by Dr. James B. Beard

TURFGRASS RESEARCH REVIEW

How nitrogen fertilizers affect Washington creeping bentgrass

Influence of nitrogen fertilizers on Washington creeping bentgrass (Agrostis palustris *Huds.) I. Growth and mineral composition.*
F. E. Markland and E. C. Roberts. 1969. Agronomy Journal. 61 (5): 698-700. (from the Department of Horticulture, Iowa State University, Ames, Ia. 50010).

The objective of this study was to determine the influence of seven nitrogen fertilizers on the growth and mineral composition of Washington creeping bentgrass. The study was conducted over a five year period. The turf was maintained at a cutting height of 0.25 inch and irrigated. Optimum levels of phosphorus and potassium were maintained. Nitrogen carrier treatments consisted of (a) activated sewage sludge, (b) ammonium nitrate (NH_4NO_3), (c) ammonium sulfate $(NH_4)_2SO_4$, (d) processed tankage, (e) sodium nitrate (N_aNO_3), (f) urea and (g) ureaformaldehyde, each applied at rates of five and 10 pounds of nitrogen per 1,000

Continued on page 26

BEARD

Continued from page 22

square feet per year. Each source was applied in one pound nitrogen increments at two and four week intervals for the 10 and five pound nitrogen rates, respectively. Fertilizer treatments were initiated the third week in May and continued through the third week of September. The treatments were watered in immediately after application to avoid foliar burn. Data collected consisted of shoot growth response evaluated on a fresh and dry weight basis from harvests made periodically during the growing season. A portion of the clippings collected was also analyzed for mineral content.

Results of the five year study showed shoot growth to increase as the level of nitrogen fertilizer application was increased. Higher rates of nitrogen decreased the per cent dry weight of bentgrass foliage. The authors concluded that the readily available nitrogen sources, such as ammonium nitrate, sodium nitrate and urea were most effective in the spring and fall. Activated sewage sludge and ammonium sulfate gave the best response during June and July. Processed tankage and urea-formaldehyde showed little variation in seasonal growth response. The activated sewage sludge stimulated shoot growth at a level comparable to the readily available nitrogen sources except during the late fall when the shoot growth response declined.

Analyses of the mineral content of Washington creeping bentgrass leaves grown under the various nitrogen carrier treatments showed higher levels of nitrogen fertility to increase the potassium content in the foliage. Applications of activated sewage sludge resulted in significant increases in the copper, zinc and iron contents. Sodium nitrate applications caused an increase in the sodium content of the leaf tissue. No other significant differ-

Continued on page 32

BEARD

Continued from page 26

ences in the mineral content of the leaf tissue was observed which could be contributed either to the level or source of nitrogen fertility applied.

Comments: Distinct affects of both nitrogen fertility level and source were apparent in terms of the amount of shoot growth, per cent dry weight and mineral composition of the leaf tissue. Shoot growth response is one of the criteria utilized by turfgrass researchers in measuring the response of various fertility treatments. A controlled, medium to low rate of shoot growth is preferable to a high rate of shoot growth under normal turfgrass culture. A rapid production of leaf tissue exhausts the carbohydrate reserves and results in reduced overall vigor and poor recuperative capability from stresses caused by disease, drought, heat and cold. The professional turfmen should adjust the nitrogen fertility program to maintain a relatively moderate, controlled rate of shoot growth and the associated deep root system rather than promoting rapid growth and the associated green, succulent leaf tissue having a restricted root system.

The distinct increase in potassium content of the leaf foliage at higher nitrogen rates is of particular interest. The importance of maintaining a balance between nutrients is becoming more and more evident in turfgrass nutritional research. Severe problems can arise if higher rates of potassium fertilization are not utilized on turfs maintained at higher nitrogen fertility levels.

Under the conditions of this study, the activated sewage sludge released nitrogen at a rate which was more like the readily available sources, such as ammonium nitrate, ammonium sulfate, sodium nitrate and urea, than the slower release materials, such as processed tankage and ureaformaldehyde. The exception to this observation was in the fall of the year when cooler temperatures reduced the rate of nitrogen release from activated sewage sludge. This is an important factor in climatic regions where winter injury is a problem, since a relatively slow growth rate is desired for maximum winter survival.

The distinct properties and turfgrass responses associated with each nitrogen carrier illustrates that the value of a nitrogen carrier depends on how it is used. No one carrier possesses all the characteristics desired for turfs. Thus, it is important to select the nitrogen carrier possessing the characteristics which best suits the particular conditions under which it is being utilized.

Effect of varied rates of atrazine and simazine on the es-

Continued on page 36

BEARD

Continued from page 32

tablishment of several zoysia strains.

R.E. Engel, C.R. Funk and D.A. Kinney. 1968. Agronomy Journal. 60:261-262. (from the Department of Soils and Crops, Rutgers, the State University, New Brunswick, N.J. 08903).

The objective of this study was to determine the relative tolerance of several strains of zoysiagrass to applications of various rates of simazine and atrazine during vegetative establishment. The cultivars of zoysiagrass utilized in this study were Meyer and Midwest plus several experimental selections. Atrazine and simazine were applied at rates ranging from 1.25 to 7.5 pounds per acre. The stolons were planted on July 15 and the herbicides were applied the next day. Frequent light watering was practiced to insure stolon establishment. Evaluation of injury to the various zoysiagrass strains was determined throughout the initial establishment year. Data taken included plant crown diameters and rate of stolon growth.

Meyer was more tolerant than Midwest to the herbicide treatments. Atrazine caused more injury than simazine, especially on the less tolerant Midwest strain. The 1.25 pounds per acre rate of simazine did not give any significant reduction in zoysiagrass stolon survival and growth. However, atrazine applied at a similar rate did give significant reductions in stand and rate of stolon growth of Midwest. As the rate of application of simazine and atrazine was increased above the 1.25 pounds per acre rate, the degree of plant survival and rate of stolon growth was reduced proportionally. □

Other papers of interest:

1. *Sands used in soil mixes.* J. H. Madison. 1969. California Turfgrass Culture. 19(1):3-5. (from the Department of Landscape Horticulture, University of California, Davis, Calif. 95616).