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Where Is Moly?

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WHERE IS MOLY?

Is moly in hiding or has it gone down the river? Recent tests in Graves County suggest that it is probably just in hiding.

Moly (molybdenum) is of importance to Kentucky farmers because of its unique relation to soil acidity and legume growth. Many other trace or minor elements necessary for plant growth are most available to crops under acid soil conditions. Molybdenum becomes more available as the soil acidity approaches neutrality.

The first harvest of alfalfa in an experiment on Grenada silt loam illustrates the relationship between the pH of the soil and the response of the plant to molybdenum applied with the phosphate and potash fertilizer.

Field plots with a pH of 7.2 did not produce more alfalfa when molybdenum was added. Plots with a pH of 5.6 produced only 50 percent as much as the plots at pH 7.2; but, when molybdenum was added with the fertilizer, the alfalfa yield was equal to that from the plots with pH 7.2. No alfalfa survived on plots at pH 5.2 but; with added molybdenum some plants survived and produced 25 percent as much as the top yield in the test.

Molybdenum is essential in the fixation of atmospheric nitrogen by the nodule bacteria associated with the roots of legume plants. It has been identified as the metal constituent of nitrate reductase, the enzyme involved in changing nitrates in the plant to forms usable in the formation of protein.

Australian workers have shown that molybdenum is also associated with the regulation of the availability of iron within the plant as well as with counteracting the toxic effect of excesses of manganese, copper, boron, nickel and cobalt.

With alfalfa and other legumes the initial symptoms of molybdenum deficiency as those of nitrogen starvation. Leaves become light green in color and growth is retarded. Eventually the older leaves develop a scorched appearance and are shed prematurely. Root nodules may be present but appear aged and inactive.

A preliminary study of the molybdenum status of Kentucky soils was made by R. H. Lowe and H. F. Massey. Laboratory and greenhouse studies of soils from 43 locations indicated that the molybdenum content of three or four of the soils used may be reaching a critical level. However, only two samples from one of the questionable soils (Eden) failed to produce higher yields of alfalfa when lime was applied. This would indicate that, of this group, only the Eden soil would be suspected of actually being low in molybdenum content.

Lowe and Massey found some soils formed from Devonian black fissile shale were extremely high in molybdenum. These soils are strongly acid in their natural state. If heavy applications of lime or molybdenum are made, the forage produced could be toxic to ruminant animals.

Plant tolerance to molybdenum is high. The range between deficiency and excess is probably 50 times that of other trace elements. However, this does not mean that we can be indiscriminate in the use of it. Ruminant animals grazing on forage with concentrations of molybdenum approaching 10 parts per million may develop a copper deficiency known as molybdenosis.

There is a probability that seed treatment with a molybdate powder along with the bacterial inocculant on small seed legumes may prove to be beneficial, economical, and safe on many of our soils. It has been shown that soils of questionable available molybdenum content may need additional molybdenum unless the acidity is reduced by liming well in advance of seeding.

Among the acid soils in which molybdenum is likely to be unavailable, in sufficient quantities for legumes, are soils high in iron oxides and high in available manganese, soils recently brought under cultivation from pasture or wasteland; and soils which have received large amounts of sulfates. Deficiences are not likely to be found in highly productive, fertile soils that have been adequately limed or have had large amounts of manure applied.

It has been suggested that the addition of molybdate fertilizer will enable legumes to produce better at one pH unit lower than they ordinarily would without the use of molybdenum. On many of our soils, this may well be the case, but the release of molybdenum is not the only benefit derived from liming soil. In addition lime increases the availability of phosphorus; supplies calcium and magnesium; regulates the uptake of potassium and other cations; reduces the availability of iron, manganese, boron, copper, and zinc, excesses of which may be toxic to plants, and it helps improve soil structure.

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