

## Irrigated Wheat Nutrition Trial

The aim of the trial is to test products that claim to improve fertiliser efficiency and the method of application, as well as nutritional treatments that **may** provide some benefit. The trials examined a range of products, ranging from biologically based products aimed at improving nutritional efficiency to chemical fertilisers.

The trial examined the use of Basis®, a product marketed by Loveland Agri Products / Landmark. The product description is available on the Agricen website:  
<https://www.agricen.com.au/products/basis>

The trial had 4 Basis treatments:

1. Control – 125 kg MAP/ha as starter fertiliser
2. 125 kg Basis treated MAP as starter
3. 100 kg Basis treated MAP as starter
4. Nil starter fertiliser

Also included were two fertiliser treatments – copper and potassium. These treatments were suggested by participants at the Crop & Connect workshops the ICC ran across the irrigation district in March 2016.

### Potassium (K)

Our clay soils do tend to have adequate potassium available, but there is some suggestion that while the soil levels are OK, the crop may demand more than the soil can deliver in peak demand (like having a big tank but a small outlet). From soil testing, we have about 1000 kg K/ha (~600 ppm Colwell), with critical levels below 165 ppm Colwell for our clays. Crop demand is 3 kg K/t for grain or 20 kg K/t for hay. As potassium is highly dependent on soil moisture for movement, the dry seasons may be the reason that responses to K that have occurred elsewhere.

Potassium was topdressed as potassium sulphate on July 25<sup>th</sup> at 67 kg/ha (or 28 kg K/ha).

### Copper (Cu)

Copper is a micro-nutrient that is needed for many reactions in the plant, including chlorophyll formation, enzymes and pollen development. Deficient plants appear wilted, short and thin stemmed with twisted leaf tips that die off. Mature plants can have delayed head emergence or heads that have empty or partially filled heads.

Soil testing suggested 30% of Wimmera soils and 7% of Mallee soils were deficient in copper but grain testing from NVT sites showed copper levels well above critical values. Soils of volcanic origin, high clay and organic matter levels and high alkalinity may be more prone to deficiency. Tissue testing is far more reliable than soil testing in identifying deficiencies.

While a deficiency is unlikely, copper was applied as a foliar spray on August 25<sup>th</sup>, (early booting coinciding with pollen formation) at 1 kg Cu/ha as copper sulphate. Actual copper demand is about 5g/t of grain.

The trial was sown on May 6<sup>th</sup> with Scout wheat, sown at 107 kg/ha. The trial was topdressed twice with urea targeting 8 t/ha. The trial received a fungicide application at full flag emergence and one irrigation in mid-October. The trial was harvested on December 7<sup>th</sup>.

### Results

Treatment	Yield t/ha	Protein %	Screenings %	Test Wt kg/hl
Nil starter	9.81	10.6	0.8%	83.0
125 kg/ha Basis+MAP	9.70	10.6	0.9%	82.5

Control 125 kg/ha MAP	9.62	10.6	0.8%	82.0
100 kg/ha Basis+MAP	9.45	10.6	1.0%	83.0
+ Potassium	9.20	10.8	0.8%	81.5
+ Copper	8.52	10.7	0.8%	81.5
p	0.022	0.972	0.459	0.237
lsd	0.68	NS	NS	NS
cv%	3.8	3.0	18.7	1.4

Basis treated fertiliser, as well as Nil Starter, had no effect on yield or grain quality. Additional potassium did not affect yield or grain quality. However applying copper did reduce yield.

What does it mean?

The Trial Block does have reasonable to good levels of phosphorus, thanks to the previous owners use of P fertiliser as well as our nutrition program that aims to replace as much P as we export out the gate. Therefore it was not unexpected that the lack of starter P would not affect yield. I would not recommend nil starter as a fertiliser strategy due to its importance in early crop development and the difficulty in getting P to the roots post sowing. If you have P levels above adequate (45 ppm Colwell), there may be an opportunity to reduce P rates, but you will be mining the soil, and eventually full replacement will be necessary.

Similarly' there was no effect from the extra potassium. If my calculations are right, and we have a pool of around 1000 kg K/ha available, then adding another 28 kg/ha isn't going to make much difference.

However, adding another 1 kg copper/ha did have a negative effect on yield, losing 1.1 t/ha. The requirement for copper is very small and, in general, our clay soils can supply most of the micro-nutrients needed. Oversupply of some nutrients can affect the crops ability to take up others, and this is illustrated in this trial where excessive copper can either cause toxicity or imbalances in the zinc nutrition of the crop.