INITIAL FERTILIZER APPLICATIONS KEY TO CLOVER ESTABLISHMENT ON FORESTED COASTAL PLAIN SOILS

LOUISIANA white clover is often seeded on cut-over Coastal Plain Forests of the southeastern states to increase range grazing values. In this area, white clover characteristically dies out in the hot summer and acts like a reseeding rather than in split-applications over the growing season. Average yields were 1,600 lbs. per acre where all the fertilizer was applied at seeding and only 950 lbs. per acre for split-applications. These are results from a recent test conducted cooperatively by the Forest Service, B.A.I., and B.P.I.S.A.E. of U. S. Department of Agriculture in cooperation with the Georgia Coastal Plain Experiment Station.

Fertilization frequency practices were tested by applying different rates of an 0-1-1 ratio fertilizer (200 lbs. per acre to 1,600 lbs. per acre of 0-15-15 commercial grade fertilizer) by various methods of split-applications (1 to 16 separate applications per year). The objective of frequent applications was to keep nutrients immediately available throughout the season despite the fact that these low fertility, sandy soils are subject to severe leaching by rain. These forest soils in their original state are approximately 90% sand and average about 50 lbs. of available P\textsubscript{2}O\textsubscript{5}, 70 lbs. of available K\textsubscript{2}O and about 2% organic matter using current soil testing methods of the Georgia Coastal Plain Experiment Station.

Chief advantage of applying all fertilizer at seeding time was that 12% more plants became established. Adjusting the yield data for stand differences showed that yields per plant were not significantly influenced by frequency of applying fertilizer. Hence, the increase in yield was caused by the greater number of plants rather than by an increase in their individual vigor.

The largest yield-increases per unit of fertilizer—approximately 2 lbs. of air-dry forage for each additional pound of 0-15-15 analysis fertilizer—were obtained with the 565-lb. rate per acre. These increases steadily diminished and became quite small with rates beyond 950 lbs. per acre. The best of the yields was certainly not great. The winter was exceptionally long and cold. Also, experience shows that white clover yields are usually low the first year, but build up during the following seasons and give relatively greater yields per unit of fertilization. This increase is probably caused by residual fertilizer effect, better inoculation of soil, and abundance of seed.

Although maximum yields were related directly to rates of initial fertilization, split-applications prevented some leaching of potassium from the principal clover root zone, especially at the higher rate of fertilization. When the 565 and 950-lb. per acre rates were applied all at seeding, an average of 12% more of the available potassium was leached from the top 6 inches of the soil than when split-applications were used. With the 1,600-lb. rate, this leaching loss increased to 35%. Most of the leaching losses with both the split-applications and the single applications occurred early in the season before the clover root system became effective in holding the nutrients.

There was little or no phosphorus movement through the soil. Over 60% of the applied phosphorus soon became fixed and unavailable for plant use, with most of the remainder, excluding that taken up by plants, staying in the surface inch of the soil.

The chemical content of the forage varied between 0.13 and 0.28% phosphorus and between 1.33 and 2.88% potassium, depending upon the fertilizer treatment. These nutrient contents were related directly to rates of fertilizer application but the method of application had little or no effect.

Commercial beef raisers may feel that fertilization indicated here does not give a highly profitable return from clover alone. However, that is not the whole story. One of the chief advantages of clover is its beneficial effect in supplying nitrogen to associated grasses on these infertile soils. Production and quality of grasses grown with these clovers was further increased by application of the phosphate and potash fertilizers.—REYNOLD F. SUMAN, Southeastern Forest Exp. Sta., U. S. Forest Service, Asheville, N. C.

PLOT BORDER EFFECTS IN A LIMING EXPERIMENT

MOVEMENT of soil across experimental plot boundaries by normal tillage operation is indicated in figure 1. The results shown are from a soil acidity study made on a liming experiment begun in 1921 on a Clermont silt loam of zero slope. A rotation of corn, wheat, and clover-timothy was used. Plots were 1/20 of an acre, 14 feet wide, with a 3 1/2-foot untreated cropped border strip between the plots. Limestone was applied in 1921 and again in 1927 on selected plots. Cultural operations carried on crosswise of the plots which contributed to soil movement were: (a) One plowing per rotation for corn with a moldboard plow; (b) two to four double discings per rotation for wheat and corn, and

![Fig. 1.—Changes in soil pH at foot intervals across three plots of a liming experiment.](image-url)