THE EFFECT OF FERTILIZERS AND THE AGE OF PLANTS ON THE QUALITY
OF ALFALFA AND SWEET CLOVER FOR GREEN MANURE

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The practice of seeding alfalfa and sweet clover in small grains is prevalent in Michigan on those soils capable of supporting both a small grain and legume seeding. The alfalfa is used for hay and the sweet clover principally for green manure, pasture, or seed purposes. The management of either of these crops for legume seeding is important in order that the most efficient use of the crop can be made. This study was begun for the purpose of investigating a number of factors that effect the quality of alfalfa and sweet clover when used as green manure.

The following factors were investigated: The effect of the age of the plant and the stage of development of alfalfa on the weight of tops and roots; on the percentage of N, K₂O, P₂O₅, CaO, and MgO contained in both tops and roots; on the rate of decomposition as measured by ammonification and nitrification under laboratory conditions; and on the yield of Proso in the greenhouse.

PROcedure

Replicated samples of tops and roots of alfalfa and sweet clover were harvested on four different dates and were taken from plots heavily fertilized, moderately fertilized, and from plots receiving no fertilizer (Table 1). Samples were also taken from plots receiving the same amount of fertilizer from plants of different ages. The field experiments conducted on Brookston clay loam soil.

The oven-dry weight of both tops and roots for each sampling dates was determined and the samples analyzed for N, P₂O₅, K₂O, CaO, and MgO. The rate of decomposition as measured by ammonification and nitrification under laboratory conditions was obtained together with the oven-dry weight of various samples, when used for green manure, on Proso in the greenhouse. The rate of ammonification and nitrification was determined under laboratory conditions by adding two grams of air-dry material from each sample to 100 grams of Warsaw soil in tumblers and maintaining the soils at optimum moisture content. The Proso was grown in Plainfield sandy loam in 2-gallon jars to which the alfalfa and sweet clover were added in twice the quantity present in the field. The treatments in the experiment were replicated.

The quantity of root material still remaining in the field and not recovered by the method used in the experiment was determined by washing out the roots remaining in the soil to a depth of 3 feet. The percentage of the total weight of the residue was determined.

The roots were removed from an area 4 feet square; fully as possible by first loosening the soil with a spade to the depth of the blade. The roots were then washed of adhering soil particles. Obviously all the subsoil were not recovered. In order to determine the amount of root material below spade depth, the roots were removed to a depth of 3 feet and the roots separated in the soil. It was found that an average of 87.3% of the root material was recovered in the soil layer sampled, leaving 12.7% below spade depth. Attention should be called to the fact that a considerable portion of the fine roots is not accounted for by this method and therefore, the amount of root material present was actually greater than reported. Thus, the data do not represent the total amount of root material present in the soil.

RESULTS

ALFALFA

Samples of tops and roots of alfalfa grown on Brookston clay loam were harvested on different dates, April 29, May 6, and May 19 from plots of an experiment in which one of the treatments was an additional 1,000 pounds of 0-12-12 fertilizer applied July 7, 1942. The respective heights of the plants for the three dates were 1, 2, and 9 inches. According to the data in Table 1, the yield of tops and roots from the plots receiving 1,000 pounds of 0-12-12 fertilizer were lower for the April 29 and May 6 harvests than yields from the plots receiving the 0-12-12. However, this difference due to the smaller number of plants in the area harvested from the plot fertilized with the 0-12-12. The difference in the yield between the fertilized and unfertilized plots on May 19 was 296 pounds per