POTASSIUM AND BORON FERTILIZATION OF ALFALFA ON A FEW CONNECTICUT SOILS

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This paper presents the data from relatively recent experiments pertaining to the use of potassium and boron on alfalfa. They are phases of a general study of alfalfa problems. The potassium and boron experiments will be considered separately.

FREQUENCY OF APPLYING POTASH

Most of the tilled land in Connecticut has been cropped for over 200 years. The soils never were very fertile and for generations a large proportion of the potash in animal voidings was not returned to the land. For a great part of the time commercial fertilizers were not available and on livestock farms little potash has been purchased anyway. The net result is a very low reserve of potash in the soils. Under such conditions alfalfa frequently suffers for lack of this nutrient, even on the dairy farms with large amounts of manure. The importance of applying potash for alfalfa in Connecticut was established by the Storrs Experiment Station over 20 years ago (4).

The general recommendation has been to mix with the soil, before seeding, sufficient amounts of minerals to suffice hay crops for several years. The high requirements of alfalfa and other legumes for potash and the rapidity of K absorption when the supply in the available form is large, raised the question if it was feasible to add enough potash to last the crop through its probable life, usually three or four years. To obtain some information on this question, an experiment was started in August, 1941. It was located on Charlton fine sandy loam soil on fields B and C, at Storrs, Conn. These fields had been growing alfalfa since 1934. The previous stand had been plowed in May, and the land fallowed until August, when Ontario Variegated alfalfa was seeded on all plots. On this seeding, five different methods of applying potash have been tested on quadruplicated plots, 52 X 11.5 feet. Each plot has received the same total amount of potash during the three-year period. This total was 360 pounds per acre of K₂O. The five treatments were:

1. All of the potash disked in before seeding;
2. Two-thirds of the potash disked in before seeding, plus one-third top-dressed in August, 1943;
3. One-third of the potash disked in before seeding, plus one-sixth top-dressed each June and August, 1942 and 1943, and August of 1942 and 1943;
4. One-sixth of the potash disked in before seeding, plus one-ninth top-dressed in April, June, and August of 1942 and 1943;
5. One-ninth of the potash disked in before seeding, plus one-ninth top-dressed in April, June, and August of 1942 and 1943.

These plots had been limed quite frequently during the period 1914 to 1929, but the pH values have decreased to about 6.0 in 1941. All of the plots of the experiment received 47% superphosphate at 300 pounds per acre before seeding, the exchangeable bases totalled 6.5 grams of bases per 100 grams of soil.

In 1942, 1943, and 1944 the alfalfa was cut twice each year after 45 to 50 days growing periods. Samples of pure alfalfa were selected immediately after the cutting and these were analyzed for Ca, K, and Prince (1), who found that the totals of these three cations tended to be quite constant in alfalfa. The Mg contents are quite uniform for all five different potash treatments and average about one-fifth the total cation content of alfalfa tended to be quite constant. In the Storrs experiment the alfalfa showed a definite increase in Ca with the highest K contents for all cuttings.

The total milliequivalents of Ca, K, and Mg vary greatly regardless of when the potash was applied. This agrees with the data published by Lucas, Prince (1), who found that the three cations tended to be quite constant.