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LIMING TOBACCO SOILS

J. L. Sims

Control of soil acidity by liming is very important in successful tobacco culture. Adding lime to an acid soil increases the availability of nearly all plant nutrient elements, increases the efficiency of added fertilizers, and prevents the toxic effects of high concentrations of soluble aluminum, manganese, and iron. It is a natural tendency for most Kentucky soils to become acid with time due to losses of bases (calcium, magnesium, potassium, and sodium) from soil by rainfall. However, tobacco soils possess certain unique problems that warrant careful monitoring of soil pH every two to three years.

Historical

Prior to about 1977, use of soil with a pH of 5.6 to 5.8 was recommended for producing best quality burley tobacco. This recommendation for a relatively low pH resulted from the reported increases in the incidence of certain diseases, notably black root rot (*Thielaviopsis basicola*) and black shank (*Phytophthora parasitica*), in soils with pH greater than 5.8. Additionally, some researchers had reported undesirable chemical properties of cured leaf grown on soils that had been limed. However, the presence of some resistance to black root rot in all varieties and to black shank in some varieties made it possible to recommend liming soils to a pH higher than 5.8. Currently, it is recommended that acid soils be limed to pH 6.4 prior to fertilization. Workers at the Kentucky Agricultural Experiment Station generally have reported favorable effects from use of lime on both yield and quality of tobacco grown in soil that initially was acid.

Why Tobacco Soils Need Lime

The over-riding factor causing tobacco soils to acidify rapidly is fertilizer-induced soil acidity. Growers in Kentucky are applying about 2200 lbs per acre of mixed fertilizer and an additional 400 to 1000 lbs of nitrogen fertilizer, depending on the source of N. These additions lead to the generation of large amounts of soil acids

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so that soil pH at midseason is often 0.6 to 1.0 pH unit below that prior to N-P-K fertilization. Research results for Maury silt loam soil indicate that adding soluble N-P-K fertilizers decreased soil pH about 0.2 pH unit through the soluble salt effect; nitrification of ammonium released from soil organic matter caused pH to drop another 0.2 pH unit; and, nitrification of added ammonium fertilizer to nitrate caused another 0.4 drop in pH. Thus, growers need to lime tobacco soils to pH 6.4 to 6.6 in order that soil pH remains above 5.5 throughout the growing season. When soil pH decreases below 5.5 one can expect lower availability of both soil and fertilizer molybdenum as well as phosphorus, magnesium, and calcium. In addition, soil manganese and aluminum are solubilized below soil pH values, of 5.5 and 5.0 respectively and these elements often are toxic to plants.

Determining Lime Needs

Soil testing is the best way to determine the lime needs of a soil (See U. of Ky. Coop. Ext. Publication AGR-1). Fields used for tobacco should be sampled every 3 or 4 years if tobacco is grown in a rotation and every 1 to 2 years if grown continuously on the same soil.

Lime Application

Limestone will correct soil acidity more effectively if applied and thoroughly mixed with the soil one to three years ahead of the crop. Summer and fall are good times to apply lime since the soil is dry, dealers in agricultural lime are not as busy at these times of the year, and the lime applied at these times reacts overwinter. Greater effort should be given to insure proper mixing with soil when applications of lime are made near the time of transplanting the tobacco crop. If applications are made two or more years ahead of the crop, the entire application may be applied to the soil surface. When liming needs are not determined until the fall or early spring before transplanting on strongly acid soil (water pH 5.5 or below) half the lime should be plowed down and the other half disced in after plowing. Since soil acidity must be corrected in a relatively short period of time under these conditions, the quality of the liming material, particularly its fineness, is of great importance.

It is essential to lime acid soils, but excessive liming should be avoided. When soils become neutral, or basic (pH 7.0 and higher), phosphorus will revert to insoluble forms and some minor elements will be less available for plant growth.