

Plants need molybdenum

Molybdenum is an essential trace element for the growth of plants. The amount needed is small, and when required, it can be supplied through specific fertilizers.

Yellow, wilted leaves? Stunted growth? Whiptail? Sounds like these plants are suffering from a molybdenum deficiency! Molybdenum is usually associated with inorganic systems such as corrosion-resistant steel; but along with sixteen other elements, it is also essential to healthy plant growth. Molybdenum is a trace nutrient or micronutrient, meaning that it is necessary in plant nutrition, but only in small amounts.

The role of molybdenum in plants

So, what exactly does molybdenum do for a plant? It plays a primary role in two ways, both of which are essential for a plant to function properly: forming an enzyme which enables plants to use

nitrate from the soil, and forming an enzyme which enables certain plants to use nitrogen from the atmosphere (nitrogen fixation). Nitrogen is necessary for a plant to grow and molybdenum helps the plant to use nitrogen for compounds such as amino acids, proteins and chlorophyll, making the plants healthy and well fed. Without molybdenum, plants cannot perform the biochemical process of making essential nitrogen compounds.

Molybdenum deficiency

Owing to the strong link to nitrogen (the most important nutrient to crops), molybdenum deficiency symptoms in plants resemble nitrogen deficiency: The

plants do not grow properly, the leaves become pale, deformed and withered, and flower formation and fruit setting may be restricted. These symptoms affect the health of the plant and its yield.

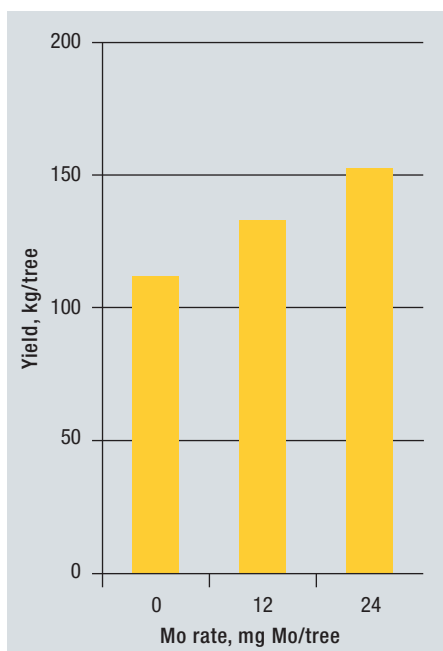
Since the scientists Arnon and Stout¹ first recognized the need for molybdenum in tomatoes in 1939, deficiency symptoms have been identified in a number of crops. The element is crucial for the nutrition of legumes, cereal, lettuce, tomatoes, cabbage, cauliflower, duckweed, grapes, citrus and horticultural plants.

Molybdenum in soil

Plants pick up molybdenum (as molybdate) from the soil and only small amounts (0.1 to 1.0 ppm) are necessary to meet their dietary requirements. Most soils can provide sufficient quantities. However, in acidic soils, the element is not available to plants even if there is sufficient molybdenum in the soil. A remedy is to add lime to the soil to reduce its acidity, making molybdenum in the soil available for plant uptake. A deficiency can also occur in peat soils and highly weathered soils with low levels of nutrients. ➤



In citrus fruit molybdenum can improve yield, juice content and skin thickness.
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Adding 24 mg of molybdenum per tree raised the production of mandarins in Egypt by 37%.²



The importance of molybdenum in plant nutrition was first discovered in tomatoes. © el lobo-fotolia.com

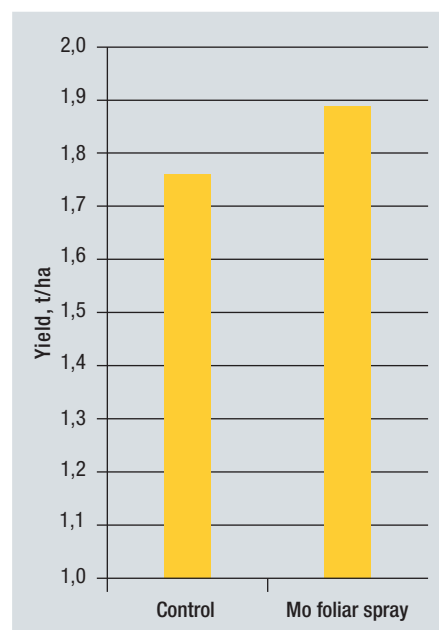
How can deficiencies be treated?

In addition to liming it is important to provide crops with balanced nutrients. The fertilizer industry offers complex fertilizers, which provide all the necessary nutrients. Based on sound agricultural practices and research and development, fertilizer companies can offer optimized recipes (including molybdenum) for different crops and soils around the world. Alternatively, growers can apply specially formulated foliar sprays where a particular deficiency is identified.

For example, in a study in Egypt², adding 24 mg of Mo per tree in the form of a foliar spray containing ammonium molybdate increased the yield of mandarins by 37%. Another study in Sweden³ showed that applying just 0.25 liters per hectare of a molybdenum-based foliar spray increased the yield of rapeseed plants from 1.76 to 1.89 tonnes per hectare. In this way, adding the missing molybdenum through fertilizers can help to restore plant health and crop productivity. (Lydia Weyand)

- 1 Arnon, D.I., and Stout, P.R., Molybdenum as an Essential Element for Higher Plants, *Plant Physiology*, V 14: 599–602, 1939.
- 2 Ezz, T.M. and Kobbia, A.M., Effect of molybdenum nutrition on growth, nitrate reductase activity, yield and fruit quality of Balady mandarin trees under low and high nitrogen levels, *Alexandria Journal of Agricultural Research*; 44; 1; 227–238; 1999.
- 3 Yara database, study in Sweden.

For more information on molybdenum in plants and soils please visit the IMO database of molybdenum in human health and the environment http://www.imoa.info/HSE/environmental_data/biology/plants_soils.php



Adding 0.25 liters per hectare of molybdenum foliar spray increased the yield of rapeseed in Sweden. Source: Yara database