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Should Burley Tobacco Farmers be Concerned About High Rates of Nitrogen Fertilizers?

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The use of nitrogen (N) fertilizer for tobacco production is necessary because (1) tobacco takes up sizable amounts of N, and (2) most soils cannot provide adequate amounts of N. Rates of fertilizer N recommended by the University of Kentucky for burley tobacco production vary based on past cropping history, and under certain conditions can be as high as 350 lbs. N/A. However, since tobacco is a high value crop, and profit margins are high, farmers often apply more N than is recommended as insurance against crop losses. The perception of widespread over-application of fertilizer N has resulted in increased concern among tobacco buyers, and environmental groups. Burley tobacco farmers need to be aware of these concerns.

Tobacco buyers are concerned about excessive N fertilizer use on burley tobacco because it can lead

to lower quality leaf and increased levels of nitrates (NO_3^-) in the cured leaf. Burley tobacco tends to have higher leaf NO_3^- levels than other tobacco types, and Kentucky leaf tends to have higher levels than that in other burley production areas. Excessive leaf NO_3^- concentrations may result in the formation of anti-quality compounds that adversely affect the flavor and aroma of tobacco smoke. When recommended rates of N fertilizer are applied, leaf NO_3^- -N rarely goes above acceptable levels.

Environmental groups are also concerned about high rates of nitrogen fertilization on agricultural crops. Since tobacco is the most heavily fertilized crop in Kentucky, it is highly visible to the environmentalists, and thus is potentially a target for criticism. The concern stems from the fear of contamination of the drinking water supply

with NO_3^- leached from farm fields. Even when burley tobacco is properly fertilized, some NO_3^- -N remains in the soil following the harvest of the crop. An estimated 20-30% of the applied fertilizer N may not be taken up by the crop when it is fertilized with 300 lbs N/A or less. That which is not taken up by the crop may be lost from the rooting zone by leaching or by denitrification. However, most of the N that is leftover at the end of the season is captured by the cover crop, and harvested or returned to the soil when the cover crop is plowed down the following spring. At N rates above 350 lbs. /A, the amount of fertilizer not taken up by the crop may be as much as 50%. While over-fertilization with N can increase the potential for leaching of NO_3^- -N into groundwater, this has not yet been shown to be a significant problem in Kentucky.

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Over-fertilization with N can also result in production problems for the farmer. High N fertilizer rates cause an increase in soil acidity and manganese (Mn) toxicity. This reduces early growth and ultimately the yield and quality of the cured leaf. It is estimated that Mn toxicity, and other disorders related to low soil pH, cost Kentucky burley producers as much as \$30 million per year. Losses due to Mn toxicity can be reduced by soil testing and applying recommended rates of lime and fertilizer.

High rates of N fertilizer may also delay maturity as much as two to four weeks. When maturity is delayed the crop will not ripen properly, sucker controls may break down, and leaf quality in some cases will be lowered. In one study at the University of Kentucky, where higher N rates delayed harvest, late

rains cause the resumption of growth close to harvest. This ultimately resulted in a higher incidence of green and variegated grades for the cured leaf from tobacco receiving the highest rates of N. In years when late rains were not a factor, cured leaf quality was similar for all rates of N fertilization.

High nitrogen rates are also associated with increased incidence of some diseases such as hollow stalk, bacterial soft rot, and blue mold, since excessive nitrogen promotes lush, tender growth that is more susceptible to attack from disease organisms.

Thus, it is in the best interest of tobacco farmers to carefully evaluate their N fertilization practices. Since the University of Kentucky's recommended N rates vary according to past crop history of the field,

it is important that this information be included on forms filled out when soil samples are submitted. Without this information the farmer is automatically given the maximum N recommendation. Remember that for tobacco grown in rotation with sod or sod-legume crops, the N rate can be lowered by 50-200 lbs. N/A below the maximum rate of 350 lbs. N/A. Also note that the recommendations made by the University of Kentucky already have a measure of insurance built in, so there is no need to apply more than is recommended. By simply following the recommendation framework that is already in place, farmers can improve N use efficiency, and save money, while providing a crop better suited to the needs of manufacturers, and lowering the potential for leaching of unused N into groundwater.


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