



Wheat

Introduction

Brenda Shackley and Dion Nicol (DPIRD)

Following a well above-average wheat crop of 12.9 million tonnes in 2021, Western Australian growers produced the State's largest ever wheat crop of 13.9 million tonnes in 2022 (Source: GIWA crop estimates). Growers responded to the favourable season by sowing early, increasing sowing area and using best practice to manage for nitrogen and disease despite the constraints and input costs of 2022.

The WA wheat industry is supported by significant private and public R&D that underpins decisions on variety selection and management. This guide summarises the yield performance, disease ratings and best practice agronomy of varieties in the GRDC National Variety Trials (NVT) and DPIRD agronomy research trials. Variety snapshots for twenty of the most common and recently released wheat varieties can be found at the back of the guide.

Scepter accounted for 50% of the area sown to wheat in 2023, making it the most popular variety grown in WA. As such, it is used as the comparison variety for yield (in the variety snapshots) and days-to-flowering data (Table 13). Diversifying from Scepter will be driven by yield advantages, which are typically driven by phenology or maturity. Other driving factors to make a variety change include disease resistance, weed control options (primarily tolerance to imidazolinone) and the potential for premium prices, such as noodle wheats.

Environmental conditions are a major driver of crop performance, making it important to review variety performance over multiple years to better understand how a variety in a specific environment might perform across variable seasons. For example, the wetter season and soft/late finish experienced in 2022 improved the relative performance of the mid-slow maturing varieties. Varietal differences can also be used to mitigate the risk of frost or terminal drought by matching the maturity rating of a variety with its optimum sowing time (and likely germination). Finally, it is important to be aware of whether a variety can access specific quality segregations and the value of the segregation for the season.

A new variety should therefore provide:

- an improvement in yield, grain quality and/or disease traits
- diversity or risk mitigation within a farming system
- suitable characteristics for current markets.

New in 2024

Mowhawk (LPB19-14343) was released by LongReach at the start of 2023. It is a quick winter AH variety that fits between Longsword and Illabo in maturity and is the first winter type to be bred in WA with a Scepter background. Mowhawk was included in the early season NVT for the first time in 2022 where it yielded 10% higher than the current benchmark winter variety Illabo. Mowhawk has an excellent disease package with an improved leaf rust rating of MR_p compared to Illabo rated as S.

Tomahawk CL Plus (RAC3261) is an APW variety released by AGT in 2023. It is closely related to Scepter with similar maturity and other characteristics, but also provides the option to apply Intervix® in-crop or to manage imidazolinone herbicide soil residues from previous crops. Tomahawk CL Plus was included in the WA NVT for the first time in 2022 where it yielded slightly higher than Scepter and significantly higher than other Clearfield® varieties currently grown in WA. AGT suggest that in the longer term yields will be similar to Scepter. At this stage Tomahawk CL Plus is rated *Sp* for leaf rust compared to Scepter at MSS.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Thumper (IGW6884) is an APW (potential AH) wheat variety released by InterGrain in 2023. Thumper has only been included in the WA NVT for the first time in 2023 so information is restricted to InterGrain data at the time of publication. Thumper is thought to have a quick-mid maturity, similar to Devil, with a higher yield than Devil, Scepter and Calibre. Disease rating of Thumper will be confirmed by GRDC and DPIRD in 2024.

Dozer (IGW6783) was released by InterGrain in 2023 as a quick to mid maturing APW wheat with tolerance to imidazolinone herbicide. It was included in selected WA NVT in 2021 and later in the 2023 WA NVT. InterGrain data suggests Dozer yielded 5% higher than Hammer CL Plus. Provisional disease ratings for Dozer are *MSp* for stem rust, *MRMSp* for stripe rust, *Sp* for leaf rust and *MSp* for yellow spot.

Note: There are no grower-to-grower sales permitted for any imidazolinone tolerant varieties.

Firefly (IGW8192) is a next generation noodle wheat (ANW) from InterGrain. Firefly was included in the 2021 and 2023 WA NVT, with InterGrain data indicating yield was 11% higher than Zen. Firefly maturity is mid-slow, similar to Zen. Provisional disease ratings are *Sp* for stem rust, *MSSp* for stripe rust, *MSSp* for leaf rust and *MRMSp* for yellow spot.

Genie (IGW6754) was released by InterGrain in 2023 primarily for the high yielding environments of WA such as the medium to high rainfall regions and the South Coast. Genie is an AH, mid to slow maturity, similar to RockStar. Genie has only been included in the WA NVT since 2023 so information is restricted to InterGrain data at the time of

publication. InterGrain data indicates that Genie yields are similar to RockStar in environments yielding above 3t/ha. Disease ratings are to be confirmed by GRDC and DPIRD in 2024.

Variety classification

Source: Wheat Quality Australia

Removal of varieties: Wheat Quality Australia (WQA) rationalise the *Wheat Variety Master List* with annual reviews of varieties that are more than ten years old and which have accounted for less than 0.1% of deliveries over the previous four seasons. In 2024, several old favourites will be removed including Carnamah, Stiletto, Spear and Halberd. The soft-wheat varieties EGA2248 and Bullaring will also be removed from the list in 2024 and 2025 respectively, due to inadequate plantings.

In attempts to improve wheat quality exports of udon noodle to Japan, Calingiri is now only received as a feed grade wheat in WA.

Australian Premium White Noodle (APWN) is a quality class created to allow varietal control of the hard wheat component of export blends with Australian Standard Noodle Wheat (ANW) and to optimise end-use quality for the premium Japanese udon noodle market. APWN classification has been determined for the following AH and APW varieties: Chief CL Plus, Cutlass, Devil, EGA Bonnie Rock, Hammer CL Plus, King Rock, LRPB Avenger, LRPB Havoc, LRPB Trojan, LRPB Scout, Mace, RockStar, Sheriff CL Plus, Vixen, Westonia and Wyalkatchem.

New classifications:

Australian White Wheat (AWW) is a new general-purpose milling wheat class suitable for the instant noodle and general-purpose flour markets. AWW meets the increasing market demand for general-purpose wheat with less complex qualities than existing classes. The AWW class will allow breeders to focus more on yield traits and less on quality attributes, which will enable faster breeding cycles within breeding programs. AWW was included in the 2021 classification guidelines and Longsword (a quick winter) is the first variety to be classified for this class in 2022. However, it is uncertain when segregations/delivery locations will be offered.

CBH has created a new wheat grade in WA called **AWW2** as a trial for the 2023–24 harvest. This new grade will replace:

- ASW1 (the milling grade that previously took protein below 9.0% – note that ASW9 takes protein >9%, see below)
- AGP1
- Fed1 (if falling number is an issue this may be open for the season)
- AUN1 (if falling number is an issue this may be open for the season).

The trial AWW2 wheat grade has been introduced to simplify the CBH wheat segregation process, which should in turn deliver supply chain efficiencies and better meet market demand for feed-specification grain.

Australian Standard White Wheat 9 (ASW9) was introduced in a statewide trial by CBH in 2022. Hard-grained wheats such as ASW with a protein concentration below 9% typically have very limited functional value and are typically sold to feed wheat markets. To ensure milling quality, ASW >9% protein was segregated from ASW <9% protein. From the 2024–25 season onwards, ASW9 (protein >9.0%) will become a national grade.

What variety should I grow?

Scepter dominates the WA wheat planting area, accounting for half of all hectares sown and superseding Mace, which continues to decline in acreage (Table 1). The area planned for sowing in 2023 was not available at the time of publication, but it is anticipated that Vixen and Calibre will increase at the expense of Scepter. The total area sown to IMI tolerant wheat is expected to remain static at about 10% in 2023. About 300,000 hectares of wheat are still being sown to varieties that have been superseded for yield, disease and quality attributes. These varieties include Mace, Yitpi and Magenta several other less popular varieties that together account for 10% of WA's wheat area. In some cases, these long-retained varieties are slower maturity types that are being retained to take advantage of earlier sowing opportunities. In recent years, there has been a significant yield improvement in varieties within the mid-slow maturity class and growers are encouraged to compare the performance of these varieties and consider their uptake.

Table 1. Proportion (%) of total area sown to individual wheat varieties in WA (2018–2022)

Variety	2018	2019	2020	2021	2022
Scepter	37.8	52.4	53.2	51.3	50.1
Vixen	-	0.0	0.2	3.4	9.1
Chief CL Plus	1.0	4.9	6.3	9.0	6.5
Devil	-	0.3	2.6	4.5	5.0
RockStar	-	-	-	1.7	4.4
Ninja	3.0	5.1	5.2	4.5	4.4
Zen	6.0	4.0	5.0	4.6	4.0
Mace	31.0	17.0	12.0	7.1	3.8
LRPB Havoc	0.0	1.0	3.0	5.0	3.4
Hammer CL Plus	-	-	-	0.1	2.2
Kinsei	-	0.0	0.3	0.7	1.0
Yitpi	1.5	1.1	1.2	0.9	0.6
Catapult	-	-	-	0.3	0.6
Illabo	-	0.1	0.3	0.8	0.6
Magenta	3.0	2.0	1.4	0.8	0.6
Cutlass	0.4	0.8	0.9	0.5	0.5
Corack	1.8	1.7	1.1	0.9	0.4
Sting	-	-	-	0.1	0.4
Denison	-	-	-	0.0	0.3
Machete	0.1	0.5	0.4	0.4	0.3
Calingiri	6.0	3.0	3.0	1.0	0.3
Calibre	-	-	-	-	0.3

Source: Grower estimates provided to CBH for 2018–2022. Varieties with less than 0.2% of total crop area in 2022 season are not included.

While many farming operations seek to limit the number of varieties on-farm, it is important to consider the opportunities that a diverse range of varieties can provide, particularly when matched with appropriate management. Several traits differ between well-adapted varieties and when these are used correctly, they can increase production and/or reduce risk. For example:

- selecting varieties of slower or quicker maturity to optimise yield potential across a range of sowing time opportunities and frost risk profiles.
- selecting varieties with improved or diverse disease resistance ratings to reduce disease risk.
- growing varieties of multiple quality grades to respond to different pricing signals.

In addition to diversification within the wheat program, diversification of crop types can also reduce risk and improve overall productivity.

When selecting wheat varieties, it is important to consider:

- yield performance in a specific environment over multiple seasons
- matching variety maturity to a targeted sowing time
- varietal herbicide tolerance and weed control options
- varietal disease resistance ratings, particularly for prevalent diseases. **Please note** that due to the incursion of new strains and mutations of pathogens already present in WA, it is essential to review disease ratings of existing varieties each year as these can change.
- susceptibility to pre-harvest sprouting (presented as falling number index ratings) and blackpoint, particularly if sowing into April or early May where the risk is higher.

Tables 2 to 5 compare current and new wheat varieties with WA's most popular variety Scepter. Agronomic characteristics and disease traits will vary in priority depending on the pressures present in the target environment and farming system. In Tables 2 to 5, the statewide MET yield (presented as a percentage of site mean) is combined across the six Agzones and a five-year weighted average has been calculated from the MET data. Caution should be exercised when examining the weighted average as it can mask important variety-by-environment interactions (i.e. how variety performance changes under different environmental conditions). Refer to Tables 6 to 11 for a more precise estimate of variety performance in specific regions for NVT main season sowings.

Early season or late April sowing performances are provided in the section 'Early season NVT' and in Tables 14 to 16.

AH and APW quick-mid season varieties

In 2023, there are three quick-mid maturity releases, Thumper (IGW6884) and the two imidazolinone (IMI) herbicide tolerant varieties Tomahawk CL Plus (RAC3261) and Dozer (IGW6783). More detail for the two CL Plus varieties is provided in the 'CL Plus' section, pages 11 and 12.

Growers continue to have a wide range of wheat varieties to choose from for May and June sowing times. It is important to take advantage of varietal tolerances to herbicide and disease and to adopt varieties with a range of maturity lengths to allow for a diversity of sowing and germination opportunities.

Scepter remains a strong overall package for sowing in May, achieving consistently high yields and having relatively good disease and pre-harvest sprouting resistance (see Tables 2, 18 and 20). However as indicated in Table 2, Vixen, Calibre and Devil may have a slight yield advantage over Scepter, depending on the environment. The yield advantage of Vixen and Calibre is more evident in Agzones 4 and 5 (Tables 9 and 10) and to a lesser extent in Agzones 1 and 2 (Tables 6 and 7). Devil has a yield advantage over Scepter in Agzones 3 and 6, but is more susceptible to preharvest sprouting which is likely to be a higher risk factor in these Agzones.

Table 2. Relative performance of top-yielding quick and quick-mid maturity wheat varieties compared to Scepter

	Scepter	Vixen	Calibre	Devil	Tomahawk CL Plus	Sting	Thumper	LRPB Havoc
Statewide MET yield (% site mean) ¹	109%	111%	111%	110%	110% [^]	109%	2023 1st year in NVT	106%
Maturity	Quick-mid	Quick	Quick-mid	Quick-mid	Quick-mid	Quick	Quick-mid	Quick-mid
Classification	AH	AH (N)	AH	AH(N)	APW	AH	APW	AH(N)
Falling no. index	5	3	6p	3	-	4p	-	3
Stem rust	MRMS	MRMS	MR	S	MR _p	MRMS	-	S
Stripe rust	RMR	MRMS	RMR	MR	RMR _p	MR	-	MR
Leaf rust	MSS	SVS	S	SVS	Sp	SVS	-	S
Powdery mildew	S	SVS	MSS	S	-	S	-	MSS
Yellow spot	MRMS	MRMS	MRMS	MRMS	MRMS _p	MRMS	-	MRMS

¹Regional differences in yield are masked when using a statewide average of the WA wheat NVT MET data (2018–2022). Readers are directed to Tables 6 to 11 for a more precise estimate of variety performance in their region. (N) = supplementary classification of APWN. Refer to page 4 for interpreting resistance classification. p = provisional rating. [^] = single year of NVT data in 2022. Falling no. index please refer to page 35.

Thumper has been in the NVT since 2023, with InterGrain data indicating it is higher yielding than Devil, Scepter and Calibre. However, it will be important to revise yield data on this variety when the 2023 NVT becomes available in early 2024.

Calibre and Tomahawk CL Plus offer an improved stem rust rating in the quick- to mid-season maturity group. All varieties competing in this maturity class are MRMS for yellow spot and most are SVS or S to powdery mildew and the new strain of leaf rust. The exceptions are Scepter with MSS for leaf rust and Calibre and LRBP Havoc with MSS for powdery mildew (Table 2). Brumby, the quickest of the mid-slow maturity group, has a disease rating of R, making it the highest of all main season varieties (Tables 4 and 18).

Quick maturity wheats have often been seen as a way to avoid drought stress, particularly when sowing late. However, they make up only a small component of the WA crop primarily because quick-mid maturity varieties like Scepter yield similarly in seasons with later emergence and the quick maturity wheats have not performed well in seasons with an early germination or later rainfall distribution.

Vixen has quick maturity and offers an alternative variety in this group. In 2022, Vixen sown in mid to late May flowered, on average, eight days before Scepter (ranging from -4 to -12 days, Table 13). Vixen is currently one of the highest yielding varieties, as mentioned above, and is likely to be the preferred option when choosing a quick season wheat. Although Vixen is very competitive, the variety should be targeted to later sowing and scenarios with higher risk of terminal drought (e.g. shallow soils and/or low rainfall environments).

CL Plus wheats

Wheat varieties denoted with 'CL Plus' are varieties with two resistance genes for imidazolinone (IMI) herbicides and are registered for spraying with label rates of Intervix®. Unlike traits such as Triazine Tolerance in canola, IMI-herbicide resistance genes in wheat are not known to reduce growth or cost yield. However, until now, IMI-tolerant wheats have lagged behind the highest yielding wheat varieties.

Tomahawk CL Plus and Dozer are two new APW quick-mid releases in 2023 and are leading the way in IMI-wheats becoming competitive with the current yield benchmark Scepter. Tomahawk CL Plus is closely related to Scepter and was included in the 2022 WA NVT where it yielded

2–3% higher. While AGT suggest that the yield difference will be less in the long-term, Tomahawk CL Plus will provide an important option to use Intervix® in-crop for certain weed control or in managing the imidazolinone herbicide soil residues from previous crops.

Dozer has been present in NVT since 2023, however InterGrain data indicate it is higher yielding than Hammer CL Plus. It will be important to revise the performance on this variety when the 2023 NVT becomes available in early 2024.

LRPB Anvil CL Plus is an AH quick IMI-tolerant variety, which has a clear advantage in the quicker season environments of Agzones 2, 4 and 5 (Tables 6–11).

In 2021, InterGrain released the mid-slow maturing AH Valiant CL Plus, which provides growers with a more appropriate maturity for use with the Clearfield system in earlier sowing opportunities. Valiant has been tested in the 'main' and 'early season' WA NVT over the past three seasons. It yielded similarly to Cutlass and Denison when sown in May or mid-to-late April (Tables 4 and 14) but was lower yielding than the quicker CL Plus varieties (Table 3).

The yields of LRPB Anvil CL Plus, Razor CL Plus, Hammer CL Plus, Chief CL Plus and Sheriff CL Plus were competitive with Mace in the NVT, however, yields were inferior to other non-imidazolinone resistant varieties. Hammer CL Plus is AH and APWN, which may be prone to lodging. Chief CL Plus and Sheriff CL Plus are both classified as APW and APWN. Razor CL Plus is classified as ASW. Disease packages vary significantly within Clearfield varieties, as does their susceptibility to preharvest sprouting, which may influence their adoption.

Note: there are no grower-to-grower sales permitted for any CL Plus varieties.

Mid-slow maturity varieties in main season NVT

Mid-slow maturity wheats, as their name suggests, show a delayed rate of development compared to the widely grown quick-mid types. When sown early, the mid-slow varieties are slower to flower than faster wheats, which enables a greater biomass accumulation and therefore yield potential. When sown on mainstream sowing dates mid-slow maturity wheats exhibit delayed development, which can help to avoid frost.

Table 3. Relative performance of CL Plus wheat varieties compared to Scepter

	Scepter	Tomahawk CL Plus	LRPB Anvil CL Plus	Razor CL Plus	Hammer CL Plus	Chief CL Plus	Dozer	Valiant CL Plus
Statewide MET yield (% site mean) ¹	109%	110% [^]	104%	103%	102%	101%	2023 1st year in NVT	99%
Maturity	Quick-mid	Quick-mid	Quick	Quick-mid	Quick-mid	Mid	Quick-mid	Mid-slow
Classification	AH	APW	AH	ASW	AH (N)	APW(N)	APW	AH
Falling no. index	5	-	2/3 _p	4	4	4	-	2/3 _p
Stem rust	MRMS	MR _p	MR	MRMS	MR	MR	MS _p	MR
Stripe rust	RMR	RMR _p	RMR	RMR	RMR	S	MRMS _p	RMR
Leaf rust	MSS	Sp	SVS	S	S	MR*	Sp	S
Powdery mildew	S	-	Sp	MSS	SVS	S	-	S
Yellow spot	MRMS	MRMS _p	MSS	MSS	MRMS	MRMS	MS _p	MRMS

¹Regional differences in yield are masked when using a statewide average of the WA wheat NVT MET data (2018–2022). Readers are directed to Tables 6 to 11 for a more precise estimate of variety performance in their region. (N) = supplementary classification of APWN. Refer to page 4 for interpreting resistance classification. * Some other races can attack these varieties. *p* = provisional rating. [^] = single year of NVT data in 2022. Falling no. index please refer to page 35.

Within this mid-slow maturity category are faster and slower types and this impacts their performance in main-season NVT yield data. For example, Cutlass, Denison and Valiant CL Plus are much slower than the other varieties in this category. The spread of phenology responses show RockStar flowering, on average, seven days after Scepter and Cutlass thirteen days after Scepter when sown in mid-May (Table 13). When sown in April, maturity of mid-slow varieties will be delayed more than those in the quick-mid maturing category (Figure 2, page 24).

Genie (IGW6754) is a new entry into this maturity group and was tested in WA NVT for the first time in 2023. InterGrain data indicates that Genie yields similarly to RockStar in southern WA. It will be important to review the performance of this variety when the 2023 NVT becomes available in early 2024.

RockStar and Brumby performed well in the main season NVT (Table 4), with RockStar yielding similar to Scepter despite its slightly later maturity (average of six days in 2021 and seven days in 2022, see Table 13). Brumby is slightly quicker than RockStar (average of two days in 2022, Table 13). Catapult and Kinsei yielded more than other mid-slow varieties such as Denison, Valiant CL Plus and Cutlass.

In earlier sowing opportunities (late April to early May) the yield advantage of mid-slow varieties can be significant over quicker maturity counterparts. However, this yield advantage is not always picked up in the main season NVT, which are commonly sown at a date best suited to quick-mid maturity varieties (see – Sowing time response page 25, and Early season NVT page 26–28). In addition,

when sowing/emergence is delayed the newer mid-slow varieties have a much lower risk of poor yields than superseded mid-slow maturity varieties such as Magenta and Yitpi (see NVT results in Tables 6–11).

Catapult, RockStar, Valiant CL Plus and Brumby have superior stem (MR) and stripe (RMR) rust resistance than Kinsei (MSS for stem and MRMS for stripe) and Denison (MS for stem and MR for stripe). Apart from Cutlass (RMR) and Kinsei (MSS), other recent mid-slow releases are all S or SVS to the new pathotype of leaf rust. However, Cutlass has an inferior rating for yellow spot compared to other mid-slow varieties, which are all MRMS. Brumby has the highest powdery mildew rating (R*) of all varieties currently grown in WA. Catapult can look worst for disease due to its leaf speckling, but this is a physiological response, which typically has no effect on yield.

Falling number index ratings suggest RockStar is at high risk of low falling number. The difference in ratings is very evident when RockStar is sown in April or early May. Valiant CL Plus is now provisionally rated as 2/3_p while Brumby is higher than Scepter at 6_p.

Winter or long season spring wheats in Early season NVT

Please refer to 'Early season NVT' on page 26.

ANW

ANW is WA's premium wheat product. Recent changes in the blend of noodle wheat for the Japanese market have resulted in an increase in the ratio of ANW to APW from the long-term, stable ratio of 60:40, to a ratio of 80:20. This has

Table 4. Relative performance of mid–slow maturity wheat varieties compared to Scepter in main season NVT (refer to Tables 15 and 16 for early season NVT)

	Scepter	RockStar	Brumby	Catapult	Kinsei	Denison	Genie	Valiant CL Plus
Statewide MET yield (% site mean) ¹	109%	109%	108%	104%	103%	101%	2023 1st year in NVT	99%
Maturity	Quick-mid	Mid-slow	Mid-slow	Mid-slow	Mid-slow	Mid-slow	Mid-slow	Mid-slow
Classification	AH	AH(N)	APW	AH	ANW	APW	AH	AH
Falling no. index	5	2	6 _p	6	4	5	-	2/3 _p
Stem rust	MRMS	MRMS	MR	MR	MSS	MS	-	MR
Stripe rust	RMR	RMR	RMR	RMR	MRMS	MR	-	RMR
Leaf rust	MSS	S	SVS	S	MSS	S	-	S
Powdery mildew	S	MS	R*	S	S	S	-	S
Yellow spot	MRMS	MRMS	MRMS	MRMS	MS	MRMS	-	MRMS

¹Regional differences in yield are masked when using a statewide average of the WA wheat NVT MET data (2018–2022). Readers are directed to Tables 6 to 11 for a more precise estimate of variety performance in their region. (N) = supplementary classification of APWN. Refer to page 4 for interpreting resistance classification. * Some other races can attack these varieties. _p = provisional rating. ^ = single year of NVT data in 2022. Falling no. index please refer to page 35.

increased the volume/proportion of ANW to the premium Japanese market. In this ratio, the APW component has also become only the varieties with the APWN classification. In recent years, APW1 prices have increased at harvest due to limited higher protein wheat in the State, with ANW failing to maintain a premium over APW1. As a result, plantings of ANW have declined and this may see a premium price return in the future.

Since the 2022 harvest Calingiri is now classified as FEED, with its yield and quality superseded by Kinsei, Ninja, Zen and now the new release, Firefly (IGW8192).

Firefly is InterGrain's first ANW release since the release of Kinsei in 2018. InterGrain data indicates that Firefly is higher yielding than the current ANW varieties in WA and possibly slightly higher yielding than Scepter. Firefly is similar in maturity to Zen. However, it will be important to review the performance of Firefly when the 2023 NVT results become available in early 2024.

Ninja is currently the highest yielding ANW in the main season NVT and has yielded below Scepter over the past five years (Table 5). The slower maturing Kinsei has performed relatively well, with Ninja and Kinsei yielding slightly higher than Zen. Ninja is marginally quicker in maturity than Firefly and Zen, while Kinsei is slightly slower in maturity. As Ninja is 'S' to leaf and stem rust, disease should be actively monitored and managed. Firefly is provisionally marginally better than Ninja and Zen for leaf rust, which is similar to Kinsei. Of the four ANW varieties, Kinsei's disease ratings are marginally better for stem rust, similar to Zen for stripe rust and currently a MS for yellow spot compared to MRMS for Firefly, Ninja and Zen.

When sown in late April in the early NVT, yields of Kinsei were slightly below RockStar and similar to Cutlass, Valiant CL Plus and Catapult (Table 14). However, with a rating of S for black point, there is a higher risk of Kinsei grain being downgraded when sown early.

Table 5. Relative performance of noodle wheat varieties compared to Scepter

	Scepter	Firefly	Ninja	Kinsei	Zen
Statewide MET yield (% site mean) ¹	110%	Data to be released in 2024	105%	103%	102%
Maturity	Quick-mid	Mid-slow	Mid	Mid-slow	Mid-slow
Classification	AH	ANW	ANW	ANW	ANW
Falling no. index	5	-	4	4	3
Stem rust	MRMS	Sp	S	MSS	S
Stripe rust	RMR	MSS _p	MS	MRMS	MRMS
Leaf rust	MSS	MSS _p	S	MSS	S
Powdery mildew	S	-	MSS	S	S
Yellow spot	MRMS	MRMS _p	MRMS	MS	MRMS

¹Regional differences in yield are masked when using a statewide average of the WA wheat NVT MET data (2018–2022). Readers are directed to Tables 6 to 11 for a more precise estimate of variety performance in their region. Refer to page 4 for interpreting resistance classification. _p = provisional rating. Falling no. index please refer to page 35.



Grain yield

**Brenda Shackley and Dion Nicol
(DPIRD)**

The GRDC National Variety Trials (NVT) provide an independent assessment of crop variety performance in WA. NVT results can be viewed as individual site reports or as multi-environment (MET) long-term summaries that provide insight into variety yield performance across environments and seasons. Tables 6 to 11 are outputs extracted from nvtonline.com.au and provide the MET data for the six Agzones in WA between 2018 and 2022. Where there is more than one year of data, or four or more observations, a five-year weighted average has been calculated from the MET data, including the predicted yields for varieties that were absent at a site or in a season. Caution should be exercised when examining the weighted average

as it can mask important variety-by-environment interactions (i.e. how a variety performance changes under different environmental conditions).

The overall performance of a variety within an Agzone does not necessarily capture the variation in relative yield performance of varieties in response to those environments. Major drivers in the relative performance of a variety include its maturity and germination timing, the amount and timing of rainfall and occurrence of abiotic stressors such as drought, heat shock and frost damage. Growers are encouraged to consider the predominant environmental conditions experienced in any given season in their region when interpreting relative varietal performance in local NVTs.

Visit app.nvtonline.com.au to access the NVT Online Long-Term Yield Reporter.

Table 6. Grain yield of wheat varieties in AGZONE 1 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			3.58	1.13	3.64	3.98	4.64	
Variety	Maturity	(No. trials)	(6)	(5)	(4)	(5)	(4)	(24)
Australian Hard								
Emu Rock	Quick	(24)	99	96	95	99	88	96
LRPB Anvil CL Plus	Quick	(9)	-	-	-	104	90	103
Sting	Quick	(18)	-	114	106	107	101	108
Vixen (N)	Quick	(24)	114	117	106	112	101	111
Calibre	Quick-mid	(13)	-	-	107	104	106	109
Devil (N)	Quick-mid	(24)	109	113	106	107	109	109
Hammer CL Plus (N)	Quick-mid	(13)	-	-	101	100	97	101
LRPB Havoc (N)	Quick-mid	(24)	110	108	101	111	98	106
Mace (N)	Quick-mid	(24)	104	104	98	102	97	101
Scepter	Quick-mid	(24)	109	112	106	108	107	109
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(24)	101	105	101	98	107	102
RockStar (N)	Mid-slow	(24)	106	111	107	107	113	109
Yitpi	Mid-slow	(24)	91	90	92	86	96	91
Valiant CL Plus	Mid-slow	(9)	-	-	-	98	108	99
Australian Premium White								
LRPB Avenger (N)	Quick	(13)	-	112	98	-	95	105
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	110	-
Dozer	Quick-mid	(-)	-	-	-	n/a	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(24)	103	101	96	105	99	101
Sheriff CL Plus (N)	Mid	(18)	-	99	100	103	101	101
Brumby	Mid-slow	(9)	-	-	-	108	111	108
Cutlass (N)	Mid-slow	(24)	96	98	97	93	106	98
Denison	Mid-slow	(13)	-	-	102	102	111	102
LRPB Trojan (N)	Mid-slow	(24)	92	92	105	95	101	96
Magenta	Mid-slow	(24)	90	90	95	88	99	92
Australian Noodle Wheat								
Firefly	Mid-slow	(5)	-	-	-	104	-	-
Ninja	Mid	(24)	103	105	106	104	108	105
Kinsei	Mid-slow	(24)	101	103	105	103	110	104
Zen	Mid-slow	(24)	104	102	100	107	102	103
Australian Standard White								
Razor CL Plus	Quick-mid	(24)	105	105	102	105	96	103

(N) = supplementary classification of APWN. ■ = new releases for 2024 season. n/a = data to be released in 2024.

Source: NVT Online, nvtonline.com.au

Table 7. Grain yield of wheat varieties in AGZONE 2 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			4.04	2.22	2.74	4.45	4.96	
Variety	Maturity	(No. trials)	(14)	(16)	(14)	(15)	(16)	(75)
Australian Hard								
Emu Rock	Quick	(75)	94	101	99	96	90	96
LRPB Anvil CL Plus	Quick	(45)	-	-	106	104	93	104
Sting	Quick	(61)	-	114	111	108	104	109
Vixen (N)	Quick	(75)	109	118	114	112	103	111
Calibre	Quick-mid	(45)	-	-	111	108	109	110
Devil (N)	Quick-mid	(75)	109	110	109	110	109	109
Hammer CL Plus (N)	Quick-mid	(45)	-	-	104	101	99	102
LRPB Havoc (N)	Quick-mid	(75)	105	109	107	108	98	105
Mace (N)	Quick-mid	(75)	101	106	103	102	98	102
Scepter	Quick-mid	(75)	108	110	109	109	107	109
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(75)	104	103	101	102	106	103
RockStar (N)	Mid-slow	(75)	110	106	107	110	112	109
Yitpi	Mid-slow	(75)	92	92	90	89	96	92
Valiant CL Plus	Mid-slow	(45)	-	-	95	101	104	99
Australian Premium White								
LRPB Avenger (N)	Quick	(46)	-	114	108	-	97	106
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	109	-
Dozer	Quick-mid	(-)	-	-	-	n/a	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(75)	102	101	99	103	97	100
Sheriff CL Plus (N)	Mid	(61)	-	98	100	102	100	100
Brumby	Mid-slow	(31)	-	-	-	109	110	108
Cutlass (N)	Mid-slow	(75)	100	95	95	97	104	98
Denison	Mid-slow	(61)	-	96	98	104	108	102
LRPB Trojan (N)	Mid-slow	(75)	96	91	97	94	102	96
Magenta	Mid-slow	(75)	94	90	91	91	99	93
Australian Noodle Wheat								
Firefly	Mid-slow	(15)	-	-	-	106	-	-
Ninja	Mid	(75)	105	102	105	105	107	105
Kinsei	Mid-slow	(75)	105	99	101	105	108	104
Zen	Mid-slow	(75)	103	101	101	105	100	102
Australian Standard White								
Razor CL Plus	Quick-mid	(75)	102	107	106	103	98	103

(N) = supplementary classification of APWN. ■ = new releases for 2024 season. n/a = data to be released in 2024.

Source: NVT Online, nvtonline.com.au

Table 8. Grain yield of wheat varieties in AGZONE 3 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			3.00	3.33	3.73	5.02	5.34	
Variety	Maturity	(No. trials)	(3)	(4)	(5)	(4)	(5)	(21)
Australian Hard								
Emu Rock	Quick	(21)	97	98	92	93	87	93
LRPB Anvil CL Plus	Quick	(9)	-	-	-	95	93	101
Sting	Quick	(18)	-	110	106	106	102	106
Vixen (N)	Quick	(21)	112	115	108	106	103	108
Calibre	Quick-mid	(14)	-	-	109	109	108	109
Devil (N)	Quick-mid	(21)	109	110	110	109	111	110
Hammer CL Plus (N)	Quick-mid	(14)	-	-	100	100	97	100
LRPB Havoc (N)	Quick-mid	(21)	109	109	103	101	99	104
Mace (N)	Quick-mid	(21)	103	105	100	99	98	101
Scepter	Quick-mid	(21)	109	109	108	108	108	108
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(21)	102	103	105	104	108	105
RockStar (N)	Mid-slow	(21)	108	108	111	110	114	110
Yitpi	Mid-slow	(21)	91	92	93	93	96	93
Valiant CL Plus	Mid-slow	(14)	-	-	103	101	109	103
Australian Premium White								
LRPB Avenger (N)	Quick	(14)	-	112	102	-	98	103
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	110	-
Dozer	Quick-mid	(-)	-	-	-	-	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(21)	104	104	100	98	101	101
Sheriff CL Plus (N)	Mid	(18)	-	100	101	100	101	101
Brumby	Mid-slow	(9)	-	-	-	109	111	108
Cutlass (N)	Mid-slow	(21)	97	98	101	100	107	101
Denison	Mid-slow	(18)	-	100	106	105	112	106
LRPB Trojan (N)	Mid-slow	(21)	92	89	98	102	98	96
Magenta	Mid-slow	(12)	91	91	95	-	-	95
Australian Noodle Wheat								
Firefly	Mid-slow	(4)	-	-	-	109	-	-
Ninja	Mid	(21)	103	102	106	107	107	105
Kinsei	Mid-slow	(21)	103	101	107	106	110	106
Zen	Mid-slow	(21)	105	104	102	101	103	103
Australian Standard White								
Razor CL Plus	Quick-mid	(21)	104	105	100	101	96	101

(N) = supplementary classification of APWN. ■ = new releases for 2024 season.

Source: NVT Online, nvtonline.com.au

Table 9. Grain yield of wheat varieties in AGZONE 4 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			3.28	1.18	2.31	3.99	4.33	
Variety	Maturity	(No. trials)	(9)	(9)	(11)	(6)	(11)	(46)
Australian Hard								
Emu Rock	Quick	(46)	97	102	103	99	92	98
LRPB Anvil CL Plus	Quick	(28)	-	-	111	108	94	107
Sting	Quick	(37)	-	120	113	110	105	111
Vixen (N)	Quick	(46)	111	122	118	115	105	114
Calibre	Quick-mid	(28)	-	-	110	108	108	112
Devil (N)	Quick-mid	(46)	109	113	108	109	108	109
Hammer CL Plus (N)	Quick-mid	(28)	-	-	105	102	100	104
LRPB Havoc (N)	Quick-mid	(46)	106	108	112	111	100	107
Mace (N)	Quick-mid	(46)	103	107	105	104	98	103
Scepter	Quick-mid	(46)	108	112	110	110	107	109
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(46)	103	105	99	100	104	102
RockStar (N)	Mid-slow	(46)	108	106	105	107	110	107
Yitpi	Mid-slow	(46)	93	93	87	87	93	91
Valiant CL Plus	Mid-slow	(17)	-	-	-	96	101	96
Australian Premium White								
LRPB Avenger (N)	Quick	(31)	-	119	112	-	98	109
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	111	-
Dozer	Quick-mid	(-)	-	-	-	n/a	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(46)	102	97	102	104	98	100
Sheriff CL Plus (N)	Mid	(37)	-	95	100	102	101	100
Brumby	Mid-slow	(17)	-	-	-	108	109	106
Cutlass (N)	Mid-slow	(46)	98	95	90	93	101	96
Denison	Mid-slow	(28)	-	-	95	100	105	98
LRPB Trojan (N)	Mid-slow	(46)	94	91	94	94	102	95
Magenta	Mid-slow	(46)	93	90	86	88	97	91
Australian Noodle Wheat								
Firefly	Mid-slow	(6)	-	-	-	103	-	-
Ninja	Mid	(46)	104	102	103	104	107	104
Kinsei	Mid-slow	(46)	102	96	99	102	107	101
Zen	Mid-slow	(46)	102	97	104	105	101	102
Australian Standard White								
Razor CL Plus	Quick-mid	(46)	103	109	109	106	100	105

(N) = supplementary classification of APWN. ■ = new releases for 2024 season. n/a = data to be released in 2024.

Source: NVT Online, nvtonline.com.au

Table 10. Grain yield of wheat varieties in AGZONE 5 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			2.43	2.06	2.09	4.02	3.82	
Variety	Maturity	(No. trials)	(4)	(4)	(6)	(5)	(6)	(25)
Australian Hard								
Emu Rock	Quick	(25)	97	100	101	93	93	97
LRPB Anvil CL Plus	Quick	(17)	-	-	116	101	105	110
Sting	Quick	(21)	-	116	117	110	108	113
Vixen (N)	Quick	(25)	118	119	122	112	111	116
Calibre	Quick-mid	(17)	-	-	117	113	111	116
Devil (N)	Quick-mid	(25)	113	112	112	112	112	112
Hammer CL Plus (N)	Quick-mid	(17)	-	-	106	102	100	104
LRPB Havoc (N)	Quick-mid	(25)	105	108	113	105	107	108
Mace (N)	Quick-mid	(25)	106	106	107	101	102	104
Scepter	Quick-mid	(25)	111	111	113	111	110	111
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(25)	108	105	101	104	105	104
RockStar (N)	Mid-slow	(25)	109	108	108	112	112	110
Yitpi	Mid-slow	(25)	97	93	87	90	92	91
Valiant CL Plus	Mid-slow	(17)	-	-	92	99	104	97
Australian Premium White								
LRPB Avenger (N)	Quick	(16)	-	116	117	-	107	112
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	115	-
Dozer	Quick-mid	(-)	-	-	-	-	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(25)	99	100	102	100	104	101
Sheriff CL Plus (N)	Mid	(21)	-	96	99	100	101	99
Brumby	Mid-slow	(11)	-	-	-	110	109	107
Cutlass (N)	Mid-slow	(25)	101	97	92	98	101	98
Denison	Mid-slow	(21)	-	95	95	103	106	100
LRPB Trojan (N)	Mid-slow	(25)	90	90	90	97	92	92
Magenta	Mid-slow	(14)	94	91	85	-	-	91
Australian Noodle Wheat								
Firefly	Mid-slow	(5)	-	-	-	108	-	-
Ninja	Mid	(25)	103	103	103	107	105	104
Kinsei	Mid-slow	(25)	99	98	99	106	106	102
Zen	Mid-slow	(25)	97	99	103	102	105	102
Australian Standard White								
Razor CL Plus	Quick-mid	(25)	105	107	110	103	101	105

(N) = supplementary classification of APWN. ■ = new releases for 2024 season.

Source: NVT Online, nvtonline.com.au

Table 11. Grain yield of wheat varieties in AGZONE 6 expressed as a percentage of site mean yield for each trial year (2018–2022) and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year			2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)			3.78	4.3	3.65	4.24	4.53	
Variety	Maturity	(No. trials)	(2)	(1)	(3)	(2)	(3)	(11)
Australian Hard								
Emu Rock	Quick	(11)	93	90	90	93	90	91
LRPB Anvil CL Plus	Quick	(5)	-	-	-	98	97	98
Sting	Quick	(9)	-	105	106	106	103	105
Vixen (N)	Quick	(11)	107	107	109	109	104	107
Calibre	Quick-mid	(8)	-	-	109	106	108	108
Devil (N)	Quick-mid	(11)	109	112	112	110	110	111
Hammer CL Plus (N)	Quick-mid	(8)	-	-	98	99	98	99
LRPB Havoc (N)	Quick-mid	(11)	103	105	105	108	101	104
Mace (N)	Quick-mid	(11)	100	100	100	100	99	100
Scepter	Quick-mid	(11)	107	110	110	109	107	108
Genie	Mid-slow	(-)	-	-	-	-	-	-
Catapult	Mid-slow	(11)	105	106	105	102	106	105
RockStar (N)	Mid-slow	(11)	110	114	114	112	112	112
Yitpi	Mid-slow	(11)	95	92	90	87	95	92
Valiant CL Plus	Mid-slow	(8)	-	-	105	103	108	105
Australian Premium White								
LRPB Avenger (N)	Quick	(7)	-	102	102	-	100	102
Tomahawk CL Plus	Quick-mid	(4)	-	-	-	-	110	-
Dozer	Quick-mid	(-)	-	-	-	-	-	-
Thumper	Quick-mid	(-)	-	-	-	-	-	-
Chief CL Plus (N)	Mid	(11)	101	104	103	104	102	103
Sheriff CL Plus (N)	Mid	(9)	-	102	102	103	101	102
Brumby	Mid-slow	(5)	-	-	-	112	109	110
Cutlass (N)	Mid-slow	(11)	102	103	101	98	105	102
Denison	Mid-slow	(9)	-	110	109	107	109	108
LRPB Trojan (N)	Mid-slow	(11)	96	94	96	97	96	96
Magenta	Mid-slow	(6)	96	94	93	-	-	94
Australian Noodle Wheat								
Firefly	Mid-slow	(-)	-	-	-	-	-	-
Ninja	Mid	(11)	105	107	108	107	106	107
Kinsei	Mid-slow	(11)	106	109	109	108	108	108
Zen	Mid-slow	(11)	102	106	105	107	103	104
Australian Standard White								
Razor CL Plus	Quick-mid	(11)	100	99	100	102	98	100

(N) = supplementary classification of APWN. ■ = new releases for 2024 season.

Source: NVT Online, nvtonline.com.au

Relative grain yield comparison

To help assess relative varietal performance at different site yields, NVT Online (through the Long-Term MET Yield Reporter) presents data in 'yield groups', based on trials that match the yield range. This guide presents an alternative method of viewing yield performance at different site yields and uses data extracted from the 'Statewide tables of yield and grain quality' available at nvtonline.com.au. For several years, the barley section has examined barley varieties based on yield potential or the site mean yield, highlighting differences between the barley varieties at sites with different yield potentials (pages 70–72). This edition of the Crop Sowing Guide includes a similar comparison for wheat varieties for the first time. Differences in comparative grain yield performance between varieties can depend on the yield potential of the site. For example, yield potential can reflect when the site was sown, soil type, total rainfall and its distribution during the season.

Figure 1 was developed by calculating differences between the grain yield of a variety relative to the site mean yield (the 'deviation'), with the deviation assessed for quadratic or linear trends. If the quadratic trend was significant ($p < 0.05$), a quadratic polynomial was fitted to the data. If the linear trend (but not the quadratic trend) was significant, a linear polynomial was fitted to the data. If neither the quadratic nor the linear trend was significant, the grain yield response of a variety was deemed to run parallel to the

site mean yield at the average deviation for that variety. From observations in the barley section, it is worth noting that depending on which years and locations are analysed, the relative performance of varieties may differ. This has highlighted the importance of examining more than one dataset and comparing the performance of new varieties over at least three seasons.

With wheat varieties now having high yield performance across a broader range of maturities, some interesting trends have emerged with different site mean yields have become more apparent in WA. With three seasons of data for Calibre now available, linear regressions were used to compare the response of Calibre, Scepter, Devil, RockStar and Devil at different yield potentials to clarify trends identified when comparing between the Agzones (Tables 6 to 13). Figure 1 shows that Calibre and Scepter had no significant quadratic or linear trends, indicating yields of these varieties are stable across a range of yield potentials. Vixen has a negative linear trend and does relatively better in low yielding environments (<4t/ha) which is likely due to its quicker maturity, while RockStar and Devil have a positive linear slope indicating they do better in high yielding environments (>4t/ha). It is likely that RockStar can also respond to a longer growing season than the other varieties due to its slower maturity. However, it is important to note that higher yielding environments (generally Agzones 3 and 6) may result in higher pre-harvest sprouting and that RockStar and Devil have a higher risk of pre-harvest sprouting.

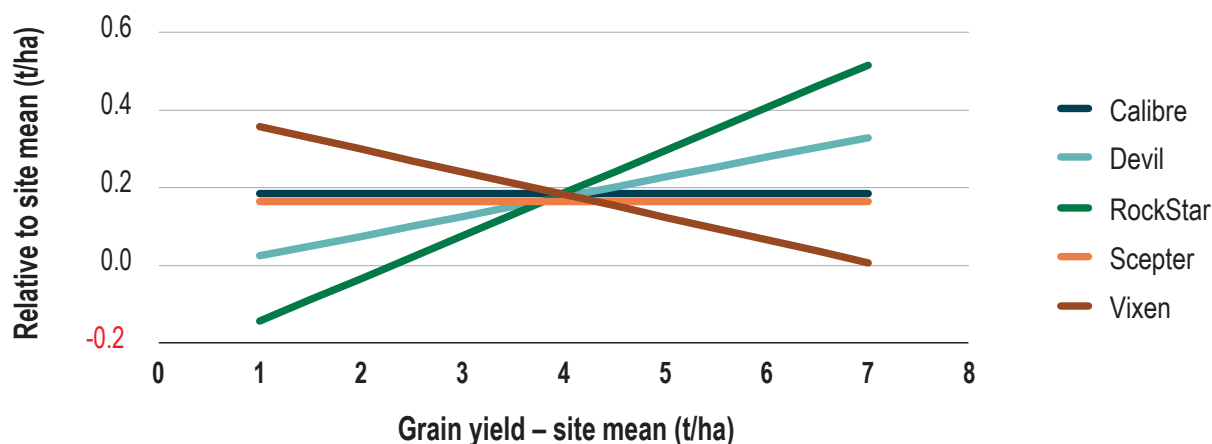


Figure 1. Fitted grain yield of Calibre, Devil, RockStar, Scepter and Vixen at different site means

Source: is based on NVT statewide tables of yield and grain quality (2020–2022). Each variety sown in all 125 trial-years of data, NVT Online, nvtonline.com.au

Suggested sowing times

Suggested sowing times for varieties (Table 12) have been developed to support decisions around sowing time preferences and opportunities. The suggestions are based on knowledge of the varieties and their performance in NVT and DPIRD agronomy trials (see *Sowing time response of wheat varieties in WA* on page 25). The suggested sowing times were developed in consultation with breeding companies and researchers. For varieties not listed in the table, refer to the maturity class of the variety.

Note: spring wheats generally have a lower yield potential if sown before late April in WA.

The number of days to flowering relative to Scepter is provided in the variety snapshots at the end of this guide. Knowing the maturity length of a variety helps with planting order planning and enables variety development to be aligned with typical seasonal conditions.

Table 12 does not suggest sowing time of wheat varieties where frost may be an issue. Frost risk is extremely variable within the landscape and across environments. Delaying sowing time and choice of variety or crop are still the most reliable ways of reducing yield losses in frost-prone areas. Frost management strategies are available on the GRDC and DPIRD websites.

Maturity

In WA, the flowering time of spring wheat varieties are broadly classified into maturity categories of quick, quick-mid, mid and mid-slow. While there are later maturing spring wheats and winter

wheats, these are not commonly grown in WA. Most spring wheat varieties grown in WA have a minor vernalisation requirement (responding to an accumulation of cold temperatures) and photoperiod sensitivity (response to daylength), which means their development is mainly driven by temperature (warmer temperatures increase development rate).

The quick-mid spring maturity type is the predominant maturity type in WA. Spring wheat varieties with a higher, albeit still limited, response to vernalisation (such as Magenta) or photoperiod (such as Cutlass) can be sown from late April as their maturity is delayed, and many of these varieties fall into the mid-slow maturity class. In recent years, very slow spring (such as LRPB Nighthawk) and winter wheats (such as Mowhawk and Illabo) with greater adaptation to the WA environment have been released, offering unique maturity characteristics for very early sowing.

Sowing spring wheats into April can result in an advanced rate of development (due to warmer temperatures and longer daylengths) and a faster time to flowering. For this reason, winter wheats are seen as having more appropriate development times for an early April (or even March) sowing in WA, primarily due to their vernalisation requirement which negates much of the warmer temperatures in April and May.

Scepter is classified as quick-mid maturity and Table 13 outlines how other varieties compared to Scepter when sown in mid to late May at the Gnowangerup and Kojonup NVT sites and in DPIRD trials in 2022. A more detailed flowering comparison between Scepter and other varieties can be found in the variety snapshots (pages 37–46).

Table 12. Suggested sowing times of wheat varieties in WA (assumes low frost risk)

AGZONES 1–6	April				May				June			
	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4
# Winter wheat (quick): Illabo, Mowhawk												
Mid-slow: Brumby, Catapult, Cutlass, Denison, Kinsei, Magenta, RockStar, Yitpi, Valiant CL Plus, Zen												
Quick-mid to mid: Calibre, Chief CL Plus, Devil, Hammer CL Plus, LRPB Havoc, Mace, Ninja, Scepter, Tomahawk CL Plus												
Quick: Emu Rock, LRPB Anvil CL Plus, LRPB Avenger, Sting, Vixen												

■ = earlier than ideal ■ = optimum sowing time ■ = later than ideal but acceptable

Suggested sowing times have been given for quick winter wheats such as Illabo or Mowhawk, however these are only applicable to southern WA where the winter types are more adapted to the longer environments (refer to Figures 3 and 4).

Table 13. Days from sowing to flowering (relative to Scepter) at selected NVT and DPIRD trials in 2022

Variety	Maturity	Southern NVTs*	Mullewa	Merredin	Katanning	Grass Patch	Average
Sowing date		Av of 13-May	13-May	18-May	10-May	16-May	
Emu Rock	Quick	-5	-	-	-	-	-
LRPB Anvil CL Plus	Quick	-5	-13	-10	-9	-10	-9
Vixen	Quick	-4	-12	-10	-8	-8	-8
LRPB Avenger	Quick	-5	-8	-9	-	-7	-7
Sting	Quick	-3	-4	-6	-5	-3	-4
Razor CL Plus	Quick-mid	-3	-	-	-	-	-
LRPB Havoc	Quick-mid	-2	-	-	-	-	-
Dozer	Quick-mid	-	-2	-2	-1	-3	-2
Mace	Quick-mid	0	-	-	-	-	-
Devil	Quick-mid	1	-	-	-	-	-
Hammer CL Plus	Quick-mid	2	2	-3	-2	1	0
Calibre	Quick-mid	-2	1	1	-4	-1	-1
Scepter	Quick-mid	0	0	0	0	0	0
Tomahawk CL Plus	Quick-mid	2	-	-	-	-	-
Chief CL Plus	Mid	4	5	3	4	5	4
Ninja	Mid	4	7	3	5	1	4
Sheriff CL Plus	Mid	5	-	-	-	-	-
Zen	Mid-slow	6	-	-	-	-	-
Brumby	Mid-slow	6	6	3	5	4	5
RockStar	Mid-slow	6	10	7	6	5	7
Kinsei	Mid-slow	10	11	9	7	6	9
Catapult	Mid-slow	9	17	10	9	8	10
Denison	Mid-slow	13	18	11	9	10	12
Valiant CL Plus	Mid-slow	13	14	8	9	8	10
Yitpi	Mid-slow	13	-	-	-	-	-
Cutlass	Mid-slow	13	19	13	10	11	13
Scepter's flowering date		Av 17 Sept	11-Aug	12-Sep	20-Sep	9-Sep	

*NVT sites include Gnowangerup and Kojonup. ■ = new releases for 2024 season.

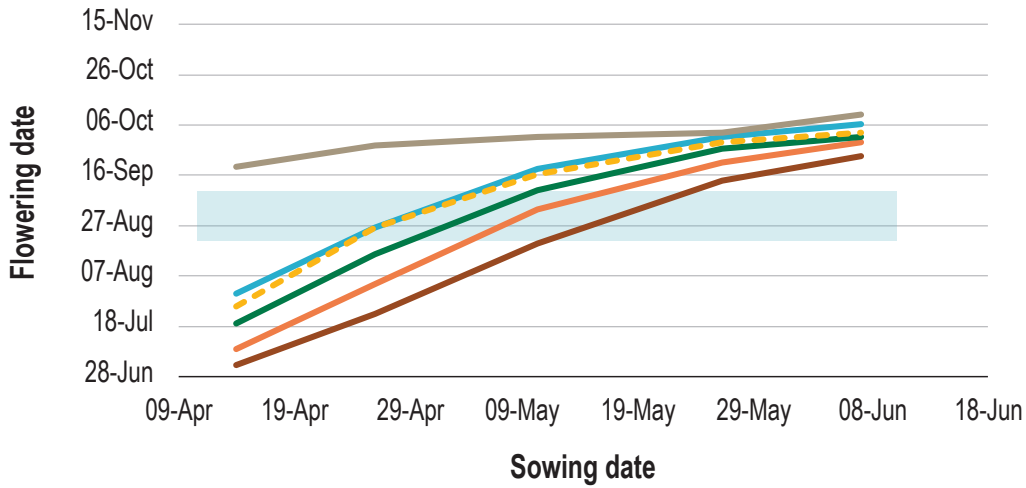
Flowering dates change with sowing date, location (Figures 2a and b) and from season to season (Figures 2b and c) predominantly due to differences in temperature, although stress can also have an impact (not shown). Figure 2 shows the large difference in flowering date measured in mid-slow spring and winter wheats at two locations (differences are greatest with an April and early May sowing). Given the genetic control of flowering is complex and is driven by environmental conditions that differ from season to season, it is important to consider data from multiple sites and seasons to better understand the maturity type of a variety.

Earlier sowing of mid-slow maturity types still results in an earlier flowering time than mid-May

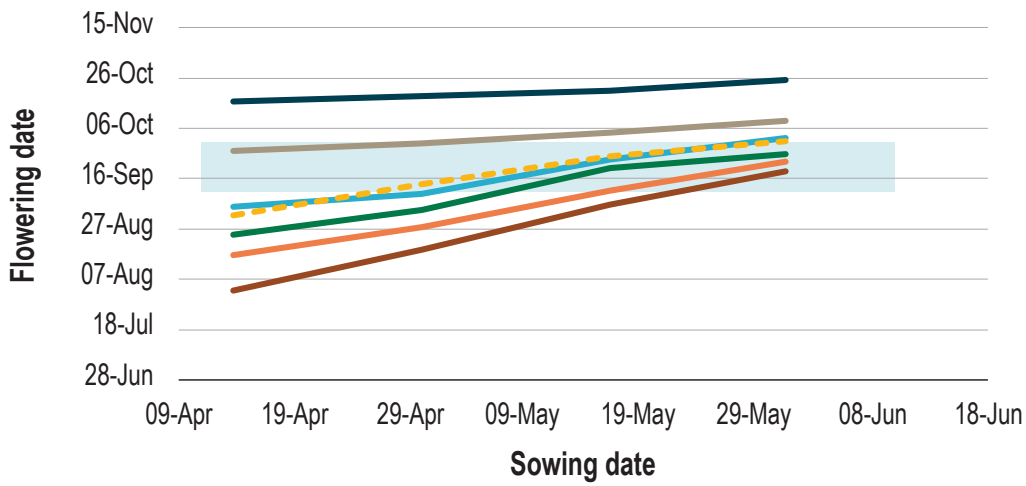
sowing of quick-mid maturity wheats. Therefore, risk factors associated with early flowering wheat such as frost damage, low falling numbers or pre-harvest sprouting and blackpoint should be considered with greater scrutiny if early sowing is planned with these maturity types

FlowerPower: is an online tool used to predict cereal flowering dates (or hay cutting dates for oats) across the WA grainbelt. FlowerPower enables the user to compare flowering date predictions over a range of sowing dates. Refer to DPIRD website or <https://www.agric.wa.gov.au/frost/flowerpower>.

(a) Merredin in 2021



(b) Katanning in 2022



(c) Katanning in 2021

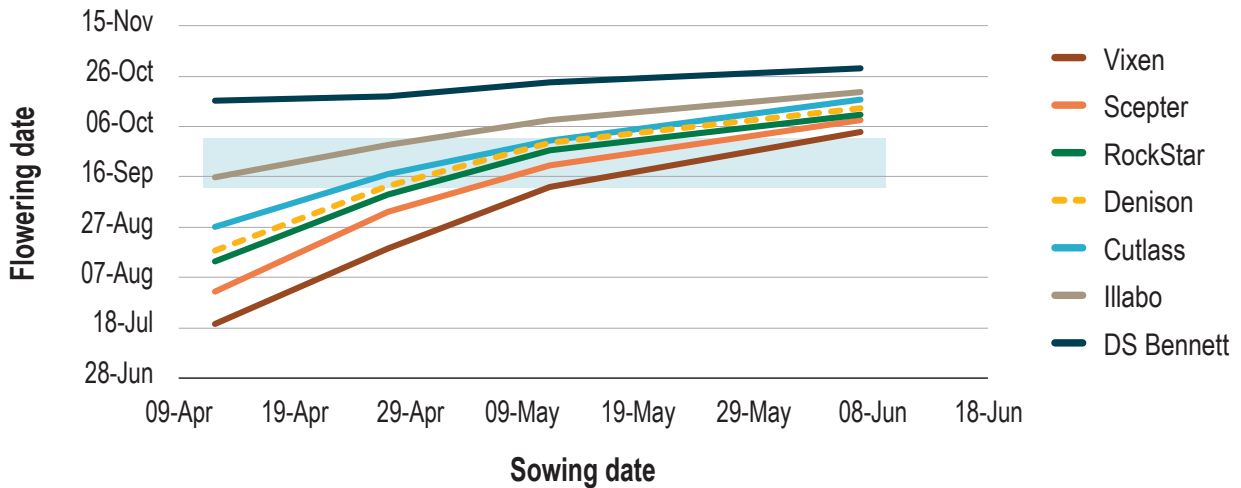


Figure 2. Flowering date of varieties sown on a range of sowing dates (mid-April to early June) at a) Merredin in 2021, b) Katanning in 2022 and c) Katanning in 2021.

Shaded area is the estimated optimum flowering window.

Sowing time response of wheat varieties in WA

Matching varieties to their optimum sowing date is key to maximising wheat yield potential in WA. However, as the environmental constraints of each season differ in significance, prevalence and timing, the perfect match of sowing date and variety development is difficult to achieve. For example, many wheat growing areas in WA have had both tight, dry finishes and cool, long finishes over the past few years. These differing conditions alter the developmental timings of wheat crops and result in one maturity type being favoured over another for any given sowing date. Despite this, there are some consistencies that occur over several seasons which can guide appropriate variety choice for any sowing opportunity.

Most of the main season wheat NVTs germinate from mid-May onwards, a time best suited to the quicker maturity varieties that currently dominate WA's wheat area. DPIRD research in 2020, 2021 and 2022 assessed the best variety choices for any given sowing date and the best match of

variety maturity types to sowing opportunities in specific environments.

Even at the vastly different locations of Katanning, Mullewa and Merredin peak yields generally occurred from a late April to early May sowing (Figure 3). However, the variety combinations to maximise yield from each sowing date at each site varied and there are opportunities to maintain high yields across the sowing window by matching varieties to a given sowing date. Table 12 provides the suggested sowing times of main season wheat varieties in WA.

Late rain in 2022: The later rains and soft finish in 2022 resulted in the latest sowings achieving the highest yields at Mullewa (data not shown) and Katanning (Figure 3d) and a fairly flat yield response at Merredin with delayed sowing (data not shown). The atypical finish to the 2022 season delivered an improved performance of the mid-slow and even the quick winter varieties at later sowing dates at Katanning and Mullewa where the quick winter varieties are rarely competitive with the mainstream varieties, even when sown in early April.



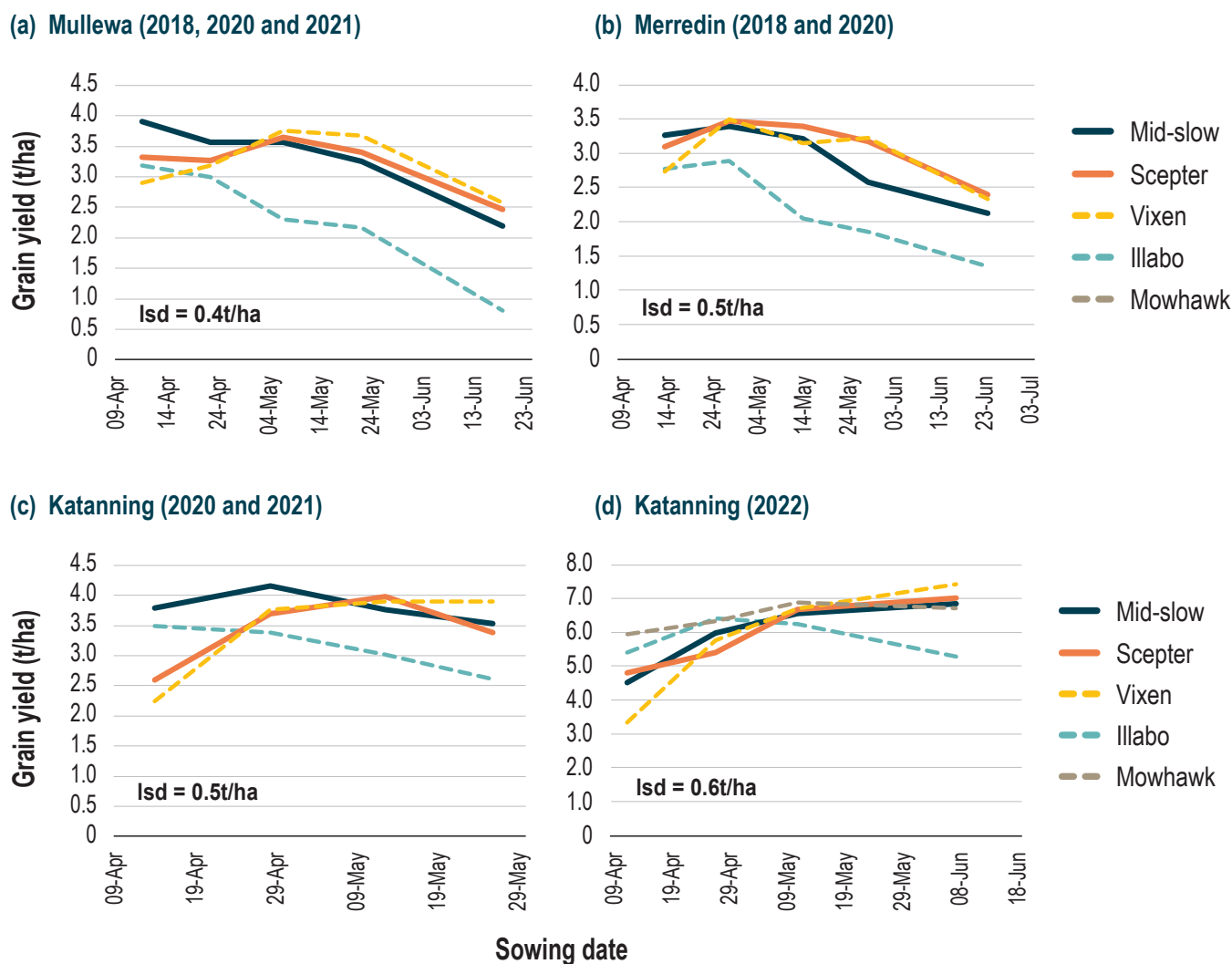


Figure 3. Grain yield (t/ha) response of varieties sown on four to five sowing dates (early April to mid-June) at a) Mullewa (2018, 2020 and 2021), b) Merredin (2018 and 2020), c) Katanning (2020 and 2021) and d) Katanning (2022).

Irrigation was used at the early sowing dates to ensure timely germination. Source: DPIRD wheat agronomy research.

Early season NVT

Since 2017, an ‘early-season’ wheat NVT series in WA has evaluated the performance of slower maturing varieties when sown at an earlier sowing date (Table 14).

Between 2018 and 2022 the ‘early-season’ series was generally sown in late April, a timing favourable to varieties with a mid-long maturity but potentially not early enough for the long spring or winter varieties (see Figure 4).

RockStar has to date yielded highest in the early season NVT, however the late/soft finish of 2022 favoured the quick winter wheats such as Mowhawk, Longsword and Illabo. The results of Mowhawk should be treated with caution as this variety has only been in the early season

NVT in 2022. Over the past five years, Denison, Cutlass, Valiant CL Plus, Kinsei and Catapult have achieved an average yield slightly lower than RockStar. Catapult has tended to be more yield competitive with the other mid-slow maturing varieties in Agzones 2,3,5 and 6 than in Agzones 1 and 4 (Tables 15 and 16).

RockStar is the quickest to flowering in the mid-slow maturity group so be aware of a higher frost risk. RockStar is also more susceptible to pre-harvest sprouting, which is expressed more with earlier sowing.

Kinsei is susceptible to black point, which is also expressed more with April sowings in susceptible environments.

Table 14. Relative performance of slower maturity wheat varieties in EARLY SEASON NVT

	RockStar	Mowhawk [^]	Denison	Cutlass	Valiant CL Plus	Kinsei	Catapult	Longsword	Illabo
Statewide MET yield (% site mean) ¹	112%	112% [^]	110%	109%	109%	108%	107%	104%	101%
Maturity	Mid-slow	Quick winter	Mid-slow	Mid-slow	Mid-slow	Mid-slow	Mid-slow	Quick winter	Quick winter
Classification	AH(N)	AH	APW	APW(N)	AH	ANW	AH	AWW	AH
Falling no. index	2	-	5	4	2/3 _p	4	6	-	5
Stem rust	MRMS	RMR _p	MS	R	MR	MSS	MR	MR	MRMS
Stripe rust	RMR	RMR _p	MR	RMR*	RMR	MRMS	RMR	RMR	RMR
Leaf rust	S	MR _p	S	RMR*	S	MSS	S	MR*	S
Powdery mildew	MS	RMR _p	S	S	S	S	S	MRMS	RMR
Yellow spot	MRMS	MRMS _p	MRMS	MSS	MRMS	MS	MRMS	MRMS	MS

¹Regional differences in yield are masked when using a statewide average of the WA wheat EARLY SEASON NVT MET data (2018–2022).

Readers are directed to Tables 15 and 16 for a more precise estimate of variety performance in their region. Refer to page 4 for interpreting resistance classification. (N) = Denotes supplementary classification of APWN. *p* = provisional rating. [^] = single year of NVT data in 2022.

* = Some races in eastern Australia can attack these varieties. Falling no. index please refer to page 35.

Table 15. Relative performance of varieties in the early season NVT for AGZONES 1 and 4 combined (2018–2022), expressed as a percentage of site mean yield and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year				2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)				3.55	2.02	2.45	4.14	4.21	
Variety (order of maturity)	Classification	Maturity	(No. trials)	(2)	(2)	(2)	(1)	(3)	(10)
RockStar	AH (N)	Mid-slow	(8)	-	118	114	99	83	104
Catapult	AH	Mid-slow	(10)	107	107	106	101	88	101
Kinsei	ANW	Mid-slow	(10)	108	109	106	100	88	101
Denison	APW	Mid-slow	(6)	-	-	113	110	105	109
Valiant CL Plus	AH	Mid-slow	(4)	-	-	-	106	104	106
Yitpi	AH	Mid-slow	(10)	100	96	96	99	91	96
Cutlass	APW (N)	Mid-slow	(10)	106	105	109	108	109	108
LRPB Nighthawk	APW	Very slow	(10)	93	96	95	97	107	99
Longsword	AWW	Quick winter	(10)	89	92	92	105	116	100
Mowhawk	AH	Quick winter	(3)	-	-	-	-	118	-
Illabo	AH	Quick winter	(10)	92	99	95	98	109	100
Sowing dates				20 and 30 April	11 and 17 April	21-Apr	21-Apr	14 and 20 April	

Agzone 1 site is Ogilvie and Agzone 4 sites were Bencubbin, Moorine Rock (2019) and Kalannie (2020, 2021 and 2022)

(N) = Denotes supplementary classification of APWN.

Table 16. Relative performance of varieties in the Early season NVT for AGZONES 2, 3, 5 and 6 combined (2018–2022), expressed as a percentage of site mean yield and the weighted average over the five-year period (where there is more than one year of data or four or more observations)

Year				2018	2019	2020	2021	2022	2018–2022
Site mean yield (t/ha)				2.16	3.07	3.43	4.79	4.51	
Variety (order of maturity)	Classification	Maturity	(No. trials)	(2)	(4)	(3)	(6)	(7)	(22)
RockStar	AH (N)	Mid-slow	(13)	-	115	124	121	104	115
LRPB Trojan	APW (N)	Mid-slow	(22)	104	106	107	108	91	102
Magenta	APW	Mid-slow	(22)	96	100	100	101	93	98
Catapult	AH	Mid-slow	(22)	110	114	116	113	103	110
Kinsei	ANW	Mid-slow	(22)	114	115	118	115	104	112
Denison	APW	Mid-slow	(16)	-	-	116	110	108	111
Valiant CL Plus	AH	Mid-slow	(13)	-	-	-	109	108	110
Yitpi	AH	Mid-slow	(22)	92	102	98	98	93	97
Cutlass	APW (N)	Mid-slow	(22)	110	110	112	108	110	110
LRPB Nighthawk	APW	Very slow	(20)	-	90	90	92	100	94
Longsword	AWW	Quick winter	(22)	112	105	101	100	114	107
Mowhawk	AH	Quick winter	(7)	-	-	-	-	118	-
Illabo	AH	Quick winter	(22)	109	95	97	99	107	101
DS Bennett	Feed	Mid-slow winter	(17)	-	77	82	81	108	89
Average sowing date				20 and 30 April	11 and 17 April	21-Apr	21-Apr	14 and 20 April	

Sites are: Agzone 2 is Eneabba or Tincurrin-N (2019), Agzone 3 is York or Narrogin, Agzone 5 is Hyden and Jerramungup and Agzone 6 is Gibson or South Stirlings (2021). (N) = Denotes supplementary classification of APWN.

The suitability of winter wheats and slower spring varieties continue to be assessed however, in general, they are more competitive when sown in early to mid-April in southern, longer season environments and/or at frost-prone locations (Figure 4).

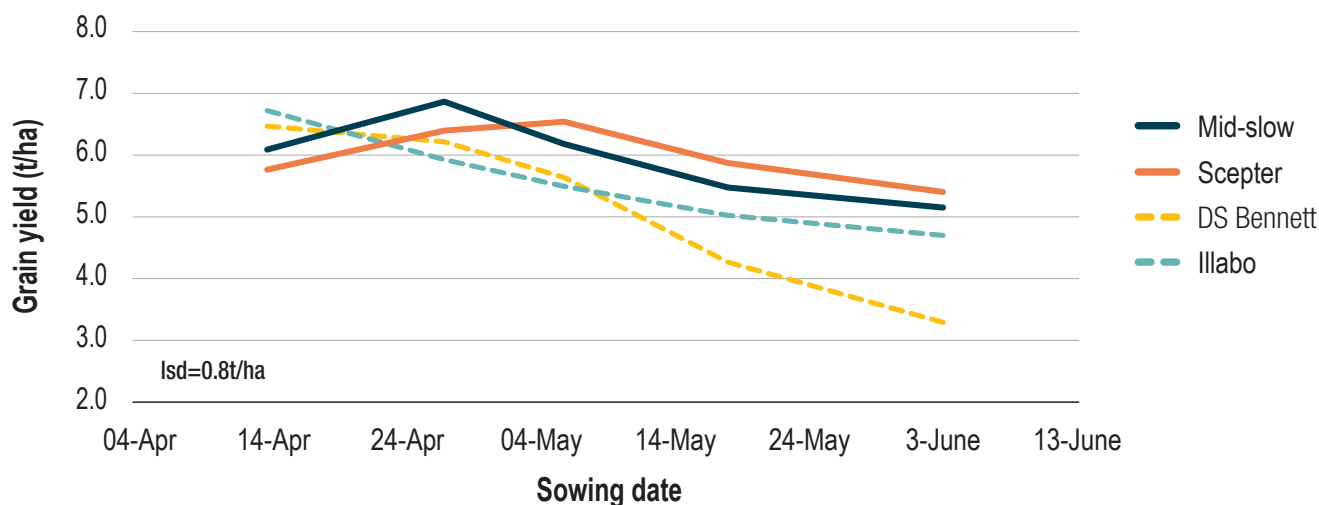


Figure 4. Grain yield (t/ha) response of mid-slow spring and winter wheat varieties compared to Scepter when sown on five sowing dates at Dale in 2021.

Source: DPIRD wheat agronomy project

Disease and pest resistance

Manisha Shankar, Geoff Thomas, Carla Wilkinson, Sarah Collins and Daniel Huberli (DPIRD)

Key points

- Be aware of a variety's disease package so that pre- and in-season disease management can be planned
- Do not plant a susceptible variety into a paddock with high disease risk
- Use a diversity of wheat varieties and crop types.

When selecting a wheat variety, it is important to consider yield and potential quality grade along with disease resistance (Table 18). Higher resistance ratings reduce disease severity and subsequent yield loss. Avoiding susceptible or very susceptible varieties significantly reduces the chance of disease outbreaks and the need for in-season management.

For a disease to become damaging in-season, there needs to be:

- the presence of inoculum, which is usually carried over from the previous season
- favourable weather conditions for disease proliferation
- a susceptible host crop to become infected.

Depending on the disease in question, inoculum can be carried on infested stubble or trash, a green bridge, in seed or in the soil (Table 17).

Table 17. Examples of wheat diseases carried over from different inoculum sources

Inoculum carryover source	Disease
Infested stubble or trash	Yellow spot, septoria nodorum blotch, powdery mildew and crown rot.
Green bridge	Rusts, powdery mildew and viruses.
Seed	Loose smut.
Soilborne	Root lesion nematode, CCN, rhizoctonia root rot, take-all, flag smut and common bunt.

Choose varieties for each paddock based on disease resistance/susceptibility and disease risk of the paddock. Disease risk is related to the potential presence of disease inoculum and the favourability of the environment for the disease. For example, it is not advisable to sow Yitpi, which is rated SVS for yellow spot, onto wheat stubble.

Knowing the disease strengths and weaknesses of a variety enables more effective disease management during the season. Varieties that are very susceptible (VS) to susceptible (S) to powdery mildew are more likely to get the disease and the rate of epidemic development will be faster and the impact will be greater in these types. When susceptible varieties such as Scepter make up a high proportion of the crop grown, the disease will be more common and damaging across the grainbelt. Therefore, the need to respond with in-crop fungicide can be greater and the time to respond shorter with these varieties. Use of proactive protection such as fertiliser applied fungicides may be more useful for these varieties to delay or slow disease onset in favourable environments.

Using a diverse range of varieties with different disease resistance traits reduces the risk that the whole farm will require disease management at the same time. Diversification also reduces the risk of new pathotypes emerging, which could render a significant proportion of a farm or region susceptible and require region-wide management responses.

Disease ratings provided in this guide reflect the expected response to the most common or dominant pathotype or strain of a disease in WA. For most diseases, very little variability in response is evident between seasons or regions, but occasionally mutations or incursions of rusts can significantly change variety ratings. For example, leaf rust ratings in Table 18 are for pathotypes that entered WA in 2015 (104-1,3,4,6,7,8,10,12 +Lr37) and 2017 (104-1,3,4,5,7,9,10,12 +Lr37).

Ratings for powdery mildew reflect expected resistance to the general mildew population, however varietal response can differ on rare occasions when a more virulent isolate occurs.

Nodorum blotch causes characteristic necrotic lesions on leaves and can also cause glume blotch, dark brown to black lesions or staining on the heads associated with infection. Varieties can differ in disease expression on foliage and heads so in this guide variety rankings have been included for both these plant parts (Table 18). Susceptible varieties are more likely to suffer glume blotch in seasons where disease is present in the foliage and when weather favourable to disease occurs after head emergence.

Soilborne diseases and pests

Soilborne pathogens and nematode pests infect plant roots and impact their ability to take up water and nutrients. Environmental factors such as soil moisture, temperature and nutrient availability will determine the severity of disease development. The most prevalent root diseases of wheat in WA are rhizoctonia bare patch, root lesion nematodes (RLN), fusarium crown rot and take-all. Less widespread are cereal cyst nematodes (CCN), common root rot and pythium root rot.

Soilborne diseases and nematode pests are best managed by (i) identifying the pathogens or pests causing plant decline, (ii) use of crop and variety rotation and (iii) chemical management if available.



DPIRD Plant Pathology group.

Rhizoctonia bare patch is probably the most prevalent and damaging soilborne disease in WA wheat, and there is no varietal resistance. For fusarium crown rot, there is currently limited resistance in varieties grown in WA. Reducing build up of infected cereal stubble and weeds are the best approach through inclusion of broadleaf crops in the rotation and controlling grasses and cereal volunteers.

Root lesion nematodes (RLN) cause damage when they enter the root and extract nutrients and water from the plant. *Pratylenchus neglectus* is the dominant RLN species in broadacre growing areas of WA, followed by *P. quasitereoides* (formerly *P. teres*). *P. thornei* and *P. penetrans* are less commonly detected but may also impact yields. The key to managing RLN is identifying paddocks with yield-limiting numbers and incorporating more resistant crops and varieties to reduce RLN populations. Wheat, barley and canola are all susceptible crops. These crops can suffer significant yield loss and can increase *P. neglectus* and *P. quasitereoides* levels in a paddock over a growing season.

In this guide, *P. quasitereoides* nematode resistance scores are from WA glasshouse and field trials. *P. neglectus* ratings should be used as a guide only as not all varieties have been tested in WA. Varieties with fewer than five observations, or where there has been no field trial verification of the glasshouse rating, receive provisional ratings.

Cereal cyst nematodes (*Heterodera avenae*; CCN) are one of the most damaging pests found in WA soils and can cause significant yield losses in wheat, oats and barley. Canola and other broadleaf crops are not hosts so yields of these crops are not affected by CCN. When the season breaks, CCN eggs hatch and juveniles enter plant

roots where they set up a fixed feeding site. They damage root tissues as they grow and reduce plant functions because they extract nutrients and water from the plant. The nematodes form into hardened cysts which protect hundreds of eggs over the summer period. CCN is mostly found around Geraldton, Esperance and the Avon Valley but can occur elsewhere in the WA grainbelt. CCN can be easily managed by including resistant cereal varieties and weed free non-cereal crops in the rotation. If levels of CCN are high, then two consecutive years of a non-host may be required. There are no registered chemical treatments to control CCN.

In-crop diagnosis of the disease or pest affecting plant roots is best achieved by sending affected plants to DPIRD Diagnostic and Laboratory Services (DDLS) in South Perth. For more information on sample submission contact (08) 9368 3351 or DDLS@dpiird.wa.gov.au. Alternatively, a DNA-based soil-testing service (PREDICTA®B) is also available, and growers can contact their agronomist or SARDI for advice on how to submit samples for molecular testing.

Fungicides

Fungicides can help control disease and limit yield impacts but fungicide resistance in a range of wheat and barley pathogens is a rapidly developing issue for the Australian grains industry. Using integrated disease management (IDM), including varietal disease resistance, can help reduce reliance on fungicides for disease management. More information on fungicide resistance is available from The Australian Fungicide Resistance Extension Network (<https://afren.com.au/>)

For more information:

- Crop diseases – forecasts and management at <https://agric.wa.gov.au/n/2319>
- Wheat disease ratings at <https://agric.wa.gov.au/n/3353>
- Registered seed dressing and in-furrow fungicides for cereals in WA at <https://agric.wa.gov.au/n/1794>
- Download the 'Australian Field Crop Disease Guide App' which is available for both Apple and Android.
- Download the 'MyCrop App' which is available for both Apple and Android.

Table 18. Disease resistance ratings for wheat varieties grown in Western Australia

Variety	Grade	Yellow spot	Nodorum blotch (leaf)	Nodorum blotch (glume)	Rust			Powdery mildew
					Stem	Stripe	Leaf	
Brumby	APW	MRMS	MRMS	MS	MR	RMR	SVS	R*
Calibre	AH	MRMS	MSS	MSS	MR	RMR	S	MSS
Calingiri	Feed	MS	MSS	MSS	SVS	SVS	S	SVS
Catapult	AH	MRMS	MRMS	MRMS	MR	RMR	S	S
Chief CL Plus	APW (N)	MRMS	MS	MRMS	MR	S	MR*	S
Corack	APW	MRMS	MS	MRMS	MR	MS	SVS	SVS
Cutlass	APW (N)	MSS	MRMS	MRMS	R	RMR*	RMR*	S
Devil	AH (N)	MRMS	MS	MRMS	S	MR	SVS	S
Denison	APW	MRMS	MR	MRMS	MS	MR	S	S
Dozer	APW	MS _p	-	-	MS _p	MRMS _p	Sp	Sp
DS Bennett	Feed	MRMS	MR	MR	MS	RMR	SVS	R*
DS Pascal	APW	MS	MRMS	MRMS	MSS	RMR	MS	RMR
EGA Bonnie Rock	AH (N)	MS	MS	MSS	MSS	SVS	SVS	SVS
Firefly	ANW	MRMS _p	-	-	Sp	MSS _p	MSS _p	-
Hammer CL Plus	AH (N)	MRMS	MRMS	MRMS	MR	RMR	S	SVS
Illabo	AH	MS	MR	MR	MRMS	RMR	S	RMR
Kinsei	ANW	MS	MRMS	MRMS	MSS	MRMS	MSS	S
Longsword	AWW	MRMS	MRMS	MRMS	MR	RMR	MR*	MRMS
LRPB Anvil CL Plus	AH	MSS	MSS	MSS	MR	RMR	SVS	Sp
LRPB Avenger	APW (N)	MS	S	MS	MS	MRMS	S	Sp
LRPB Cobra	AH	MRMS	MRMS	MS	MR	MSS	MR*	MSS
LRPB Havoc	AH (N)	MRMS	MS	MRMS	S	MR	S	MSS
LRPB Nighthawk	APW	MS	MRMS	MR	RMR	RMR	MSS	MSS
LRPB Trojan	APW (N)	MSS	MS	MS	MRMS	MR	MR*	S
Mace	AH (N)	MRMS	MS	MS	MRMS	RMR*	S	MSS
Magenta	APW	MRMS	MRMS	MS	MR	MSS	RMR*	MRMS
Mowhawk	AH	MRMS _p	-	-	RMR _p	RMR _p	MR _p	RMR _p
Ninja	ANW	MRMS	MS	MS	S	MS	S	MSS
Razor CL Plus	ASW	MSS	MS	MS	MRMS	RMR	S	MSS
RockStar	AH (N)	MRMS	MRMS	MRMS	MRMS	RMR	S	MS
Scepter	AH	MRMS	MRMS	MSS	MRMS	RMR	MSS	S
Sheriff CL Plus	APW (N)	MRMS	MRMS	MRMS	MS	MS	SVS	SVS
Sting	AH	MRMS	MS	MS	MRMS	MR	SVS	S
Tomahawk CL Plus	APW	MRMS _p	-	-	MR _p	RMR _p	Sp	-
Valiant CL Plus	AH	MRMS	MR	MRMS	MR	RMR	S	S
Vixen	AH (N)	MRMS	MSS	MSS	MRMS	MRMS	SVS	SVS
Westonia	APW (N)	MSS	S	MSS	SVS	VS	S	SVS
Wyalkatchem	APW (N)	MRMS	MS	MS	SVS	S	S	SVS
Yitpi	AH	SVS	MS	MRMS	S	MRMS	S	MS
Zen	ANW	MRMS	MS	MRMS	S	MRMS	S	S

(N) = Denotes supplementary classification of APWN. ■ = new releases for 2024 season.

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. Refer to page 4 for interpreting resistance classification.

No score '-' = no rating is currently available. p = provisional rating.

* Some races in eastern Australia can attack these varieties, including races with Yr17 virulence for stripe rust and races with Lr24 virulence for leaf rust and a virulent pathotypes for powdery mildew at Bute, SA affecting Brumby and Shenton Park affecting DS Bennett.

[Table 18. continued following page...]

Table 18. Disease resistance ratings for wheat varieties grown in Western Australia (cont'd)

Variety	Grade	Septoria tritici blotch	Flag smut	Common bunt	Root lesion nematode [#]		Cereal cyst nematode	Crown rot
					<i>P. neglectus</i>	<i>P. quasitereoides</i>		
Brumby	APW	MSS ^p	–	–	MRMS ^p	–	MRMS ^p	S
Calibre	AH	SVS	–	–	S	MR ^p	MRMS	S
Calingiri	Feed	MSS	RMR	MRMS	SVS	S	–	S
Catapult	AH	S	RMR	MRMS	S	MRMS	R	MSS
Chief CL Plus	APW (N)	MSS	SVS	MR	MRMS	MRMS	MS	MSS
Corack	APW	S	S	MSS	MSS	MSS	RMR	S
Cutlass	APW (N)	MSS	MSS	S	MSS	MS ^p	MR	S
Devil	AH (N)	SVS	SVS	MR	MSS	MRMS	MSS	MSS
Denison	APW	MS	R ^p	MR ^p	S	MR ^p	MS	MSS
Dozer	APW	–	–	–	–	–	MS ^p	–
DS Bennett	Feed	MR	SVS	RMR	S	–	S	VS
DS Pascal	APW	MS	S	SVS	S	–	S	S
EGA Bonnie Rock	AH (N)	S	S	MS	VS	S	S	–
Firefly	ANW	–	–	–	–	–	MSS ^p	–
Hammer CL Plus	AH (N)	MSS	RMR	RMR	MSS	MR ^p	MRMS	MSS
Illabo	AH	MR	R	MS	MSS	MR ^p	MRMS	S
Kinsei	ANW	MSS	RMR	MR	S	S	MSS	MSS
Longsword	AWW	MRMS	MRMS	RMR	MRMS	–	MRMS	MSS
LRPB Anvil CL Plus	AH	S	–	–	MSS	–	MRMS	MSS
LRPB Avenger	APW (N)	MSS	S	S	MSS	–	MRMS	SVS
LRPB Cobra	AH	S	MS	VS	MSS	MSS	MS	S
LRPB Havoc	AH (N)	MRMS	MS	R	S	MRMS	S	MSS
LRPB Nighthawk	APW	MRMS	MSS	RMR	MSS	MRMS ^p	MS	MSS
LRPB Trojan	APW (N)	S	SVS	SVS	MSS	MS ^p	MS	MS
Mace	AH (N)	S	S	MRMS	MSS	MRMS	MRMS	S
Magenta	APW	MS	MSS	SVS	MSS	MSS	S	MSS
Mowhawk	AH	–	–	–	–	–	–	–
Ninja	ANW	MSS	MR	RMR	S	S	MS	S
Razor CL Plus	ASW	SVS	RMR	RMR	S	–	MR	S
RockStar	AH (N)	S	VS	MR	MRMS	MS	MSS	S
Scepter	AH	S	MSS	MSS	S	MS	MRMS	MSS
Sheriff CL Plus	APW (N)	S	S	RMR	MRMS	MRMS ^p	MS	S
Sting	AH	S	SVS	S	MRMS	MS ^p	MS	MSS
Tomahawk CL Plus	APW	–	–	–	–	–	–	–
Valiant CL Plus	AH	MRMS	–	–	S	MS ^p	MSS ^p	S
Vixen	AH (N)	MSS	SVS	RMR	MRMS	MSS	MSS	S
Westonia	APW (N)	S	SVS	S	SVS	S	S	S
Wyalkatchem	APW (N)	S	S	MR	MRMS	MSS	S	S
Yitpi	AH	MS	MR	S	MSS	MS	MR	S
Zen	ANW	S	MS	MR	MRMS	MRMS ^p	S	S

(N) = Denotes supplementary classification of APWN. ■ = new releases for 2024 season.

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. Refer to page 4 for interpreting resistance classification.

No score '–' = no rating is currently available. ^p = provisional rating.

* Some races in eastern Australia can attack these varieties, including races with Yr17 virulence for stripe rust and races with Lr24 virulence for leaf rust and a virulent pathotype at Bute in SA for powdery mildew.

Use *P. neglectus* ratings as a guide only as not all varieties have been tested in WA. *P. quasitereoides* ratings are from DPIRD WA glasshouse and field trials.

Cereal Cyst Nematode data from nvtonline.com.au

Crown rot ratings from SARDI, USQ and DPI NSW data.

Variety traits

Jeremy Curry, Brenda Shackley and Dion Nicol (DPIRD)

Coleoptile length and seeding depth

Seeding into moisture at a seeding depth of 2–4cm is the preferred option in WA to ensure quick establishment and maintain yield potential. However, with expanding seeding programs and increased variability in the timing and amount of autumn rainfall, dry seeding has dramatically increased in WA.

Avoid sowing deeper than 5cm as this has the potential to delay and reduce emergence, causing weaker seedlings and an overall reduction in yield (Table 19).

Longer coleoptiles can maintain establishment rate if seeding depth increases (Table 19). The ability to establish wheat crops from seed placed deeper in the soil can be useful in situations where the soil surface is dry, but the subsoil is moist. Coleoptile length is influenced by factors other than variety, including seed size and source, temperature, soil water, certain seed dressings and the type of coleoptile length assessment (as shown in Table 19). Generally, there is more scope to adjust seeding equipment for deep sowing and impact establishment to a greater degree than the often minor differences in mainstream varieties.

Varieties vary inherently in coleoptile lengths. Table 20 replaces previous reporting of coleoptile index and provides a guide to coleoptile group. Coleoptile groups are collectively identified as short (S), medium (M), long (L) or very long (VL).

- Halberd is currently the only variety in the 'very long' coleoptile group, with potential replacements in the breeding pipeline.
- Varieties with 'long' coleoptile lengths include Calibre, Cutlass, Magenta and Yitpi. Denison and Sting have a slightly shorter coleoptile and hence are rated as M/L.
- The impact of deep sowing on grain yield depends on growing season conditions and whether lower plant density and vigour can be compensated for through increases in other yield components such as tiller number, grains per ear and grain weight.
- Increasing seeding rates can help partially reduce the yield penalty caused by reduced establishment with deeper sowing.
- Not all seeding systems are equal for deep sowing, so ensure depth is monitored as conditions change.

Grain quality

While hectolitre weights and small grain screenings for individual varieties can vary from site to site and year to year, they are generally well below industry limits in WA and are therefore not presented in this guide.

Details can be found at nvt.online.com.au.

Table 19. Coleoptile length (cm) and plant establishment of a range of varieties germinated on filter paper 'cigars' or sown at 10cm at Katanning in 2021

Variety (Coleoptile group)	Coleoptile length (cm)		Establishment (m ²) at 10cm deep	Grain yield (t/ha)	
	Filter paper	Sown at 10cm		at 10cm deep	at 4cm deep
DS Pascal (S)	6.3	4.9	27	2.3	4.4
Scepter (S/M)	7.5	5.5	31	2.5	5.0
Calibre (L)	8.5	6.7	48	3.0	4.9
Yitpi (L)	9.4	6.8	58	2.7	4.6
Halberd (VL)	12.3	7.8	100	3.3	4.2
Isd			30 (m ²)	0.5 (t/ha)	0.5 (t/ha)

Germination cabinet set at 15°C and average soil temp = 14.7°C for the 15 days from 'seeding' to measurement. Plant establishment determined at 21 days after sowing, sown 5th May. Average establishment at 4cm was 175 plants/m². Variable seed sources and grain weights. Coleoptile groups are collectively identified as short (S), medium (M), long (L) or very long (VL).

Falling Number Index

The falling number index (FNI) is a rating system that reflects the risk of a wheat variety exhibiting a low falling number at harvest (Table 20). Low falling number in wheat has several causes and these are controlled by complex interactions between genotype and the environment. An example is pre-harvest sprouting, a common cause of low falling number where mature grain begins to germinate in the paddock in response to rainfall. The falling number of a variety upon receipt will be influenced by the wheat variety grown, stage of maturity, timing and intensity of seasonal rainfall and temperature/humidity during the growing season.

DPIRD has carried out research since 2013 to better understand the susceptibility of wheat varieties to low falling number, both in response to growing conditions and rainfall in the pre- and post-maturation period.

The FNI determines the risk of a variety exhibiting low falling number. On a 1–9 scale, the higher the rating the more likely a variety is to maintain falling number and the lower the risk of downgrade at grain delivery.

The pre-harvest sprouting (PHS) tolerance of Mace and Scepter (FNI of 5) has underpinned their widespread adoption across WA, even into areas of high PHS risk. With a FNI of 7, DS Pascal is considered the variety of lowest risk of PHS. New varieties with updated ratings include Calibre and Brumby (both rated 6*p*), Mowhawk (5), Sting (4*p*), and LRPB Anvil and Valiant CL Plus (both 2/3*p*).

DPIRD research has found crops that mature earlier (such as spring wheats sown in April) have a higher risk of low falling number and blackpoint.

Further research is being carried out to understand the drivers of this risk and how it varies across WA wheat growing regions.

Table 20. Black point ratings, falling number index and coleoptile group of wheat varieties in 2023

Variety	Black point [#]	Falling number index	Coleoptile group
Brumby	MS <i>p</i>	6 <i>p</i>	M
Calibre	MS <i>p</i>	6 <i>p</i>	L
Catapult	S	6	M
Chief CL Plus	MS	4	M
Cutlass	MS	4	L
Denison	MS	5	M/L
Devil	MSS	3	M
DS Bennett	MSS	-	M
DS Pascal	MS	7	S
Hammer CL Plus	MRMS	4	M
Illabo	MRMS	5	M
Kinsei	S	4	M
LRPB Anvil CL Plus	Sp	2/3 <i>p</i>	M
LRPB Avenger	MS	5 <i>p</i>	-
LRPB Havoc	MS	3	-
LRPB Nighthawk	MS	-	-
LRPB Trojan	MS	5	-
Mace	MRMS	5	M
Magenta	MSS	3	L
Mowhawk	-	5	M <i>p</i>
Ninja	MRMS*	4	S/M
Razor CL Plus	MS	4	M
Rockstar	MSS	2	M
Scepter	MS	5	S/M
Sheriff CL Plus	MS	4	-
Sting	S	4 <i>p</i>	M/L
Valiant CL Plus	MS <i>p</i>	2/3 <i>p</i>	M
Vixen	MSS	3	M
Westonia	MS*	2	M
Wyalkatchem	MS*	3	S
Yitpi	MS	5	L
Zen	MRMS	3	S

Black point ratings are sourced from NVT disease ratings from NVT Online, nvtonline.com.au

* = Black point ratings not updated. Coleoptile groups are collectively identified as short (S), medium (M), long (L) or very long (VL). Coleoptile groups are based filter paper 'cigars' germinated at 15°C for 15 days. Groups combine information previously supplied as part of an NVT project and DPIRD research in 2023.

p = provisional rating based upon a single year of data and limited data hence results to be treated with caution.

Variety snapshots

Brenda Shackley, Jeremy Curry and Dion Nicol (DPIRD)

Variety snapshots are presented for 20 varieties in order of quality classification.

Each snapshot includes a summary of essential characteristics for each variety and its key strengths and weaknesses. Grain yields relative to Scepter for each year between 2018 and 2022 for each Agzone are presented (extracted from nvtonline.com.au). Disease ratings are as per Table 18.

Flowering information is sourced from DPIRD experiments in 2019, 2020, 2021 and 2022 and from NVT sites when other data is not available.

All information is presented relative to Scepter.

Variety information including pedigree, seed licensee, seed trading restrictions and end point royalty (EPR) payable is sourced from breeding companies and Variety Central (varietycentral.com.au).

If seeking information for any varieties not included in the snapshots, please consult varietycentral.com.au, nvtonline.com.au or the respective breeding company.

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Calibre^(b)

AH

Comments

Calibre is the first Scepter cross released by AGT in 2021. It is a quick-mid maturing AH variety with a longer coleoptile than its parent Scepter (similar to Cutlass). Calibre has been included in the NVT since 2020, yielding similar to or slightly higher than Scepter, and competitive with Vixen, Rockstar and Devil across the various agzones. Calibre is MSS to powdery mildew, similar to LRPB Havoc, which is the highest rating amongst the quick-mid maturity group. Preliminary data indicates Calibre has a slightly higher rating than Scepter for pre-harvest sprouting.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	101	96	99
Agzone 2	-	-	102	99	102
Agzone 3	-	-	101	101	100
Agzone 4	-	-	100	98	101
Agzone 5	-	-	104	102	101
Agzone 6	-	-	99	97	101
Disease resistance		Adult rating			
Yellow spot	MRMS				
Nodorum blotch (leaf)	MSS				
Nodorum blotch (glume)	MSS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	S				
Powdery mildew	MSS				
Septoria tritici blotch	SVS				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	MR _p				
RLN (<i>P. neglectus</i>)	S				
CCN	MRMS				
Crown rot	S				
Flowering		Days after/before Scepter			
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+2	+2	+0	-
Merredin	-	-1	+1	2	-
Katanning	-1	-3	-2	-1	-
Grass Patch	2	-1	+0	-	+1
Agronomic traits					
Coleoptile group	Long				
Black point	MSP				
Falling number index	6 _p				
Maturity	Quick-mid				
Variety information					
Pedigree	Derived from a Scepter cross				
Breeder/Seed licensee	AGT				
Access to seed	AGT Affiliates, retailers, or Seed Sharing				
EPR (\$/t, excl GST)	\$3.50				

Refer to page 4 for interpreting resistance classification.
p = provisional rating

Catapult^(b)

AH

Comments

Catapult is a mid-slow maturity AH variety released by AGT in 2019. Catapult was included in the NVT for the first time in 2018, yielding higher than alternatives such as Denison, Cutlass and Valiant CL Plus, but lower than Scepter, RockStar and Brumby in the main season trials. In the early season NVT trials, Catapult has yielded similar to Kinsei with a more robust performance in Agzones 2, 3, 5 and 6 compared to Agzones 1 and 4. However in the early season NVT, Catapult is slightly lower than Denison, Cutlass and Valiant CL Plus. Catapult is S to leaf rust, powdery mildew and black point. With a falling number rating of 6, Catapult has a lower risk of pre-harvest sprouting. In good growing conditions, Catapult can exhibit a speckling on the leaves or what has previously been known as 'Mace yellows'. This is not a disease but a physiological response, which typically has no effect on yield.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	93	94	95	91	100
Agzone 2	96	94	93	94	99
Agzone 3	94	94	97	96	100
Agzone 4	95	94	90	91	97
Agzone 5	97	95	89	94	95
Agzone 6	98	96	95	94	99
Disease resistance		Adult rating			
Yellow spot	MRMS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	S				
Powdery mildew	S				
Septoria tritici blotch	S				
Flag smut	RMR				
Common bunt	MRMS				
RLN (<i>P. quasitereoides</i>)	MRMS				
RLN (<i>P. neglectus</i>)	S				
CCN	R				
Crown rot	MSS				
Flowering		Days after/before Scepter			
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+19	+13	+12	-
Merredin	+19	+13	+8	+5	-
Katanning	+20	+11	+9	+5	-
Grass Patch	+18	+13	+6	-	+5
Agronomic traits					
Coleoptile group	Medium				
Black point	S				
Falling number index	6				
Maturity	Mid-slow				
Variety information					
Pedigree	Mace/Corack				
Breeder/Seed licensee	AGT				
Access to seed	AGT Affiliates, retailers, or Seed Sharing				
EPR (\$/t, excl GST)	\$3.25				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

Devil[Ⓛ]

AH (N)

Comments

Devil is a quick-mid maturity AH (N) variety which was released in 2018. Devil has been in the NVT since 2017 and has yielded similarly to Scepter in all years and agzones. Devil has been recently downgraded to S for stem rust and remained SVS to the latest leaf rust pathotype and powdery mildew. DPIRD trials suggest that Devil has different maturity triggers to Scepter resulting in earlier flowering when sown in April or in the northern regions. A falling number rating of 3, so not recommended for areas prone to pre-harvest sprouting. Devil is best suited to the Northern zone of WA for this reason.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	100	101	100	99	102
Agzone 2	101	100	100	101	102
Agzone 3	100	101	102	101	103
Agzone 4	101	101	98	99	101
Agzone 5	102	101	99	101	102
Agzone 6	102	102	102	101	103
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MS				
Nodorum blotch (glume)	MRMS				
Stem rust	S				
Stripe rust	MR				
Leaf rust	SVS				
Powdery mildew	S				
Septoria tritici blotch	SVS				
Flag smut	SVS				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	MRMS				
RLN (<i>P. neglectus</i>)	MSS				
CCN	MSS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2020 & 2021 DPIRD trials	Early/mid April	Late April	Early/mid May	Late May	Early June
Mullewa	-3	-3	-3	-1	-1
Merredin	+1	-2	-2	+0	-
Katanning	-4	-1	-1	+0	-
South East	-4	-2	-1	-	-1
Agronomic traits					
Coleoptile group	Medium				
Black point	MSS				
Falling number index	3				
Maturity	Quick-mid				
Variety information					
Pedigree	IGW3110/Mace				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$3.50				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.

Hammer CL Plus[Ⓛ]

AH (N)

Comments

Hammer CL Plus is an AH (N) imidazolinone tolerant variety released in 2020 by AGT. Hammer CL Plus has been included in the WA NVT since 2020, where it yielded 5 to 9% lower than Scepter depending on the agzone. Overall, it is slightly higher yielding than Chief CL Plus and Sheriff CL Plus and slightly lower yielding than Razor CL Plus. Hammer CL Plus is closely related to Mace with a similar maturity. A disadvantage with Hammer is that it may be prone to lodging compared to other IMI varieties. Hammer CL Plus is RMR for stripe rust, MR for stem rust, S for leaf rust and SVS for powdery mildew. Registered for label rate applications of Intervix[®] herbicide.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	95	93	91
Agzone 2	-	-	95	93	93
Agzone 3	-	-	93	93	90
Agzone 4	-	-	95	93	93
Agzone 5	-	-	94	92	91
Agzone 6	-	-	89	91	92
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	S				
Powdery mildew	SVS				
Septoria tritici blotch	MSS				
Flag smut	RMR				
Common bunt	RMR				
RLN (<i>P. quasitereoides</i>)	MR _p				
RLN (<i>P. neglectus</i>)	MSS				
CCN	MRMS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/mid April	Late April	Early/mid May	Late May	Early June
Mullewa	-	-1	+2	+1	-
Merredin	+5	+1	-2	+0	-
Katanning	-3	-2	+1	+0	-
Grass Patch	+0	-1	+1	-	-2
Agronomic traits					
Coleoptile group	Medium				
Black point	MRMS				
Falling number index	4				
Maturity	Quick-mid				
Variety information					
Pedigree	Clearfield donor backcrossed to Mace derivative				
Breeder/Seed licensee	AGT				
Access to seed	AGT Affiliates or retailers. No grower-to-grower trading permitted				
EPR (\$/t, excl GST)	\$4.25				

(N) denotes the supplementary classification of APWN
Refer to page 4 for interpreting resistance classification.
p = provisional rating.

LRPB Anvil[Ⓛ] CL Plus

AH

Comments

LRPB Anvil was released by LongReach in 2022, as a quick AH imidazoline tolerant variety. It has been included in the WA NVT since 2020, previously achieving the highest yields of the IMI tolerant varieties until the latest release of Tomahawk CL Plus and Dozer. It is lower yielding than Scepter, particularly in the soft finish of 2022. LongReach suggests that LRPB Anvil is well suited to the terminal drought conditions in the low to medium rainfall areas of WA. LRPB Anvil has a similar stem and stripe rust profile to Hammer CL Plus, but is weaker for leaf rust and yellow spot. Registered for label rate applications of Intervix® herbicide.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	-	96	84
Agzone 2	-	-	97	95	87
Agzone 3	-	-	-	88	86
Agzone 4	-	-	101	98	88
Agzone 5	-	-	103	91	95
Agzone 6	-	-	-	90	91
Disease resistance	Adult rating				
Yellow spot	MSS				
Nodorum blotch (leaf)	MSS				
Nodorum blotch (glume)	MSS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	SVS				
Powdery mildew	Sp				
Septoria tritici blotch	S				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	-				
RLN (<i>P. neglectus</i>)	MSS				
CCN	MRMS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/mid April	Late April	Early/mid May	Late May	Early June
Mullewa	-	-18	-13	-9	-
Merredin	-	-12	-11	-4	-
Katanning	-17	-12	-9	-5	-
Grass Patch	-	-11	-9	-	-4
Agronomic traits					
Coleoptile group	Medium				
Black point	Sp				
Falling number index	2/3p				
Maturity	Quick				
Variety information					
Pedigree	Mace cross				
Breeder/Seed licensee	LongReach Plant Breeders				
Access to seed	Seed associate network. No grower-to-grower trading permitted				
EPR (\$/t, excl GST)	\$4.25				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

LRPB Havoc[Ⓛ]

AH (N)

Comments

LRPB Havoc was released by LongReach in 2017, as an AH and now an APWN. Over the last five years the variety has yielded slightly less than Scepter in Agzones 1, 2 and 4. Havoc is slightly quicker in maturity than Scepter. Havoc has a low falling number index rating. Please note: Havoc is S to both rust types but MR to stripe rust. Havoc is now MSS to powdery mildew, similar to Calibre, which is the highest rating amongst the quick-mid maturity group.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	101	96	95	103	92
Agzone 2	97	99	98	99	92
Agzone 3	100	100	95	94	92
Agzone 4	98	96	102	101	93
Agzone 5	95	97	100	95	97
Agzone 6	96	95	95	99	94
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MS				
Nodorum blotch (glume)	MRMS				
Stem rust	S				
Stripe rust	MR				
Leaf rust	S				
Powdery mildew	MSS				
Septoria tritici blotch	MRMS				
Flag smut	MS				
Common bunt	R				
RLN (<i>P. quasitereoides</i>)	MRMS				
RLN (<i>P. neglectus</i>)	S				
CCN	S				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2018 & 2019 DPIRD trials	10-Apr	24-Apr	08-May	22-May	20-Jun
Northern	-9	-7	-9	-4	-5
Eastern	-5	-6	-3	-4	-4
Katanning	-	-4	-3	-4	-3
Gibson	-	-12	-6	-6	-6
Agronomic traits					
Coleoptile group	-				
Black point	MS				
Falling number index	3				
Maturity	Quick-mid				
Variety information					
Pedigree	Mace/LPB07-0980				
Breeder/Seed licensee	LongReach Plant Breeders				
Access to seed	Seed associate and farmer to farmer (WA)				
EPR (\$/t, excl GST)	\$4.00				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.
p = provisional rating.

RockStar[Ⓛ]

AH (N)

Comments

RockStar is a mid-slow AH (N) variety released in 2019 by InterGrain. It has been included in the NVT since 2018, yielding similar to Scepter and higher than other mid-slow alternatives such as Catapult, Cutlass, Denison, Kinsei and Valiant CL Plus. RockStar is MRMS to *P. neglectus* but S to leaf rust and VS to flag smut. RockStar was amongst the highest yielding varieties in the early season NVTs. RockStar has different maturity triggers than other mid-slow varieties such as Cutlass, caution is recommended if sown in April. It has a falling number rating of 2, so a higher risk to pre-harvest sprouting.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	97	99	101	99	106
Agzone 2	102	96	98	101	105
Agzone 3	99	99	103	102	106
Agzone 4	100	95	95	97	103
Agzone 5	98	97	96	101	102
Agzone 6	103	104	104	103	105
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	MRMS				
Stripe rust	RMR				
Leaf rust	S				
Powdery mildew	MS				
Septoria tritici blotch	S				
Flag smut	VS				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	MS				
RLN (<i>P. neglectus</i>)	MRMS				
CCN	MSS				
Crown rot	S				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+12	+9	+7	-
Merredin	+12	+9	+7	+5	-
Katanning	+10	+7	+5	+3	-
Grass Patch	+9	+6	+5	-	+3
Agronomic traits					
Coleoptile group	Medium				
Black point	MSS				
Falling number index	2				
Maturity	Mid-slow				
Variety information					
Pedigree	IGW3119/Mace/IGW3176				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$3.50				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.

Scepter[Ⓛ]

AH

Comments

Scepter, released in 2015, remains the yield benchmark in WA NVT, although it is similar in yield to Calibre and Devil, and slightly lower in yield than Vixen in Agzones 4 and 5. Scepter is MSS to the latest strain of leaf rust, which is an advantage over Calibre, Devil, Vixen, LRPB Havoc and Sting, which are more susceptible. Scepter appears to have a similar pre-harvest sprouting resistance 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 and additional nitrogen may benefit yield and protein performance.

Yield (% of Mace)	2018	2019	2020	2021	2022
Agzone 1	105	104	107	108	106
Agzone 2	105	107	104	107	107
Agzone 3	110	106	104	108	108
Agzone 4	105	106	105	105	106
Agzone 5	108	107	105	106	110
Agzone 6	107	108	110	111	110
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MSS				
Stem rust	MRMS				
Stripe rust	RMR				
Leaf rust	MSS				
Powdery mildew	S				
Septoria tritici blotch	S				
Flag smut	MSS				
Common bunt	MSS				
RLN (<i>P. quasitereoides</i>)	MS				
RLN (<i>P. neglectus</i>)	S				
CCN	MRMS				
Crown rot	MSS				
Flowering	Days after/before Mace				
2020 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	+2	+1	+4	+1	+6
Merredin	+4	+4	+4	+4	+2
Katanning	+3	+3	+3	+2	-
Gibson	+6	+5	+6	+3	+4
Agronomic traits					
Coleoptile group	Short				
Black point	MS				
Falling number index	5				
Maturity	Quick-mid				
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				

Refer to page 4 for interpreting resistance classification.

Sting[Ⓛ]

AH

Comments

Sting is a quick maturity AH variety released in 2020 by AGT. It was present in the NVT for the first time in 2019, and although its average yield is similar to Scepter, its performance is variable depending on the season and agzone. Sting is usually superior to Scepter in scenarios with late sowing or earlier onset of terminal drought. Maturity is similar to Corack but not as quick as Vixen. Sting is SVS to leaf rust.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	102	100	99	94
Agzone 2	-	104	102	99	97
Agzone 3	-	101	98	98	94
Agzone 4	-	107	103	100	98
Agzone 5	-	105	104	99	98
Agzone 6	-	95	96	97	96
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MS				
Nodorum blotch (glume)	MS				
Stem rust	MRMS				
Stripe rust	MR				
Leaf rust	SVS				
Powdery mildew	S				
Septoria tritici blotch	S				
Flag smut	SVS				
Common bunt	S				
RLN (<i>P. quasitereoides</i>)	MSp				
RLN (<i>P. neglectus</i>)	MRMS				
CCN	MS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	-10	-6	-5	-
Merredin	-	-7	-7	-1	-
Katanning	-12	-7	-5	-2	-
Grass Patch	-	-5	-2	-	-3
Agronomic traits					
Coleoptile group	Medium/Long				
Black point	S				
Falling number index	4p				
Maturity	Quick				
Variety information					
Pedigree	Mace backcross				
Breeder/Seed licensee	AGT*				
Access to seed	AGT Affiliates, retailers, or Seed Sharing				
EPR (\$/t, excl GST)	\$3.50				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

Valiant CL Plus[Ⓛ]

AH

Comments

Valiant CL Plus is an AH imidazolinone tolerant variety released in 2021 by InterGrain. Valiant CL Plus has been included in WA NVT since 2020 where it yields between 3 to 12% lower than Scepter depending on the agzone. Valiant CL Plus has a mid-slow maturity, offering the unique trait of IMI tolerance for an April sowing. However, it should be noted that Valiant CL Plus has a provisional rating of 2/3p for falling number index, a risk that is increased with earlier sowing. Valiant CL Plus is MRMS for yellow spot, RMR for stripe rust, MR for stem rust and S for leaf rust and powdery mildew. Registered for label rate applications of Intervix[®] herbicide.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	-	91	101
Agzone 2	-	-	87	93	97
Agzone 3	-	-	95	94	101
Agzone 4	-	-	-	87	94
Agzone 5	-	-	81	89	95
Agzone 6	-	-	95	94	101
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MR				
Nodorum blotch (glume)	MRMS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	S				
Powdery mildew	S				
Septoria tritici blotch	MRMS				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	MSp				
RLN (<i>P. neglectus</i>)	S				
CCN	MSSp				
Crown rot	S				
Flowering	Days after/before Scepter				
2022 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+25	+16	+13	-
Merredin	+16	+19	+11	+6	+4
Katanning	+16	+11	+9	+5	-
Grass Patch	+23	+9	+8	+7	-
Agronomic traits					
Coleoptile group	Medium				
Black point	MSp				
Falling number index	2/3p				
Maturity	Mid-slow				
Variety information					
Pedigree	Complex cross				
Breeder/Seed licensee	InterGrain				
Access to seed	Intergrain Seed Club Members or Seed Retailers. No grower-to-grower trading permitted				
EPR (\$/t, excl GST)	\$4.35				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

Vixen^(b)

AH (N)

Comments

Vixen is a quick maturity AH (N) variety released in 2018 by InterGrain. Yields are higher than Scepter in Agzones 4 and 5 and slightly lower in Agzone 6. Despite its quick maturity, Vixen is a very competitive variety, however, it responds better with later sowing and terminal drought to the season compared to the softer finish in 2022. Vixen is MRMS to stem and stripe rust but SVS to the latest strain of leaf rust and powdery mildew. A falling number rating of 3, so not recommended for areas prone to pre-harvest sprouting.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	105	104	100	104	94
Agzone 2	101	107	105	103	96
Agzone 3	103	106	100	98	95
Agzone 4	103	109	107	105	98
Agzone 5	106	107	108	101	101
Agzone 6	100	97	99	100	97
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MSS				
Nodorum blotch (glume)	MSS				
Stem rust	MRMS				
Stripe rust	MRMS				
Leaf rust	SVS				
Powdery mildew	SVS				
Septoria tritici blotch	MSS				
Flag smut	SVS				
Common bunt	RMR				
RLN (<i>P. quasitereoides</i>)	MSS				
RLN (<i>P. neglectus</i>)	MRMS				
CCN	MSS				
Crown rot	S				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	-13	-11	-9	-
Merredin	-	-12	-10	-3	-
Katanning	-14	-12	-7	-4	-
Grass Patch	-	-10	-6	-	-5
Agronomic traits					
Coleoptile group	Medium				
Black point	MSS				
Falling number index	3				
Maturity	Quick				
Variety information					
Pedigree	Mace/IGW3119				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$3.50				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.

Brumby^(b)

APW

Comments

Brumby is an APW variety released by InterGrain in 2022. Brumby was included in the WA NVT for the first time in 2021 where it yielded similar to RockStar and Scepter. Brumby has a similar maturity to RockStar in the southern areas of WA, but slightly quicker in the warmer northern regions. A key attribute of Brumby is its powdery mildew resistance of R*, with ratings of RMR for stripe rust, MR for stem rust but SVS for leaf rust. Brumby currently has a provisional rating of 6p for pre-harvest sprouting, similar to Catapult, which has the highest rating for the more recently released wheat varieties grown in WA.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	-	100	104
Agzone 2	-	-	-	100	103
Agzone 3	-	-	-	101	103
Agzone 4	-	-	-	98	102
Agzone 5	-	-	-	99	99
Agzone 6	-	-	-	103	102
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MS				
Stem rust	MR				
Stripe rust	RMR				
Leaf rust	SVS				
Powdery mildew	R*				
Septoria tritici blotch	MSS				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	-				
RLN (<i>P. neglectus</i>)	MRMS _p				
CCN	MRMS _p				
Crown rot	S				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+7	+6	+4	-
Merredin	+11	+5	+4	+2	-
Katanning	+10	+8	+7	+3	-
Grass Patch	+11	+5	+4	-	+3
Agronomic traits					
Coleoptile group	Medium				
Black point	MS _p				
Falling number index	6 _p				
Maturity	Mid-slow				
Variety information					
Pedigree	-				
Breeder/Seed licensee	InterGrain				
Access to seed	Intergrain Seed Club Members or Seed Retailers. Free to trade				
EPR (\$/t, excl GST)	\$3.50				

Refer to page 4 for interpreting resistance classification.

_p = provisional rating.

* = some races in eastern Australia can attack these varieties.

Chief CL Plus^(b)

APW (N)

Comments

Chief CL Plus is an APW imidazolinone tolerant variety which was released in 2016. At release it was the highest yielding APW imidazolinone tolerant variety but is now slightly lower yielding than the recently released Tomahawk CL Plus, LRPB Anvil CL Plus, Hammer CL Plus and Razor CL Plus. Chief CL Plus is resistant to both pathotypes of leaf rust, but S to the Lr24 virulent pathotype which is not present in WA (*). Registered for label rate applications of Intervix[®] herbicide.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	94	90	91	97	93
Agzone 2	94	92	91	94	91
Agzone 3	95	95	93	91	94
Agzone 4	94	87	93	95	92
Agzone 5	89	90	90	90	95
Agzone 6	94	95	94	95	95
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MS				
Nodorum blotch (glume)	MRMS				
Stem rust	MR				
Stripe rust	S				
Leaf rust	MR*				
Powdery mildew	S				
Septoria tritici blotch	MSS				
Flag smut	SVS				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	MRMS				
RLN (<i>P. neglectus</i>)	MRMS				
CCN	MS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+7	+5	+3	-
Merredin	+8	+4	+1	+4	-
Katanning	+3	+4	+4	+1	-
Grass Patch	+4	+3	+3	-	+2
Agronomic traits					
Coleoptile group	Medium				
Black point	MS				
Falling number index	4				
Maturity	Mid				
Variety information					
Pedigree	Wyalkatchem derivative				
Breeder/Seed licensee	InterGrain				
Access to seed	Intergrain Seed Club Members or Seed Retailers. No grower-to-grower trading permitted				
EPR (\$/t, excl GST)	\$4.25				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.

* = some races in eastern Australia can attack these varieties.

Cutlass^(b)

APW (N)

Comments

Cutlass provides growers with a later season APW option. In the main season NVT, Cutlass averages 90% of Scepter yield. However, DPIRD and early season NVT show that Cutlass is best suited to sowing from late April to early May and is competitive with other mid-slow types in this window. Cutlass is resistant to all three rusts, is MSS to yellow spot and S to powdery mildew. Appears to have a higher risk of pre-harvest sprouting than Catapult and Denison.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	88	88	92	86	99
Agzone 2	93	86	87	89	97
Agzone 3	89	90	94	93	99
Agzone 4	91	85	82	85	94
Agzone 5	91	87	81	88	92
Agzone 6	95	94	92	90	98
Disease resistance	Adult rating				
Yellow spot	MSS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	R				
Stripe rust	RMR*				
Leaf rust	RMR*				
Powdery mildew	S				
Septoria tritici blotch	MSS				
Flag smut	MSS				
Common bunt	S				
RLN (<i>P. quasitereoides</i>)	MSp				
RLN (<i>P. neglectus</i>)	MSS				
CCN	MR				
Crown rot	S				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+24	+16	+14	-
Merredin	+26	+16	+12	+11	-
Katanning	+23	+14	+11	+9	-
Grass Patch	+30	+20	+11	-	+11
Agronomic traits					
Coleoptile group	Long				
Black point	MS				
Falling number index	4				
Maturity	Mid-slow				
Variety information					
Pedigree	RAC1316//Fang				
Breeder/Seed licensee	AGT				
Access to seed	Seed Sharing				
EPR (\$/t, excl GST)	\$3.00				

(N) denotes the supplementary classification of APWN.
Refer to page 4 for interpreting resistance classification.
p = provisional rating.

* = some races in eastern Australia can attack these varieties.

Denison[Ⓛ]

APW

Comments

Denison is a mid-slow maturing APW variety released by AGT in 2020. Denison yields slightly higher than Cutlass in Agzones 4 and 5 and about 4–6% higher than Cutlass in Agzones 1, 2, 3 & 6. In Agzone 6, Denison yields similar to Scepter in the main season NVT. Denison is one of the highest yielding varieties in the early season NVT, slightly behind RockStar, but slightly higher than Cutlass, Valiant CL Plus, Kinsei and Catapult. Denison's maturity is similar to Cutlass when sown in May, but it can be quicker than Cutlass when sown early to mid April, particularly in the northern areas. Denison is rated S to leaf rust and powdery mildew. Denison has a good pre-harvest sprouting rating compared to Cutlass.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	96	94	104
Agzone 2	-	87	90	95	101
Agzone 3	-	92	98	97	104
Agzone 4	-	-	86	91	98
Agzone 5	-	86	84	93	96
Agzone 6	-	100	99	98	102
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MR				
Nodorum blotch (glume)	MRMS				
Stem rust	MS				
Stripe rust	MR				
Leaf rust	S				
Powdery mildew	S				
Septoria tritici blotch	MS				
Flag smut	Rp				
Common bunt	MRp				
RLN (<i>P. quasitereoides</i>)	MRp				
RLN (<i>P. neglectus</i>)	S				
CCN	MS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/mid April	Late April	Early/mid May	Late May	Early June
Mullewa	-	+12	+16	+15	-
Merredin	+21	+17	+11	+7	-
Katanning	+16	+14	+12	+7	-
Grass Patch	+26	+17	+10	-	+7
Agronomic traits					
Coleoptile group	Medium/Long				
Black point	MS				
Falling number index	5				
Maturity	Mid-slow				
Variety information					
Pedigree	-				
Breeder/Seed licensee	InterGrain				
Access to seed	Intergrain Seed Club Members or Seed Retailers. Free to trade				
EPR (\$/t, excl GST)	\$3.50				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

Tomahawk CL Plus[Ⓛ]

APW

Comments

Tomahawk CL Plus is an APW variety released by AGT in 2023. It is closely related to Scepter with a similar maturity but with the additional benefit of the option to use Clearfield® Intervix® technology in-crop or to manage the Clearfield® Intervix® soil residues from previous crops. Tomahawk CL Plus was included in the WA NVT for the first time in 2022 where it yielded slightly higher than Scepter and significantly higher than other Clearfield® varieties currently grown in WA. At this stage Tomahawk CL Plus is rated Sp for leaf rust compared to Scepter at MSS.

Note: There are no grower-to-grower sales permitted for any CL Plus varieties.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	-	-	105
Agzone 2	-	-	-	-	104
Agzone 3	-	-	-	-	104
Agzone 4	-	-	-	-	104
Agzone 5	-	-	-	-	104
Agzone 6	-	-	-	-	105
Disease resistance	Adult rating				
Yellow spot	MRMS _p				
Nodorum blotch (leaf)	-				
Nodorum blotch (glume)	-				
Stem rust	MR _p				
Stripe rust	RMR _p				
Leaf rust	Sp				
Powdery mildew	-				
Septoria tritici blotch	-				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	-				
RLN (<i>P. neglectus</i>)	-				
CCN	-				
Crown rot	-				
Flowering	Days after/before Scepter				
2022 NVT					
Great Southern	+2				
Agronomic traits					
Coleoptile group	-				
Black point	-				
Falling number index	-				
Maturity	Quick-mid				
Variety information					
Pedigree	Scepter type with Clearfield donor				
Breeder/Seed licensee	AGT				
Access to seed	AGT Affiliates or retailers. No grower to grower trading permitted				
EPR (\$/t, excl GST)	\$4.15				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.

Firefly[Ⓛ]

ANW

Comments

Firefly was released in 2023, InterGrain's first ANW release since Kinsei in 2018. Firefly was included in the 2021 and 2023 WA NVT. InterGrain data indicates Firefly's yields to be 11% higher than Zen. Firefly has mid-slow maturity, similar to Zen, although 2021 NVT data indicates it may be quicker in northern areas.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	-	-	-	96	-
Agzone 2	-	-	-	97	-
Agzone 3	-	-	-	101	-
Agzone 4	-	-	-	94	-
Agzone 5	-	-	-	97	-
Agzone 6	-	-	-	-	-
Disease resistance	Adult rating				
Yellow spot	MRMS _p				
Nodorum blotch (leaf)	-				
Nodorum blotch (glume)	-				
Stem rust	Sp				
Stripe rust	MSS _p				
Leaf rust	MSS _p				
Powdery mildew	-				
Septoria tritici blotch	-				
Flag smut	-				
Common bunt	-				
RLN (<i>P. quasitereoides</i>)	-				
RLN (<i>P. neglectus</i>)	-				
CCN	MSS _p				
Crown rot	-				
Flowering	Days after/before Scepter				
2022 NVT					
Northern	+3				
Great Southern	+4				
Agronomic traits					
Coleoptile group	-				
Black point	-				
Falling number index	-				
Maturity	Mid-slow				
Variety information					
Pedigree	Complex cross of coded breeding lines				
Breeder/Seed licensee	InterGrain				
Access to seed	Intergrain Seed Club Members or Seed Retailers.				
EPR (\$/t, excl GST)	\$4.00				

Refer to page 4 for interpreting resistance classification.

p = provisional rating.

Kinsei[Ⓛ]

ANW

Comments

Kinsei is a mid-slow maturity noodle wheat released by InterGrain in 2018. It is well suited to early sowing opportunities and has also performed well in the NVT main season plantings. Kinsei yields slightly less than Ninja, similar to Zen, and out-yields Calingiri (which is now classified as Feed). Kinsei is among the highest yielding varieties in the early season NVT, only out-yielded by RockStar. Kinsei is S to leaf rust, powdery mildew and black point. Kinsei's disease ratings are marginally better than Ninja and Zen.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	93	92	99	95	103
Agzone 2	97	90	93	96	101
Agzone 3	94	93	99	98	102
Agzone 4	94	86	90	93	100
Agzone 5	89	88	88	95	96
Agzone 6	99	99	99	99	101
Disease resistance	Adult rating				
Yellow spot	MS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	MSS				
Stripe rust	MRMS				
Leaf rust	MSS				
Powdery mildew	S				
Septoria tritici blotch	MSS				
Flag smut	RMR				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	S				
RLN (<i>P. neglectus</i>)	S				
CCN	MSS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/mid April	Late April	Early/mid May	Late May	Early June
Mullewa	-	+12	+11	+9	-
Merredin	+15	+10	+10	+6	-
Katanning	+10	+10	+9	+6	-
Grass Patch	+11	+10	+7	-	+5
Agronomic traits					
Coleoptile group	Medium				
Black point	S				
Falling number index	4				
Maturity	Mid-slow				
Variety information					
Pedigree	Complex cross				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$4.00				

Refer to page 4 for interpreting resistance classification.

Ninja[Ⓛ]

ANW

Comments

Ninja is a noodle wheat variety released by InterGrain in 2016 with a Calingiri and Wyalkatchem background. To date; Ninja has been the highest yielding ANW variety, but will likely be replaced in the future as InterGrain release Firefly and a new generation of noodle wheats. Ninja is S to stem rust, powdery mildew and the new incursion of leaf rust. Rated MRMS to black point.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	93	92	99	95	103
Agzone 2	97	90	93	96	101
Agzone 3	94	93	99	98	102
Agzone 4	94	86	90	93	100
Agzone 5	89	88	88	95	96
Agzone 6	99	99	99	99	101
Disease resistance	Adult rating				
Yellow spot	MS				
Nodorum blotch (leaf)	MRMS				
Nodorum blotch (glume)	MRMS				
Stem rust	MSS				
Stripe rust	MRMS				
Leaf rust	MSS				
Powdery mildew	S				
Septoria tritici blotch	MSS				
Flag smut	RMR				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	S				
RLN (<i>P. neglectus</i>)	S				
CCN	MSS				
Crown rot	MSS				
Flowering	Days after/before Scepter				
2022 & 2021 DPIRD trials	Early/ mid April	Late April	Early/ mid May	Late May	Early June
Mullewa	-	+12	+11	+9	-
Merredin	+15	+10	+10	+6	-
Katanning	+10	+10	+9	+6	-
Grass Patch	+11	+10	+7	-	+5
Agronomic traits					
Coleoptile group	Medium				
Black point	S				
Falling number index	4				
Maturity	Mid-slow				
Variety information					
Pedigree	Complex cross				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$4.00				

Refer to page 4 for interpreting resistance classification.

ZEN[Ⓛ]

ANW

Comments

Zen is a noodle variety with a Calingiri and Wyalkatchem background. On average Zen's yields are similar to Kinsei, however Kinsei does outyield Zen in Agzones 3 and 6 and with earlier May sowings. Zen is S to leaf rust, stem rust and powdery mildew. It has a good black point and RLN (*P. neglectus*) rating but has a weaker falling number index rating than Ninja and Kinsei.

Yield (% of Scepter)	2018	2019	2020	2021	2022
Agzone 1	95	91	94	99	95
Agzone 2	95	92	93	96	93
Agzone 3	96	95	94	94	95
Agzone 4	94	87	95	95	94
Agzone 5	87	89	91	92	95
Agzone 6	95	96	95	98	96
Disease resistance	Adult rating				
Yellow spot	MRMS				
Nodorum blotch (leaf)	MS				
Nodorum blotch (glume)	MRMS				
Stem rust	S				
Stripe rust	MRMS				
Leaf rust	S				
Powdery mildew	S				
Septoria tritici blotch	S				
Flag smut	MS				
Common bunt	MR				
RLN (<i>P. quasitereoides</i>)	MRMS _p				
RLN (<i>P. neglectus</i>)	MRMS				
CCN	S				
Crown rot	S				
Flowering	Days after/before Scepter				
2018 & 2019 DPIRD trials	10-Apr	24-Apr	08-May	22-May	20-Jun
Northern	+9	+4	+5	+6	+4
Eastern	+7	+8	+5	+2	+0
Katanning	+6	+4	+0	+0	+0
Gibson	-	-	-	-	-
Agronomic traits					
Coleoptile group	Short				
Black point	MRMS				
Falling number index	3				
Maturity	Mid-slow				
Variety information					
Pedigree	Calingiri/Wyalkatchem				
Breeder/Seed licensee	InterGrain				
Access to seed	Free to trade				
EPR (\$/t, excl GST)	\$3.85				

Refer to page 4 for interpreting resistance classification.
p = provisional rating.



Wheat