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AGRONOMY NOTES

EFFECT OF LIME AND SOURCE OF NITROGEN FERTILIZER ON YIELD AND CHEMICAL COMPOSITION OF BURLEY TOBACCO

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Current trends in the fertilizer industry indicate a shift to greater production of ammonium forms of nitrogen fertilizer in comparison to nitrate forms. Reasons for these trends are many, but both economic and energy conservation are major factors. Generally, ammonium forms are produced with less total energy and have higher nitrogen contents that permits lower production and transportation costs per unit of N. Agronomically, ammonium forms are less readily leached from soils, but produce acid as they are converted to nitrates by soil microorganisms. Thus, ammonium sources of nitrogen have both advantages and disadvantages as fertilizers for crops.

Production of urea (an ammonium source) has increased greatly during the past few years, and there are indications that its production soon will increase even greater. Because of this, there is great interest in the agronomic performance of urea in producing burley tobacco. In recent years, different forms of nitrogen fertilizer have been tested on burley tobacco under both greenhouse and field conditions by research and extension personnel of the University of Kentucky College of Agriculture. Generally, results indicated that response of tobacco to different sources of nitrogen in field experiments was similar on soils with pH near 6.5. In the greenhouse, ammonium forms (such as urea) produced best growth in nutrient solutions of high pH (6.5 to 7.0) while nitrate sources produced best growth in solutions with pH below 6.0. The results reported in Table 1 are from a field experiment conducted over a 2-year period (1973-74) to compare the effects of urea and sodium nitrate in limed and unlimed soil on yield, value, and selected chemical components of burley tobacco.

The experimental area was located on Maury silt loam soil with an initial water pH of 5.4 and buffer pH of 6.0. Treatments consisted of agricultural limestone applied at rates of 0, 5, and 7.5 tons per acre in combination with 225 lbs N per acre as either urea or sodium nitrate. The lime was applied half plow-down and half disc-in after plowing in early March of the first year. Yield, value, and concentration of manganese and molybdenum were measured on cured leaf.

Average leaf yields were increased 221 to 276 lbs per acre by adding agricultural limestone with the 5-ton rate being as effective as the 7.5-ton rate when all the nitrogen was applied as sodium nitrate. However, when the source of nitrogen was urea, highest yields were obtained in plots receiving lime at the rate of 7.5 tons per acre. Yields in urea-treated, unlimed plots were about 250 lbs/acre lower than in unlimed plots receiving sodium nitrate, but differences due to nitrogen source were negligible when 7.5 tons of lime were applied. Nitrogen source had no effect on dollars per cwt in limed plots but values for urea-treated plots were slightly lower than for sodium nitrate in unlimed plots.

Addition of lime significantly lowered leaf content of manganese. When no lime was used, leaf content of manganese was lower in plants fertilized with sodium nitrate than in those receiving urea. However, when lime was applied, the source of nitrogen did not affect the leaf content of manganese. Application of lime increased leaf concentrations of molybdenum 3 to 4 fold, depending on source of nitrogen used. Since leaf concentrations of 400 to 500 PPM of manganese are considered to be toxic to field grown burley and concentrations of molybdenum less than 0.40 PPM are considered deficient, soils used for burley should be limed to about pH 6.4 prior to fertilization. This is particularly true when ammonium sources of nitrogen are used.

Liming is best done one to three years ahead of the tobacco crop. Additionally, all soils will not need the same amounts of lime used in this study. The best way to determine lime needs for any particular soil is to have the soil tested, then follow extension recommendations.

Table 1. Effect of rate of lime application and N source on yield, value, and Mn and Mo concentration of burley tobacco leaves, average of two years.

Rate of lime Tons/A	N source	Leaf Characteristics				Soil pH*
		Yield	Value	Manganese	Molybdenum	
		Lbs/A	dollars/cwt	PPM	PPM	
0	Sodium Nitrate	2612	84	170	0.22	5.3
0	Urea	2358	83	673	0.14	4.7
5.0	Sodium Nitrate	2765	84	116	0.50	5.8
5.0	Urea	2647	84	101	0.41	5.7
7.5	Sodium Nitrate	2772	84	108	0.60	6.3
7.5	Urea	2750	84	107	0.58	6.0

*Soil pH (water) measured at midseason of each year.

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