MOLYBDENUM—NEW SOUTH WALES

Key points

- Molybdenum is more likely to be deficient in acid soils.
- Liming to bring pH above 5.5 usually fixes molybdenum deficiency in the long term.
- Applying a molybdenum fertiliser can correct molybdenum deficiency symptoms in plants more quickly.

Background

Molybdenum is one of the ‘minor’ nutrients plants require for normal growth. Minor nutrients are only required in very small amounts, as little as 50 g/ha of molybdenum will satisfy the needs of most crops. Molybdenum is present in farmyard manure, in composts and mulches, in some chemical fertilisers and in seeds and other planting material, such as tubers and corms.

Molybdenum deficiency in NSW

Molybdenum tends to be unavailable in acid soils. Molybdenum is present in soil as molybdate, an ion with a negative charge. In acid conditions molybdate bonds with positively charged sites on soil minerals (in a similar way to phosphate), reducing its availability to plants.

In NSW molybdenum deficiencies occur mainly on acid soils throughout the coastal areas, on much of the Southern Tablelands, and on parts of the Central Tablelands and Northern Tablelands. Molybdenum responses have been obtained in crops in the Murrumbidgee irrigation areas.

Molybdenum deficiency symptoms

Molybdenum is needed by plants for chemical changes associated with nitrogen nutrition. Without sufficient molybdenum plants accumulate nitrate in their leaves, but cannot use it to make proteins for normal growth. The plant becomes stunted and the leaves show symptoms of nitrogen deficiency, appearing pale green or yellowish green in colour between the veins (figure 1). The older leaves may be more severely affected with scorched edges.

The root nodule bacteria of legumes need more molybdenum to fix atmospheric nitrogen than the legumes need to utilise nitrates. In lucerne, clover and other pasture legumes, the main symptoms are associated with an inability to fix atmospheric nitrogen. Again, the stunting and yellowing are identical with nitrogen deficiency (figure 2).

In cereals, Molybdenum deficient plants appear to be limp (figure 3).

Figure 1: Molybdenum deficiency symptoms in a bean leaf (left), compared to a healthy leaf (right). Photo: R. Weir

Figure 2: The appearance of molybdenum deficiency in lucerne. Photo: R Weir
Molybdenum can be applied mixed with dry fertiliser, or in solution to:
• seedlings in a seedbed before transplanting
• the leaves of plants in the field
• the soil at the base of plants in the field.

**Molybdenum and livestock**

Too frequent application or excessive rates of molybdenum can induce plant levels of molybdenum that may be harmful to stock. Molybdenum combines with copper in the rumen, and this can induce a copper deficiency in the animal.

Where copper deficiency has occurred in livestock, or could be induced by molybdenum fertilisers, it is advisable to include copper with the application of molybdenum. Total molybdenum applications to acidic soils should be limited to small amounts, otherwise subsequent liming may release concentrations that cause health problems in grazing stock.

**Forms of molybdenum**

Molybdenum compounds used for crops include molybdenum trioxide, sodium molybdate and ammonium molybdate. Choice of the compound to be used depends on whether it is to be applied with fertilizer or as a solution.

Molybdenum trioxide is the form usually added to superphosphate. Molybdenum trioxide is not very soluble so it is not suitable for making up sprays to treat a growing crop.

Water soluble forms are ammonium molybdate, which is slow to dissolve in cold water, and sodium molybdate which is sold as fine crystals that dissolve readily in cold water making it the most convenient form for the preparation of solutions for spraying.

**Further reading and references**

Snowball K and Robson AD (1988) *Symptoms of Nutrient Deficiencies in Subterranean Clover and Wheat*, The University of Western Australia.

The New South Wales Department of Primary Industries maintains information resources on soils and their management, including more detail on molybdenum deficiency [online].

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