

Production of legume forage crops in frost-prone areas of Tasmania

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ABSTRACT

Grain legume (or pulse) crops in many cropping areas of Tasmania frequently suffer yield loss from frost at flowering. Harvest of legume crops as forage was examined as an alternative to grain production. Over two years of trials mean dry matter production from field pea and vetch cultivars at late pod swell was 9.9t/ha and 6.5t/ha respectively. There were no significant differences in dry matter production between pea cultivars (Morgan, Secada, Whero and Parafield) at four times of harvest. Of the vetch cultivars, Morava was significantly higher yielding than Popany. Tests for feed quality at late pod swell showed forage peas and vetch acceptable as a replacement for lucerne hay in local feedlot rations.

KEY WORDS

Forage legumes, field peas, vetch, frosts.

INTRODUCTION

Grain production in many cropping areas of Tasmania is limited by frost at floral initiation and early grain fill. They often occur as late as mid-November and are severe enough to restrict the areas sown to wheat. Barley and oat crops are less affected than wheat but can also suffer losses. Grain legume species evaluated as break crops in the Midlands area have consistently shown poor yields due to late frost (1). Low winter temperatures also limit vegetative growth of grain legumes resulting in poor competitive ability against weeds and low harvest height. Field peas are the exception, with good vigour and vegetative growth over winter. Given the common occurrence of grain loss due to frost, the option of growing crops purely for harvest of forage was proposed. This study examined the dry matter production of field peas, (*Pisum sativum*) and vetch (*Vicia spp.*) over two seasons in the Midlands area of Tasmania.

METHOD

A preliminary trial was conducted in 1999 to compare dry matter (DM) yield of two cultivars of field pea (Morgan, Secada) and vetch cultivars, Popany (*V. benghalensis*) and Morava (*V. sativa*). The potential of field peas was evident by mid-spring and other Tasmanian field pea cultivar trials (30 entries) were visually scored for DM production. Cultivars with the highest scores were selected for forage trials in 2000: Morgan, Secada, Whero and Parafield. The vetch cultivar Morava was also re-evaluated in 2000.

Trials were sown at Campbell Town at the end of May in 1999 and 2000. Fertiliser (N,P,K + Mo, B) was pre-drilled at 150kg/h. Sowing rates of pea and vetch cultivars were corrected for germination and seed weight to achieve target densities of 60 and 100 plants/m² respectively.

In 1999 three quadrats were cut from plots when the most mature pod on the main stem was at late pod swell. In 2000 pea plots were cut at 10 day intervals from 27th October to 28th November to determine optimal time of harvest. Harvest corresponded to 4 physiological stages of main stem development:

Harvest 1. flat pod (mid flowering)

Harvest 2. early pod swell -maximum seed size of 3mm

Harvest 3. late pod swell - maximum seed size of 6mm

Harvest 4. early pod fill - maximum seed size of 8mm (end of flowering)

Vetch samples were cut at late pod swell and the start of pod fill. Samples were oven dried for 48 hours and weighed. Sub-samples were analysed for crude protein (CP), digestibility (IVDMD), neutral detergent fibre (NDF) and metabolisable energy (ME) at Feedtest?, Hamilton, Victoria.

RESULTS

Dry Matter: There was no significant difference in DM production between field pea cultivars at the same time of harvest. Mean DM yield in 1999 was 10.5t/ha. In 2000 mean DM production increased significantly between each harvest with a large increase between harvest 2 and 3 (Figure 1).

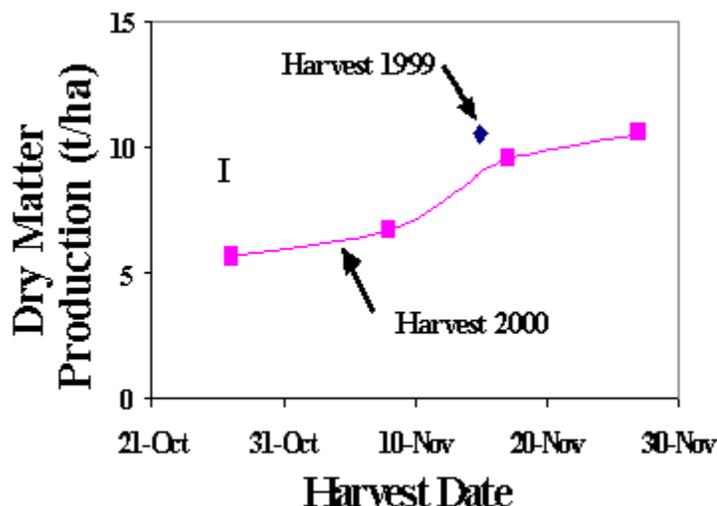


Figure 1. Mean DM production (t/ha) of field peas at different harvest times.

Vertical bar indicates Lsd ($P=0.05$).

Of the vetch cultivars, DM production from Morava (7.7t/ha) was significantly higher than Popany (5.6t/ha) in 1999. Forage yield from Morava at late pod swell and early pod fill in 2000 was 6.3t/ha and 7.4t/ha respectively.

Feed Quality: There were large differences between the two vetch cultivars in NDF, IVDMD and ME with respective field pea values being intermediate (see Table 1). Crude protein values for vetch appear to be higher than field peas at a similar physiological stage.

Table 1. Feed quality of field pea and vetch evaluated in 1999.

Crop	Cultivar	CP	NDF	IVDMD	ME
		% of DM	% of DM	% of DM	MJ/kg DM
Field pea	Morgan	14.5	38.5	73.7	10.8
	Secada	13.2	41.1	70.6	10.3
Vetch	Popany	18.3	34.5	75.6	11.1
	Morava	16.3	48.1	66.7	9.6

DISCUSSION

Results from trials conducted suggest that field peas produce greater forage yields than vetch in the Midlands area of Tasmania. Mean DM production of field peas at late pod swell was 9.5t/ha in 2000 and 10.5t/ha in 1999. This is considerably higher than the maximum of 8t DM/ha at the end of pod fill in NSW cultivar trials (E. Armstrong, pers. comm.). There were no significant differences in forage yield between

field pea cultivars at each time of DM harvest. This is quite likely due to cultivars in the trial being initially selected on high visual scores for DM production. Vetch forage yields were also higher than those reported in South Australia (2).

DM production of peas increased significantly with time, suggesting harvest should be delayed to maximise yield. However as plants mature feed value deteriorates and optimal harvest time is a function of high DM production and adequate feed value. A nearby beef feedlot has agreed to trial forage peas as a substitute for lucerne hay. Based on 1999 data, quality specifications for NDF, IVDMD, and ME will be comfortably met with forage peas harvested at late pod swell (Harvest 3). The CP content of Secada was slightly below the 14% minimum reflecting the earlier maturity of this spring cultivar from Germany. Comparison with the database of pea hay samples tested at Feedtest? shows a similar pattern, with CP being the only marginal parameter. Interestingly, vetch feed quality was similar to results from South Australia (2) except for CP that was also lower in this trial. It is possible the lower CP values in Tasmania are a result of protein dilution due to the large increase in DM associated with a relatively prolonged and mild spring. Quality tests will be conducted on samples from the different harvest times in 2000 to provide further information.

Currently producers receive around \$140/t for lucerne hay at the feedlot and with DM values obtained in this study, forage peas should prove a viable crop option. Frost-affected field pea grain crops grown over the trial period were uneconomic with an average yield of 1.4t/ha (1). A fodder crop cut in mid November also provides the opportunity for removing weeds prior to seed set and for double cropping.

CONCLUSION

Trials have shown fodder peas and vetch grown as break crops have considerable potential as a means of avoiding the problem of grain losses due to late frosts. In particular field peas have shown high DM production and adequate feed value at late pod swell. Further work is required to evaluate the potential for double cropping, yield responses of following crops, and growing legume/oat mixes for on-farm fodder reserves.

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