

# Serradella in sub-tropical pastures 2013 vs 2015

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|   |  |
|---|--|
| <b>Purpose:</b>                               | To determine how serradella performs when introduced to a sub-tropical pasture stand.  |
| <b>Location:</b>                              | Peter Negus property. West side of Dandaragan Rd (~ 2km North of Rowes Rd)   |
| <b>Soil Type:</b>                             | Deep sand.   |
| <b>Soil Test Results:</b>                     | (0-10cm): OC - 1.06%, P - 26 mg/kg, K - 19 mg/kg, S - 5.9 mg/kg, N - 5.33 mg/kg, conductivity - 0.04 dS/m<br>pH(CaCl <sub>2</sub> ) - 5.4 (0-10cm)<br>4.5 (10-40 cm)<br>4.8 (40-80 cm)<br>5.0 (80-120cm) |
| <b>Rotation:</b>                              | Volunteer pasture pre 2012; perennial pastures sown August 2012, serradella sown into perennials in 2013 and barley sown in 2014. 2015 was regenerating serradella in perennial pasture.                 |
| <b>Growing Season Rainfall (2013 - 2015):</b> |  |

|      | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec | Total |
|------|------|------|------|------|------|------|------|------|------|------|------|-----|-------|
| 2013 | 23.8 | 1.4  | 73.6 | 9.4  | 116  | 15.6 | 89.6 | 168  | 135  | 25   | 1.6  | 0   | 659   |
| 2014 | 13.8 | 0    | 6.8  | 34.6 | 106  | 65.6 | 101  | 50.6 | 81.6 | 37.8 | 18   | 0.2 | 516   |
| 2015 | 1.6  | 39.6 | 34.4 | 26.8 | 61.6 | 49.2 | 98.8 | 90   | 27.2 | 16.4 | 10.4 | 4.8 | 461   |

## BACKGROUND SUMMARY

Perennials are nitrogen hungry and respond well to N inputs. Typically though, the deep sands that are suited to perennials have poor nutrition and leach nitrogen readily through the soil. Legumes are an important tool that can address shortfalls in N during periods of perennial growth. Serradella has shown to be suited to this role as both a source of much needed nitrogen and a valuable winter feed source during times of perennial inactivity. Although there is a yield penalty when sowing serradella into perennials; this trial aims to examine this and serradella performance over two contrasting seasons (2013 and 2015).

## TRIAL DESIGN

**Plot size:** 15 x 7 m (30 Total)

**Machinery use:** DAFWA cone seeder (1.5 m wide), 220 mm row spacing, tynes with trailing press wheels, offset to perennials rows (DGPS with +/- 2cm accuracy and auto steer)

**Replicates:** Range from 2 to 12 (6 Treatments)

**Crop type and varieties used:** Margurita French Serradella, YS\_72.1A Yellow Serradella

**Seeding, treatments and harvest:**

| Date |        | Action                          |   |
|------|--------|---------------------------------|---|
| 2013 | 27 Feb | Summer Sowing                   | Margurita 20 and 40kg/ha pod, 77.1A 30kg/ha pod,                  |
|      | 24 May | Winter Sowing                   | Margurita 10kg/ha   |
|      |        | Fertilizer                      | 160 kg/ha Super Potash  |
|      |        | Knockdown                       | Sprayseed (1L/ha) prior to winter sowing treatments only          |
|      | 2 July | Grass selective                 | Select (500mL/ha)   |
|      | 11 Nov | Harvested Serradella            |   |
| 2014 | 21 May | Barley seeded                   | Barley was seeded into perennial grass, and harvested in November |
| 2015 | April  | Serradella germination          | False break   |
|      | 6 May  | Grass selective                 | Propizamide sprayed (1L/ha)                                       |
|      | June   | 2 <sup>nd</sup> Serradella germ | Definitive break  |
|      | 18 Nov | Harvested Serradella            |   |

**TRIAL LAYOUT**

## Treatments

Margarita over Perennial rows 44 cm apart

Margarita over Perennial rows 88 cm apart

Margarita over traditional annual based pasture (Control)

YS\_72.1a over Perennial rows 44 cm apart

YS\_72.1a over Perennial rows 88 cm apart

YS\_72.1a over traditional annual based pasture (Control)

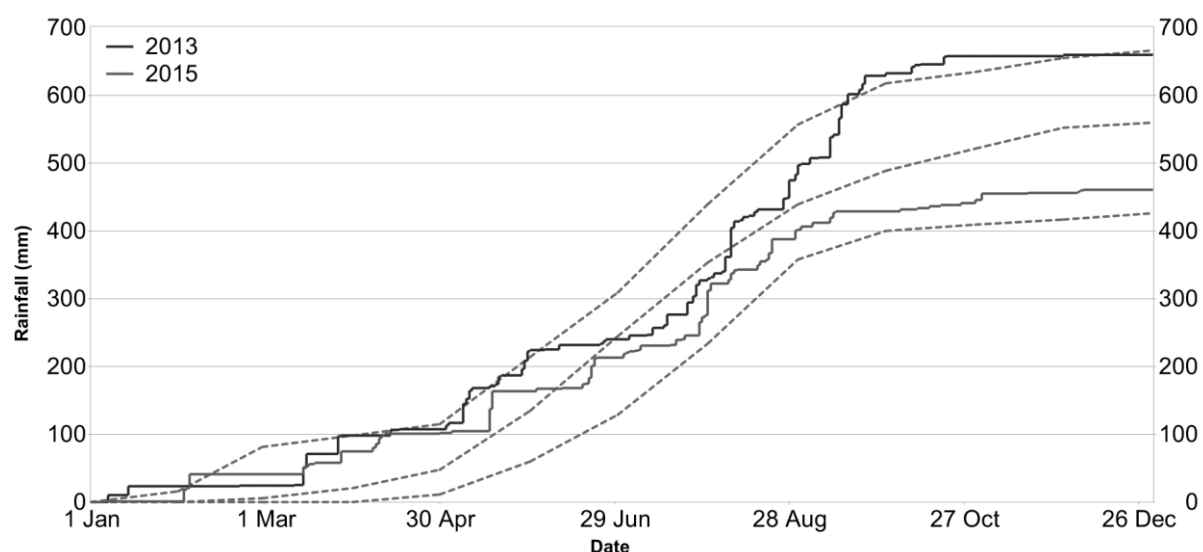
**RESULTS**

The annual rainfall conditions in 2013 were a decile 9 and contrasted by 2015 with a decile 2, (Figure 1). The total rainfall for 2013 was 659mm, with 558mm of that falling in the annual growing season. Almost 200mm less (461mm) fell in 2015, 370mm of that in the growing season.

**Serradella Germination**

In 2013, serradella was summer sown in February before 74mm of rain fell in March. Fortunately, this didn't result in a false break as YS\_72.1a and Margurita seed pod require several months in the environment to 'soften' before being able to germinate. This was followed up by a favorable seasonal finish, with 228mm falling from August to October. The serradella yielded a large seed bank to be set up for a rotational crop or permanent pasture.

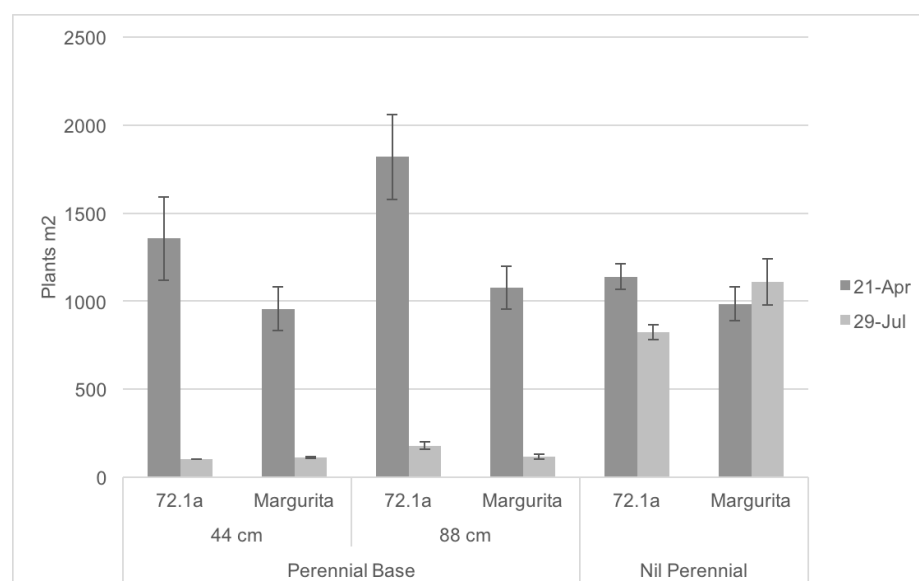
**Figure 1: Shows the rainfall deciles at the Lake Nammen weather station in 2013 and 2015. The weather station is situated 11km west of the trial site**



Barley was sown into the trial in 2014 and there was still a large seed bank left in 2015. A false break of 27mm in April 2015 resulted in the serradella pod from the 2013 seed set to germinate. Panic grass was still highly active and able to compete with the germinating annuals, consequently the serradella seedlings died in the perennial plots. There was some germination in the control (nil perennial) plots, these survived and managed to gain a 'head start' on the later germinating serradella, (Figure 2).

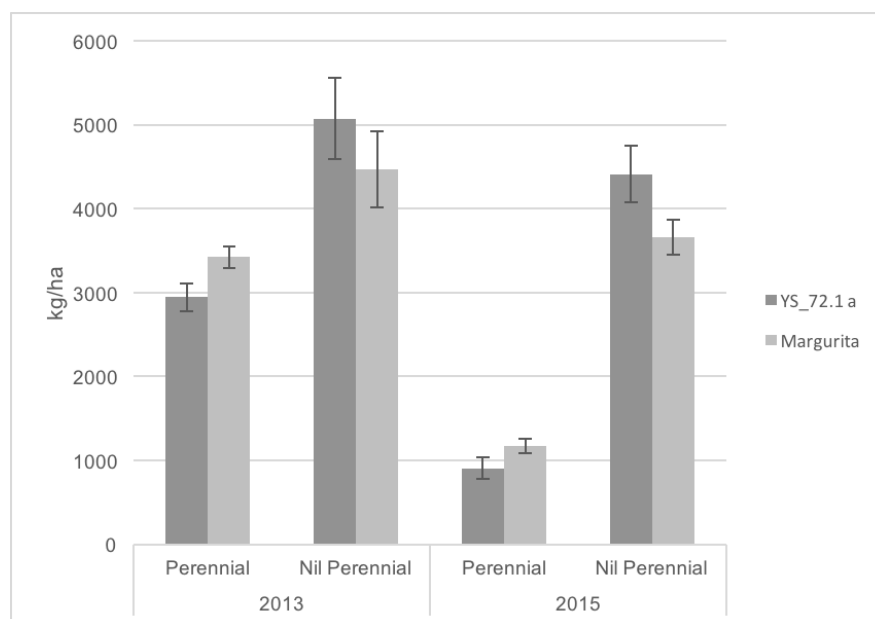
Fortunately, serradella seed set was very good in 2013 and this allowed for an effective reserve to be available for the more decisive winter break in May.

**Figure 2: The impact of a perennial base and perennial row spacing on 2015 serradella establishment; measured April 21 and July 29 (Bars = SE)**



## Biomass

**Figure 3: The impact of a perennial base and season on the biomass of Margurita and YS\_72.1a yellow serradella (Bars = SE)**



The ability for the serradella in the nil perennial plots to survive the false break allowed for a developmental 'head start' on serradella sown into perennials. This can be seen in the results in Figure 3 which show that:

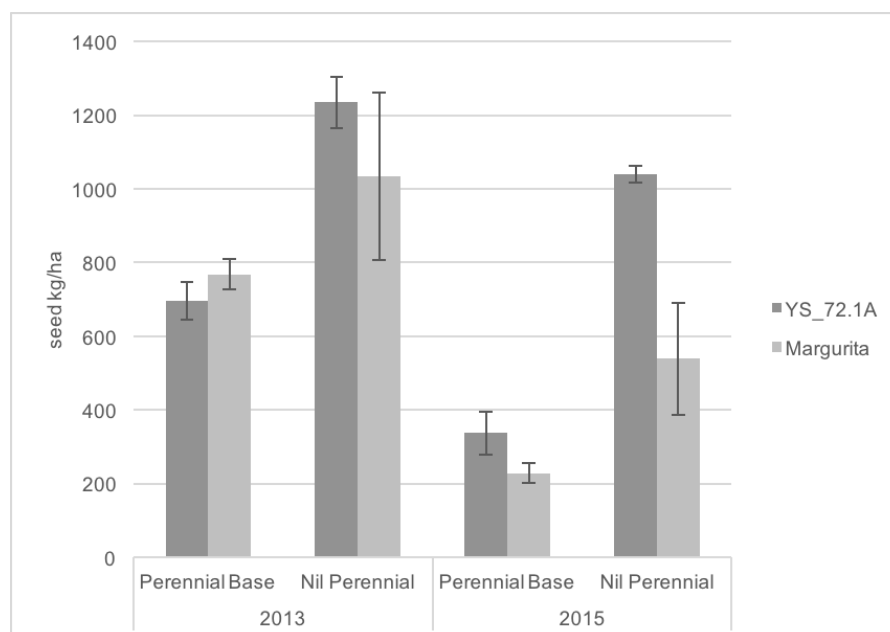
- Serradella did far better in the perennial plots in 2013 compared to 2015
  - When sown into perennials, the 2013 YS\_72.1a produced 69% more biomass and Margurita 66% compared to 2015.
- Serradella performed similarly in the control (nil perennial) in 2013 when compared to 2015
  - There was little biomass difference between 2013 and 2015 when established in a typical pasture without perennials.
- Serradella grown in perennials had a small to moderate biomass penalty in 2013
  - In 2013 when sown into perennials, there was a 23% biomass penalty in Margurita and 42% in YS\_72.1a when compared to serradella in traditional pasture.
- Serradella grown in perennials had a large biomass penalty in 2015
  - In 2015 when sown into perennials, there was a 68% biomass penalty in Margurita and 80% in YS\_72.1a when compared to serradella in traditional pasture.

## Harvest

Figure 4 shows seed weight in kg/ha and includes seed that was grown and harvested in 2013 and 2015. In 2013, sowing serradella into a perennial grass reduced Margurita seed yield by approximately 25% and YS\_72.1a yield by 43%. However, perennial row spacing made little difference to seed yield (not shown).

Biomass has been a good predictor of seed yield, even with the harsh cut off of the 2015 season. The false break in 2015 initially depressed seedling numbers, but the serradella was able to rebound from seed stores and produce a large bank of seed. In 2015, Margurita yield was reduced by 58% and YS\_72.1a 67% when sown into perennials.

**Figure 4: 2013 and 2015 serradella seed harvest. (Bars = SE). Serradella pod was harvested and seed yields were estimated using the seed to pod ratio of 36% for YS\_72.1a and 63% for Margurita**



## OBSERVATION/ DISCUSSION/ MEASUREMENTS

Legumes are an important tool in a perennial sward to supply a nitrogen source and maintain production. Serradella can be successfully established and persist in an established perennial pasture; this includes persisting as part of a crop/pasture rotation in perennials.

In the more favorable year of 2013 serradella biomass and pod production was higher. There is a yield penalty for serradella when sown into perennials, the penalty though will vary depending on the seasonal conditions. Perennials are still actively growing in March and April before the cooler weather starts to suppress their growth and they become less competitive. An indecisive Autumn break can allow active perennials to deplete moisture reserves that would normally allow germinating serradella to survive. These results clearly demonstrate the advantage of a successful early germination and establishment, although an indecisive break and low rainfall year will exaggerate the yield penalty when serradella is sown into perennials. Additionally, the suppressive effect of a grass selective on perennial growth may reduce competition with annual pasture species and can be used as a tool to increase annual legume production.

## ACKNOWLEDGEMENTS/ THANKS

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