Impact of Potassium and Sulfur on Maize Yields
Irrigation Discussion Groups Focus Paddock Report

The irrigation discussion groups are part of the GRDC investment in the Optimising Irrigated Grains projects.

McLeod Maize Trial Summary and Results

Trial Objective

To measure the effect of different nutrient treatments, particularly Potassium and Sulfur on maize yields.

Trial Location

Paddock: Lateral 3 North

Saint Leon's Road, Finley

Trial Layout

The trial was designed based off lateral irrigator spans (e.g., Span 1 through to 8).

Each irrigator span and plot is therefore 15 metres wide running the length of the paddock (1500 metres).

See trial design below. All nutrients are written in kg/ha.

			125 K		125 K		
4.7 Zn	4.7 Zn	4.7 Zn	4.7 Zn	4.7 Zn	4.7 Zn	4.7 Zn	4.7 Zn
	60 S		60S				
50 P	50P	50P	50P	50P	50 P	50 P	50 P
183 N pp	183 N pp	183 N pp	183 N pp	183 N pp	183 N pp	183 N pp	183 N pp
	50 N pp (AMS)		50 N pp (AMS)				
300 N td	300 N td	300 N td	300 N td	300 N td	300 N td	300 N td	300 N td
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

South **North**

Treatments used for monitoring during the season were:

- Span 2 – Sulphate of Ammonia
- Span 3 – Control
- Span 4 – Sulphate of Ammonia + Muriate of Potash
- Span 5 – Control
- Span 6 – Muraite of Potash

The following plots were not monitored during the season:

- Span 1 – not monitored due to excess Sulphate of Ammonia applied.
- Span 7 – due to ridge running through middle of plot area which was not representative of the other treatments.
- Span 8 – not monitored due to excess Mutriate of Potash applied.

Products and Application Method

- Muriate of Potash (K)
  Spread prior to planting at 250 kg/ha providing 125 kg/ha K.

- Zinc (Zn)
  40L/ha FlowPhos 13Z applied in-furrow at the time of planting. At a specific gravity of 1.3, this provides 4.7 kg/ha Zn.

- Sulfur (S)
  Sulphate of Ammonia spread prior to planting at 250kg/ha providing 60 kg/ha S and 50 kg/ha N.

- Phosphorus
  Di-Ammonium Phosphate (DAP) applied prior to planting at 250kg/ha providing 50kg/ha P and 45kg/ha N.

- Nitrogen
  - Urea applied at 300kg/ha prior to planting providing 138 kg/ha N.
  - DAP applied at 250kg/ha prior to planting providing 45kg/ha N.
  - SOA applied at 250kg/ha prior to planting providing 50kg/ha N.
  - Urea topdressed throughout the season at an estimated 660kg/ha providing 300 kg/ha N.
  - **Total Nitrogen Applied = 483 kg/ha N** (equivalent to 1,050 kg/ha urea).

  Note: In the trial protocol it was intended that treatment spans 2 & 4 would receive 50 kg/ha N (110kg/ha urea) less to ensure total nitrogen throughout the season is equal across all treatments. However, due to difficulty during this via aerial application, treatment spans 2 & 4 received an additional 50kg/ha of N (totaling 533kg/ha of N or 1159 kg/ha urea).

Paddock Management

- Paddock Sown
  Variety: P1837
  October 9th -11th, 2023

- In-Furrow Insecticide
  Applied at planting
  Fipronil
  Bifenthrin

- Post-Sowing Pre-Emergent Weed Control
  Applied October 11th, 2023
  Atrazine at 2.5 kg/ha
  Dual Gold at 1.5 L/ha

- Urea Topdress Application 1

  200 kg/ha urea applied at V5 stage around November 15th, 2023

- Urea Topdress Application 2

  200kg/ha urea applied at V8 stage around December 4th, 2024

- Urea Topdress Application 3

  200kg/ha urea to be applied by air at time of tasseling. Earlier nitrogen applications were not adjusted for the additional N in the SOA. Due to the difficulty doing this via aerial application, Spans #2 and #4 will have an additional 50kg/ha of urea compared to the other treatments. Date to be confirmed with Geoff.

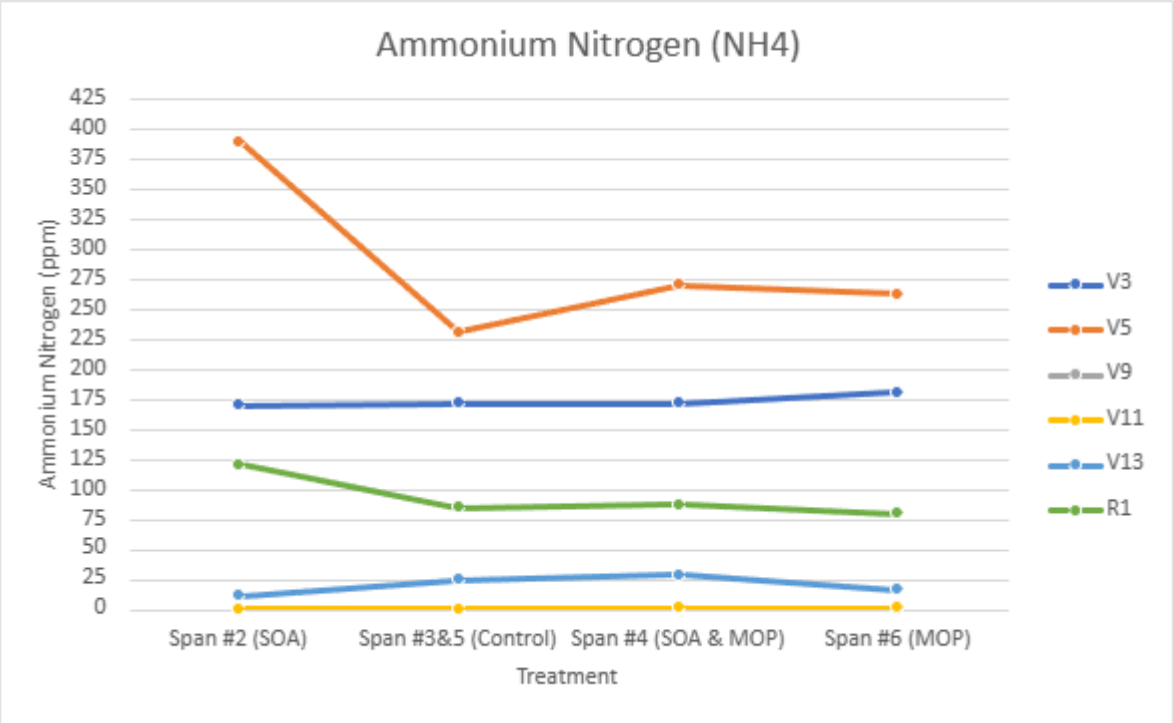
Tissue Testing

Tissue testing was conducted on treatment spans 2,3,4,5,6. Treatment spans 3&5 were combined into one sample to make up the control sample.

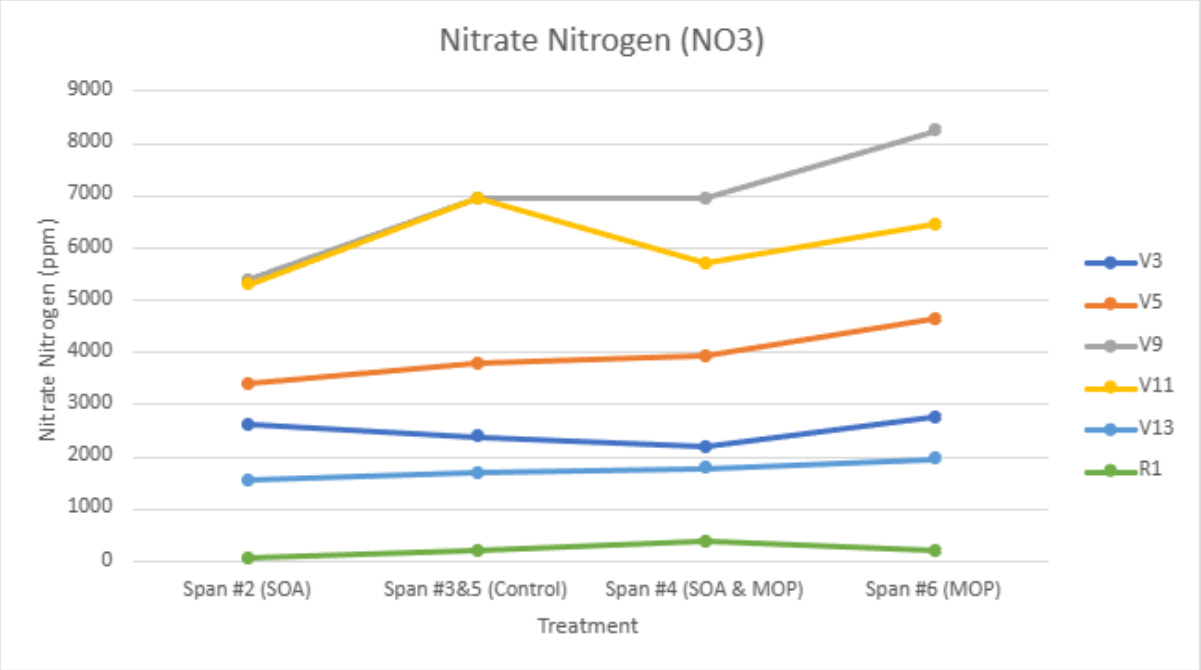
Tissue tests were taken at the development of every second leaf beginning on the 7th of November 2023 at V3 stage. Tissue testing concluded at the time of tasseling on December 27th, 2023. A total of 7 tissue tests were taken during this time. One sample was unable to be processed due to sitting in transit for a prolonged period.

The graphs below show the nutrient levels of each treatment at the time of sampling.

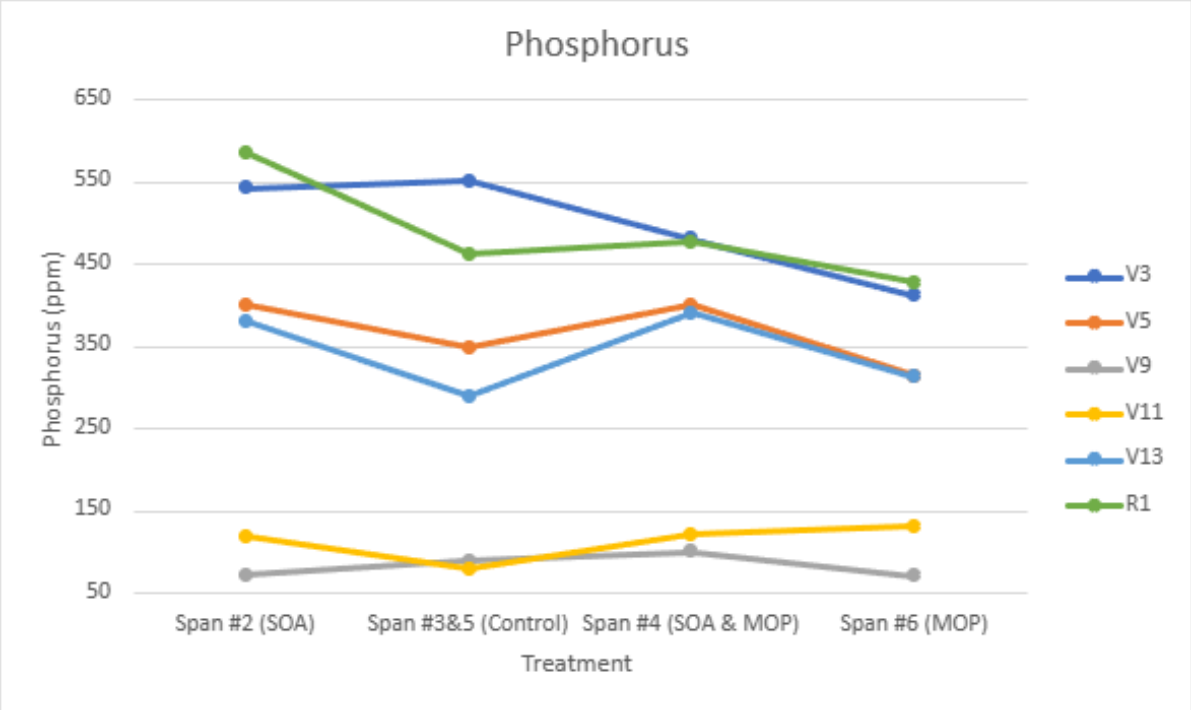
Ammonium Nitrogen



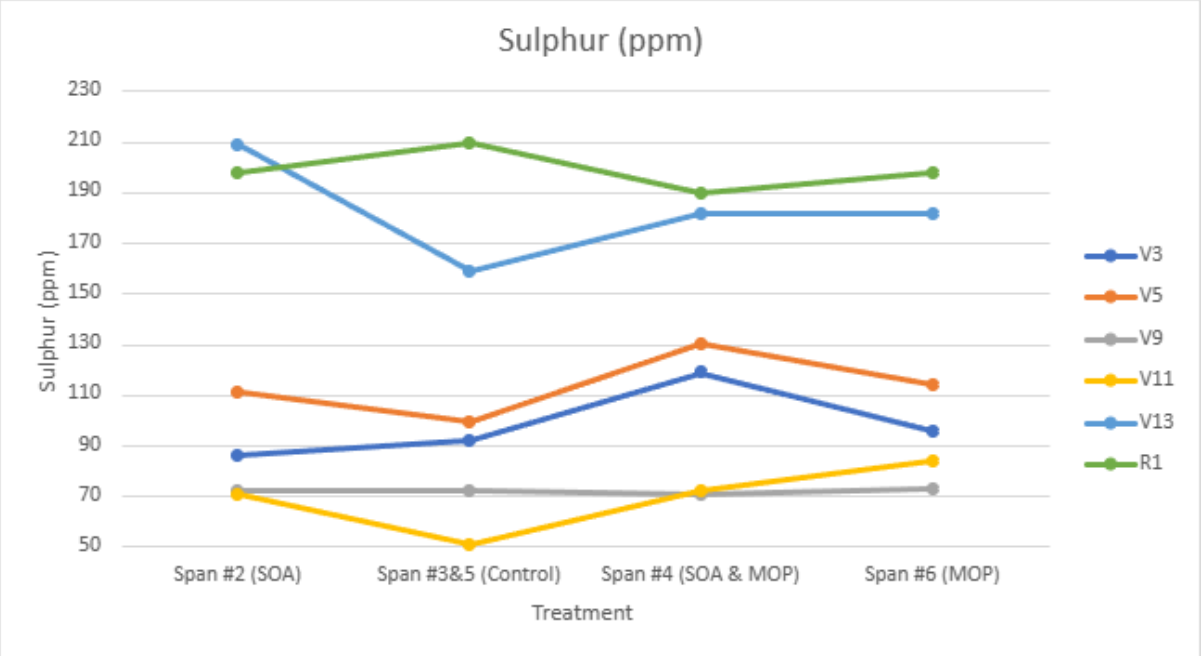
Nitrate Nitrogen



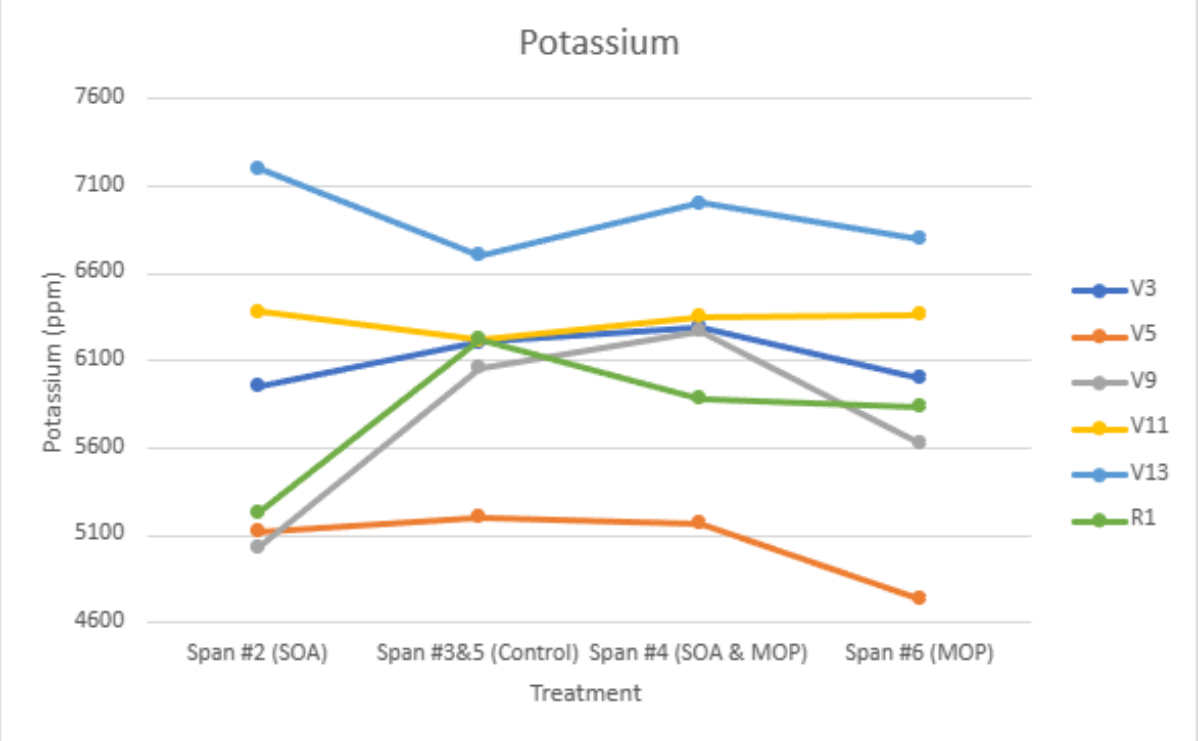
Phosphorus



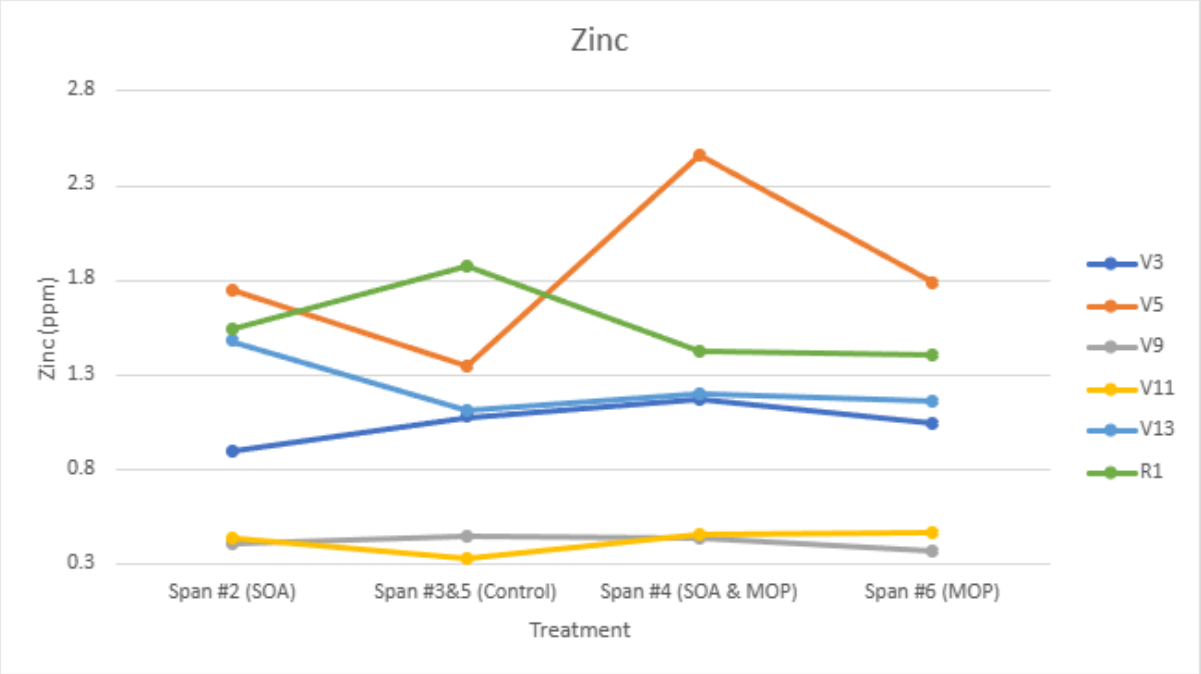
Sulphur



Potassium



Zinc



- Yield Data
  Header

Yield Data

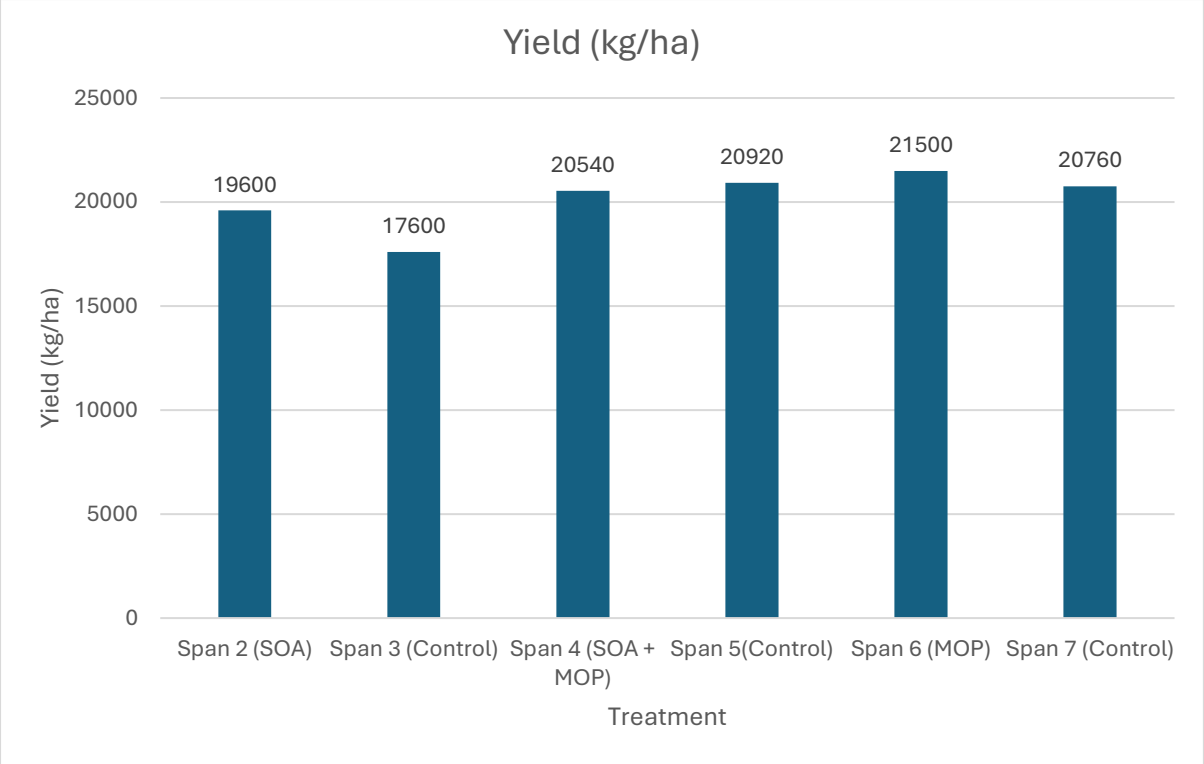
Harvest of the trial was completed on April 27th, 2024.

Header harvested two strips up the middle of each treatment span.

This is approximately 1.8 hectares (12 metres x 1500 metres).

Each treatment was weighed by using a truck and weigh bridge.

Treatment span 3 was affected by water which explains the anomaly in yield.



Conclusion

No correlation or consistent pattern was observed between treatments during the season through the regular tissue test monitoring. NDVI Imagery did not show any biomass differences between treatments.

The maize yield throughout the paddock was greatly influenced by paddock variability. It is believed that this played a greater role in yield than any treatment effect.

In conclusion, Geoff would like to conduct another strip trial next year using Muriate of Potash and Sulphate of Ammonia. Instead of weekly tissue testing, we may just select 3 keys times of the crops growth to conduct tissue tests.

This demonstration was conducted by Sefton Agronomics for Southern Growers

Sefton Agronomics