TURFGRASS TRENDS

DISEASE CONTROL

CaSi Doesn't Strengthen Creeping Bent, Tall Fescue against Foliar Disease

By Jack Fry, Qi Zhang, Kathy Lowe and Ned Tisserat

Some researchers report that one potential tool for reducing fungicide requirements on turfgrasses may be the use of silicon (Si) fertilizers. Silicon has been reported to suppress diseases on various crops in the last decade (Raid et al., 1992; Chérif et al., 1994; Deren et al., 1994; Seebold et al, 2000; Seebold et al., 2001).

Researchers in North Carolina found that brown patch and dollar spot on creeping bentgrass were reduced approximately 20 percent and 30 percent, respectively, when soluble potassium silicate (21 percent SiO_2) at 0.5 pounds per 1,000 square feet was applied (Uriarte et al., 2004). However, in that study measurable increases in potassium but not Si occurred in creeping bentgrass leaves.

Gray leaf spot on St. Augustinegrass was reduced 9 percent to 28 percent by Si alone (100 pounds per 1,000 square feet) and 59 percent to 68 percent with the com-

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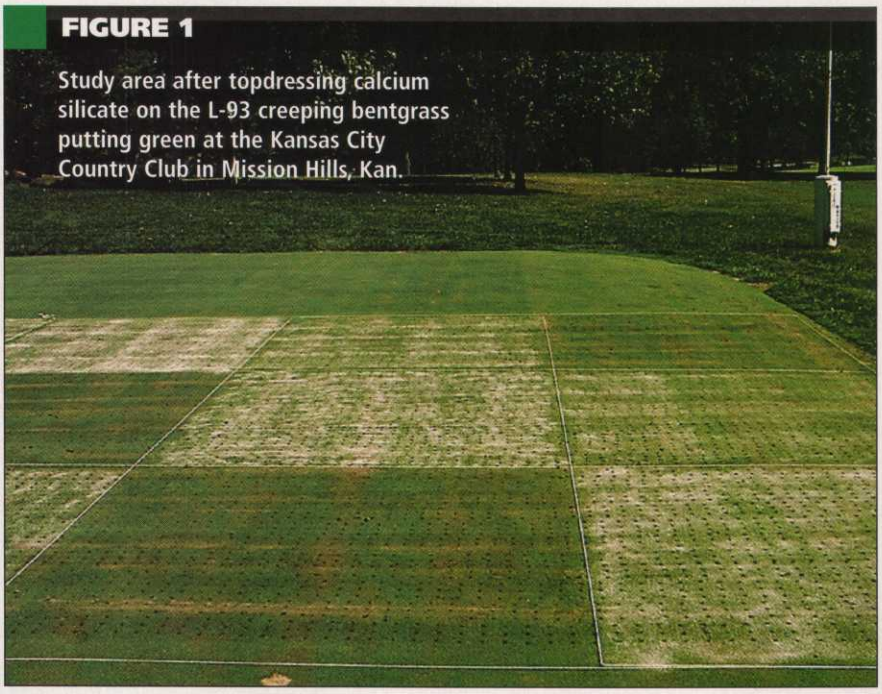
FIGURE 1



Study area after topdressing calcium silicate on the L-93 creeping bentgrass putting green at the Kansas City Country Club in Mission Hills, Kan.

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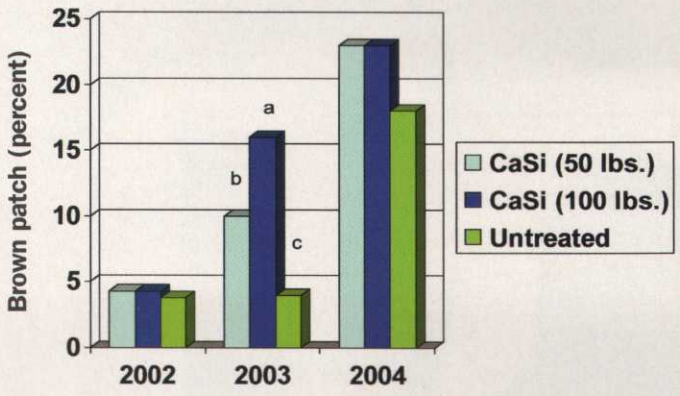
FIGURE 2



Brown patch on L93 creeping bentgrass as affected by calcium silicate at the Kansas City Country Club. Rates indicate amounts applied per 1,000 square feet. Data were collected in August 2002 and 2003 and July 2004. No differences occurred in 2002 or 2004. All treatments were different ($P<0.05$) in 2003.

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bination of Si and the fungicide Daconil (Brecht et al., 2004).

It is believed that Si may reduce foliar diseases by creating a physical barrier to restrict fungal hyphae penetration (Kim et al., 2002). Alternatively, Si may serve to encourage the accumulation of other chemicals in the plant that confer resistance. (Chérif et al., 1992a; Chérif et al., 1992b).

We conducted field experiments to evaluate the potential for calcium silicate ($CaSiO_3$) topdressing to reduce dollar spot on creeping bentgrass and brown patch reduction on creeping bentgrass and tall fescue.

Methods

Creeping Bentgrass: This experiment was conducted on an L-93 creeping bentgrass nursery putting green at the Kansas City Country Club in Mission Hills, Kansas (Fig. 1).

L-93 creeping bentgrass was seeded in March 2002 on a rootzone consisting of 98 percent sand and 2 percent clay. Soil pH was 6.9, and phosphorus (P) and potassium (K) levels were 20 and 25, respectively (Brown, 1998). Soil Si level when tested in untreated plots in 2003 was 2.9 mg kg^{-1} (milligrams per kilogram, or ppm). Treatments included two levels of $CaSiO_3$ application and untreated turf.

Calcium silicate (31 percent SiO_2, 22 percent calcium [Ca]) was uniformly applied using a hand-held shaker bottle at 50 pounds or 100 pounds per 1,000 square feet on May 24 and Sept. 26, 2002; April 4 and Aug. 15, 2003; and May 4, 2004. Prior to $CaSiO_3$ application, the study area was core aerified.

Nitrogen from a combination of granular and liquid quick-release fertilizers was used throughout each year to provide a total of about 6 pounds of nitrogen (N) per 1,000 square feet. Turf was mowed at 0.118 inches every other day and watered as needed.

Data were collected on turfgrass visual quality, brown patch severity (percentage of brown patch infested area), dollar spot, levels of N, P, K, Ca, Si in leaves and Si levels in soil. Visual quality and brown patch severity were measured once in August in 2002 and 2003 and in July 2004 when the disease was most active in the field.

Tall Fescue: This study was conducted on a 1-year old stand of Tarheel and Bonsai II tall fescue at the Rocky Ford Turfgrass Research Center in Manhattan, Kan. Responses of cultivars to $CaSiO_3$ application were similar and data are averaged over both. Soil was a silt loam and tests indicated a pH of 6.4 and P and K levels of 41 and 367 mg kg^{-1}, respectively, and an initial Si content of 173 mg kg^{-1}. Turfgrass was mowed at 7.5 cm twice weekly and watered as needed.

Urea (4600) was applied to provide N at 1 pound per 1,000 square feet on April 17, May 3 and Sept. 18, 2002; May 5 and 29 and Sept. 22, 2003.

Calcium silicate was applied at the same rates as in the creeping bentgrass experiment on May 29 and Oct. 10, 2002, and May 14 and Sept. 29, 2003. In addition, a treatment consisting of the fungicide Prostar at 2.2 oz. per 1,000 square feet was applied on 21-day intervals with a CO_2 pressurized sprayer at 30 psi in water equivalent to 87 gallons per acre. The initial Prostar application was made the last week of May in each year and the final application the last week of September.

Data were collected on turfgrass visual quality, leaf N, P, K and Ca concentrations and Si concentration in leaves and soil. Turfgrass visual quality was rated once weekly on a 0 to 9 scale, where 0 = dead turf; 6 = acceptable quality for a home lawn; and 9 = optimum color, density and uniformity. The percentage

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