The Nitrogen and Phosphorus Content of Winter Oat Forage at Various Clipping Dates as Affected by Applications of Nitrogen

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MUCH of the recent rapid growth of the livestock industry in the southeastern United States can be attributed to the development of improved winter grazing. Previous workers (9, 11, 12, 14) have discussed the value of fall planted small grains in providing such grazing.

The best fertilizer practice for small grain forage production may differ considerably from the practice giving the greatest grain yields. The rapid response of small grain crops in the Southeast to nitrogen fertilization suggested the possibility of increasing forage production during the fall and winter by the application of high-nitrogen fertilizer at seeding time. The application of nitrogen in this manner might also be more economical than top-dressing later.

It has been shown that the chemical composition of plants may be considerably influenced by the amount of available plant nutrients in the soil (2, 4, 8, 13). This paper is concerned with the effect of various fertilizer and nitrogen top-dressing treatments on the nitrogen and phosphorus content of winter oat forage at Experiment, Ga., during 1947–1948.

EXPERIMENTAL PROCEDURE

Eighty plots, each 3 by 20 feet, and constituting four replications of 20 treatments, were laid out on a Cecil sandy clay loam at the Georgia Experiment Station. Five fertilizer treatments were used at seeding time:

(a) No fertilizer
(b) Home mixed 0–10–10
(c) Home mixed 5–10–10
(d) Home mixed 10–10–10 ("H 10–10–10")
(e) Commercial mixed 10–10–10 ("C 10–10–10")

These fertilizers were broadcast on the plots by hand at a rate equivalent to 600 pounds per acre on September 25, 1947. Terruf oats were cross-drilled at the rate of 3 bushels per acre the same day.

Four rates of nitrogen top-dressing were superimposed on each of the initial fertilizer treatments, with 16% nitrate of soda applied at rates equivalent to 0, 24, 48, and 72 pounds of nitrogen per acre. Half of the top-dressing was applied October 22, 1947, and the remainder was applied on November 28, 1947, and on March 8, April 8, and May 10, 1948.

Climatological data for the Georgia Experiment Station for the growing season of this crop are summarized in Table 1.

All plots were mowed about 1½ inches above the ground on November 28, 1947, and on March 8, April 8, and May 10, 1948. The green forage was collected and weighed, dried for 3 days at a temperature of approximately 105° F, and reweighed to determine the dry matter yields. Chemical analyses were ground in a Wiley mill with a 1-mm mesh screen. The percentage nitrogen in each sample was determined by the Gunning method modified to include the percentage of nitrates (1). The percentage phosphorus in samples was determined by the no-fertilizer, 0–10–10, and H 10–10–10 plots, and 72-pound rates of nitrogen top-dressing was made colorimetrically following dry ashing with magnesium carbonate. Data on the per cent total nitrogen and phosphorus were analyzed statistically. No consistent or significant differences were found in the results from the use of the two 10–10–10 fertilizers, and the following discussion refers to "the 10–10–10's."

RESULTS AND DISCUSSION

NITROGEN CONTENT OF FORAGE

Large variations were obtained in the nitrogen content of forage produced between time and the first clipping, November 28, 1947, and April 8, 1948. All of this forage had a relatively high nitrogen content, the lowest average for any treatment being 3.88% nitrogen, in forage from the plots receiving the no-fertilizer, 0–10–10, and H 10–10–10 plots. The nitrogen content of the other extreme, forage from plots receiving the 0–10–10 at seeding time with no top-dressing, was 7.28% nitrogen as top-dressing later in the fall had an average nitrogen content of 4.50%. The nitrogen content of forage at this clipping date was increased significantly by the application of a 10–10–10 fertilizer at a 600-pound rate at seeding time and by each increment of nitrogen as top-dressing.

1 Contribution from the Department of Agronomy, University of Georgia, Athens, Ga., and the Georgia Experiment Station, respectively. Published with the approval of the Dean and Director.

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3 The home mixed 10–10–10 included the following per ton:
   1000 lbs. 20% superphosphate
   333 lbs. 60% muriate of potash
   52 lbs. peanut hulls
   615 lbs. 32% ammonium nitrate
   (The home mixed 5–10–10 and 0–10–10 were similar to the H 10–10–10 but with some or all of the nitrogen replaced by potash and sulfur.)