

# Optimising vetch grazing and hay production

Declan Anderson and Rebekah Allen

Hart Field-Site Group

## Key findings

- Studenica, Timok and RM4 produced the highest grazing biomass (kg DM/ha) across two seasons at Hart.
- RM4 and Capello produced the best quality feed, with Timok, RM4 and Jumbo2 producing the best quality hay when measured in 2021.
- RM4, Morava and Capello produced superior hay yields in 2022 of 6.95, 6.04 and 6.02 t DM/ha, respectively.
- Vetch performance is highly influenced by both variety selection and seasonal conditions.
- Studenica, Timok and RM4 have shown to be high yielding across multiple seasons when trialed at Hart.
- Time of sowing did not influence vetch production at Hart in 2022, however dry sowing in 2021, as a result of infrequent rainfall events prior to the season break, was shown to reduce crop establishment to 44%.

## Introduction

Vetch is a low input crop commonly grown across the Mid-North region of SA for grazing and hay end-uses within mixed farming systems, providing a legacy effect of nitrogen fixation for subsequent crops.

Decision making based around variety selection and sowing time, can greatly impact the potential \$/ha return from a vetch crop. Optimising production will be important to increase the lasting benefit and return of vetch as a rotation option within farming systems.

There are three species of vetch grown in Australian farming systems. Common Vetch (*Vicia sativa*) is mostly grown in dryland mixed farming systems due to low hard seededness levels and high grain and hay production. Woolly Pod Vetch (*Vicia villosa*) and Purple Vetch (*Vicia benghalensis*) are typically grown in livestock systems and in high rainfall regions due to their hard seededness for grazing purposes and waterlogging tolerance (GRDC 2018). Breeding efforts in the last decade for woolly-pod vetch have resulted in the commercialisation of RM4. This variety has reduced hard seededness in addition to improved establishment and vigour when compared to previous woolly-pod vetches (Matic 2016). These traits allow RM4 to be better suited to dryland mixed farming systems, when compared to older varieties.

This trial aims to assess the performance of vetch varieties across two times of sowing (TOS) to optimise vetch grazing and hay production. Data presented has been collected over two growing seasons; 2021 and 2022.

## Methodology

|                           |                                  |                     |   |
|---------------------------|----------------------------------|---------------------|---|
| <b>Plot size</b>          | 1.75 m x 10.0 m                  | <b>Fertiliser</b>   | DAP (18:20) + 1% Zn + Impact @ 80 kg/ha |
| <b>2021 Seeding date</b>  | April 19, 2021                   | <b>Crop history</b> | Mulgara Oaten Hay                       |
| <b>2022 Seeding dates</b> | TOS 1: April 22<br>TOS 2: June 9 | <b>Location</b>     | Hart, SA                                |

The trial was a split-plot design with three replicates, two times of sowing (TOS) and six varieties. Trials were managed with the application of pesticides to ensure a weed, insect and disease-free canopy. All plots were assessed for grazing and hay production (t DM/ha). Data was analysed using a split-plot ANOVA model in Genstat 22<sup>nd</sup> edition.

Common vetches are widely grown across most cropping regions and varieties trialed in 2022 include Studenica, Timok and Morava which have a very early, mid and late maturities, respectively (Table 1). The woolly-pod vetches trialed were RM4 and Capello which are typically later maturing and have been developed for forage and hay production. Grain produced cannot be fed to livestock due to high toxin levels (Nagel et al 2021). Care should be taken when grazing woolly-pod vetch once pods have formed, but should not be grazed prior to 10-nodes (GRDC 2018).

A lentil hay option trialed in 2021 was included as a comparison in 2022. PBA Jumbo2 was selected due it's medium - tall height, better suited for hay production (Day and Blake 2022).

The recommended seeding rate varied for each vetch type, however a target of 70 plants/m<sup>2</sup> is ideal (Nagel et al 2022). For common vetches, this results in a seeding rate of approximately 50 kg/ha and 40 kg/ha for the woolly-pod vetches. PBA Jumbo2 was sown to a target density of 120 plants/m<sup>2</sup> as the recommended sowing rate (GRDC 2017).

Observations in 2021 suggest that delaying seeding until either adequate soil moisture was available, or prior to a significant rain event, could be beneficial in improving establishment and therefore crop production. This resulted in the inclusion of two TOS in the 2022 trial; standard practice; mid-late April and late seeding into soil moisture. The late TOS was sown on June 9 after a season break of 37 mm rainfall on May 31. All plots emerged on June 12.

Table 1. Maturity characteristics (Nagel et al 2020) and cut dates for all varieties sown at Hart in 2022.

| Variety    | Maturity   | Hay cut date |
|------------|------------|--------------|
| Studenica  | Very early | October 6    |
| Timok      | Mid        | October 6    |
| PBA Jumbo2 | Mid        | October 6    |
| Morava     | Late       | October 17   |
| RM4        | Mid        | October 28   |
| Capello    | Late       | October 28   |

Grazing cuts were completed on all vetch plots on August 26, 2022 (10 weeks after emergence).

## Results and discussion

### Grazing performance

Observed trends show there are high performing varieties for grazing options in the medium rainfall region of the Mid-North. RM4, Timok and Studenica were the highest performing varieties in 2021 and 2022. In 2022, these varieties produced 913, 891 and 850 kg DM/ha, respectively. Morava yielded equally, producing 980 kg DM/ha (Figure 1). Timok regularly performs well due to very high dry matter production, while Studenica also performs well at grazing due to superior winter growth and increased vigour (Nagel et al 2022).

Overall, Timok and Studenica have yielded consistently well as a grazing option across two seasons at Hart. When comparing woolly-pod vetch varieties, RM4 was the best performing variety at grazing with high levels of biomass production and excellent feed quality characteristics (Anderson & Allen 2021).

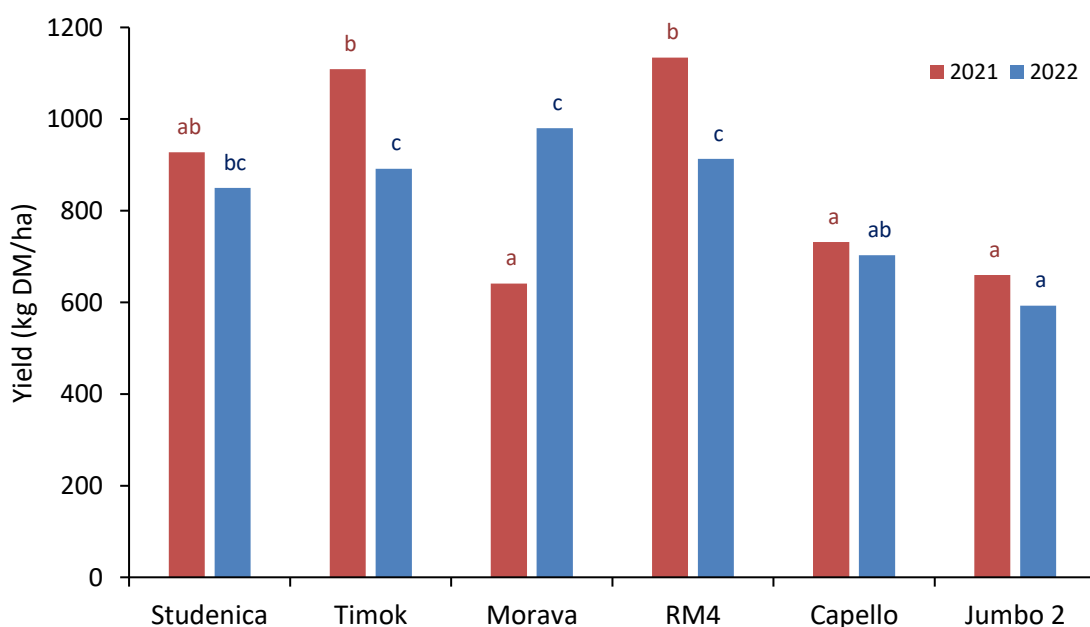


Figure 1. Biomass production (kg DM/ha) at grazing for each variety trialed at Hart in 2021 and 2022. Varieties with the same letters are not significantly different from each other. Significance levels are for comparison within each individual season only.

PBA Jumbo2 produced low biomass in both years, displaying its un-suitability for early grazing. Capello was also lower performing across two seasons due to low biomass production, however it did produce high quality feed, similar to RM4 in 2021 (Anderson & Allen 2021). Woolly-pod vetch like Capello is typically known for their poorer performance to early grazing with the exception of RM4 having improved early grazing performance due to recent breeding efforts (GRDC 2018).

### Hay performance

Performance of vetch varieties varied across the two years trialed due to diverse seasonal conditions. A dry finish and minimal soil moisture in 2021 saw varieties yield similarly, with an average hay production of 2.3 t DM/ha (Table 2). Conditions in 2022 were cool and wet later into the growing season, allowing longer season varieties like Morava, RM4 and Capello to capitalise on additional soil moisture, yielding 6.04, 6.95 and 6.02 t DM/ha, respectively (Table 2). The shorter season varieties Studenica, Timok and Jumbo2 lentils were limited in production by their maturity length as they were unable to benefit from late season rainfall.

Although RM4 is noted as mid-maturing, woolly-pod vetch is typically later maturing than common vetch, resulting in RM4 yielding exceptionally well.

Table 2. Hay production of vetch and lentil varieties at Hart in 2021 and 2022. Values shaded blue indicate best performing varieties. Varieties with the same letters are not significantly different.

| Variety             | Hay Yield<br>(t DM/ha) |                    |
|---------------------|------------------------|--------------------|
|                     | 2021                   | 2022               |
| Studenica           | 1.91                   | 4.60 <sup>a</sup>  |
| Timok               | 2.30                   | 5.50 <sup>ab</sup> |
| Morava              | 2.24                   | 6.04 <sup>bc</sup> |
| RM4                 | 2.59                   | 6.95 <sup>c</sup>  |
| Capello             | 2.37                   | 6.02 <sup>bc</sup> |
| Jumbo2              | 2.39                   | 4.97 <sup>ab</sup> |
| <b>Average</b>      | <b>2.30</b>            | <b>5.68</b>        |
| <b>LSD (P≤0.05)</b> | <b>NS</b>              | <b>1.135</b>       |

In 2021, hay quality was measured for all varieties trialed. Stand-out varieties included RM4, Timok and Jumbo2 (Anderson & Allen 2021). RM4 and Timok had increased fibre digestibility (NDFDom30 of 41.05%) and protein levels (19.5%). Jumbo2 lentil had increased digestibility and greater energy density. Hay quality for vetch varieties was not measured in 2022.

#### Time of sowing

Emergence was negatively impacted in 2021 due to small and infrequent rainfall events occurring post-sowing. Crop establishment in 2021 averaged 44% and was visually inconsistent. Sowing date did not affect crop establishment in 2022 due to negligible rainfall between both TOS. As a result, TOS 1 did not germinate until the season break arrived. Establishment was not affected.

#### Acknowledgements

The Hart Field-Site Group would like to acknowledge the generous support of our sponsors who provide funding that allows us to conduct this trial. Proceeds from Hart's ongoing commercial crop also support Hart's research and extension program.

We would like to thank the Australian National Vetch Breeding Program (ANVBP) and SARDI Clare for providing seed to conduct this trial.



#### References

- Anderson D & Allen R 2021, 'Improving vetch dry matter production'  
<https://www.hartfieldsite.org.au/pages/resources/trials-results/2021-trial-results.php>
- Day S & Blake S 2022, 'Lentil', GRDC 2023 South Australian Crop Sowing Guide  
<https://grdc.com.au/resources-and-publications/all-publications/nvt-crop-sowing-guides/sa-crop-sowing-guide>
- GRDC 2017, 'Lentil – Southern', *GRDC GrowNotes*
- GRDC 2018, 'Vetch – Southern', *GRDC GrowNotes*
- Matic 2016, 'DAS00117 - New common and woolly pod vetch varieties for grain and hay/silage production for Australian farmers', *GRDC Project Final Reports*
- Nagel S, Kennedy A & Kirby G 2022, 'Vetch', *2023 South Australian Crop Sowing Guide*
- Nagel S, Kirby G & Kennedy A 2021, 'Vetch agronomy and management', *GRDC Research Update Adelaide, South Australia*