Response of Kentucky Bluegrass to Potassium - 1996

Barbara R. Bingaman, Nick E. Christians, and David S. Gardner

The responses of Kentucky bluegrass to a standard potassium and a coated (T-60) potassium material (from Viridian Inc.) were compared. This study was conducted on an established 'Park' Kentucky bluegrass at the Iowa State University Horticulture Research Station north of Ames, Iowa. The soil in this area was a Nicollet (fine-loamy, mixed, mesic Aquic Hapludoll) with an organic matter content of 4.1%, a pH of 7.2, 3 ppm P, and 80 ppm K as of May 1996. This plot was not fertilized in the spring of 1996.

Individual plots were 5 x 5 ft and three replications were conducted. Three-foot barrier rows were placed between replications. There were five treatments including an untreated control. Potassium was applied in a standard formulation of K_2SO_4 (0-0-50) and in the experimental coated formulation T-60 (0-0-48.5) from Viridian Inc. Both materials were applied at an annual rate of 1 lb K/1000 ft^2 in a single application and at 2 lb K/1000 ft^2 in split applications with the sequential being applied 30 days after the initial application (Table 1). The potassium materials were applied with 'shaker dispensers'.

Initial treatments were made on May 30. A pre-application survey of the plot showed uniform turf quality. Thirty-day sequential applications for treatments 4 and 5 were made July 3. Because of dry conditions, supplemental irrigation was used to maintain the turf in good growing condition.

The duration of the experiment was 11 weeks. The plot was mowed weekly beginning June 11. Fresh clippings were collected and weighed. Bi-weekly, the clippings were dried to determine dry weights and to analyze tissue potassium.

Fresh clipping weights and turf quality data were taken on June 11, June 19, June 25, July 12, July 23, July 30, August 8, and August 15. Visual quality was assessed using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality (Table 1). Fresh clipping weights were measured as grams fresh tissue (Table 2). Mowing height for collecting clippings was 2 inches.

The clippings from June 19, July 12, July 30, and August 15 were dried and dry weights were measured in grams dry weight (Table 3). The dry tissue was ground to pass through 40 mesh screen using a Wiley Mill Grinder and analyzed for potassium content.

Potassium analyses were conducted by the Plant Nutrition Lab in the Department of Horticulture at Iowa State University. Potassium content was determined using an IRIS - AP - Duo, Inductively Coupled Argon Plasma Analyzer (ICAP). The dry tissue samples were ashed at 490° C and the ash was dissolved in 1 N aqua regia solution (a 3:1 solution of hydrochloric acid and nitric acid). The aqua regia and ash solution was filtered with Whatman #42 paper prior to ICAP analysis. A calibration curve (K range 10 - 800 ppm) was constructed and potassium content was determined in ppm and converted to percent in tissue (Table 4). The results of the ICAP analyses were confirmed by checking one representative sample for each treatment using the Flame Atomic Absorption (FAA) analyzer.

The soil in each individual plot was tested for a standard profile and for potassium content at the end of the study. These tests were conducted at the Soil Test Lab in the Department of Agronomy at Iowa State University. Soil samples were taken August 30 and one sample per treatment was taken and analyzed for percent organic matter, pH, phosphorous, and potassium (Table 5).

Data were analyzed using the Statistical Analysis System (SAS) version 6.09 and the Analysis of Variance (ANOVA) procedure. Mean quality ratings and clipping weights were compared using Fisher's Least Significant Difference (LSD) test.

There were no differences in visual quality among the treated and untreated plots (Table 1). There also were no differences in either fresh or dry clipping weights of the grass on plots treated with the potassium materials as compared with the untreated controls throughout the study (Tables 2 and 3).

The 1-lb K rate did not increase soil test amounts of K but the 2-lb rate increased soil test levels to 100 ppm (Table 4). Surprisingly, no increase in K tissue levels was observed with increasing K application rates (Table 5). The data were double checked and backup samples were examined with the Flame Atomic Absorption analyzer to verify the results. We are uncertain as to the reason why K tissue levels showed no increases at these relatively low K soil test levels. Additional research will be needed to evaluate K uptake under these conditions.