

Evaluating the fit of Long Season Oat Varieties as Alternative Hay Varieties in South-West Western Australia 2015-2017

Acknowledgments: This project has been funded by AEXCO and GRDC through the Department of Agriculture and Food break crop project. This trial was carried out by ConsultAg (Narrogin) in collaboration with Peter Dowdell (Gilmac). Thanks to the generous donations of oat seed from Heritage seeds and the growers who assisted in the trial implementation.

Author: Trent Butcher and Peter Dowdell

Key Finding

- The long season varieties such as Wizard or Genie showed to be high yielding hay oats but usually had low quality for export markets.
- For early sowing (27th April -1st May) Brusher, Carrolup Williams and Banister were the best performers in terms of return per Ha over the 3 years of the trial.
- In the conventional hay sowing window (17th -26th May) Banister, Brusher, Mulgara and Carrolup were the best performers in terms of return per Ha over the 3 years of the trial.
- On average the yield gain from early sowing did not increase returns enough to compensate for poorer quality. Frequently the early sown hay was cut earlier and took longer to dry resulting in more downgrading than the later sown and cut hay.
- The implication of leaf disease on hay quality needs further investigation.

Introduction:

This report covers the findings of three years of research. The goal of the trial program was to explore new varieties with different maturities. This has been driven by the risk associated with post-cutting rainfall, which, has been exacerbated by growers electing to sow short season varieties earlier. Sowing earlier has historically resulted in higher yielding crops particularly when the end of season rainfall is minimal. Earlier cutting time not only means that the hay is on the ground when there is a higher chance of rain, but the cooler conditions usually result in the hay taking longer to cure, thus further increasing the risk of quality downgrades.

Trial Aims

The trial series aimed to identify the potential profits to be made by selecting different varieties to optimise yield and quality. Additionally the trial aims to identify the risks associated with sowing short season varieties too early and whether variety selection can help reduce this risk by delaying cutting time. Seasonal conditions played a pivotal role in exposing the weaknesses and benefits of variety selection and sowing time.

Methods

The trial was located to the west of Narrogin in the 2015 season then moved east of Cuballing for the 2016 and 2017 seasons. The trial design varied slightly between the years with the addition of extra varieties in the second year and increased replication in the third year. The first two years featured a near neighbour control layout where Carrolup was used as the control variety in 2015 and Brusher used in 2016. The 2017 trial aimed to reduce the number of varieties and perform a replicated trial so that a more accurate representation of variety performance could be recorded. This was only able to take place after the number of varieties were reduced so that logistics did not prevent trial accuracy. TOS1 occurred between the 27th of April and the 1st of May and TOS2 occurred between the 17th and 26th of May, over the three years.

Results

Seasonal Conditions

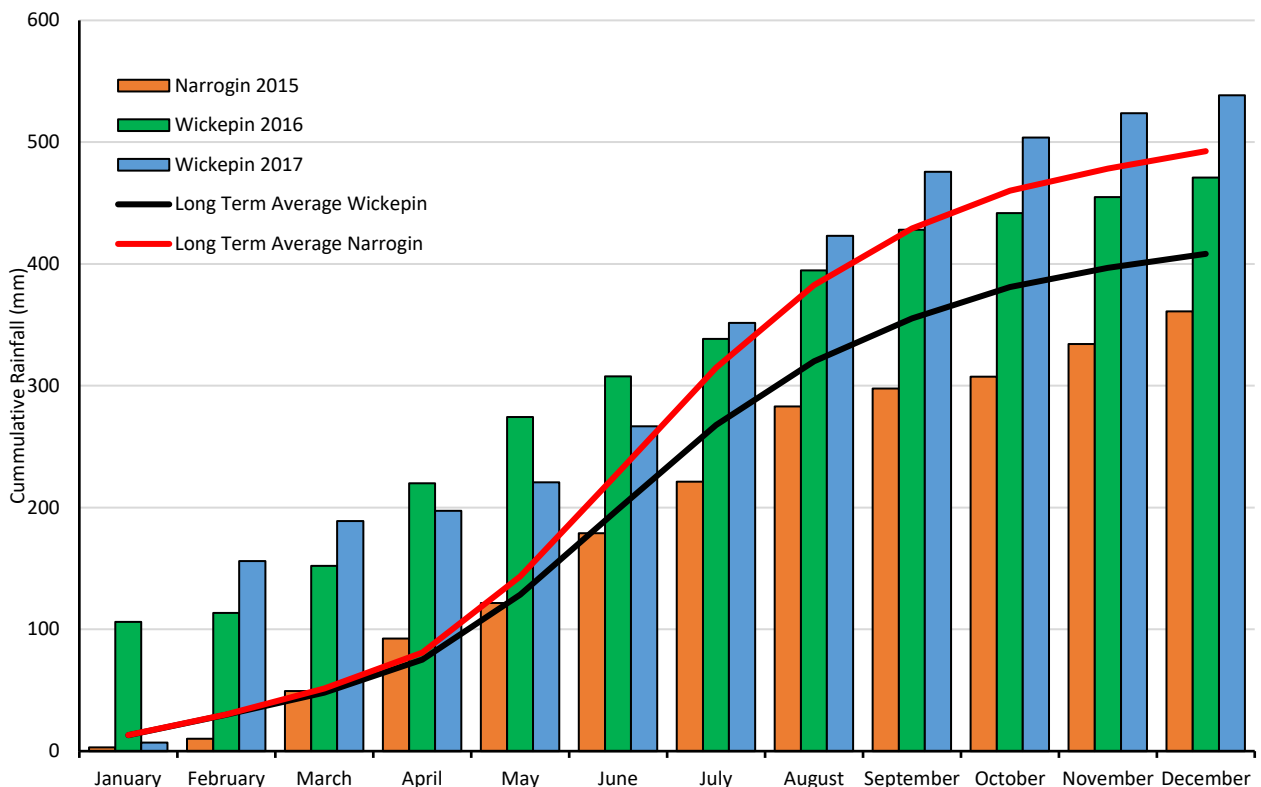


Figure 1: Cumulative rainfall at each of the sites (2015-2017) compared to the corresponding long term average

The conditions varied appreciably between the years. In the 2015 season the finish was very dry, rainfall leading up to cutting was very limited and resulted in some of the longer season varieties requiring a premature cutting to prevent too much yellowing as the result of moisture stress. In 2016 the season had good summer rains and establishing rains for the crop. The remainder of the season was wet and mild which allowed for crops to finish well. There were also rainfall events post cutting which had quality implications. The 2017 season was similar to the 2016 season however the start of the growing season was drier and emergence was reliant in chasing stored moisture from

the summer. The end of the season was very wet and again resulted in slow drying as well as cutting issues due to rainfall and significant quality down grades.

Hay Yield

To compare hay yield over the three years, yield relativities were used in comparison to Brusher which was sown in the trial every season. Yields for each given year were calculated as a percentage of Brusher and then averaged. This is a compromised strategy as there was a large degree of season variability and in many of the varieties were not included in every season. By varieties not being included in every season it is difficult to model how they would have performed in a more or less favourable season.

Wizard was the top yielding variety, however it was only present in the 2017 trial and had quality issues. Genie performed better than Brusher in both the 2015 and 2016 season, however it was not included in the 2017 season. Bannister returned a more consistent yield than Williams and Carrolup however on average Williams averaged a higher yield than both with an early time of sowing. Time of sowing two which is the more conventional hay sowing window favoured Carrolup slightly over Williams.

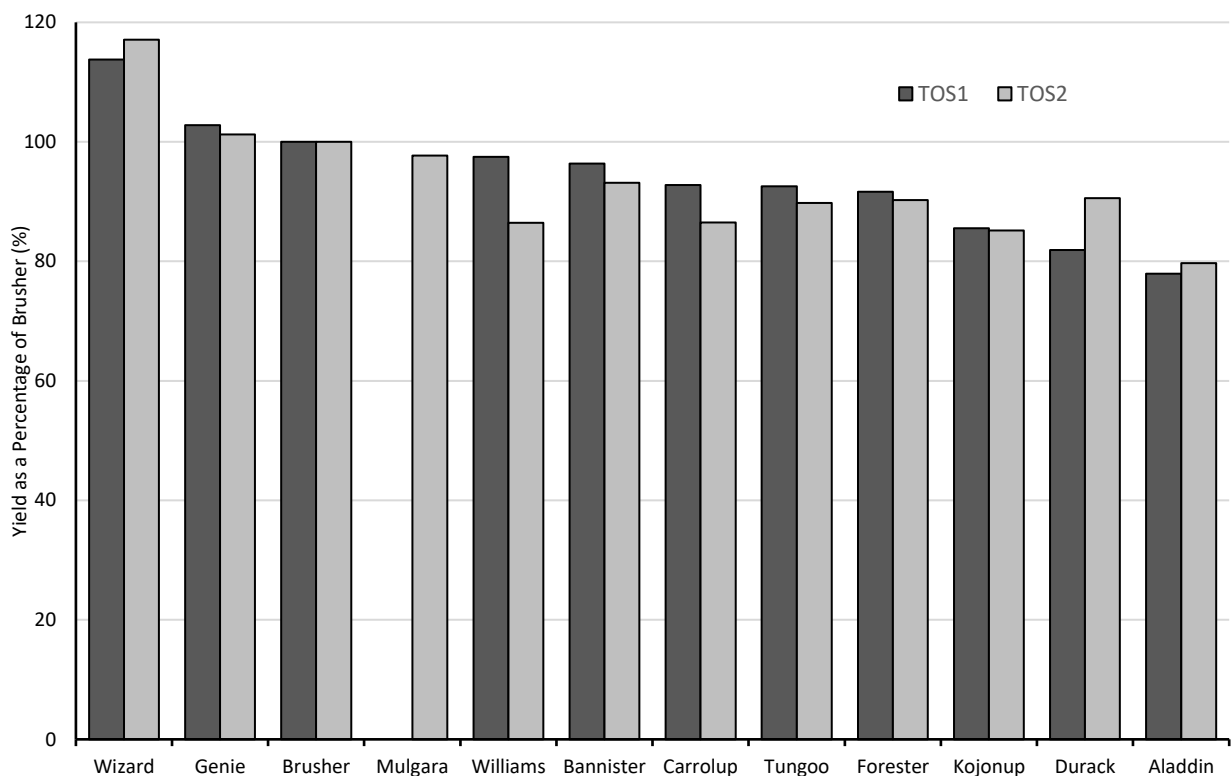


Figure 2: Hay yield by variety determined as a percentage yield of Brusher at two times of sowing

Hay Quality

Hay quality was very good in the 2015 season. The dry finish allowed for all the short season varieties to test up well. The long season varieties struggled with quality as some had to be cut prematurely due to early desiccation as a result of the dry finish. The 2016 and 2017 season both

had quality issues as a result of rainfall. In 2016 substantial amounts of rainfall fell on the TOS1 varieties post-cutting which resulted in significant downgrades. Early rain events in the 2017 season compromised the quality of Brusher as it had to be cut later in an attempt to avoid the rain. Even though this was done the subsequent rainfall events significantly reduced the brusher compared to other varieties.

The probability of rainfall on hay was lower for later sown hay than early sown hay. This was particularly true in the 2016 season. Later sown hay had on average shorter drying times than the early sown hay. The shorter drying times can be attributed to higher temperatures, lower relative humidity and lower soil moisture.

Pricing for each of the grades were fairly consistent across the years.

Table 1: The average price per tonne of each variety based upon quality specifications

	2015		2016		2017		Average	
	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2
Aladdin	203	203	180	223			192	213
Carrolup	243	223	203	223	223	203	223	217
Williams	243	223	203	203	203	203	217	210
Tungoo	243	223	223	223			233	223
Forester	243	243	180	115			212	179
Brusher	243	203	187	223	160	180	197	202
Genie	187	203	180	203			183	203
Mulgara				223		180	0	202
Kojonup				223	180	203	180	213
Bannister			223	223	203	223	213	223
Durack			160	203			160	203
Wizard					85	85	85	85

Economics

An important consideration when looking at the economic data is that many of the varieties were not in the trial every single year. This makes it particularly difficult to compare the economic results as quality varied greatly between years. The yields used to determine price were the relative yields aforementioned which are based on a yield percentage relative to Brusher and multiplied by the average yield of each time of sowing.

Time of sowing 1 on average returned a yield of 5.96t/ha, this is 420kg/ha less than what was averaged from TOS2 (6.38t/ha). Only in 2017 did the yield from TOS1 outperform the yield of TOS2. Though it must be noted in 2015 the short season varieties yielded higher in TOS1, the average was effected by the long season varieties. On average TOS1 returned \$190/ha less than TOS2 as a result of on average poorer quality and yields.

TOS1

The results indicate that Tungoo was the best performing variety in TOS1 however Tungoo was not included in the 2017 trial which may have potentially dropped its quality down. The yield of Tungoo in TOS1 was close to the middle in terms of performance however it managed to maintain its quality in both the 2016 season where other higher yielding varieties suffered more significant quality downgrades. Williams, Carrolup, Bannister and Brusher were the next best performers which all have a similar season length. The brusher fell to the lower end of the list of these varieties due to the 2017 season where its cutting time was suboptimal and rain damage was extensive. Carrolup, Williams and Brusher were cut at a more appropriate time and had significantly greater quality in 2017.

TOS2

Bannister in TOS2 was the best performing variety across the trial. Potentially it could have been poorer performing if it was included in the 2015 trial. Most short season varieties like Bannister did have good quality in 2015, however Bannister has issues with head emergence under dry conditions. In 2015 this may have meant that Bannister would require cutting whilst the head was still in the boot. This could have had significant implications on quality due to prolonged drying times and discoloration. Genie was the next best performer however it is very similar to Wizard which had the worst quality in the 2017 trial (Genie was replaced with Wizard for this trial). This has likely given Genie a higher average quality than was likely to occur. Brusher was the third best performer and fairly consistent across all years for yield and quality (when cut on time). Carrolup the most widely grown hay in this more conventional sowing window was in the middle in terms of performance, it managed to provide a greater return on average than Williams.

Generally speaking the long season varieties didn't yield competitively against the shorter season varieties and had comparable quality. The net result of this was a lower economic return from these varieties. Genie and Wizard did return greater yields however their digestible fibres often resulted in significant quality downgrades. The low quality was not able to be compensated with yield. Potentially the quality could be improved with these varieties if their agronomics were studied more closely.

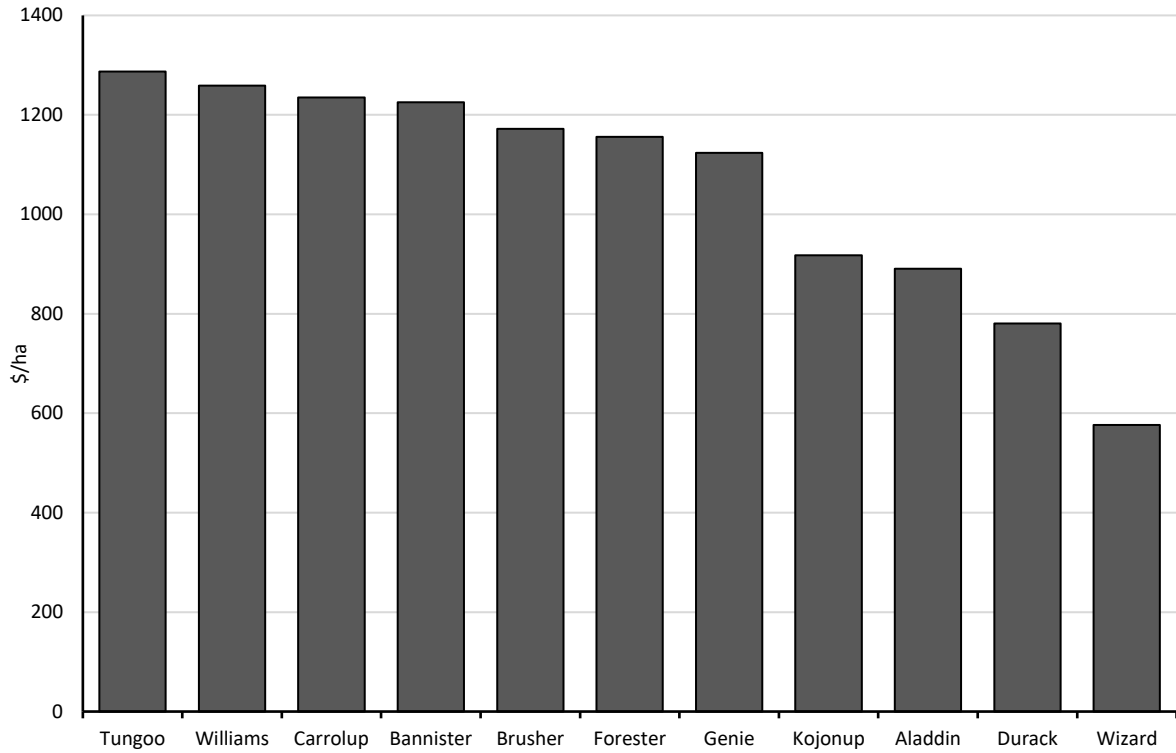


Figure 3: Economic return of TOS1 calculated using a relative yield to Brusher and an average yield of 5.96 t/ha. Pricing was determined using an average for each variety from 2015-2017.

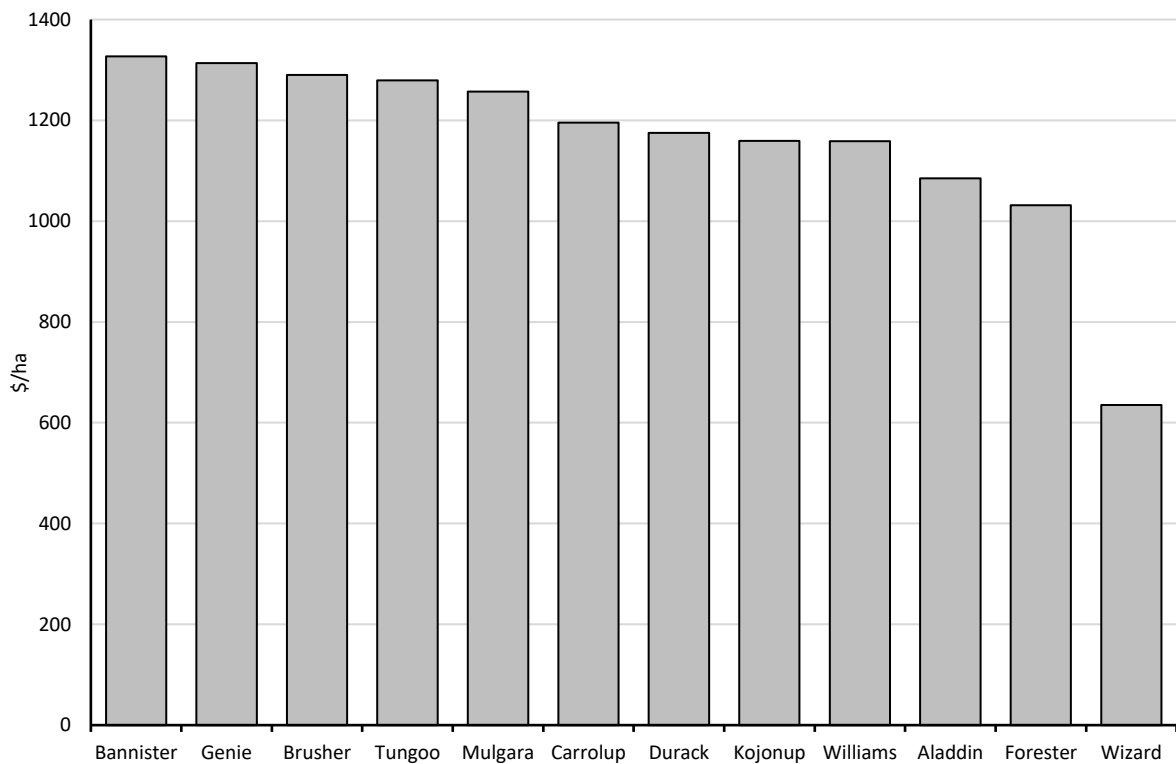


Figure 4: Economic return of TOS2 calculated using a relative yield to Brusher and an average yield of 6.38 t/ha. Pricing was determined using an average for each variety from 2015-2017.

Conclusions

- On average TOS2 (17-26th May) averaged 420kg more than TOS1 (27th April-1st May).
- Williams and Carrolup were the best performing varieties for early sowing (TOS1).
- Brusher and Bannister on average were the best performer in the traditional hay sowing window (TOS2).
- Brusher performed well in all three trials however in 2017 its performance was diluted due to greater variability in quality results.
- Not surprising, in a droughted season like 2015 the early sowing of short season varieties gave a better return than later seeding.
- Probability of rain is lower for later sown hay.
- Later sown hay has on average shorter drying times as the temperatures are increasing and there is lower soil moisture and humidity.
- The long Season varieties struggled to compete in yield compared to traditional varieties, those that did yield well had poor quality.