EFFECT OF LIME AND FERTILIZER TREATMENTS ON YIELD AND COMPOSITION OF
VETCH AND YIELD OF COTTON FOLLOWING VETCH

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NITROGEN is almost invariably the limiting element in the production of cotton and corn throughout the South. There are two methods of obtaining this needed nitrogen, viz., (a) the purchase of commercial nitrogen, and (b) the growing of winter green manure crops which have the ability to use atmospheric nitrogen and store it in the soil. Due to the shortage of commercial nitrogen, the latter now assumes much greater importance than at any time in the past.

According to Coleman (4), legume nitrogen obtained from turning under an average crop of winter legumes in the hill section of Mississippi is equal to approximately 24 pounds of commercial nitrogen which can be secured from 150 pounds of nitrate of soda.

Experiment station data from Alabama (10), Louisiana (6), and Mississippi (4) have shown that phosphate is necessary for profitable production of winter legumes and that lime and phosphate in most cases will produce more vetch than phosphate alone.

Rogers and Sturkie (9) reported that both the yield and nitrogen content of hairy vetch could be increased by the proper fertilizer and inoculation treatment, but concluded that the percentage of nitrogen could not be raised above about 3.9 on a dry-weight basis. Davis and Brewer (5) found that lime alone increased the nitrogen content from 0.51 to 0.53% on a green-weight basis, whereas lime and phosphate raised the percentage of nitrogen to 0.62. The latter increase amounts to a 12.4% increase in nitrogen content due to lime and phosphate. The yield was increased 19.8%.

Albrecht (1) has shown that, except in cases of extreme acidity, the application of lime is more important as a source of calcium for plant nutrition than as a means for the neutralization of soil acids. He recommended that lime be regarded as a calcium fertilizer and that it be drilled at about normal fertilizer rates.

Although it has been generally recognized that absorption of nitrogen by legumes, there will be a very limited amount of data relative to the magnitude of such increase.

Any fertilizer practice which will economically increase the yield or the nitrogen content, or both, of winter legumes in the hill section of Mississippi is highly desirable.

The original objectives of the experiment herein were to determine the effect of several fertilizer treatments on the yield of vetch and to compare the value of the vetch nitrogen produced with 18 and 36 pounds of commercial nitrogen from nitrate of soda for the production of cotton. It developed, however, that one of the most important phases of this test was the marked effect of 300 pounds per acre of dolomitic limestone, and in combination with phosphate, on the yield and nitrogen content of vetch, and on the cotton yields following vetch.

PROCEDURE

A field experiment consisting of 14 soil treatments replicated four times was located in the fall of 1938 on a silt loam soil on the Holly Springs Branch Experiment Station, Holly Springs, Miss. This soil has a pH of 6.8 and a lime requirement of 2,400 pounds of calcium carbonate per acre.

Treatments for cotton and vetch are shown in Table I. The check treatment, which was 300 pounds per acre of 6-8-4 under cotton without vetch, occurred every fifth plot in the field in order that soil variations between checks be estimated by interpolation. The plots consisted of two rows and were 1/40 acre in size. All yield data were obtained by harvesting the two inside rows of each plot, while half of each of the two inside rows were cut and weighed to obtain yields just before turning. During the first two years of the experiment only one row of vetch per old cotton row was planted, while in the last two years of the experiment two rows of vetch per cotton row were planted. Special care was taken during the years 1941 and 1942 to place the fertilizer in a band under the inoculated vetch seed but not in contact with it, and to place the seed in a narrow band directly under the inoculated vetch seed but not in contact with it.