

Fertilizing field crops - pre-plant banding of dual applications of nitrogen and phosphorus fertilizers

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The application of fertilizer at planting time to grain and oilseed crops can limit nutrient use and thus farm profitability for two main reasons: the limited application rate possible in contact with the seed, and the unwillingness of many farmers to handle, at planting time, the volume of fertilizer necessary to meet crop needs.

The application of fertilizers other than at planting time of field crops could thus be desirable. Already, large quantities of nitrogen fertilizers (urea and anhydrous ammonia) are applied before planting of grain and oilseed crops. However, apart from the grain industry in parts of southern Australia, and the Queensland sugar industry where preplant broadcast applications are made, little phosphorus has been applied before planting of field crops in Australia. No attempt has been made to develop systems which apply both nitrogen and phosphorus before crop planting. For such a system to be economic, yield response to applied nutrient and rate of nutrient recovery will need to be as good as those for conventional methods of fertilizer application.

The preplant application of nitrogen and phosphorus together, in bands approximately 30 cm apart and up to 20 cm deep, is practised widely in the United States and Canada with crops such as sorghum, maize and winter cereals. The fertilizers are applied as solids or liquids, or as a combination of solids or liquids and anhydrous ammonia, several months in advance of crop planting. USA data show that yield response to phosphorus (and nitrogen) applied in this manner is as good as that applied by other means, e.g., banded at planting or broadcast and incorporated before planting (L.S. Murphy, pers. comm.). The concentration of nutrients in grain may also be increased, suggesting that the efficiency of applied nutrients is improved (1). The use of preplant applications of banded dual nitrogen and phosphorus has been shown to be particularly beneficial under dry conditions because of greater moisture use efficiency through an improved root system.

It is important that the dual nitrogen and phosphorus fertilizer band be placed at such a depth so as not to be disturbed by any following cultivation or during the seeding operations. Disturbance of the phosphorus in the band could reduce plant available forms of this nutrient. With the trend to minimum tillage, preplant banding at 12 to 15 cm depth is becoming more common overseas than the original method of 15 to 20 cm.

In very phosphorus-deficient soils, the application of small quantities of starter nitrogen and phosphorus fertilizer (ammonium phosphate) at planting may still be necessary after a preplant dual fertilizer application.

Preplant application of banded dual nitrogen and phosphorus is currently being evaluated in a large scale field program with wheat, sorghum and sunflowers throughout central and southern Queensland and northwest New South Wales. Should the results show that the system is a commercial alternative, fertilizer application practices can be expected to change, since early indications are that farmers will accept them readily.

1. Murphy, L.S. et al. 1978. Solutions, July-August.