Hart's 2020 Trial Results

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HART
SA's premier cropping field site

SARDI
South Australian Research and Development Institute

SAGIT

National Hay Agronomy (NHA) project

Aims

- Address knowledge gaps in the Australian export fodder industry

- Reduce barriers to adoption of new varieties and agronomic practices

AgriFutures Australia

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How was it done?

Four sites across Australia

Nine varieties with varying maturities

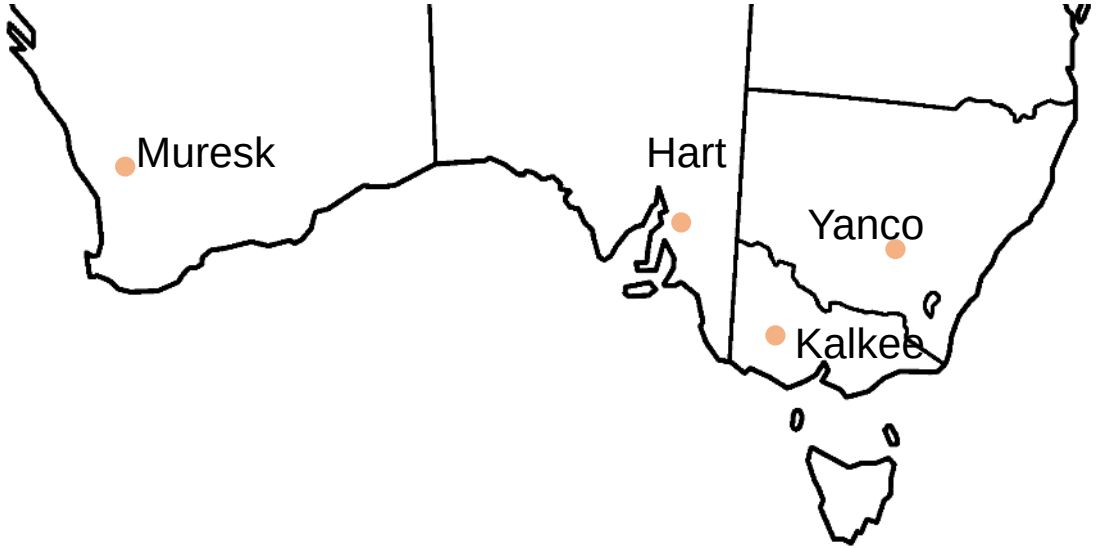
Two times of sowing (TOS)

Six rates of nitrogen (N) fertiliser

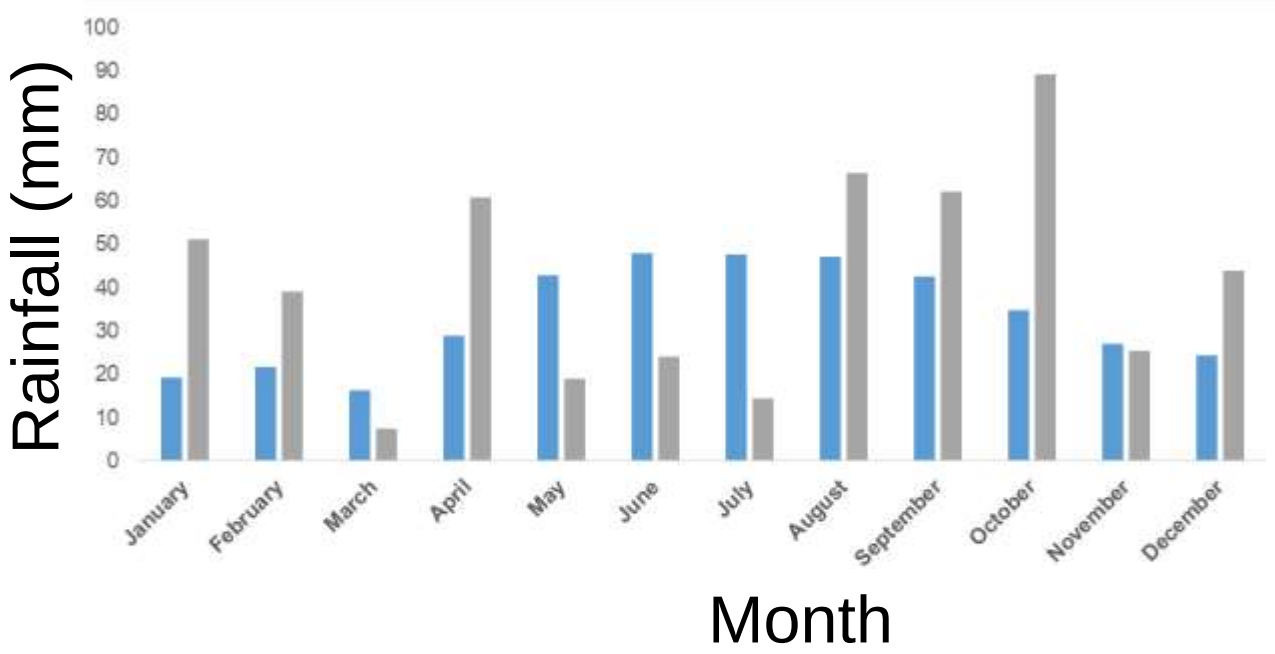
- 10, 30, 60, 90, 120, 150 kg N/ha

Assessments

- Hay yields and hay quality
- Grain yields



The trial and season at Hart



Varieties

Brusher, Carrolup, Durack, Koorabup, Mulgara, Williams, Wintaroo, Vasse*, Yallara

Time of sowing (TOS)

TOS 1: 6th May

TOS 2: 25th May

Rainfall

- Annual: 502 mm
- GSR: 335 mm
- Above average for most months
- Below average for most of Winter

What happened? Hay yields

Variety	*Hay yield (t/ha)*
Vasse	2.3[a]
Williams	2.9[b]
Koorabup	2.9[b]
Mulgara	3.0[bc]
Durack	3.1[bcd]
Wintaroo	3.2[bcd]
Yallara	3.2[bcd]
Carrolup	3.4[cd]
Brusher	3.5[d]
LSD (p≤0.05)	**0.39**

- Ranged from 2.3 t/ha to 3.5 t/ha
- Brusher, Carrolup, Yallara, Wintaroo and Durack were the highest yielding
- Vasse was the lowest yielding

What happened? Hay yields

Sowing date	*Hay yield (t/ha)*
May 6	3.47[b]
May 25	2.67[a]
LSD (p≤0.05)	**0.44**

- In 2020, earlier sowing date translated into higher yields (+800 kg/ha in 2020)
- TOS 1 plots had access to rainfall close to seeding

What happened? Hay quality

Variety	*Hay yield (t/ha)*	*NDF %*
Vasse	2.3^{a}	53.81^{g}
Williams	2.9^{b}	50.23^{ef}
Koorabup	2.9^{b}	50.05^{def}
Mulgara	3.0^{bc}	49.29^{cde}
Durack	3.1^{bcd}	50.86^{f}
Wintaroo	3.2^{bcd}	48.92^{cd}
Yallara	3.2^{bcd}	47.37^{a}
Carrolup	3.4^{cd}	47.58^{ab}
Brusher	3.5^{d}	48.73^{bc}
LSD (p≤0.05)	**0.39**	**1.24**
Sowing date		
May 6	3.47^{b}	49.80
May 25	2.67^{a}	49.49
LSD (p≤0.05)	**0.44**	**n.s.**

Neutral Detergent Fibre (NDF)

- All varieties had NDF values lower than the export hay threshold (57%)
- Yallara and Carrolup had the lowest NDF%

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Neutral Detergent Fibre (NDF)

- All varieties except Vasse had NDF values lower than the export hay threshold (57%)
- Yallara and Carrolup had the lowest NDF%
- No difference in NDF% between sowing dates

What happened? Hay quality

Variety	***WSC %***
Vasse	15.3[a]
Williams	21.21[b]
Koorabup	23.52[c]
Mulgara	23.86[c]
Durack	21.42[b]
Wintaroo	24.10[c]
Yallara	25.88[d]
Carrolup	25.91[d]
Brusher	25.89[d]
LSD (p≤0.05)	**1.09**
Sowing date	
May 5	24.30[b]
May 25	21.73[a]
LSD (p≤0.05)	**2.03**

Water Soluble Carbohydrates (WSC)

- All varieties surpassed the minimum export hay requirement of 18% except Vasse
- Brusher, Carrolup and Yallara had the highest WSC%

What happened? Hay quality

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Williams	21.21[b]
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Water Soluble Carbohydrates (WSC)

- All varieties surpassed the minimum export hay requirement of 18% except Vasse
- Brusher, Carrolup and Yallara had the highest WSC%
- TOS 1 plots had a higher WSC% than TOS 2 (+2.6%)

What happened? Grain yields

Variety	*Hay yield (t/ha)*	*Grain yield (t/ha)*
Vasse	2.3^{a}	2.84^{d}
Williams	2.9^{b}	2.87^{d}
Koorabup	2.9^{b}	2.87^{d}
Mulgara	3.0^{bc}	2.43^{c}
Durack	3.1^{bcd}	2.28^{bc}
Wintaroo	3.2^{bcd}	2.14^{ab}
Yallara	3.2^{bcd}	2.78^{d}
Carrolup	3.4^{cd}	2.43^{c}
Brusher	3.5^{d}	2.12^{a}
LSD (p≤0.05)	**0.39**	**0.15**
Sowing date		
May 6	3.47^{b}	2.55
May 25	2.67^{a}	2.51
LSD (p≤0.05)	**0.44**	**n.s.**

- Ranged from 2.1 t/ha to 2.9 t/ha
- Vasse, Williams, Koorabup and Yallara were the highest performing

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LSD (p≤0.05)	**0.44**	**n.s.**

- Ranged from 2.12 t/ha to 2.87 t/ha
- Vasse, Williams, Koorabup and Yallara were the highest performing
- Brusher and Wintaroo were the lowest performing
- No difference in yields between sowing dates

What happened? Nitrogen management

N rate	*Hay yield (t/ha)*	*Grain yield (t/ha)*
10	2.70[a]	2.25[a]
30	3.20[b]	2.35[b]
60	3.10[b]	2.46[c]
90	3.15[b]	2.54[d]
120	3.16[b]	2.59[de]
150	3.10[b]	2.61[e]
LSD (p≤0.05)	**0.05**	**3.13**

Hay yields

- Fertiliser rates of less than 30 kg N/ha produced low yields
- In 2020 rates of 30 kg N/ha were sufficient to achieve highest hay yields

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Hay yields

- Fertiliser rates of less than 30 kg N/ha produced low yields
- In 2020 rates of 30 kg N/ha were sufficient to achieve highest hay yields

Grain yields

- 120 kg N/ha was sufficient for the highest grain yields

Conclusions

- Early May sowing resulted in higher hay yields (2019 and 2020)
- High yielding varieties at Hart have been Brusher, Carrolup, Yallara, Wintaroo and Durack
- Nitrogen applied at 30 kg N/ha was sufficient to produce the highest hay yield
- All varieties except Vasse met the export hay recommendations for NDF and WSC

Oat variety comparison trial – How does Kingbale stack up?

- Kingbale (GIA1701O) is the first IMI tolerant oat variety, released by InterGrain in 2019.
- A close derivative of Wintaroo, with similar agronomic & disease characteristics.

How was it done?

Trial performed over two years (2019 and 2020)

Three oat varieties
- Kingbale, Wintaroo and Yallara (2019)
- Kingbale, Wintaroo and Mulgara (2020)

Same management
- 2019: Sown May 30 | ~70 units N during the year
- 2020: Sown May 6 | ~70 units N during the year

Measurements
- Hay yield and quality (2019)
- Grain yield

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What happened? Hay yields

Variety	Grain yield (t/ha)	Dry matter (t/ha)
2019		
Kingbale	0.54[a]	2.31[a]
Wintaroo	0.59[a]	2.60[a]
Yallara	0.91[b]	3.57[b]
LSD (P ≤ 0.05)	0.17	0.55
2020		
Kingbale	2.23[c]	2.63[a]
Mulgara	1.98[a]	3.21[b]
Wintaroo	2.08[b]	3.09[b]
LSD (P ≤ 0.05)	0.04	0.02

2019

- Kingbale performed the same as Wintaroo
- Both were lower yielding than Yallara

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2019

- Kingbale performed the same as Wintaroo
- Both were lower yielding than Yallara

2020

- Kingbale was lower yielding than Wintaroo and Mulgara

What happened? Hay quality

Variety	Acid detergent fibre (%ADF)	Crude protein (% CP)	Water soluble carbohydrates (% WSC)	Neutral detergent fibre (%NDFom30)
2019				
Kingbale	29.70[b]	8.80	16.90[a]	23.10[b]
Wintaroo	29.10[b]	9.80	11.20[a]	22.60[b]
Yallara	25.00[a]	9.00	34.50[b]	16.40[a]
LSD (P ≤ 0.05)	3.00	ns	5.90	4.20

Acid Detergent Fibre (ADF)

- Kingbale had the same ADF content as Wintaroo, both higher than Yallara.

What happened? Hay quality

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Neutral Detergent Fibre (NDF)

- Kingbale and Wintaroo had the highest NDF content

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Crude Protein (CP)

- No differences between varieties. All >8% desired by market[1]

[1.] Department of Primary Industries and Regional Development: Agriculture and Food 2017. Oats: hay quality for export and domestic markets. Available: https://www.agric.wa.gov.au/hay-production/oats-hay-quality-export-and-domestic-markets?nopaging=1

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Water Soluble Carbohydrates (WSC)

- Kingbale and Wintaroo had the lowest WSC, significantly below Yallara

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2019

- Yields ranged from 0.5 t/ha to 0.9 t/ha.
- Kingbale and Wintaroo yields matched, both lower than Yallara.

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2019

- Yields ranged from 0.5 t/ha to 0.9 t/ha.
- Kingbale and Wintaroo yields matched, both lower than Yallara.

2020

- Yields ranged from 1.9 t/ha to 2.2 t/ha.
- Kingbale was the highest yielding, followed by Wintaroo and Mulgara.

Conclusions

- Kingbale hay yields were similar to Wintaroo across two seasons at Hart
- Kingbale grain yields matched or exceeded Wintaroo at Hart in 2019 and 2020
- Provides a new option for growers to include oats in the rotation where IMI residues are of concern
- Sentry® pre-emergent registration approved for 2021