The experiment described in this paper was designed to ascertain the relative effects of ammonium sulfate and sodium nitrate on amounts of nitrogen in the drainage from soil. During the fifteen years of the experiment, the same cropping system was used for each treatment. From the available records, it is possible to determine the effects of treatment on the composition of each of four vegetable crops.

Procedure

Lysimeter tanks, each having a capacity of three and one-half tons of soil, a depth of four feet, and an area somewhat more than four times four feet, were used for the experiment. The tanks were filled with Petosky gritty, sandy, loam. The surface soil and subsoil were placed in four layers, in the order of their occurrence in the field. This soil is weakly buffered, well aerated, and readily permeable to water. It is a type of soil that is frequently used for market gardening, as it responds readily to commercial fertilizers.

In order to insure nitrogen removal in measurable quantities, the applications of nitrogenous fertilizers were large, and to avoid injury to crop, applications were made twice during the season. For this reason, it was desirable to have two crops each year, and this could best be accomplished by using vegetable crops. One application was accordingly made in the spring, and the other before the second crop was planted, in July. At the outset of the experiment in 1922, the fertilizers applied each year contained 82.35 pounds of nitrogen per acre. After 1925 the nitrogen was increased to 164.7 pounds per acre, per year. For the period 1922-1927, inclusive, muriate of potash was applied at the rate of 200 pounds per acre each year during the period 1922-1927, inclusive. Later applications were as follows: 1928, 800 pounds; 1933, inclusive, 400 pounds, and 1934, inclusive, 600 pounds.

The soil, when placed in the tanks, had a reaction of pH 5.5, and as this was considered too acid for best growth, limestone was applied to all tanks at a rate of 4,000 pounds per acre before the first crop was planted, in 1922. In the spring of 1926 all tanks were again limed at the rate of 2,000 pounds per acre. A test made in the fall of 1927 showed that soil from the tanks treated with ammonium sulfate had a reaction of pH 6.1, while soil from the tanks treated with sodium nitrate had a pH of 7.7. In order to eliminate, as far as practicable, this difference in reaction, subsequent additions of limestone were made only to the ammonium sulfate tanks, on the following dates: 1928, 2,000 pounds in the spring, and 4,000 pounds in the fall; 1930, 4,000; 1932, 2,000; and 1954, 1,000. Periodic determinations of hydrogen concentration indicated that these extractions of limestone maintained the reaction at approximately the neutral point. From 1922 to 1928, therefore, all tanks received the same amounts of nitrogen, potash, superphosphate, and lime. After 1928, those treated with sodium nitrate received no more limestone, while those treated with ammonium sulfate received additional limestone, amounting altogether to 13,000 lbs.

The Cropping System

Four kinds of plants were used in cropping the soil. Two of these were grown one year and the other two the next. Thus, in 1922, spinach was planted in the spring and carrots in the summer. After the carrots were harvested, rye was planted and remained on the land until turned under;