INFLUENCE OF LEGUMINOUS PLANT ADDITIONS ON THE ORGANIC MATTER CONTENT AND AVAILABLE NUTRIENT SUPPLY OF SOUTHERN SOILS

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COTTON farming in the Southeast has greatly favored erosion and the reduction of the organic matter content of the soil. During the past decade the Agricultural Adjustment Act and Soil Conservation Service have emphasized the growing of legumes as an effective means of providing necessary organic matter for erosion control and soil improvement. Leguminous cover crops have been stressed for soil improvement, but inasmuch as many of the legumes recommended as soil conservers are also good feed crops, they are often fed and consequently are not beneficial to the soil unless the plants produced therefrom are returned. Legumes have high nutrient requirements for calcium, phosphorus, and potassium and in many cases the nutrients removed may be greater than those absorbed by the cotton plant. Thus, unless they are used in a manner that returns organic matter, very little benefit will be derived from their growth.

The practice of growing winter cover crops is very desirable for the South as a good cover restricts erosion and the leaching of plant nutrients during the open winter months. Crimson clover and vetch are the commonly used crops for this purpose and usually produce considerable green plant material to be turned under for the succeeding crops. Lespedeza, crotalaria, and soybeans are good summer cover crops, but in order to provide protection against erosion during the winter months, the plants must be allowed to remain on the soil and form a natural mulch. The protection afforded by mulches against erosion has been previously reported (8) and shows that 4 tons of crimson clover hay applied as a mulch reduced runoff and erosion to very low amounts as compared with the same amount of crimson clover incorporated with the soil. Lespedeza (8) also gave a marked reduction of water and soil losses during the winter months where the plant residues had been left to form a natural mulch. Such action is characteristic of close-growing plants as lespedeza and leaf litter mulches accumulate where this crop is included in the rotation for several years even when the hay is removed. This natural mulching by plants is a desirable soil conservation practice and is advisable rather than applying the mulch artificially as hay. In this present investigation plant materials were applied as green manures, hay mulches, and incorporated treatments to determine the effect of these different methods of adding organic material on the organic matter content, the available soil nutrients, and crop yields. Samples for the chemical analysis and greenhouse cultures were collected for