

Grain & Graze 3 2015

In 2015 Ag Consulting Co in partnership with the York Peninsula Alkaline Soils Group conducted research in two key areas adopting profitable grazing systems as part of the Grain & Graze 3 Initiative. The key areas being, grazing effect on grain & quality of wheat & new pasture species for calcareous soils

Focus Area: New Pasture Species

In 2015 the YPASG continued its work with Sulla extending on from work conducted in 2014. Sulla has a wide range of favourable characteristics that could be utilised to better manage weed populations and fill feed gaps. A demonstration trial was set up at the YPASG Minlaton trial Site

Sulla Demonstration

- To explore the tolerance of Sulla to common Pre & Post Emergent Chemicals
- To compare biomass production of Sulla with common grazing species

Focus Area: Grazing Crops

In 2015 the YPASG conducted a grazing trial of two common wheat cultivars to add to existing data on grazing crops & grain production conducted in Grain & Graze 1 & 2.

Farming Systems Trial: Grazing Wheat

- Explore the effect of grazing on crop yield
- Explore the effect of grazing on crop quality
- Explore the effect of grazing on crop development

Trial 1: Sulla Demonstration

Overview

In 2015 the YPASG held a large-scale demonstration site exploring a range of pre and post emergent chemicals over Sulla & common Medic varieties utilised in the region.

Trial Details

Aim: To explore viable pre emergent & post emergent chemical options on legume grazing species

Sowed 16 May

Sulla at 8kg/ha

Medic varieties at 4kg/ha

Starter Fertiliser, 60kg/ha Granuloc

Pre Emergent Chemicals 1.5L Treflan, 1.5L Avadex

Select @500ml – 15 July

Select + Targa – 29th July

Trial Design:

The trial was a strip plot design where chemicals were run across the plots in strips of 1.5m. Untreated areas were spaced between chemicals applications and on the ends of plots.

	Metribuzin (200)	Metribuzin (400)	Simazine (900)	Simazine (1.8)	Terbyne (800)	Terbyne (1.6)	Balance (100)	Balance (200)	
1 Moonbi									Pre Emergent
2 Wilpena									
3 Herald									
4 Cavalier									
5 Caliph									
Buffer									
1 Moonbi									Post Emergent
2 Wilpena									
3 Herald									
4 Cavalier									
5 Caliph									
	Broad Strike 25g Hasten 500ml	Broad Strike 50g Hasten 500ml	Brodal 100ml	Brodal 200ml	Eco Par 600ml 330 ml MCPA Amine	Eco Par 1200ml 330ml MCPA Amine	Eco Par 600ml	Eco Par 1200ml Sprayed with 600ml again so 1800ml total	
1 Moonbi									
2 Wilpena									
3 Herald									
4 Cavalier									
5 Caliph									
	Metribuzin 200g	Metribuzin 400g	Nail 30ml	Nail 60ml					

Trial sown on the 16th of May including two varieties of sulla, Moonbi & Wilpena & Popular medic cultivars grown on York Peninsula, Herald, Cavalier & Caliph.

Pre Emergent Chemicals & Rates

- Metribuzin @ 200g & 400g
- Simazine @ 400g & 800g
- Terbyne @ 800g & 1.6kg
- Balance @ 100g & 200g

Note: Treatments were applied in front of the seeding pass

Post Emergent Chemicals Included

- Broadstrike 25g & 50g
- Brodal 100ml & 200ml
- Eco Par 600ml & 1200ml + 330ml MCPA Amine
- Eco Par 600ml & 1200ml
- Metribuzin 200g & 400g
- Nail 30ml & 60ml

Observations & Measurements

The following assessments were carried out during the year

1. Plant Counts
2. Herbicide Tolerance Assessment
3. Ending Biomass
4. Height

Results:

1.Pre Emergent Chemical Trial

Figure 1: Scoring Key: The Key below corresponds to results presented in (Figure 2)

Key	Effect
	No Visible Effect
	Some Visible Effect
	Visible Yellowing
	Stunted Growth
	Plants Severly Effected

Figure 2: Physiological effect of pre emergent chemicals on Medic & Sulla cultivars.

Cultivar & Species	Pre Emergent Treatment							
	Metribuzin 200g	Metribuzin 400g	Simazine 900g	Simazine 1.8kg	Balance 100g	Balance 200g	Terbyne 800g	Terbyne 1.8kg
Moonbi Sulla								
Wilpena Sulla								
Herald Medic								
Cavalier Medic								
Caliph Medic								

Figure 2 (previous page) shows observed effects of a range of common pre emergent chemicals on Sulla and Medic varieties as measured in this year's trial.

Sulla by itself has shown reasonable tolerance to Metribuzin & Terbyne at both high and low rates. While Simazine has caused some damage at low and high rates. Balance has caused extreme damage at both rates with Sulla exhibiting a similar tolerance to this chemical as Medic.

Sulla appears to demonstrate similar chemical tolerance characteristics to Medic towards the selected pre emergents. Sulla may exhibit a slightly higher tolerance to Metribuzin, as seen where no visible effect was observed at the 400g rate whilst some medic cultivars have been more sensitive. Some results need to be treated with caution as common label & agronomy adage is that Terbyne should be highly damaging to Medic. In this trial this has not been exhibited, see discussion section for an explanation as to why this may have arose.

2. Post Emergent Chemical Trial

Figure 3: Scoring Key: The Key below corresponds to results presented in (Figure 4)

Key	
No Effect	5
Slight Effect	4
Some Plants Stunted	3
Severe Stunting <40% loss	2
Few Survivor, Severe Stunting	1
No Suvivors	0

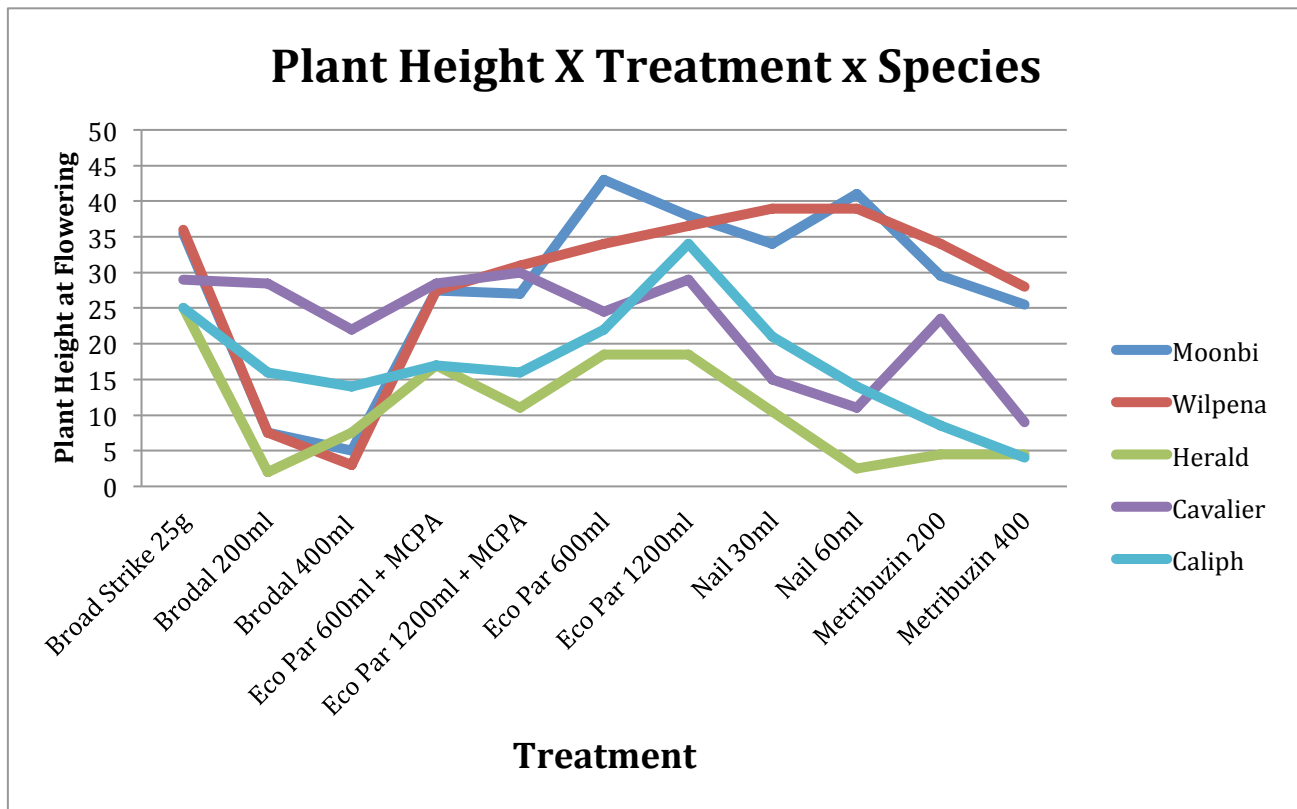
Figure 4: Physiological effect of post emergent chemicals on Medic & Sulla cultivars.

	Broadstrike 25g	Brodal 200ml	Brodal 400ml	Eco Par 600ml + MCPA	Eco Par 1200ml + MCPA	Eco Par 600ml	Eco Par 1200ml	Nail 30ml	Nail 60ml	Metribuzin 200g	Metribuzin 400g
Moonbi Sulla	4	1	1	2	2	4	5	3	3	3	2
Wilpena Sulla	3	1	1	2	2	4	3	3	3	3	2
Herald Medic	4	1	2	3	3	3	4	2	1	1	2
Cavalier Medic	4	3	3	4	3	3	5	3	2	3	2
Caliph Medic	4	2	2	4	3	3	5	5	2	3	1

Figure 4 show the results of vigour scoring conducted on the Sulla and Medic varieties at flowering.

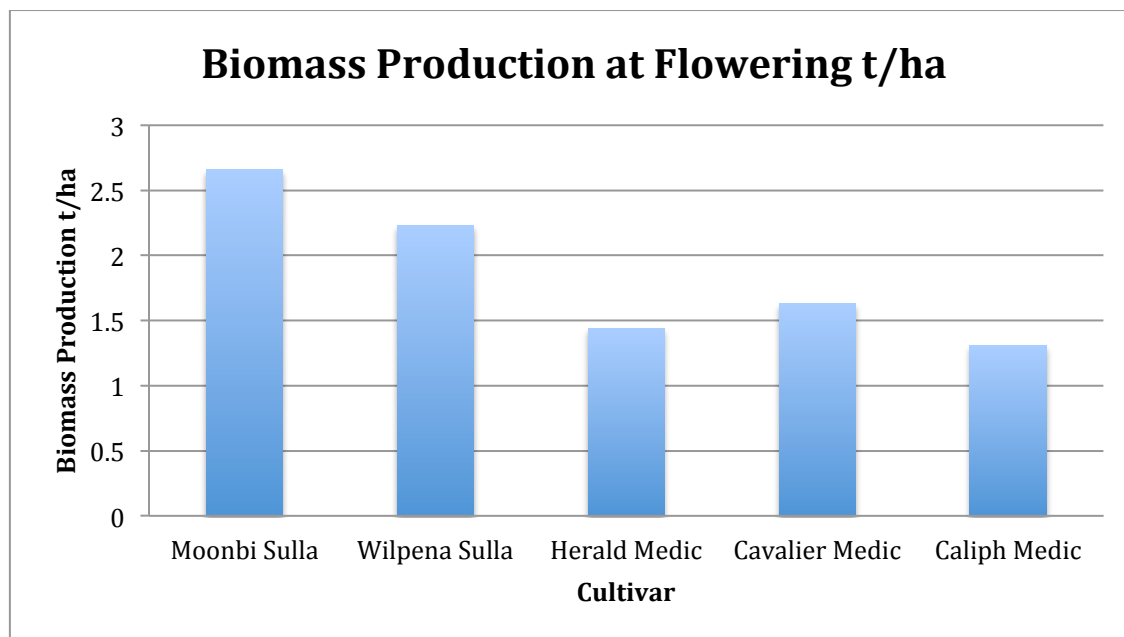
Sulla appears to have increased sensitivity to Brodal & MCPA Amine compared to Medic (MCPA used with EcoPar). Sulla has exhibited a good level of tolerance to Broadstrike & EcoPar similar to that of Medic. Sulla's does not appear to have improved tolerance to Metribuzin as hypothesised in the first year, demonstrating a similar, low level of tolerance like Medic.

Chart Number 1: Plant Height (cm) Measured at Flowering



The Chart above shows canopy height of both Sulla and Medic at flowering. Key points found in this set of observations is 1) Brodal at the 200ml & 400ml rate & mixtures containing MCPA at both the high and low rate have significantly reduced canopy height in Sulla & Medic. Sulla appears to have greater sensitivity to both these chemicals compared to Medic. Canopy height of Sulla is greater than that of Medic when grown under the same conditions.

Chart 2: Biomass at Flowering (t/ha) of Sulla & Medic



In 2015 both Sulla cultivars produced more biomass/ hectare than all three-medic cultivars as shown in Chart 2 above . Biomass production gains of Sulla verse Medic were considerable, in the order of 0.5-1 t/ha.

Discussion:

Results from this trial have uncovered some interesting management considerations that must be made when growing Sulla, as Sulla's tolerance to both pre & post emergent chemicals differs from that of Medic it cannot be treated the same as Medic.

Sulla has exhibited similar tolerances to pre emergent chemistry to Medic, however it does differ in its ability to tolerate certain post emergent chemical options. Pre emergent, Metribuzin in 2015 has been quite safe along with the low rate of Simazine. Whilst Terbyne has also shown good crop safety, this result is unusual and should be treated with caution as this chemical is known to have good activity on Medics. It did not show this in 2015, It is possible that Terbyne applied up front in this trial was either thrown from the furrow causing good crop safety, or the little amount of rainfall received post provided perfect conditions for safety of this chemical.

Post Emergent options have shown to be quite different to that of Medic, with Sulla exhibiting poor tolerance to Brodal & Ester. Broad Strike appears to be a good post emergent option, which aligns with what is observed in the field.

Metribuzin was included as a post emergent treatment because there have been reports of second year Sulla stands handling high doses. In this years trial Sulla has not exhibited an increase tolerance to Metribuzin compared to Medic.

Sulla's biomass production and canopy height differs considerably to Medic, with Sulla producing significantly more biomass/ha in 2015. As observed in flowering biomass measurements Sulla has produced biomass gains of 0.5-1 t/ha over Medic.

2. Grazing Demonstration

Details: The following grazing demonstration was conducted on a wheat paddock planted back on vetch stubble at Balmar Stud, Wokurna, SA. The site was sown to two different wheat cultivar's with a grazing cage was set up to straddle both cultivars. White Suffolk Ewes & lambs were introduced to the to the paddock for two grazing events lasting ten days. For this study a Ewe will be classified as 2.5 DSE while a lamb will be classed as 0.8 DSE.

Sowing Date 25/5/15

Variety/s Axe & Cobra

Paddock Size 28.3 ha

Grazing Treatments

Grazing Treatment 1: 13/7/15 - 23/7/15 (10 Days)

98 White Suffolk Ewes & 131 Lambs

Total DSE: 349.8

DSE/ha 12.4

Duration 10 Days

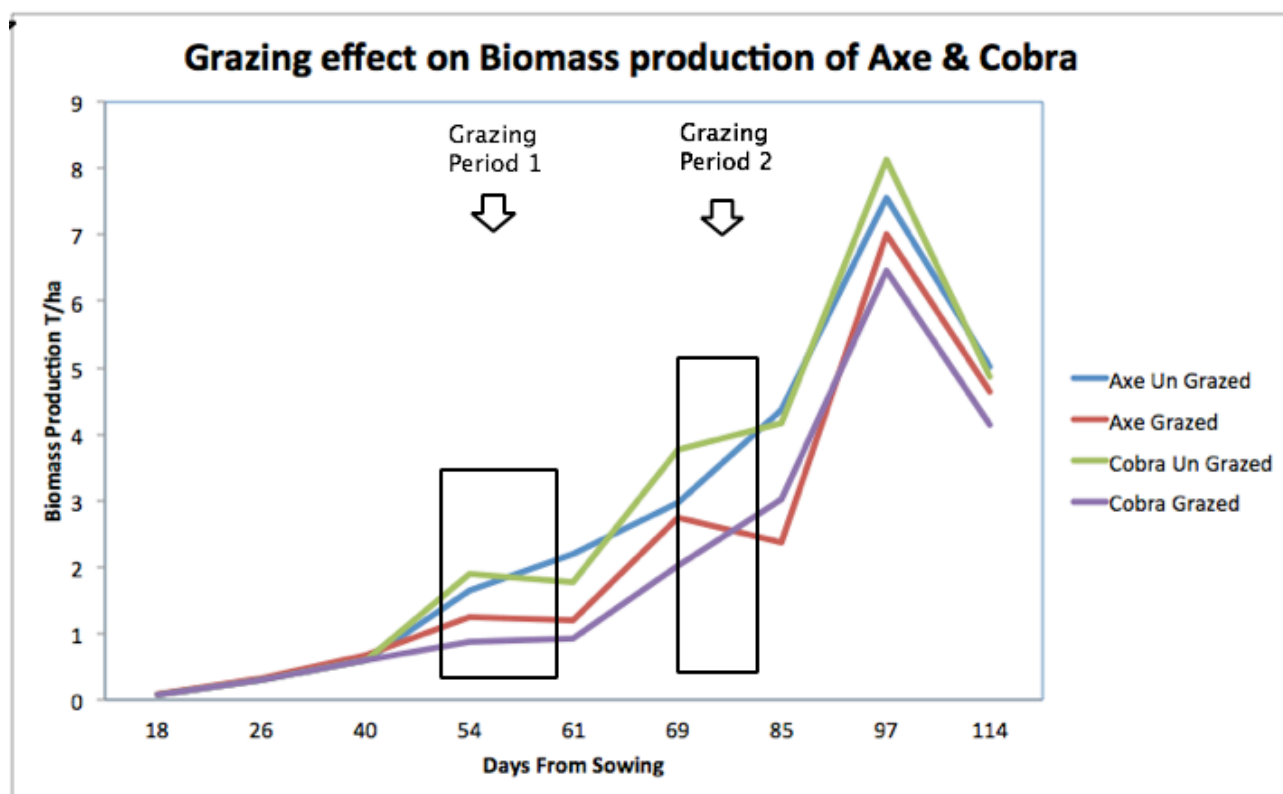
Grazing Treatment 2: 3/8/15 – 13/8/15 (10 Days)

21 Ewes & 131 Lambs

100 of the lambs weaned

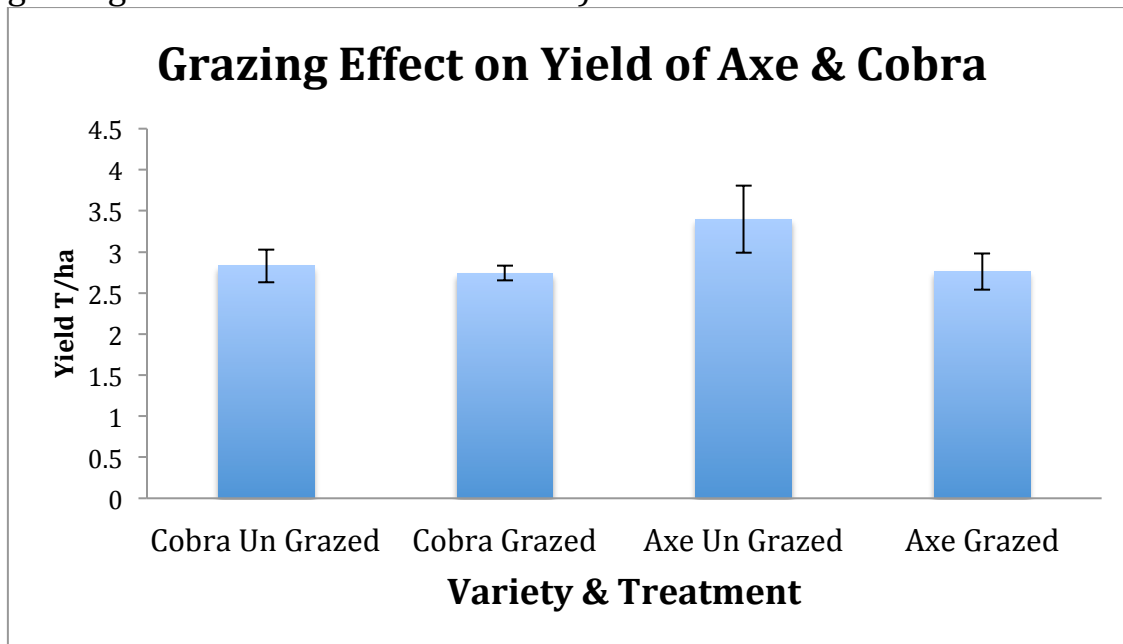
Total DSE: 177.3

DSE/ha 6.3

Chart 1: Interaction of Grazing on Biomass Production of Wheat Varieties Axe & Cobra

Grazing has effected biomass production of both Axe & Cobra throughout the year. This can be seen in Chart 1 above where Axe & Cobra grazed treatments (Maroon & Purple Lines) have produced lower biomass levels than un grazed (Blue & Green Lines) respectively. Final biomass of both varieties has been reduced at flowering, with a larger final biomass difference appearing to show up between Cobra grazed & ungrazed compared to Axe.

Chart 4: Grazing effect on Yield of Wheat Varieties Axe & Cobra
 (note statistical analysis found no significant difference at the 5% level between grazing treatment for both varieties)



No significant reduction in grain yield was found between grazed & un-grazed treatments for either variety.

Table 1: Grazing effect on grain screenings. Note: Screenings for grazed treatments were obtained from delivery docket for each cultivar. Screenings for un-grazed treatments were obtained through hand harvests taken from grazing cage. No statistical analysis was conducted on treatments.

Variety	Grazed	Un Grazed
Axe	7.63	7.33%
Cobra	12.56	8.5%

The table above indicates that the grazing treatment has had a greater impact on the grain quality of Cobra compared to that of Axe. Both grazed treatments produced higher screenings, however the difference between grazed & un-grazed treatments on Cobra was far larger than that of Axe. Axe is considerably shorter seasoned than Cobra and had completed flowering before the un seasonal hot October long weekend witnessed in 2015. It was also noted by the grower that sheep did prefer grazing the Cobra wheat compared to Axe which may have increased its screenings level.

Discussion

Grazing treatments in 2015 reduced biomass production of both cultivars Axe & Cobra, resulting in 0.5 to 1 tonne or larger reduction in biomass at flowering due to grazing. Biomass reduction between grazed and ungrazed treatments has been greater for Cobra compared to Axe. This could be due to a varietal sensitivity to grazing or better palatability compared to Axe, it was noted during the season by the cooperating farmer that sheep appeared to preferentially graze Cobra.

Final yields of Cobra and Axe were not affected in 2015 by the grazing treatment, as seen in Table 1, yield differences were not significant at the 5% level between treatments for both varieties. Whilst unable to be statistically validated the effect of grazing on grain quality there is indication that grain quality has been effected by grazing in 2015 & that sensitivity to grazing is different between cultivars. In Table 1 it can be seen that grazing has increased screenings on both varieties, the difference in screenings between Axe grazed & ungrazed is quite small at 0.3%, however between Cobra grazed & ungrazed the difference is large at > 4%.

Axe is one of the earliest maturing wheats available on the market while Cobra is mid range with respect to maturity. Given the harsh finish in 2015 with the October long weekend heat wave it is likely that Axe has been able to maintain quality over Cobra when subject to grazing because it matured before this hot spell. This is likely the reason why Axe has not exhibited a large effect on screenings induced by grazing. Comparisons between Axe & Cobra need to be treated with caution in this study as the amount of time stock spent grazing each cultivar could not be measured. If this demonstration was to be repeated, set stocking each variety would be preferred to allow better comparisons between them to be made.

