Urea-form: Greenhouse Studies with Perennial Ryegrass

W. H. Armiger, K. G. Clark, F. O. Lundstrom, and A. E. Blair

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Experiments with a variety of urea-form materials at levels of nitrogen application both above and below those at which more soluble chemical nitrogen fertilizers would produce injury.

Experimental Materials and Design

Five urea-form preparations and a commercial sample of urea resin scrap were selected for comparison with Milorganite, process tankage, and Uramon (fertilizer-grade urea) as sources of nitrogen for perennial ryegrass grown in 2-gallon (8½ inch diameter) pots on Evesboro loamy sand soil. Data on the properties of the materials used are given in Table 1.

The soil, pH 4.8, was taken from an uncultivated area at a depth of 0 to 8 inches.

A randomized block design with four replicates of each treatment was employed.

Procedure

The soil for each pot (20 pounds) was thoroughly mixed with minus 100-mesh dolomite, 20% superphosphate, and 60% muriate of potash in amounts equivalent to 2,000 pounds dolomite, 300 pounds P₂O₅, and 120 pounds K₂O per acre, and treated with a solution of minor elements that had been found adequate for this soil. Perennial ryegrass was sown at the rate of 500 seeds per acre in the present experiment. Milorganite, however, has since been applied at the 400- and 800-pound nitrogen levels without apparent injury to the ryegrass.

The plant tops exceeding 1½ inches in height were harvested five times and the clippings removed to reduce the supply of readily available soil nitrogen.

Three days after the fifth preliminary harvest, the urea-form preparations and other nitrogen materials were applied at rates equivalent to 200 pounds nitrogen per acre, based on the pot area. Four of the urea-form preparations also were applied at rates of 400 and 800 pounds nitrogen per acre. Uramon was not applied at either of the higher rates because in an earlier experiment its use at the 400-pound N level resulted in complete kill of the ryegrass. Neither Milorganite nor process tankage was used at rates higher than 200 pounds nitrogen per acre in the present experiment. Milorganite has since been applied at the 400- and 800-pound nitrogen levels without apparent injury to the ryegrass.

The plant tops exceeding 1½ inches in height were harvested 11 times at intervals of 14 to 41 days over a total growing period of 299 days. All clippings were removed and the dry matter and nitrogen content determined for use in evaluating the availability pattern, of the various sources of nitrogen. At the end of the experiment water was supplied as needed without drainage.

In the 585-day interval between seeding and termination of the experiment water was supplied as needed without drainage.