THE EFFECT OF LIMING ON THE ABSORPTION OF PHOSPHORUS AND NITROGEN BY WINTER LEGUMES

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ALTHOUGH the increased yield of crops is usually accepted as a measure of the effects of applications of lime and fertilizers to soils, there is evidence that the yield alone does not fully evaluate the effects of such treatments. Numerous investigators (5) have shown that the composition of plants varies with the composition of the soil on which they grow and that infertile soils produce crops low in mineral and protein content. Others (9) have shown that applications of fertilizers to poor soils usually result in an increased content in the plant of the elements supplied by the fertilizers. Such increases in the mineral content of feed and forage crops represent increased feeding value not measured by the yield.

Since calcium is the most abundant nutrient base found in normal soils, it is usually considered as being present in sufficient quantities for the normal nutrition of most crop plants, and liming the soil is looked upon as a practice to be used only when the soil becomes too acid to grow some desired crop. Chemical analyses of plants grown under field conditions prove that this is not always the case and show that crop yields may not be an accurate indication of the lime deficiency of soils. For example, Sewell and Latshaw (8) found that fertilizing with superphosphate did not increase the percentage of phosphorus in alfalfa, but that applying lime with the superphosphate did. Albrecht and Klemme (1) have reported field work in which applications of limestone and superphosphate almost doubled the calcium, phosphorus, and protein content of lespedeza forage over that obtained from superphosphate alone. These data show that the absorption of phosphorus and nitrogen was increased by liming and indicate that soils may be deficient in calcium without crop yields being seriously affected.

In a study of the factors affecting the inoculation and growth of winter legumes in Louisiana, data have been obtained on this subject. They show that liming increased the absorption of calcium, phosphorus, and nitrogen by winter legumes and that many Coastal Plains soils may be so deficient in calcium as to curtail seriously the normal absorption of phosphorus by crop plants even when it is supplied by fertilizer applications.

EXPERIMENTAL

Both Austrian winter peas (Pisum arvense) and common vetch (Vicia sativa) were planted in cooperation with farmers at various locations throughout the...