10.1071/ANv62n10–11abs

# ANIMAL SCIENCE IN AUSTRALIA

Proceedings of the Australian Association of Animal Sciences

Volume 34

## Anchoring knowledge – exploring the animal science ecosystem

34th Biennial Conference

Australian Association of ANIMAL SCIENCES
34TH BIENNIAL CONFERENCE
Anchoring knowledge – exploring the animal science ecosystem

Pullman Cairns International Hotel, Cairns, Queensland
5–7 July 2022

# An analysis and comparative study of the growth characteristics and nutritional value of *Desmanthus* (*Desmanthus* spp.) cultivars as a potential silage

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Desmanthus (*Desmanthus* spp.) is a promising improved pasture legume for use across tropical, subtropical and possibly temperate Australia (Gardiner 2016). Since introduction there has been significant investment in the development of new cultivars (McLachlan 2021). Importantly, this includes the Progardes® range, which comprises a large number of newly developed cultivars including JCU 1 (D. leptophyllus), JCU 2 (D. virgatus), JCU 3 (D. virgatus), JCU 4 (D. bicornutus), JCU 5 (D. virgatus), JCU 6 (D. bicornutus), JCU 7 (D. leptophyllus), JCU 8 (D. virgatus) and JCU 9 (D. pernambucanus) (Gardiner 2016; McLachlan 2021). Being tolerable to the northern environment and more importantly heavier textured soils, Desmanthus cultivars can be used to redefine the opportunities for livestock grazing performance (Gardiner 2016). The objective of this study was to analyse and compare six cultivars of the leguminous plant Desmanthus in relation to the selected parameters of growth and development and nutritional quality for potential silage production. This entailed implementation of a greenhouse trial involving nelly bin plots at The University of Queensland Gatton Campus Nursery Facility.

An 8 × 4 factorial experiment was established using a randomised complete block design with four replications. Factor A comprised six cultivars of Desmanthus planted with inoculum (SU 1841) plus two of the cultivars planted without inoculum. The six cultivars were Cv JCU 2, Cv JCU 4, JCU 6, Cv JCU 7, Cv JCU 8 and Cv JCU 9. The two treatments without inoculum were Cv JCU 2 and Cv JCU 6. Factor B was four harvest times (8, 10, 12 and 14 weeks after planting (WAP), when plants were cut to measure yield and nutritional quality. Following harvest plant material was partitioned into leaf, stem and reproductive material and the dry matter yield recorded. Material was then ground and sent to Dairy One™ for nutritional analysis. Two weekly recordings included height, canopy area and the number of stems. Statistical analysis was undertaken used R-Studio and Genstat.

There were significant differences between various cultivars in relation to growth, development and nutritional parameters. JCU 9 recorded the largest height, canopy area, biomass and regrowth production, while JCU 6 recorded the lowest in these parameters. The other cultivars generally were similar and not significantly different from each other. JCU 9 produced a relatively large amount of reproductive material when compared to other cultivars. Stem to leaf ratio was maximised in the 10 WAP harvest throughout the cultivars, except for JCU 9 where the interaction between maturity was minimal. Regrowth production yield following cutting was higher over a shorter timeframe when compared to initial cuttings, where JCU 9 and JCU 8 recorded the highest yields. Cultivars recorded high nutrition, for crude protein, dry matter production, water-soluble and ethanol-soluble carbohydrates and metabolizable energy values, with JCU 6 containing higher nutritive values, whilst JCU 9 was in the lower range. Overall, there was no significant difference between non-inoculated and inoculated treatments for the cultivars tested (i.e. JCU 2 and 6), which is most likely correlated to the addition of fertiliser.

The findings of this study support the preliminary information regarding Desmanthus as a high-quality tropical legume with silage potential. As the trial was conducted under controlled and thus ideal environmental conditions (nutrition, temperature, moisture) the outcomes were likely influenced by these optimum levels and may differ under field conditions. Additionally, when grown under ideal conditions Desmanthus has exhibited capacity to compete with other fodder crops which currently dominate the grazing industry in tropical, subtropical and temperate regions. Particularly in relation to nutrition, yield and also regrowth yields post cutting. While all of the trial cultivars indicated nutritional suitability for silage production, JCU 9 at 14 WAP was the most favourable. This evaluation is based on the nutritive value, although more importantly DM yield which was significantly higher than other samples, thus is favourable for commercial production output. The establishment of field trials across different adaphic and edaphic conditions are now recommended to evaluate the best performing cultivars on a larger scale.

**References**

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*We gratefully acknowledge The Department of Agriculture, Fisheries, AW Howard Memorial Trust Incorporated and Agrimix Pastures Pty Ltd for funding this work and the primary support and contribution from Dr Shane Campbell.*