

Webinar questions: Establishing small seeded legumes in existing grass pastures (11/12/15)

1. Are there any complimentary grasses and legume mixes, as in ones that benefit from each other?

All grasses will benefit from incorporating legumes into the pasture, however some grasses are more competitive with legumes than others, for example creeping blue grass (Bisset) seems more competitive (where it grows well) with legumes than other grasses. The tufted type grasses eg Panic, Premier digit, buffel, can combine with companion legumes including annual medics (which need to regenerate from seed each year) as they can provide space between the tussocks for legumes to grow. Although stoloniferous (running) grasses are often described as covering the ground and therefore inhibiting legume content, there are many examples of legumes combining with these grasses.

2. What is the correct depth of seed planting for optimum germination and viability after a small fall of rain, or is it better to plant deeper to encourage germination from a good fall of rain but could this affect viability?

For pasture legumes, planting depth is dependent on what depth a seedling can emerge from rather than varying depth for smaller or larger rainfall events. Generally the smaller the seed, the shallower it will need to be planted. Small seeded legumes such as stylos need to be sown on the soil surface, or just under (less than 1cm), otherwise they will not emerge. Desmanthus can emerge from about 2cm of soil depth. Larger seeded legumes such as butterfly pea and Leucaena can be sown up to 3cm deep, enabling planting into wet soil for immediate germination. The shallow depth requirement means small seeded legumes are sown in anticipation of rain to germinate the seed. Having a good profile of water will reduce the risk of failure and allow seedlings to grow between falls of rain.

3. Does spinnaker at planting have any detrimental effect on these 2 legumes, as opposed to spinnaker a few weeks prior or post planting?

Spinnaker is not registered for use on desmanthus or Caatinga stylo (if these are the 2 legumes you are referring to), so this product cannot be legally recommended. However in research trials Spinnaker has shown to be effective on broadleaf weeds (and some grasses), while not having a significant impact (ie plant death) on legume growth however growth was retarded in some of our trials in the early growth stages. Spraying a few weeks prior or post planting does reduce the risk of damage in some other legume species, however we are not aware of trials that have tested this on Caatinga stylo or desmanthus.

4. Do you have any recommendations for establishing Siratro into green panic?

Siratro can be very productive but is seldom persistent in the long term under grazing as it is very palatable and struggles with grass competition. Like other legumes it's seedlings will need to be protected from the competition from green panic (and other weeds) for satisfactory establishment. Therefore the grass will need to be controlled either by cultivation or spraying, if you want to maintain the grass following strips would provide a satisfactory environment for legume establishment. Ensure the strips are around 5m wide to

ensure adequate soil moisture in the middle of the strip for effective legume establishment. Siratro is a very palatable legume and not very tolerant of heavy grazing (especially young plants), therefore grazing needs to be managed both in the establishment phase and longer term to maintain Siratro in a pasture.

5. So are you better to plant after rain?

For large seeded legumes that can be sown into wet soil, yes, you would be better to plant after rain. But for small seeded legumes that will not emerge from deeper than 2cm, you are unable to plant after rain as by the time the soil is dry enough to carry machinery the soil surface is too dry to germinate the seed. Therefore it is better to plant before the rain but ensure there is sufficient stored soil water for seedlings to survive until follow up rain.

6. I have 100ha of Premier Digit and Bambatsi mix and I want to plant a winter pasture into it and the soil is a red sandy soil. What legume would you recommend and at what rate?

It's difficult to provide accurate suggestions without further information, such as location, winter rainfall, and the intended use of the pasture ie long or short term. Winter legumes such as medics, clovers or vetches could all be suitable, or a perennial legume with active winter growth such as Lucerne might also be suitable although is likely to last only 3 -4 years. To successfully establish winter growing annuals still relies on either using good agronomy to store soil moisture (or receiving good winter rains) as the soil will be dry as the grasses normally use all the available water up until it is frosted. The seeding rate will depend on what legume is chosen.

7. Apart from practical management (for the purposes of your trials) what is the benefit of sowing in strips? Would this not simply promote selective grazing by livestock? ie why not simple sow the whole paddock to legumes?

The concept of sowing in strips is to provide areas or zones within an existing grass pasture for reliable legume establishment, at a lower cost compared to preparing the whole paddock. Simply broadcasting, drilling or one pass cultivation while spreading seed into vigorous grass pastures is very seldom successful (it requires an exceptionally kind season). During consultations workshops many graziers reported that they considered ploughing or spraying out whole paddocks to be too expensive, strips would allow these people to improve the reliability of legume establishment at a lower cost. Economic analysis suggests total returns (net present value per hectare) can be higher if ploughing out whole paddocks results in quicker establishment, however benefit cost ratios (dollar return compared to dollars spent) may be higher using strips.

Sowing in strips may result in greater selective grazing pressure as livestock (and wildlife) may walk along and graze the strips of legume whereas they may not find all legume plants mixed in amongst the grass if a whole paddock was planted. However, if the legume is more palatable than the grass (which it normally is late in summer and autumn) then stock will preferentially graze it whether in strips or across the whole paddock. Therefore, no matter whether planted in strips or across the whole paddock it is recommended that:

- Livestock access and grazing should be managed to allow good growth and seed-set.
- A big enough area be planted to spread the grazing pressure from wildlife and livestock across the paddock and property.
- Enough plants per hectare (or square metre) be established to spread the grazing across individual plants. Low legume populations normally result in individual plants being heavily grazed thereby reducing their growth, seed set and recruitment of seedlings in the following growing season.

Ultimately the legume needs to establish with good plant numbers and good growth across the whole paddock to obtain full benefit, especially from a nitrogen cycling aspect.

8. I don't completely understand how the fallow was achieved? Spraying?

Because we wanted to assess a range of fallow management strategies, we included a number of treatments with different techniques for controlling the existing grass. For example some plots were sprayed only, some were cultivated , and some were cultivated and sprayed.

9. We are in a high rain fall coastal area. We get frosts and often the grass will be green at this time of the year. Is there any hope of establishing legumes? Also not sure what you use to drill seeds into soil?

Yes there is hope of establishing legumes! While it would be worthwhile talking to a pasture expert to get more specific advice for your situation, the most reliable method will be to prepare zones (eg strips) or the whole paddock. Competition from the existing grass needs to be controlled (normally through cultivation or spraying) to allow legumes to establish. One option could be to spray out the grass a couple of times in strips (or the whole paddock if you wish), then broadcast seed (if on friable soils) or drill seed. To direct drill legume seed into the soil, a planter with good depth control is critical because several of the small seeded legumes struggle to emerge from greater than 1cm of depth. If good depth control cannot be maintained, it is better to put the seed on the surface of the soil. We used a single disc opener and press wheels for improved seed to soil contact for the drilled treatments in our trials which worked very well for zero tilled treatments, however depth control was difficult for soft soil surfaces in our cultivated treatments. Planters that have been developed for zero till grain cropping can be adapted to plant pastures however they must have good depth control and be able to sow low seeding rates.

10. If leaving grass strips will they not affect the fallow strip with adjacent seeding making control of "weed" bank difficult?

Yes grass (or weed) seeds could come into the fallow strip however the amount of seed that is generally already present in the soil would be more than what typically comes in during the fallow period. Also, fresh grass seed generally is dormant for many months and so will more than likely germinate after the legumes are already established.

11. What is your sample size?

Not sure what you are referring to here. For the legume establishment trials we count 14 quadrats (1m x 1m squares) measurements per plot and for pasture production (dry matter)

we cut at least 4 quadrats per plot. Each treatment is replicated, so we have high confidence in the data collected.

12. Will irrigation have a significant impact on the establishment of the legume?

Irrigation will have a positive impact on the establishment of the legume, especially if the soil profile is dry at planting, there is low rainfall post planting and if there are other plants present competing for moisture. Therefore irrigation significantly reduces the risk of establishment failure, especially in low rainfall environments or where soil moisture is low.

13. Is Seca stylo considered a good legume, especially around the South Burnett?

Yes, Seca stylo can be a productive legume for the south Burnett on lighter soils with low incidence of frost. In areas that frost more frequently (e.g. away from trees on valley floors) Seca can struggle.

14. Do you use an inoculum on the legume seed at planting? Any further comments?

Inoculating legume seed or placing the inoculant in the soil in close proximity to the seed at planting with the correct strain of rhizobium is recommended when planting a legume species into a paddock for the first time. Nodulation will be diminished if the correct rhizobium is not in the soil which in turn means lower nitrogen fixation, reduced legume growth and therefore lower pasture and animal productivity. There is no easy way to test whether an effective rhizobia occurs in a soil naturally, therefore it is more reliable to inoculate legumes.

Rhizobia survival when sowing legume seeds in summer on hot dry soils is a real concern, however effective nodulation is critical for high nitrogen fixation and legume productivity. Management options to improve rhizobia survival include:

- Sowing seed closer to germinating rains.
- Placing rhizobia deeper in the soil (e.g. through water injection while placing the seed on the soil surface).
- Following recommendations on the rhizobia packet (e.g. storing rhizobia in the fridge, inoculating the seed immediately prior to sowing).

For further information on inoculating legumes there is a good publication that GRDC produced that can be found on the following link:

<http://www.grdc.com.au/Resources/Bookshop/2015/07/Inoculating-Legumes>

There is a “frequently asked questions” section in the front of this book which should answer most of your queries on inoculating legumes.