Effects of Time of Sowing on Sub-tropical grass establishment

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Purpose:	To identify the optimum sowing time for establishment of sub-tropical grasses to the east of Eneabba
Location:	Callum Scott, 'Kariba', Gabriel-Willis Rd, Eneabba; (-29.84903, 115.51984)
Soil Type:	Moderately deep sand over gravel

BACKGROUND SUMMARY

The district to the east of Eneabba and west of the Darling Fault (Midlands Road) has a high proportion of sandy soils. Many of these sandy soils are marginal for growing crops, however when compared with areas further west – the current area of perennial grasses in the district is low while there appears to be a large area of suitable soils. However, this district is cooler in winter than the coastal areas which will impact on perennial production over winter and also influence the time of sowing.

The correct timing of seeding is critical for the successful establishment of sub-tropical grasses. The key is to strike a balance between rising soil temperatures in late winter and early spring versus the likelihood of follow-up rainfall after seeding. As a result, the ideal sowing time is a compromise between sowing early enough to enable sufficient root development before the onset of the summer drought and late enough so that low soil temperatures do not limit germination and seedling growth.

This leads to a 'sowing window' for each location, which is the range of sowing dates that maximise the chance of successful establishment. The sowing window is earlier for warmer and lower rainfall areas than for cooler, higher rainfall areas. For the Eneabba district the sowing window is thought to be in late August. Can the sowing window be moved earlier? This trial was set up to measure the impact of sowing ~2 weeks before and ~2 weeks after this date.

The main sub-tropical grass species used in the Northern Agricultural region - Gatton panic and Rhodes grass were included as monocultures and in seed mixes to assess the impact of sowing time on establishment and composition. With the cooler conditions over winter there is interest in including perennial veldt grass in the mix to increase perennial grass production over the growing season.

TRIAL DESIGN

Four perennial grasses (Katambora & Callide Rhodes grass, Gatton panic, Mission perennial veldt grass) and 2 seeding mixes were compared in a small plot trial. The trial was a randomized block with 3 replicates for each of the three times of sowing.

Plot size:

20 m x 2.6 m

Machinery use:

Department of Agriculture cone seeder, set up for sowing perennial grasses with a modified scalping point, followed by a depth wheel for accurate seed placement with a press wheel in line.

Crop type and varieties used:

Gatton panic

Katambora Rhodes grass

Callide Rhodes grass

Mission perennial veldt grass

Mix (75% Gatton panic, 25% Katambora Rhodes grass)

Mix (67% Gatton panic, 22% Katambora Rhodes grass, 11% Veldt grass)

Seeding rates and dates: Veldt grass was sown at 3 kg/ha, all other treatments were sown at 4 kg/ha, with three times of sowing (TOS);

1. TOS 1 – Aug 8, 2012;
2. TOS 2 – Aug 22, 2012
3. TOS 3 – Sep 5, 2012.

Fertilizer rates and dates: No fertilizer was applied at seeding.

Herbicide rates and dates: Knockdown - glyphosate - approximately 1 week before the first time of sowing.

RESULTS

Seed Mixture's: Two seed mixes were included in the trial with the aim of measuring variety performance within a mix over 3 times of sowing.

1. A mix of Gatton Panic and Katambora Rhodes.
2. A mix of Gatton Panic, Katambora Rhodes and Veldt grass.

The number of plants was recorded 8 weeks after the final time of sowing; Figure 1 shows the plants m^2 and the species composition.

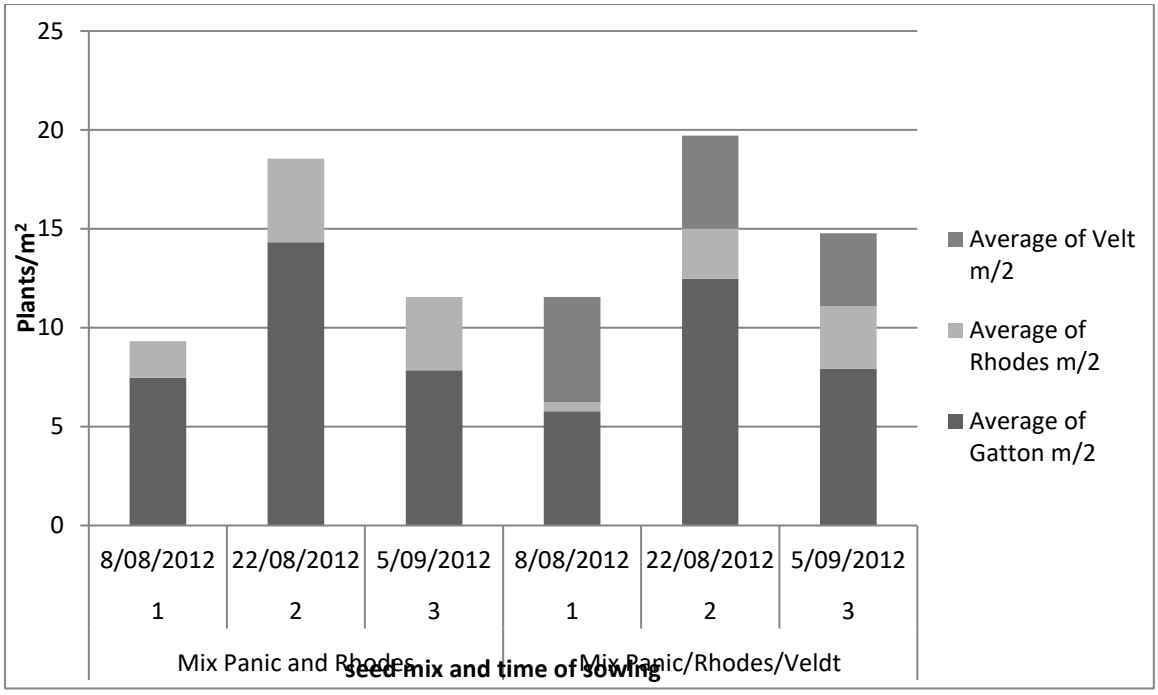

Figure 1. Establishment counts on Oct 31 (8 weeks after the third time of sowing).

For both mixtures, recommended sowing date of the last week of August resulted in the highest establishment densities. For the Panic / Rhodes mix, there was a penalty in seedling numbers for sowing two weeks earlier or two weeks later than the recommended seeding date, but the resulting seed composition was similar. By contrast, where veldt was included in the mix, Panic made up a lower proportion of the pasture. If sown early, veldt makes up 46% of the germinated plants, but reduced to 25% if sown at or after the last week of August.

It is important to note that there may be a difference in the persistence of individual species which will ultimately influence the density and composition of the pasture in the longer term.

Figure 2 shows the percentage difference of the 1st and 3rd times of sowing when compared to the second time of sowing (Aug 22nd).

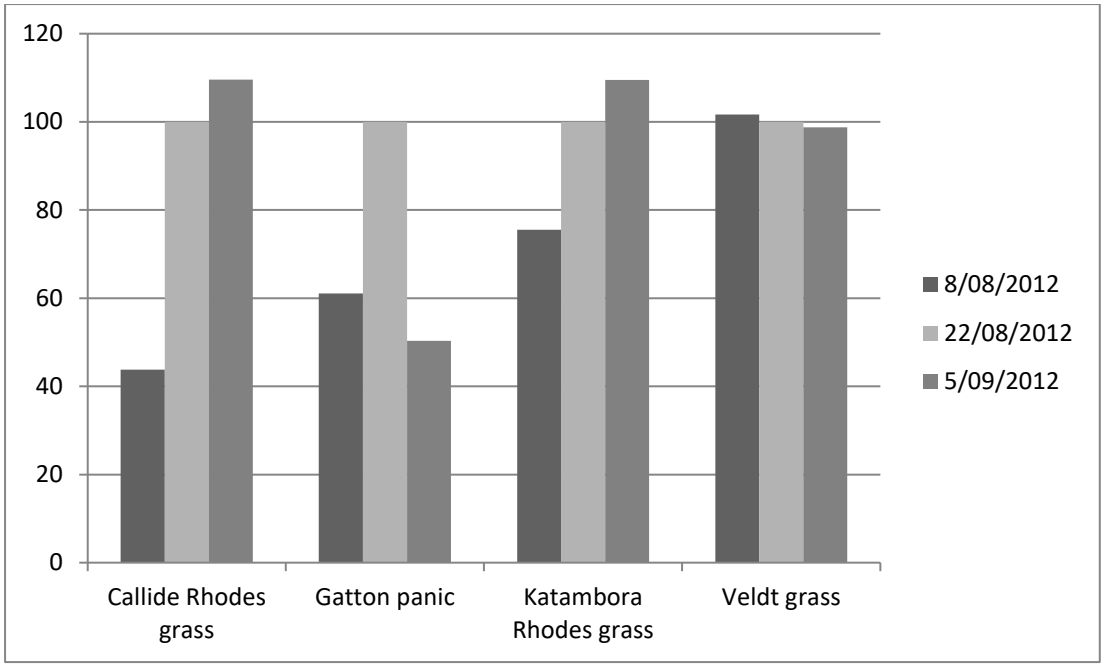

Figure 2. Percentage difference of establishment when compared to the second time of sowing.

The ideal time for sowing Gatton Panic was consistent with the current recommendation of late August. Seedling numbers of Gatton Panic at this time were very good at 22 m^2. Sowing on Aug 22 also maximized germination for Rhodes grass, but unlike Panic, Rhodes grass has a wider window and may be suitable for later sowing if needed. When seeded at the second time of sowing, Callide Rhodes produced 14 plants m^2 and Katambora Rhodes produced 11. Generally, the earlier sowing times were less successful at converting seed into a seedling; the exception being Veldt grass which produced 18 plants m^2 at the second time of sowing with the trend being similar germination numbers across all times of sowing.

The change in germination numbers were also recorded over time. Figure 3 and 4 show germination numbers per square meter that were recorded on Sep 4, Sep 24, and Oct 31, that is, 0, 3 and 8 weeks after the last time of sowing. Each line on the chart represents the number of plants germinated at each time of sowing.

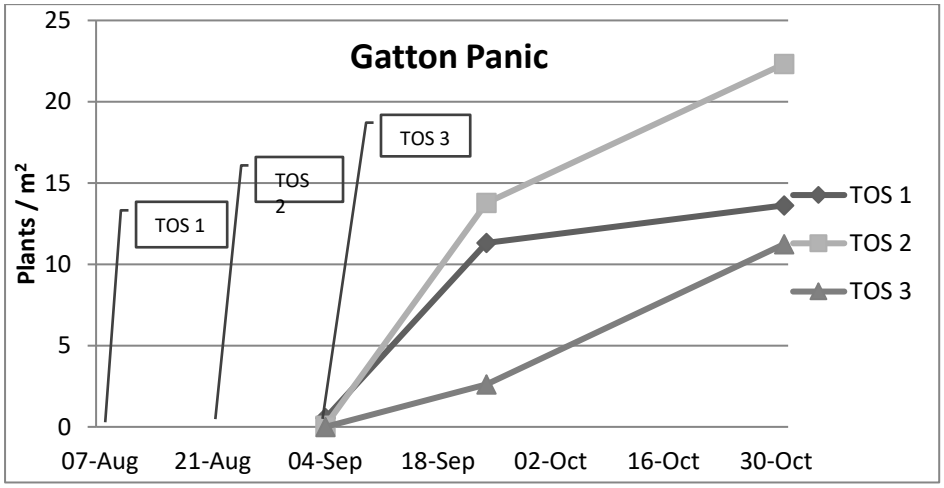

Figure 3. Change in germination numbers of Gatton Panic over 7 weeks across 3 times of sowing.

With Gatton Panic, there was little difference in germination numbers between the first and second time of sowing when measured 3 weeks after sowing. As expected there were few plants germinating at the third time of sowing at this time. When sown at the conventional time, numbers of Gatton Panic seedlings increased from 14 plants / m^2 to 22 / m^2. The third time of sowing also showed a similar increase in numbers, but had only established 11 plants / m^2 by this stage.

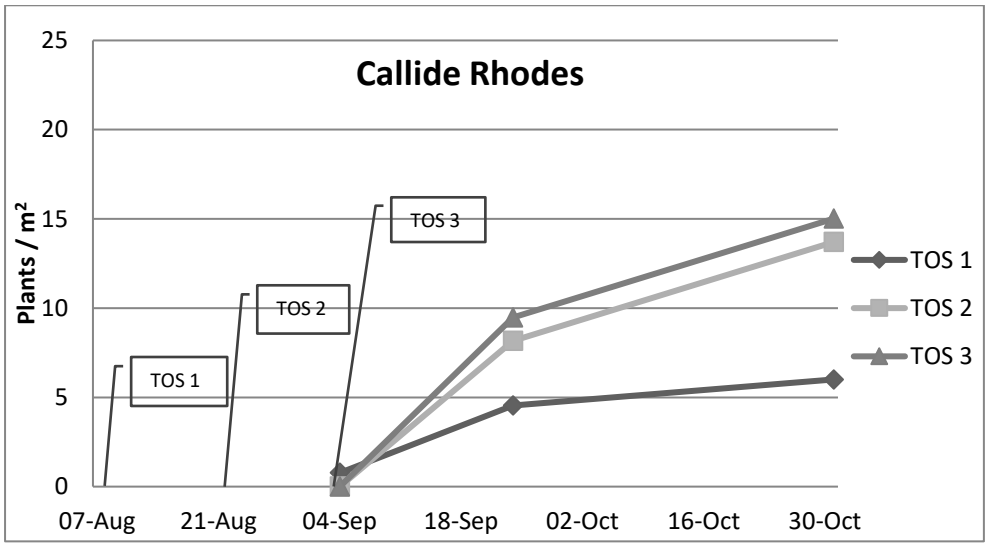

Figure 4. Change in germination numbers of Callide Rhodes over 5 weeks across 3 times of sowing.

The window for the best time of sowing for Callide grass appears to be wider than Gatton panic, although the first time of sowing of Callide Rhodes shows only 4.5 plants / m^2 by Sep 24 and increases to only 2.6 per m^2 by Oct 31. The numbers for the second and third time of sowing show a very similar result to each other, increasing from approximately 9 plants per m^2 to 14 m^2 over 5 weeks.

OBSERVATION/DISCUSSION

The early growth of the sub-tropical grasses (panic grass, Rhodes grass) was slow and they appeared to have cold stress. The seedlings were cold stress with all three TOS and they took a while to recover.

An interesting observation was that the surrounding paddock was sown to a sub-tropical grass mix (Gatton panic and Rhodes grass) just before the 3rd time of sowing, however the early growth of the perennial seedlings in the paddock was superior to the small plot trials. Gatton panic is apomictic (i.e. all plants are essentially clones), so any difference must be due to the environment. In this case, the markedly stronger early growth and less cold damage maybe due to the improved nutrition from the fertilizer applied at seeding.

To evaluate whether there was a nutrient deficiency an application of fertilizer - 150 kg/ha of DAP plus 100 kg/ha of MOP was applied to half of each rep in mid-December in a split plot design. Subsequently there has been little rainfall, so no opportunity to measure a response.

By mid-February there was not a substantial difference between the three times of sowing for Rhodes grass and Gatton panic which makes sense as in effect the sub-tropical grasses all emerged in early to mid-September for all three TOS. The only species to emerge in any numbers before the third TOS was perennial veldt grass. However, by mid-February about

35-40% of the veldt grass plants had died and many more plants were highly stressed and may die over summer –autumn. Sowing veldt grass in late winter – early spring with the sub-tropical grasses may not work in that persistence over summer may be poor. Perennial veldt grass is a C3 so does not have the same soil temperature requirements as the sub-tropical grasses (C4). An autumn sowing may be more successful for veldt grass.

The results from the TOS at Eneabba in 2012 suggest little or no advantage in early sowing of sub-tropical grasses in early August. The optimum sowing window appears to be late August with more flexibility with Rhodes grass than Gatton panic for early sowing.

PEER REVIEW/REVIEW

Geoff Moore

ACKNOWLEDGEMENTS/ THANKS

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