1-1969

Molybdenum Recommendation for Legumes

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CROPS
SOILS

AGRONOMY NOTES

DEPARTMENT of AGRONOMY — Lexington 40506

Vol. 2, No. 1 January 1969

MOLYBDENUM RECOMMENDATION FOR LEGUMES

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Molybdenum is recommended in Kentucky for legumes (soybeans, alfalfa, clovers and other forage legumes) beginning in 1969. The application should be made as a seed treatment and at the rate of 0.4 to 0.8 (4/10 to 8/10) ounces of molybdenum per acre. Molybdenum is recommended only on soils testing less than pH 6.2.

The availability of soil molybdenum to plants is closely related to soil pH and generally increases as the pH increases. In most instances, deficiencies of the element do not occur when soils are properly limed to pH 6.2 or above. In addition to making molybdenum more available in acid soils, lime increases the availability of phosphorus; supplies calcium and magnesium to the plant; regulates the uptake of potassium and other cations; and reduces the availability of aluminum, iron, manganese, boron, copper, and zinc, which are often toxic to plants growing in acid soils. Consequently, the application of molybdenum is not to be used as a substitute for a sound liming program. Rather, it is recommended primarily for legume establishments or soybean plantings in those cases where lime was not applied soon enough before seeding to raise soil pH to the desired level.

Molybdenum is essential for the symbiotic fixation of atmospheric N by nodule bacteria and legume plants. It also has been identified as the metal constituent of nitrate reductase, the enzyme involved in reducing nitrate to ammonia in the plant so that synthesis of amino acids and proteins may proceed. The latter function takes place in non-legumes as well as in legumes. However, it is generally thought that most soils contain sufficient molybdenum for proper nitrate reductase activity and that any response to the element is most likely to result from greater symbiotic fixation of N by legumes.

Seed treatment with sodium molybdate (39.7 percent molybdenum) dissolved in water together with (or without) a bacterial inoculant may prove to be an economical method of application. Presently, materials containing soybean inoculants and molybdenum premixed are commercially available. Generally the premixed preparations are applied dry to the seed, but in some cases may be applied as a slurry. Wisconsin research ("Molybdenum Deficiencies of Wisconsin Soils," G. R. Hagstrom and K. C. Berger, Soil Science, 100:52-56) indicated that dissolving molybdate in water and applying it to the seed was somewhat superior to applying the dry materials to the seeds.

Since molybdenum is not readily leached from soils and only minute quantities are removed by cropping, caution should be exercised concerning rates of application. Plants are fairly tolerant to high concentrations of molybdenum, but ruminant animals consuming forage with high concentrations of molybdenum may suffer from molybdenum toxicity.

Agricultural and Home Economics Extension Service of the University of Kentucky, the United States Department of Agriculture cooperating. W. A. Seay, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.