

## **The effect of nitrogen and phosphorus application on yield of raingrown summer crops in Central Queensland. 2. sorghum and sunflower - Central Highlands**

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The cropping area of the Central Highlands of Queensland has expanded rapidly in recent years, the major crops being sorghum and sunflower. Limited information is available on yield responses to applied nutrients on these crops in this region. The five trials reported in this paper form part of a current project by Consolidated Fertilizers Limited to evaluate and demonstrate nitrogen and phosphorus responses in sorghum and sunflower in the Central Highlands of Queensland.

### **Methods**

Five trials, with treatments of 0, 10, 20, 40, 60, 80 kg N ha<sup>-1</sup> and 0, 10, 20 kg P ha<sup>-1</sup> were established in January 1981. A partial factorial design with three replicates was used. Phosphorus as mono-ammonium phosphate (MAP) was banded 5 cm to the side of the seed row. Nitrogen was applied as urea, the rates of which were adjusted to account for the N content of MAP, in bands 10 cm to the side of the seed row. Sorghum was planted in four trials, and sunflower in one.

### **Results and Discussion**

The application of nitrogen as urea significantly (P 0.01) influenced yield in one sorghum trial with NO<sub>3</sub>-N (0-60 cm) of 5.2 ug g<sup>-1</sup> and in the sunflower trial with NO<sub>3</sub>-N (0-60 cm) of 1.2 ug g<sup>-1</sup>. Maximum yield at the sorghum site was achieved with 60 kg N ha<sup>-1</sup> and at the sunflower site with 40 kg N ha<sup>-1</sup>.

Non-significant yield increases to N were recorded at two of the other sorghum sites. At the fifth site there was a strong positive interaction between N and P. At these sites 80 kg N ha<sup>-1</sup> tended to reduce yields to levels below those achieved with lower N rates, but not below the yields of the control plots.

Significant responses to phosphorus as MAP occurred on the so-called "Open Downs" country of Central Highlands where P (bicarb) (1) was less than 5 ug g<sup>-1</sup> in the top 10 cm of soil. Where the distribution of P (bicarb) through the top 60 cm was concentrated in the top 10 cm, responses were more pronounced than where there was a substantial proportion of the extractable P in the 10-60 cm layer.

This work has indicated that responses to N may occur in sorghum and sunflowers when NO<sub>3</sub>-N (0-60 cm) is less than 5-6 ug g<sup>-1</sup>. Responses to P may be expected when P(b) in the top 10 cm of soil is less than 5 ug g<sup>-1</sup>. This work is planned to continue, investigating the relationship of soil NO<sub>3</sub>-N and yield responses to N fertilizer and soil P(b), P sorption capacity and yield responses to P fertilizer.

1. Colwell, J.D. 1963. Aust. J. Agric. Anim. Husb. 3: 190.