

# THE ROLE OF LEGUMINOUS BROWSE PLANTS IN A COOL MEDITERRANEAN ENVIRONMENT

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## ABSTRACT

There is considerable scope for improving the productivity and persistence of pasture systems, in the temperate low rainfall zones (< 550 mm annual rainfall) of Australia and New Zealand. Alternative pasture species, including leguminous browse plants, have potential to increase the diversity and stability of these pasture systems. The genus *Dorycnium* (canary clover), has previously been identified as containing a number of species with desirable forage and soil conservation characteristics. Preliminary investigations have indicated that at least two species, *D. rectum* and *D. hirsutum*, produce significant quantities of forage in the year of establishment and are palatable to sheep. It is proposed that these plants may provide a valuable source of forage on land which currently lacks productive and persistent pasture. Forage produced by these plants would be allowed to accumulate in a 'forage bank' and used for strategic grazing during summer and autumn or for drought feeding.

## KEYWORDS

browse plants, legumes, temperate, forage, *Dorycnium* spp., canary clover.

## INTRODUCTION

Leguminous browse plants (shrubs) are an important component of the grazing communities of much of the warm temperate world, with the exceptions of Australia and New Zealand, where the majority of species are unpalatable, toxic or spiny, and usually unable to withstand regular browsing. Palatable browse plants offer a great deal in the provision of stock forage, particularly for sheep, and also have the potential to ameliorate extreme climatic conditions, reduce soil erosion and improve nutrient recycling. The successful introduction of these plants into Australian farming systems could provide a significant opportunity for summer/autumn grazing and for drought feeding, when the feed supply from more traditional pasture and forage plants is severely restricted. Research in New Zealand over the last 25 years has indicated that the genus *Dorycnium* (canary clover) contains three species, *D. hirsutum*, *D. pentaphyllum* and *D. rectum* which are adapted to drought-prone, free-draining soils and tolerate pH levels from 5.2 to 8.5 (Douglas and Foote, 1994; Wills *et al.*, 1989). Extensive areas of land exist in southern parts of Australia and New Zealand which fall into this broad category and which presently exhibit problems with respect to conventional pasture production and persistence. This paper examines basic growth and feed quality characteristics of a collection of *Dorycnium* species, currently being evaluated across a range of sites in Tasmania. The overall objective of this work is to identify genotypes that can be recommended for trial under grazing, and ultimately the development and incorporation of browse plant technology into livestock grazing systems in cool temperate climates.

## MATERIALS AND METHODS

The following species of *Dorycnium* are currently held by the Tasmanian Institute of Agricultural Research: *D. rectum*; *D. hirsutum*; *D. pentaphyllum* spp *pentaphyllum*, spp *herbaceum*, and spp *germanicum*; *D. brousonetti*; and *D. spectabile*. In 1995 field plots of three perennial species of canary clover, *D. rectum*, *D. hirsutum* and *D. pentaphyllum*, were established from seedling transplants at three sites in Tasmania (latitude 42½ S) to determine basic growth and feed quality characteristics. Sites were selected so as to ensure

that the species were subjected to key environmental constraints, including summer drought, low winter temperatures and soil acidity, typical of the cool Mediterranean environment of Tasmania, and temperate parts of southern Australia and New Zealand. The seedlings were inoculated with commercial *Rhizobium* strains, (Group D inoculum for *Lotus* spp.) and planted into a prepared seedbed. Meteorological recording stations were located at each site. Measurements to date have included: observations and ranking of species based on rate of establishment and survival, spring-summer growth and response to grazing, and estimates of digestibility, protein and fibre content at time of first grazing.

## RESULTS AND DISCUSSION

Preliminary field trials have demonstrated that *D. rectum*, *D. hirsutum*, and *D. pentaphyllum* establish and perform well in the first year under Tasmanian conditions and are palatable to stock. Rate of establishment and initial growth was greatest for *D. rectum* followed by *D. hirsutum* and *D. pentaphyllum*. All three species continued to grow throughout summer and autumn, flowered in late summer/early autumn and set large quantities of seed, particularly *D. rectum* and *D. hirsutum*. The plants demonstrated their characteristic ability to retain foliage over the drier summer/autumn months, although 1995/96 was abnormally wet and cool. At the end of the first growing season (September 1995 to April 1996) it was estimated that *D. rectum* had produced two to three times more forage than *D. hirsutum* and 10 to 15 times more forage than *D. pentaphyllum*. Observations on response to browsing were obtained by set stocking the field plots at moderate grazing pressure with sheep for approximately four weeks in late autumn. Sheep were observed to readily browse all three species of *Dorycnium* with some initial preference for *D. hirsutum* before the other two species. This was somewhat surprising considering the dense covering of hairs on the leaves and stems of *D. hirsutum*, a plant characteristic often associated with decreased acceptance by livestock. Other factors such as differences in stage of growth, accessibility of the forage, digestibility and the presence of condensed tannins could have influenced the preferential grazing exhibited by the sheep on this occasion and requires further investigation. At completion of the browsing period the sheep had eaten all leaf and stem material of *D. rectum* and *D. hirsutum* down to a height of 15 - 20 cm and to a height of 8 - 12 cm for *D. pentaphyllum*. Below this height the stems were not eaten because of their woody and unpalatable nature. This could be interpreted as a means for these plants to prevent over browsing by restricting livestock from removing basal shoots from which subsequent regrowth would be produced. Future work will concentrate on further agronomic characterisation of *Dorycnium* species with an emphasis on the identification of species or cultivars which have good drought tolerance and are well adapted to browsing by sheep. Initial evaluation of existing genotypes has indicated that *D. rectum* and *D. hirsutum* will be favoured for their forage production, whereas *D. pentaphyllum* may be more drought tolerant and persistent. The selection of cold tolerant lines may be an important consideration for inland locations where winter frosts are common. Other species of browse plants, such as *Amorpha fruticosa* and some perennial lupins may also be worthy of investigation. It is envisaged that under Tasmanian conditions leguminous browse plants would be primarily used for forage and to a lesser extent for land conservation purposes. They have considerable potential to reduce

the seasonality of feed supply by providing a reserve of forage at times of the year when the availability of traditional pasture species is limited due to low soil moisture conditions. As well, the high protein content of these legumes would provide a valuable supplement to the low quality pasture on offer during late summer and autumn.

#### **REFERENCES**

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