosate.
3. Mix and rotate herbicides.
4. Stop weed seed set.
5. Crop competition.
6. Harvest weed seed control.

### Disease management

- Monitor the crop throughout the season.
- Seed treatments, in-furrow fertiliser applications and fungicide spray provide an extra option. Overuse of fungicides may lead to resistance.
- For foliar diseases, it is important to protect the top three leaves, especially the flag leaf (a major contributor to yield).
- A general rule is that root diseases will not build up if there is greater diversity of non-cereal crop rotation species.

### Insect management

- Control the green bridge prior to sowing to prevent windborne 'wheat curl mites' from transferring viruses (e.g. Wheat streak mosaic virus) into germinating seedlings. If cockchafer activity observed in previous years use high seed rates and an imidacloprid seed dressing.

- Inspect crops regularly to avoid crop damage from sporadic pests such as cutworm, pasture webworm and armyworm.
- Control mites and Lucerne flea during the seedling stage if necessary.
- If necessary control aphids to prevent virus spread, for example, barley yellow dwarf virus (BYDV) in the first 10 weeks after emergence.
- Spraying aphids for feeding damage in crops is worthwhile if the expected yield is more than 3t/ha and 50% of tillers have 15 or more aphids.

### Harvest

- Consider management of stubble and chaff at harvest because this can affect the succeeding crop.
- Revise each variety's falling number index to gauge risk to pre harvest sprouting. Consider harvesting varieties with a low Falling Number Index as soon after they have reach maturity as harvest rainfall is likely to affect quality.





## Seed distributor and marketer information

### Distributors

#### Australian Seed and Grain

Moora, +61 (0)8 9651 1069

[austseedgrain.com.au](http://austseedgrain.com.au)

- AGT seed affiliate
- InterGrain seed group member
- Pacific Seed associate
- Seednet partner

#### Coorow Seeds

Coorow, +61 (0)8 9952 1088

[coorowseeds.com.au](http://coorowseeds.com.au)

- AGT seed affiliate
- InterGrain seed group member
- Pacific Seed associate

#### Eastern Districts Seed Cleaning Co

Kellerberrin, +61 (0)8 9045 4036

[easterndistrictsseedcleaningco.webs.com](http://easterndistrictsseedcleaningco.webs.com)

- AGT seed affiliate
- InterGrain seed group member
- Pacific Seed associate
- Seednet partner

#### Melchiorre Seeds

Narrogin, +61 (0)8 9881 1155

[melchiorreseeds.com.au](http://melchiorreseeds.com.au)

- AGT seed affiliate
- InterGrain seed group member
- Pacific Seed associate

#### MultiSEED Production

Esperance, +61 (0)8 9071 1053

- AGT seed affiliate
- InterGrain seed group member
- Pacific Seed associate
- Seednet partner

### Marketers

#### AGT

- +61 (0)8 9622 8935
- [ausgraintech.com](http://ausgraintech.com)

#### COGGO Seeds

- +61 (0)8 9310 2636
- [coggo.net.au](http://coggo.net.au)

#### Elders

- Contact your local Agronomist
- [eldersrural.com.au/locations](http://eldersrural.com.au/locations)

#### InterGrain

- +61 (0)8 9419 8000
- [InterGrain.com](http://InterGrain.com)

#### Pacific Seeds

- +61 (0)7 4690 2666
- [pacificseeds.com.au](http://pacificseeds.com.au)

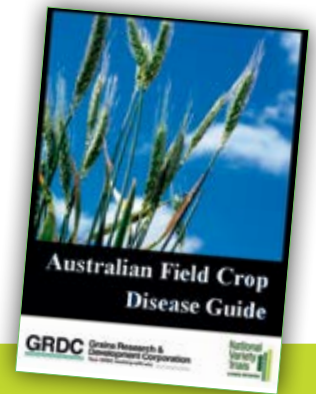
#### Seednet

- +61 (0)8 8752 1777
- [seednet.com.au](http://seednet.com.au)

Notes

# NVT apps

National  
Variety  
Trials  
A GRDC INITIATIVE



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.