



Polycultural Pasture Cropping

The following report provides additional information relating to the Polycultural Pasture Cropping project 72.2015 including:

- Learnings from the trials
- Photos of the trials including before and after photos
- A summary of the results from the field day participant evaluation forms

Also included are some photos and lessons learned from an additional pasture cropping plot sown into a different area of the same site as part of the Marginal to Mainstream grazing project. Further trials are being conducted in 2016 using lessons learned from both projects and the results of these will be shared with Natural Resources SA Murray Darling Basin both through the Ranges to River NRM group, as well as shared through producer groups including SA Regenerative Farmers and the Fleurieu Beef Group.

KEY LEARNINGS:

Species selection

The selection of appropriate species to sow is always a relevant factor, but increases in significance where sowing into poor sandy soils as well as when sowing into an existing pasture where competition exists, particularly from the perennial veldt grass. For example, of the two different oat varieties sown - Wintaroo and Outback - the Wintaroo showed markedly more vigour despite neither producing significant amounts of dry matter in the varietal trials (see fig 1 and 2). Outback is a newer, higher yielding, more expensive variety but obviously requires much higher nutrition to achieve that higher yield. A similar result occurred in relation to the two annual rye varieties - Tetila and Winter Star. As discussed at the field day with the various agronomists who attended, it was determined that even older varieties would be better suited to the conditions such as Wimmera Rye and Saia Oats. It was interesting to note that both the Wintaroo Oats and Tetila Rye performed better when sown at lower rates in a mix than in the varietal trial plots, as was the case with other species sown.

Fig 1. WINTAROO OATS - 70kg/Ha with 65kg



Fig 2. OUTBACK OATS - 70kg/Ha with 65kg



Limiting Factors

A significant amount of time at the field day was spent discussing what the limiting factors were in terms of the sown plants meeting their growth potential. Clearly, given the season, rainfall was one of these factors, with a total of 296mm of rainfall during the growing season, with the bulk of this during April and May. A total dry matter of 2200kg/Ha was measured at a part of the site which was sown with the mixed species and not grazed all season. This amounts to less than 10kg DM/Ha/mm whereas production of at least 20kg DM/Ha/mm could be expected in the circumstances according to agronomic advice.

It was agreed that both phosphorous (P) and sulphur (S) were very low according to the soil test results and several people suggested that it was these, particularly P, that was limiting productivity. However, the two replicated plots sown with a mix of species and either 100kg or 200kg respectively of Superphosphate (which contains S also) both appeared to be similarly limited in their productivity. It was further contended that while enough P and S may be present in these plots there would be a lack of Nitrogen (N) and Potassium (K). However, these strips were cross-spread with 100kg/Ha of pasture booster which is 24%:4%:13%:4% N:P:K:S on 12 August. Although rainfall following this date was not generous, there was no sign at all that the pasture booster had been spread.



Fig 3. Photo taken 30 August - 20m wide strips of pasture booster applied perpendicular to trial strips @100kg/Ha on 12 August showed little or no effect

Discussions with several agronomists both at and since the field day have tended toward the conclusion that, as well as rainfall, the crucial limiting factor on poor sandy sites such as this is organic matter. Specifically the ability for organic matter to buffer, hold and release water and nutrients. One agronomist has commented that they no longer recommend spreading conventional soluble fertiliser on such soils as there is nothing to hold the nutrients and they are lost through leaching before they can be utilised. A further trial is

planned using several composted products which aims to further investigate this crucial limiting factor.

A pasture cropping trial conducted under the Marginal to Mainstream project at a different site on the same property provided further evidence for this, being a soil higher in organic matter with less competition from the veldt grass, though similar competition from weedy species. Fig 4 shows the vigour of the oats in particular sown as a similar mix into existing pasture at this other site. This photo was taken in mid June, only 11 days after a moderate/hard grazing by sheep.



Fig 4. M2M site showing oat vigour in different soil type using same technique, rates etc.

OTHER LEARNINGS:

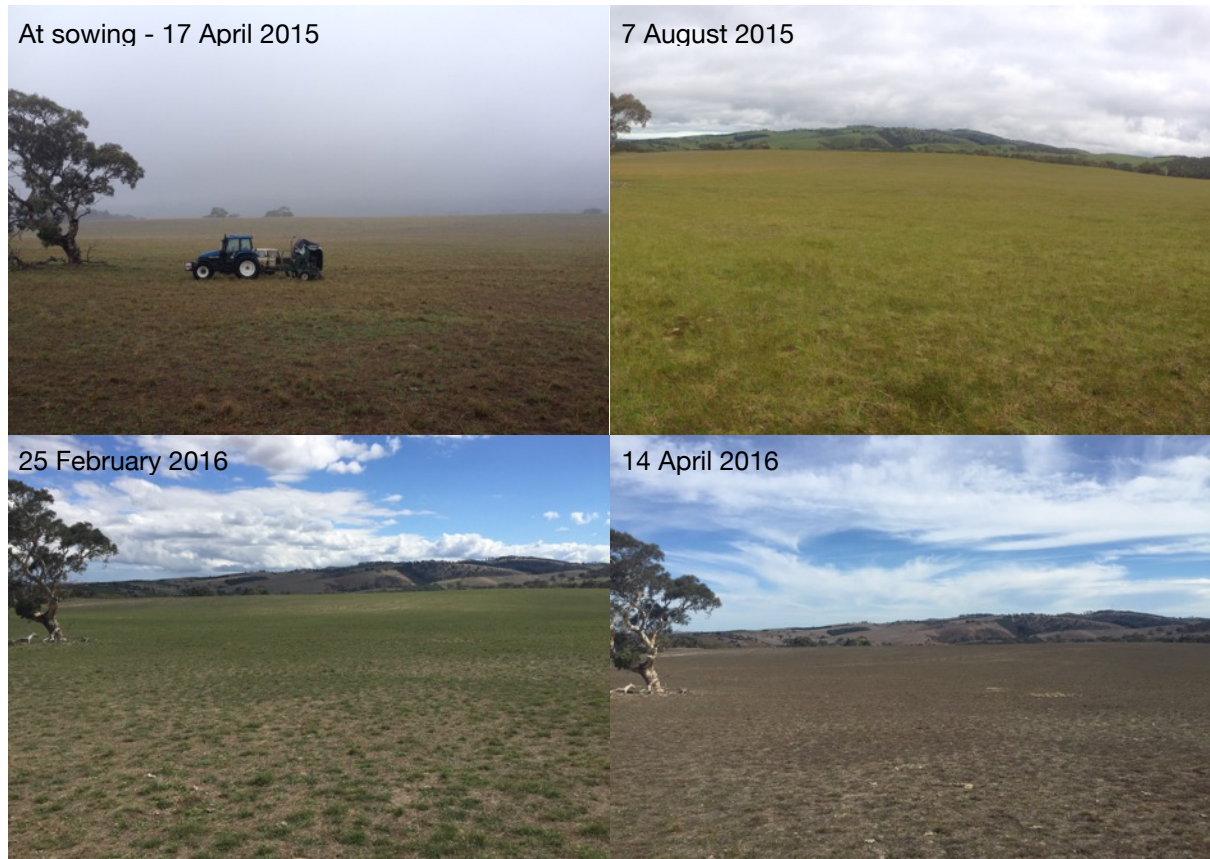
As discussed briefly above, competition from the veldt grass was an issue and it may have been advantageous for the sown species if greater attempts were made to graze the veldt to a lower level in places.

It was suggested, based on some trials done on poor sandy soils in Victoria, that the site will show improved results in the second year after such treatment. Further photo records will be maintained in an effort to investigate this idea.

Small seeded varieties such as Lucerne, Chicory, Plantain and Forage Rape suffered from red-legged earth mite (RLEM) attack and despite germination being successful, evidence of establishment has not been found. Further investigation is being conducted into methods of RLEM control not involving pesticides which would kill many beneficial insects. Molasses spray has been recommended and will be used next time these species are trialed.

TRIAL PHOTOS

The following photos show the trial site across the past 12 months. This photo point will be maintained throughout future seasons.



Interestingly, the site showed an excellent response to the 30mm of rain received on 2 February 2016. The lower left photo is following a grazing event and shows the regrowth then observed. This regrowth had hayed-off by April as seen in the lower right photo.

The below photos show the ground cover and dry matter production at different stages throughout the trial.

This photo is typical of the pasture sown into. Primarily veldt grass growing in low fertility deep, moderately acidic sands.

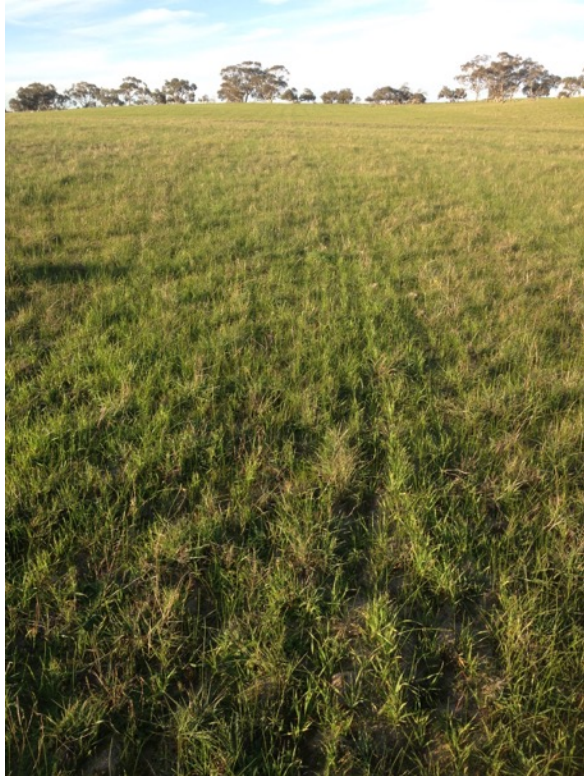


The sowing of the varietal and fertiliser trial plots. As can be seen here, the veldt grass is longer than ideal.



These photos show the development of the trial plot in which all species were sown into existing pasture with 65kg/Ha DAP (site 4 on handout sheet).

12 June



4 July



These photos show the same plot on 19 July (left) immediately following the first grazing event and on 4 August (right) during the second grazing event which was unexpectedly the last grazing during the growing season which ended abruptly in August.

19 July



4 August



16 April 2015



These two photos were taken in mid April before and after the pasture cropping respectively. During this period the trial area carried approximately twice the number of stock as the previous corresponding period. Though not immediately visible from these photos, the area is more vigorous and has responded much more to summer rain events than in the past. Although it is largely veldt grass as before, there are other species appearing including increased *microlaena* and *danthonia* spp.

14 April 2016



EVALUATION FORM SUMMARY

The following is a summary of the evolution forms from the field day held as part of the project. Unfortunately, of the 28 participants, only 24 provided feedback forms.

	Strongly disagree	Disagree	Undecided	Agree	Strongly Agree
Participation in this workshop has increased my:					
awareness and knowledge of the topic		2	2	11	9
knowledge to change how I do things		3	4	13	4
skills in the topic		2	4	14	4
skills to change how I do things		3	5	12	4
capacity to make better decisions		2	3	15	4
commitment to change my actions/management		2	6	11	5
Are you likely to adopt any of the practices outlined?		3	7	10	4

Not all participants who filled out evaluation forms provided comments. However, the comments provided on the forms relating to the most useful things gained from attending are as follows:

- Be flexible in my approach. P is important in soil for pasture growth.
- Importance of legumes, especially deep rooted annuals such as serradella. Importance of Phosphorous.
- Difficult regions can tell you more than simply keeping to your patch.
- The usefulness of discussion to look at options other than high fertiliser inputs was great. On such degraded soils, to see the pathways to add to higher production while watching bottom line was realistic. Also good to see and hear about the seeding and growth rates of different crop options.
- Understanding pasture species establishment with direct drilling. Understanding establishment of pastures on poor soils. Looking at my options of renovating.
- Cost of production. How different species responded.
- Seeing the trials of pasture and fertiliser. Listening and picking up information from agronomists.

- How to manage poor soil. How different pastures react with poor soil.
- Proof that lack of nutrient application will take a long time to remedy.
- All starts with fertility and health soil bank. Increased my awareness of various species and their management preferences and value to livestock enterprises and soil sustainability.
- Exchange ideas/concepts. Collective thoughts. On the ground monitoring. Hands on.
- My land is quite different to Tom's so needs different management strategies. However, the pasture field trials and fertiliser plots were very interesting and I will consider more super. Pasture species - Have had trouble with new varieties enduring but older established varieties of clover and rye grass have persisted through drought and flood.
- Quality impact of grazing. Management options for extreme low fertility.
- Grazing is a powerful tool for pasture establishment.

In terms of feedback on what other training needs would increase confidence to adopt the practices and what could be added or changed to improve future events, only a handful of participants made any comments. These comments were as follows:

- More work with other inputs i.e. compost to increase organic matter
- Selection of varieties in trial could have been slightly more relevant i.e. Saia oats, Wimmera ryegrass. Insecticide to ensure survival of herbs/lucerne.
- Follow up inspection after further soil treatments.
- Look at getting the base right before doing trials i.e. clay spreading, delving, applying compost or liming.
- More days like this. Comparison of just cropping to remove weeds and cost of establishment vs pasture comparison with various P applications.
- Great to look at different machinery application in the pasture cropping system.