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Manganese (Mn) toxicity of burley tobacco is viewed by tobacco specialists in Kentucky as the greatest single factor which reduces yields. Estimates are that this problem adds 30 to 50 million dollars to the cost of burley production because of the greater acreage (and all associated costs) required by growers to produce their allotment. And, even though the cause and cure of Mn toxicity has been known for about 50 years, many growers are caught each year at transplanting time with no knowledge as to whether Mn toxicity may be a problem in their fields. The solution to Mn toxicity is to keep soil pH in the rooting zone from dropping below 5.5-5.8 during the growing season. To accomplish this requires starting the season with a soil pH of about 6.4. If soil pH is near this level before fertilizer is applied and the green manure crop decomposes, there is a much better chance that root zone pH will not drop below 5.5-5.8 after transplanting.

All soils contain considerable amounts of Mn, which remain largely insoluble (and non-toxic) if soil pH is above 5.5-5.8. Below this pH level, solubility of soil Mn becomes great enough that it often accumulates to toxic levels in the root zone. The amount of yield reduction this creates is extremely variable, relating largely to the actual drop in soil pH, and to soil moisture conditions which occur soon after fertilization and transplanting. Unsuspecting growers are usually not aware that a problem exists until 2-4 weeks after transplanting. The first sign of alarm they notice is a yellowing of the leaf tissue between veins (interveinal chlorosis). If soil pH is only borderline and soil moisture is adequate, additional new leaf growth may not show further yellowing and plants may "grow out" of the problem. In such cases, yield reductions are most likely related to lower quality and unsound, ragged lower leaves and may not total more than 100-200 pounds per acre.

In more severe situations, often associated with several days of inadequate soil moisture between rainfall events, further leaf growth may also show interveinal yellowing and plants may grow so slowly as to appear stunted. If this condition persists, the interveinal tissue of the most mature leaves near the ground may turn a vivid yellow, then brown and die, leaving only the skeletal remains of the leaf's veinal structure. Under such conditions, yield reduction

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can be substantial, perhaps 500 to 1000 pounds per acre. Under the worst conditions (extremely acid root zone), young transplants may actually die, or at best remain severely stunted. Although most of such situations could be prevented by systematically testing soils and then liming if needed, the question at hand is what can be done to lower the odds of incurring Mn toxicity when fields are ready for transplanting and nothing has been done. Some suggested actions to take are as follows:

Collect a soil sample immediately and send it in for analysis. If you can delay transplanting for the 7-10 days it will take to get results back from the soil testing lab, then you have the best chance for doing something to help if your soil pH is below 6.4. If you can't delay transplanting long enough to get your soil tested, and the field hasn't been limed during the past 2 to 4 years, spread lime (3 T/A aglime or 1.5 T/A fine, bagged lime) and thoroughly disk it into the soil (cross disking will mix it more thoroughly) before transplanting.

Delay application of supplemental nitrogen. If using the traditional 5-10-15 tobacco fertilizer grade for mixed fertilizer, broadcast and disk it in preplant with the lime but delay application of the remaining nitrogen until the 1st to 3rd week after transplanting. Band it about 10 to 12 inches to the sides of the row. If soils are moderately to strongly acid (below pH 5.8 before fertilization), use of a non-acid forming source of nitrogen such as sodium or calcium nitrate will further lower the risk of Mn toxicity.

Use Molybdenum (Mo) in the transplanter water. The concentration of leaf Mn is generally lowered when "moly" (Mo) fertilizer is used in the setter water. Apply no more than 1.6 to 3.2 ounces of actual Mo per acre. Be sure to evenly divide the total amount of the Mo fertilizer among the number of barrels of setter water used per acre. If using dry sodium molybdate and 8 barrels of water, add one-half to one ounce of sodium molybdate to each empty barrel before filling it with water. This amount of sodium molybdate per barrel will supply 1.6 to 3.2 ounces of actual Mo per acre when using 8 barrels of water. If using the more convenient liquid molybdenum, add 1 to 2 cups of the 2.5% Mo liquid to each of the 8 barrels used per acre.

If Mn toxicity appears after transplanting, broadcast 1000 to 1500 lbs/A of finely ground bagged lime over the field and cultivate it into the soil. This is a "rescue" operation which sometimes alleviates Mn toxicity after it appears.

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