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J. L. Sims
University of Kentucky

Jones H. Smiley
University of Kentucky

M. E. Suchy
University of Kentucky

A. M. Wallace
University of Kentucky

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AGRONOMY NOTES

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USE OF MOLYBDENUM IN THE TRANSPLANT WATER FOR BURLEY TOBACCO

J. L. Sims, J. H. Smiley, M. E. Suchy, and A. M. Wallace

The need for adding molybdenum to tobacco arises because contents in Kentucky soils generally are on the "borderline" of sufficiency and because amounts of available molybdenum in soil are low when soil pH is low. Soil pH in tobacco fields at midseason often is 0.5 to 1.0 pH unit lower than prior to fertilization, primarily because of the high rates of commercial fertilizers commonly applied to tobacco. This acidity greatly lowers the availability of molybdenum to tobacco plants. That is why we recommend the use of molybdenum when soil pH before fertilization is 6.4 or below.

The initial recommendation made in 1976 was for applications to be made broadcast at the rate of 1 pound of sodium molybdate (6.4 oz molybdenum) per acre. This amount of sodium molybdate salt (or 2 gallons of 2.5 percent molybdenum liquid product) was dissolved in 20-40 gallons of water and sprayed uniformly over each acre. The application was made prior to transplanting and disced into the soil. It was recommended that not more than 2 pounds of sodium molybdate (12.8 oz of molybdenum) per acre be used on the same field during a 5-year period to prevent an excessive buildup of residual soil molybdenum. Although, plants are fairly tolerant to high concentrations of soil molybdenum, ruminant animals consuming forage with concentrations of molybdenum greater than about 10 parts per million may suffer from an imbalance of copper and molybdenum.

More recently (1980), an alternative recommendation was made to apply molybdenum to tobacco in the transplant water during transplanting. Some of the research data on which the recommendation is based are shown in Tables 1 to 3. Tables 1 and 2 show that 50 days after transplanting at Lexington, plant molybdenum concentration and plant dry weight generally were higher for a given rate of added molybdenum when the application was made in the transplant water rather than being broadcast.

Replicated field experiments were conducted in Kentucky during 1970-79 to investigate the influence of rate of molybdenum fertilization on yield of burley tobacco. The fertilizer was applied either in the transplant water or broadcast, at separate locations, and the data of Table 3 were taken from those locations showing positive responses (about one-half of the locations tested). Yield increases for these sites ranged from 200 to 800 lbs cured leaf per acre but averaged 250 to 350 lbs per acre. Maximum yields were obtained with lower rates of molybdenum when applications were made in the transplant water. Consequently, costs should be lower with transplant water applications.

Table 1. Effect of rate and method of molybdenum application on concentration of plant molybdenum in burley tobacco 50 days after transplanting at Lexington.

Application Method	Rate of Sodium Molybdate, Lb/Acre			
	0	0.25	0.50	1.0
-----ppm Mo-----				
Broadcast.	0.34	0.44	0.56	0.86
Transplant water	0.34	0.59	0.72	1.16

Table 2. Effect of rate and method of molybdenum application on plant dry weight of burley tobacco 50 days after transplanting at Lexington.

Application Method	Rate of Sodium Molybdate, Lb/Acre			
	0	0.25	0.50	1.0
-----Grams per plant-----				
Broadcast	143	145	151	150
Transplant water	143	151	152	163

Table 3. Yield response of burley tobacco to molybdenum applications made either in the transplant water or broadcast at 12 locations in Kentucky.

Application Method	Rate of Sodium Molybdate, Lb/Acre				
	0	0.25	0.5	1.0	2.0
-----Cured Leaf, Lb/Acre-----					
Broadcast ^{1/}	2595	-	2778	2808	2937
Transplant Water ^{2/}	2680	2929	2909	-	-

^{1/} Values are averages for 6 locations.

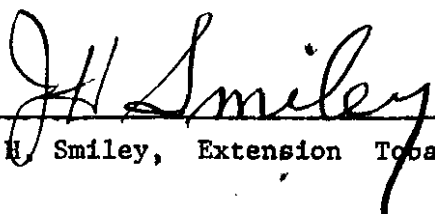
^{2/} Values are averages for 6 locations differing from those for broadcast application.

The advantages noted when molybdenum was used on soils that needed it include (a) improved early growth, (b) less manganese toxicity, (c) increased cured leaf yields, and (d) small increases in dollars per cwt. The most meaningful advantage to the grower is increased cured leaf yield.

The recommendation for use of molybdenum in the transplant water is as follows: Recommendation- Use one-fourth ($1/4$) to one-half ($1/2$) pound sodium molybdate (1.6 to 3.2 oz of molybdenum) per acre. If sodium molybdate salt is used, divide the total recommended amount of salt ($1/4$ to $1/2$ lb/A) equally among the number of 52-gallon barrels of water used per acre. For example, if 8 barrels of water per acre are used, add one-eighth (0.5 to 1.0 oz. sodium molybdate) of the total recommended amount to each barrel. The barrel should contain enough water (1-2 gallons) to fill the hose running to the transplanter prior to adding the salt and filling the barrel with water.

If a 2.5% liquid source of molybdenum is used with 8 barrels of setter water per acre, add $1/2$ to 1 pint (1 to 2 cups) of the liquid product per barrel after filling the hose with water and prior to filling the barrel with water.

The application of molybdenum is not to be used as a substitute for a sound liming program. In addition to making molybdenum more available in acid soils, applying proper rates of lime will increase the availability of phosphorus; supply calcium and magnesium to the plant, regulate the uptake of potassium and other cations; and reduce the availability of aluminum and manganese which may become toxic to tobacco plants growing in acid soil.



J. H. Smiley, Extension Tobacco Specialist