

Comparison of oat varieties; including imidazolinone (IMI) tolerant variety

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Key findings

- Wintaroo and Kingbale yielded similarly for oaten hay production at Hart in 2021, producing 3.89 and 3.91 t/ha, respectively.
- No yield penalty was observed for Kingbale with the application of Sentry® IBS, at 50 g/ha.
- Kingbale (+/- Sentry®) produced the highest grain yield, ranging from 1.49 – 1.59 t/ha.
- In 2021, hay quality was similar for Wintaroo and Kingbale (+/- Sentry®) across crude protein (%), neutral detergent fibre (% aNDFom), acid detergent fibre (% ADF) and water-soluble carbohydrates (% WSC).

Why do the trial?

Herbicide tolerant crops are becoming increasingly common within our farming systems, due to the benefits of improved weed control options. As a result, the risk of plant back restrictions from these herbicides in a following year's crop has increased.

Kingbale is the first single gene imidazolinone (IMI) tolerant oat variety to be developed and was released by InterGrain in 2019. This variety has an improved tolerance to Group 2 (previously Group B) soil residual herbicides. A registration for the use of Sentry® (active ingredient imazapic and imazapyr) was approved in 2021 as a pre-emergent herbicide. The release of this variety provides growers additional management tools to reduce the risk of plant back issues from IMI herbicides, particularly where hay production is a common rotational option and additional grass weed control is required.

Preliminary trial data suggests that Kingbale is agronomically similar to Wintaroo, with a similar disease profile and comparable hay and grain properties.

This trial compares the hay yield, hay quality and grain yield of Kingbale standalone, and with the application of Sentry® IBS (incorporated by sowing) compared to Wintaroo, a commonly grown oat variety.

How was it done?

Plot size	1.75 m x 10.0 m	Fertiliser	DAP (18:20) + 1% Zn + Impact @ 80 kg/ha
Seeding date	May 18, 2021		Easy N (42.5:0) 70 L/ha on June 12, 2021
Location	Hart, SA		Easy N (42.5:0) 70 L/ha on August 20, 2021
Harvest date	November 30, 2021		

The trial was a randomised complete block design with three replicates and two varieties (Kingbale +/- Sentry® IBS). It was managed with the application of pesticides to ensure a weed, insect and disease-free canopy. All plots were assessed for hay yield (t/ha), hay quality and grain yield (t/ha). Hay cuts were conducted at watery-ripe (GS71) by cutting 4 x 1 metre of row at ground level. The Sentry® herbicide treatment was applied IBS at 50 g/ha prior to seeding.

Results and discussion

Hay yield

At Hart in 2021, Wintaroo and Kingbale yielded similarly for oaten hay production, producing 3.89 and 3.91 t/ha, respectively. No yield penalty was observed for Kingbale + Sentry® IBS at 50 g/ha, with a hay yield of 3.75 t/ha (Figure 1).

Hay yield data from Hart in 2019 also supports the result observed in 2021, with varieties yielding similarly. The exception to this was 2020, where Kingbale had a lower hay yield compared to Wintaroo (Table 1). Results from the Agrifutures funded, National Hay Agronomy project (conducted across Southern and Western Australia) have also shown that Kingbale has consistently yielded similar to Wintaroo. In only one of four years, Kingbale yielded lower than Wintaroo at Muresk, WA (Peirce & Schilling 2021). Results at Hart showed that there was no hay yield penalty associated with the application of Sentry® herbicide to Kingbale oats.

Grain yield

Kingbale + Sentry® applied IBS was the highest performing variety, with a grain yield of 1.59 t/ha, showing that no grain yield penalty occurs with the application of Sentry®. Kingbale standalone achieved a grain yield of 1.49 t/ha, compared to Wintaroo of 1.39 t/ha (Figure 1).

Similar results were also observed at Hart in 2020. However, Kingbale yielded lower than Wintaroo in 2019, under Decile 1 conditions at Hart (Table 1).

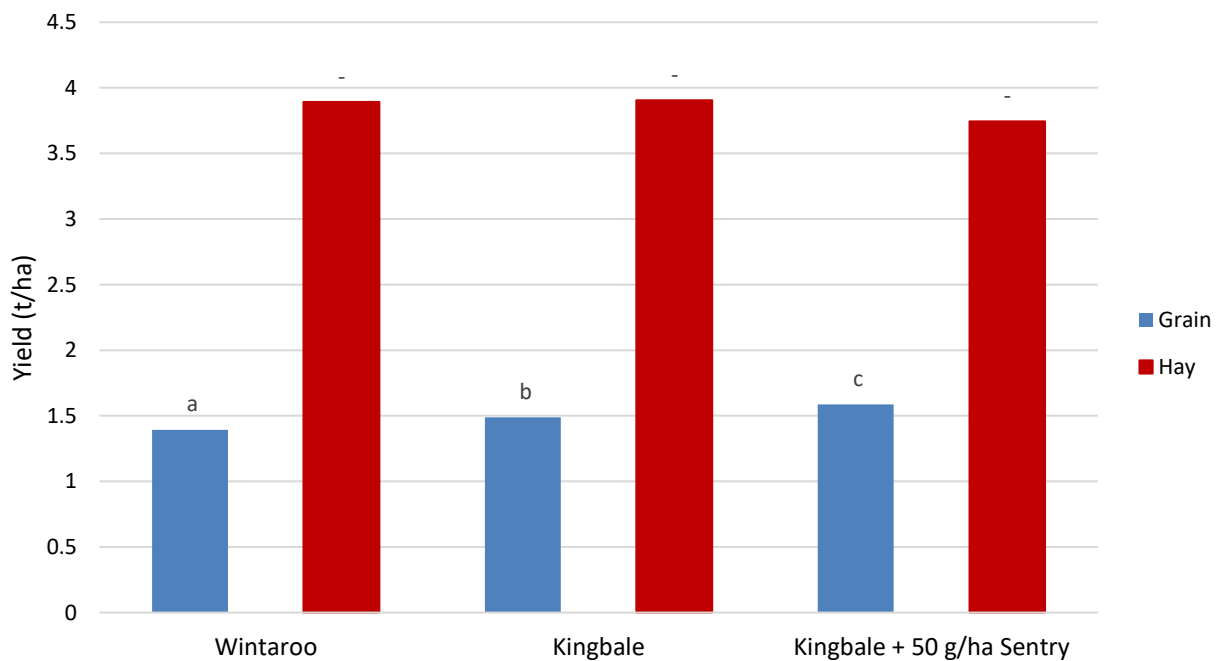


Figure 1. Grain and hay yield of Wintaroo and Kingbale treatments in the 2021 trial at Hart. Yields with the same letter are not significantly different.

Table 1. Long-term oaten hay and grain performance for Group B tolerant oats trial at Hart (expressed as % trial average).

Variety	% of trial average						Hay yield (t/ha)	Grain yield (t/ha)
	2019		2020		2021			
	Hay	Grain	Hay	Grain	Hay	Grain	2021	
Wintaroo	92	86	104	99	101	93	3.89	1.39
Kingbale	82	80	88	106	101	100	3.91	1.49
Yallara	126	134						
Kingbale + Sentry IBS					97	107	3.74	1.59
Mulgara			108	94				
Average yield (t/ha)	2.83	0.68	2.98	2.10	3.85	1.49	3.85	1.49
Sowing date	May 30		May 6		May 18			
April - Oct (mm)	162		336		232			
Annual rainfall (mm)	189		503		401			

Hay quality

In 2021, hay quality was similar for Wintaroo and Kingbale (+/- Sentry®) across crude protein (%), neutral detergent fibre (% aNDFom), acid detergent fibre (% ADF) and water-soluble carbohydrates (% WSC). Similar results were also observed in 2019 for both varieties (Table 2).

Crude protein is the measurement of protein content (%) within a feed sample. In 2021, Kingbale and Wintaroo did not meet requirements for export fodder, as displayed in Table 2. All varieties trialed in 2019 met protein requirements, showing that protein content is likely influenced by in-crop management practices and seasonal conditions.

Neutral detergent fibre (NDF) is a measure of insoluble fibre in feed and correlates to the dry matter intake (DMI) of an animal. Higher levels of NDF result in a reduced DMI, and a low NDF can result in increased DMI. All varieties in 2019 and 2021 met the minimum requirements for export fodder. Neutral detergent fibre values across both seasons are similar, suggesting NDF is influenced by variety selection and cut timing.

Lower levels of ADF provide improved digestibility (AEXCO 2016). Results in 2019 and 2021 show that Wintaroo and Kingbale have similar results across multiple seasons. Acid detergent fibre results for 2021 show that Kingbale meets the export fodder requirements, with Wintaroo slightly above the requirement.

Water soluble carbohydrates (WSC) are readily digestible sugars that can contribute to protein synthesis and influence palatability (AEXCO 2016) and were low in Kingbale and Wintaroo across 2019 and 2021.

In 2019, Yallara was the only variety to meet minimum export fodder requirements for WSC, producing a better quality hay for export compared to that of Kingbale and Wintaroo in that year.

Table 2. Feed quality analysis for oaten hay treatments at Hart in 2019 and 2021.

Variety	Crude Protein (% CP)	Neutral Detergent Fibre (% aNDFom)	Acid Detergent Fibre (% ADF)	Water soluble carbohydrates (% WSC)
Minimum export fodder standards	4 – 10%	< 57%	< 32 %	> 18%
2019				
Kingbale	8.80	50.5	29.70 ^b	16.90 ^a
Wintaroo	9.80	49.3	29.10 ^b	11.20 ^a
Yallara	9.00	45.0	25.00 ^a	34.50 ^b
LSD (P≤0.05)	NS	NS	3.00	5.90
2021				
Kingbale	13	47.4	31.9	12.6
Kingbale + 50 g/ha Sentry	12.9	45.9	31.0	13.9
Wintaroo	11.9	47.1	32.5	14.2
LSD (P≤0.05)	NS	NS	NS	NS

Minimum standards for export hay quality requirements were sourced from AEXCO, 2016. Other quality parameters not shown.

References

AEXCO 2016, 'Market requirements', *Producing Quality Oaten Hay*

Peirce C, Schilling R 2021, 'National hay agronomy update', *2021 Hart Field Day Guide*

Acknowledgements



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