Effects of Winter Cover Crops on Soil Properties and Yields in a Cotton-corn and in a Cotton-peanut Rotation

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Certain beneficial effects of cover crops as green manures and soil conserving crops have long been recognized in agriculture. The increased yield of the succeeding crops has been attributed to various factors such as nitrogen supplied, soil and water conservation, and improved physical condition of the soil. In view of the predominant row-crop system of farming in southeastern United States, winter cover crops might offer considerable promise in improving soil productivity.

Several investigators have studied the effects of cover crops on soil properties, such as water-holding capacity, aggregation, and pore size distribution (1, 2, 3, 5, 6). Reports of their findings show crop yield increases as great as 60% following cover crops, but the explanations are conflicting. In some cases the beneficial effect of one cover crop has remained 2 to 3 years while in others a reduced yield has resulted (4).

It is the purpose of this paper to present data comparing the effects of certain winter cover crops in a 2-year rotation of cotton-corn and a 2-year rotation of cotton-peanuts during the period from 1945 to 1949. One cover crop in a continuous cotton rotation is included. Soil and plant analyses and penetrometer data are also presented.

MATERIALS AND METHODS

The experiment was located at the Upper Coastal Plain Experiment Station, Rocky Mount, N. C., on a soil which was predominantly Marlboro fine sandy loam. The initial pH was 6.5 and the exchange capacity, 4.2 millequivalents per 100 grams of soil. The exchange complex was 59, 17, and 3% saturated with calcium, magnesium, and potassium, respectively, and the soil contained 63 pounds of soluble (Truog) P<sub>2</sub>O<sub>5</sub> per acre.

These rotations were initiated in 1941, but the data for the period 1942-44 are not presented because of poor stands and growth of cover crops. The rotations were (1) cotton-corn, (2) cotton-peanuts, and (3) continuous cotton. The rotations involved two blocks each so that all crops were grown every year. Two winter cover crops, hairy Austrian winter peas, were compared with no cover in cotton-corn and cotton-peanut rotations. Oats-vetch were also included in the cotton-corn rotation while crimson clover and rye grass were used in the cotton-peanut rotation. Hairy vetch was used in the continuous cotton rotation.

The cotton, corn, and peanuts were considered as whole plots with cover crops as split plots for each row crop. The cover crop plot was 17.5 by 182.4 feet. The covers were further subdivided into plots 17.5 by 60.8 feet. Rates of nitrogen were applied to the cotton and received 60 pounds of P<sub>2</sub>O<sub>5</sub> and 120 pounds of K<sub>2</sub>O per acre at planting. The peanuts received gypsum about July 1 and 60 pounds of K<sub>2</sub>O per acre at emergence in 1947-48. Each treatment was replicated three times in a randomized block design.

The cover crops were seeded each year with oats during the period from September 25 to October 5 seeded between the cotton rows after the first picking and in the peanut and corn plots after harvesting and diskings. Oats and one-half of the rye grass plots received nitrogen topdressing in November and 9 pounds in February. The other half of the rye grass plots received 27 pounds of nitrogen in November and 27 pounds in February.

The starter fertilizer for cotton and corn was placed 3 inches to each side and 2 inches below the seed of crops planted in 35-inch rows. The peanuts were in 35-inch rows prior to 1948, 18-inch rows in 1948, and 27-inch rows in 1949. Recommended corn hybrids, Coker 100 wilt resistant cotton, and Virginia Bunch peanuts were planted.

Cover crop samples were taken just prior to turning, in the period March 25 to 31. The samples were taken from areas 1/10,000 acre in size, washed, dried, weighed, and analyzed for total nitrogen and, in some instances, potash.

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