THE EFFECTS OF PLOWING UNDER HAIRY VETCH ON THE YIELD OF COTTON AND ON LUFKIN FINE SANDY LOAM

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SEVERAL years ago the Texas Agricultural Experiment Station began experiments in different parts of Texas to determine the best legume for soil improvement. In the course of this work hairy vetch proved to be one of the best and most dependable legumes for green manuring on the sandy soils in eastern Texas. This paper reports the results obtained with hairy vetch as a green-manure crop for cotton on Lufkin fine sandy loam at College Station from 1937 to 1942.

REVIEW OF LITERATURE

A great deal of work has been done in the United States to determine the value of green manure crops and the best crops for green manures. Pieters (11) made an excellent review of literature on green manuring in 1927. The results of much of the more recent work on green manures in the southern states have been compiled by others (12, 14). Only the results of work that has a direct bearing on the studies reported in this paper are reviewed here.

Bailey, Williamson, and Duggar (2) in Alabama reported a decided increase in the yield of cotton following vetch as a green manure crop over cotton grown continuously without vetch. Hoover (8) in Mississippi reported that soil receiving treatments of vetch with lime, phosphate, and potash and of vetch, potash, and basic slag produced larger yields of cotton than soil that received 600 pounds of a 6-8-4 fertilizer per acre. Further, results obtained in Alabama (2, 13), Georgia (3), Florida (14), Louisiana (5), Mississippi (4, 9), and Ohio (16) have shown that the application of phosphate is necessary for the profitable production of winter legumes for green manure.

Lohnis (10), using green manures in varying amounts, found that in general 50 to 60% of the nitrogen applied in green manure could be recovered in crops that followed.

EXPERIMENTAL PROCEDURE

The object of the work was to determine the value of vetch as a soil-improving crop for cotton and its effect on the soil. In order to get specific information on the various phases of the use of hairy vetch for soil improvement, field and laboratory studies were begun at College Station, Tex., in the fall of 1936. It was desired to determine the effect of superphosphate and potash on the yield of vetch, and the effect of plowing under vetch on the yield of cotton and on the soil, especially the amount of nitrates and phosphoric acid made available through the decomposition of vetch and on the reaction of the soil.

The field work was conducted on Lufkin fine sandy loam, which is an extensive soil in east central Texas. This soil is grey in color and rests upon a rather dense plastic clay subsoil. It is low in nitrogen and phosphorus and is naturally not very productive. The soil contained 0.054% nitrogen, 0.018% phosphoric acid (P₂O₅), about 5 p.p.m. of available phosphoric acid according to Fraps and Fudge's method (6), and 0.610% potassium.

The field work involved in this experiment included treatments of vetch alone, vetch and 0-8-4 fertilizer, vetch and 4-8-4 fertilizer, 4-8-4 fertilizer, and un-