

Better agronomy improves the reliability of establishing legumes into existing grass pastures

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Introduction

Commercially, small seeded legumes have not established reliably in sown grass pastures. Although good establishment is recognised as critical to the long term productivity and persistence of legumes, most producers use low-cost and low-reliability establishment techniques such as broadcasting after either no or minimal pasture disturbance (e.g. fire) or severe soil disturbance and a rough seed bed behind a blade plough. This paper reports results from 6 legume establishment trials.

Methods

Six trials across three districts (Wandoan, Goondiwindi and St George) and two soil types (grey cracking clays and loamy surfaced soils) have been conducted over 4 years to test the impact of better agronomy on establishing small seeded legumes into existing grass pastures. The trials are designed with 5.5 m wide by 20 m long plots with grass strips (either 4.5 or 2.5 m) left between each plot. Clay soil trial sites were sown with Progardes desmanthus (various *Desmanthus spp.*); the Wandoan loam soil sites were sown with fine-stem stylo (*Stylosanthes guinensis var. intermedia*); Goondiwindi and St George loam sites were sown with Caatinga stylo (*Stylosanthes seabrana*). Treatments are a combination of fallow period (i.e. period from first treatment to control the grass until sowing); seedbed preparation; and post-emergent weed control as follows:

- No disturbance of the grass pasture.
- Grass pasture disturbed at plant through: slashing; cultivation with a deep ripper, tynes or off-set discs; herbicide spray.
- Short fallows of 2-4 months using herbicide (i.e. zero tillage (ZT)), cultivation or both.
- Medium fallow of about 4-6 months using either ZT or cultivation.
- Long fallow of about 4-6 months using either ZT or cultivation.

Within the fallow treatments there were also with and without post emergent weed control treatments. There were 30 treatments in total, with most treatments also having split plots in which seed was either drilled with a single disc opener planter or broadcast. Not all treatments were included at each site. Legume plant numbers and pasture biomass were measured for up to 3 years post sowing.

Results and discussion

The sites had a variety of seasonal conditions during the trials: Wandoan was average in the year of sowing but below average overall; Goondiwindi was below average (driest 20-30% of years); St George was very dry (driest 10% of years). At all sites the most common commercially used techniques of no disturbance, slash and cultivate at plant treatments failed to produce adequate legume numbers and should not be recommended to graziers for establishing legumes into competitive existing grass pastures. Storing soil moisture and reducing competition from the existing grasses through fallows dramatically improved legume seedling survival and in turn plant numbers and growth. Fallow length had the major impact on legume establishment with relatively small differences between ZT and cultivated treatments. Post emergent weed control increased plant numbers and growth especially in the long fallows and at sites with higher weed loads. Drilling seed improved emergence on soils with a firm or crusted surface compared to broadcasting seed. Drilling produced negative results on soft soils most likely due to difficulties in controlling sowing depth with the machine used.

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