

Forages and crops:

The potential for forage legumes on the tablelands/slopes

Kirrily Smith

NSW Agriculture, PO Box 132, Cootamundra NSW 2590

Why forage legumes?

Grain legumes have traditionally been used as 'break crops' (i.e. crops which improve nitrogen levels and break disease cycles, such as take-all), for the benefit of the following crop in a rotation. However, disease problems and low prices have led many tablelands farmers away from using grain legumes in their rotations. The absence of these break crops has resulted in heavier reliance on fertiliser and greater occurrence of disease. Researchers at NSW Agriculture, Wagga Wagga, have just completed a 3 year GRDC-funded project looking at the benefits of including forage legume break crops as a more profitable alternative to grain legumes.

Where do forage legumes fit?

The forage legumes being evaluated are annual crops. They provide the traditional benefits of legume break crops (e.g. nitrogen input, disease break and weed control flexibility) which enhance following crop yields. However, they also provide additional benefits over grain legumes:

- they can be cut for silage/hay, or green manured, providing flexibility between paddocks
- the forage can be grazed by livestock or sold as hay or silage off-farm
- 'high density' forage legumes can also be strategically grazed during winter (if sown early) and, after a silage/hay cut produce regrowth which can then be cut or grazed again

- forage legumes provide more nitrogen than grain legumes, giving improved crop yields
- forage legumes increase the overall profitability of the rotation compared with grain legumes

Types of forage legumes

High-density legumes (HDLs)

Examples of these are Persian (*Trifolium resupinatum*), Berseem (*T. alexandrinum*) and Arrowleaf (*T. vesiculosum*) clovers. They provide the bulk of their growth in spring, and can provide substantial regrowth. Varieties are selected for their soft seed-ness and ability to produce regrowth when cut. A mix of these 3 clovers (6 kg/ha Berseem, 3 kg/ha Persian and 3 kg/ha Arrowleaf) has been used as the 'standard' for sowings in the southern region. The soil and climatic requirements for HDLs are shown in Table 1. In general, they require loamy soils with pH (CaCl₂) 5.0 and rainfall 550 mm. However, if cropping lighter soils, Arrowleaf clover on its own or with another 'sandy soil' species could be a viable alternative.

Large-seeded legumes

Examples include soft-seeded vetch (*Vicia* sp.) and field peas (*Pisum* sp.). These are competitive, annual forage crops which produce a bulk of growth in spring, but no regrowth. They can be successfully grown in high and lower rainfall areas.

Forage legumes as a source of nitrogen

Forage legumes fix about 25 kg nitrogen per

Table 1. Soil and climatic requirements of high density forage legumes

Legume	Optimum pH (CaCl ₂) ^A	Optimum rainfall ^A	Comments
Berseem (var. Elite II)	>6.0	>600mm winter dominant	Tolerant of salinity and waterlogging. Suits heavy and light soils, not sandy. Good regrowth. May be affected by heavy frosts. Inoculant Group B
Persian (var. Laser)	5.0-8.0	>600mm	Excellent tolerance of waterlogging and mild salinity. Prefers heavier soils. Excellent regrowth. Inoculant Group O.
Arrowleaf (var. Zulu)	4.8-6.0	>450mm	Susceptible to waterlogging. Prefers acidic, sandy soils or loams. Limited regrowth - needs early cutting. Difficult to dry down for hay (thick stems). Inoculant Group CS.

^A Values are a guide only. The mix has been grown successfully at Wagga (550 mm rainfall) on clay loam soils with pH (CaCl₂) .0.

tonne of dry matter. This becomes available over time for use by the following crops in the rotation. This 'free' nitrogen not only saves on some fertiliser costs the next year, but also contributes substantially to improving crop yields.

Weed management

High-density legumes are very slow to germinate, and are outcompeted if weeds are present. Therefore, paddocks should be selected that have previously had 1 or 2 years of cropping with good weed control. The large-seeded legumes, however, are very competitive against weeds and should be used if a weed problem is likely.

With herbicide resistance becoming a major problem, farmers need to start utilising non-chemical weed control measures. One effective method is to cut the forage legumes for silage before weed seed set, allowing virtually no weed carry over the following year. Grazing high-density legume regrowth reduces the weed burden even further by removing any later germinating weeds.

Animal production

Steers fed high-density legume silage (without supplements) are able to put on up to 1 kg/day. However, lambs do not perform as well on pure legume silage, possibly due to poorer utilisation of silage nitrogen. The addition of a 20% grain supplement could increase liveweight gains to 180 g/day. Performance on pea and vetch silage has been disappointing due to crop lodging and disease, resulting in poor-quality silage. Sowing a low rate of companion species such as oats may overcome this problem, although this option has not been tested.

Profitability

Regrowth produced after cutting has a substantial influence on overall profitability. The production of this high-quality fodder late in the season when other pastures are starting to die, may enable stock to be fattened to meet lucrative late-season markets. High-density legumes which were cut for silage and the regrowth grazed, gave better returns than the other legumes in the Wagga project.