Protocol 11. Potassium Use Efficiency

Trial 1. Influence of additional Potassium on grain yield (Yenda)

Protocol Objective:
To assess the influence of additional Potassium fertiliser (Potassium Sulphate) used in crop on grain yield, tissue and grain concentration on soil with adequate K indices.

Yenda, NSW

Sown: 1 October 2019
Harvested: 31 March 2020
Soil Type: Slightly acidic Red Brown Earth
Previous crop: Cotton (summer 2018/19 followed by winter fallow)

Hybrid: Pioneer Hybrid 1756
FAR code:
Irrigation Type: Beds in bays

Key Messages:

- *The Yenda site had a Potassium (K) soil level (0-10cm) that exceeded 500 ppm (Colwell K) at sowing and showed no yield response to additional K applied post sowing in crop.*
- *Application of K as potassium sulphate at V4 and or V8 saw no change in leaf tissue levels when compared to the control (no added K) when tissues were assessed at V8 or tasselling.*
- *Harvest results showed no response to added potassium, indicating that the soil was able to supply the required potassium to the crop.*
- *There was no evidence of luxury uptake of K in tissue and grain samples (assessed in untreated and 80 kg /ha K).*

Table 1. SAGI analysis for grain yield (t/ha @ 14% moisture) and test weight (kg/hl).

Treatment K Rate (kg K/ha) applied V4	Yield t/ha		Test weight	
0 (nil control)	19.17	+/- 0.768	83.55	+/- 0.331
20	18.33	+/- 0.765	83.90	+/- 0.331
40	18.73	+/- 0.768	83.38	+/- 0.331
40+40 (applied V4 & V6)	19.61	+/- 0.77	83.70	+/- 0.331
80	19.21	+/- 0.773	83.47	+/- 0.331
Mean	**19**		**83.6**	
P val	0.81		0.818	
LSD	2.145		0.997	
CV	8.048		0.739	

Yields taken from hand harvest quadrats as opposed to machine harvest based 2x 2m row opposite one another. Hand harvested quadrats tend to give higher yields than machine yields.

There were no statistically significant differences in grain yield as a result of any potassium application in this trial (Table 1) and no indication that K applications led to luxury uptake in the leaf tissue (Table 2), since potassium application had no effect on potassium concentration in either the leaf or grain.

Table 2. Influence of potassium application of leaf and grain K content (%) at V10 and VT- Tasselling (Youngest emerging leaf assessed at V10 & highest leaf at V14)

Treatment (kg K/ha)	Leaf %K		Grain % K
	V10	VT	
Nil (Control)	2.50	1.80	0.41
80	2.55	1.75	0.42