

Defining Optimal and Deficient Annual Nitrogen Fertility Rates for Annual Bluegrass-Creeping Bentgrass Putting Greens

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Objectives:

1. To evaluate annual nitrogen fertility rates ranging from 1.5 to 5.5 lb/1000 ft² for two years on an annual bluegrass-creeping bentgrass putting green nursery.
2. To measure visual ratings of turfgrass quality and color, recovery from core cultivations, coverage of disease activity, and other visual ratings on an as-needed basis; clipping yields, concentration of total N, P, K in clipping tissue, and two-day plant uptake of N, P, and K; soil analyses of total N, Olsen-P, and exchangeable cations; and measurements of whole-plant morphological traits.

Start Date: 2005

Project Duration: two years

Total Funding: \$6,000

Most golf course superintendents in California are managing annual bluegrass (*Poa annua*) as their putting green turf. The major reason for this is the relatively mild climate of the region which usually results in newly established creeping bentgrass putting greens converting to *Poa annua* putting greens in five to seven years.

The annual N fertility rates that have been evaluated on *Poa annua* grown in the field have varied from approximately 2.0 to 20.0 lb/1,000 ft² which may be a reflection of length of growing season, amount of rainfall, and other factors. In a relatively recent GCSAA/CGCSA Chapter Cooperative Research Program study, annual N fertility rates of 6.0 and 11.0 lb/1,000 ft² were evaluated on a *Poa annua* putting green in southern California. It was reported that the lower rate was close to optimal.

Since there is a trend for golf course superintendents to apply less N on *Poa annua* putting greens, it would be use-



Several growth and quality parameters including clipping yields are being monitored in response to variable nitrogen rates.

ful to evaluate the lower range of annual N fertility rates. These data could be combined with other data concerning optimal annual N fertility rates, so that golf course superintendents in southern California could be offered a range of optimal, sufficient, and deficient rates. This information could serve as a general guide, keeping in mind that N rates may need to be adjusted depending on other factors.

The location of this study is an 8,500 ft² mature annual bluegrass-creeping bentgrass nursery located at Industry Hills Golf Club at Pacific Palms Conference Resort, City of Industry, California. The majority of the nursery is covered with *Poa annua*, especially during the cool season. The nursery is irrigated with recycled water which supplies an annual N fertility rate of approximately 0.5 lb/1,000 ft².

The four annual N fertility rate treatments (1.5, 2.8, 4.2, 5.5 lb./1,000 ft²) are arranged in a randomized complete block design with three replications and are being spray-applied once every three weeks. Individual plot size is 6.0 x 11.0 ft. Phosphorus and potassium are included in the spray application to maintain sufficient and representative nutrient levels. The measurements being taken during this study are listed in the Objective 2.

Preliminary results show that all N fertility rate treatments provided satisfactory visual turfgrass quality and color. In terms of annual N fertility rate (lb./1000 ft²): 5.5 > 4.2 > 2.8 and 1.5. If the additional N supplied by irrigation (approximately 0.5 lb/1000 ft² per year) is included, then, in terms of annual N fertility rate (lb/1000 ft²): 6.0 > 4.7 > 3.3 and 2.0. It is possible that the optimal and deficient annual N fertility rates may range from approximately 3.0 to 6.0 lb/1000 ft². This range would be a general guide, keeping in



The four N fertility treatments are being spray applied once every three weeks.

mind that annual N fertility rates may need to be adjusted depending on several factors, such as: amount of play, soil type, salinity and leaching requirements, amount of rainfall, irrigation with recycled water, N application schedule, rates, and N sources, Fe and plant growth regulator applications, and others.

Not enough data have been collected to provide consistent preliminary observations for visual ratings of recovery from core cultivations, clipping yields, concentration of total N, P, and K in clipping tissue, and two-day plant uptake of N, P, and K.

Summary Points

- Preliminary results show that optimal and deficient annual N fertility rates for annual bluegrass-creeping bentgrass greens in southern California may range from approximately 3.0 to 6.0 lb./1000 ft².
- Annual N fertility rates may need to be adjusted depending on several factors, such as: amount of play, soil type, salinity and leaching requirements, amount of rainfall, irrigation with recycled water, N application schedule, rates, and N sources, Fe and plant growth regulator applications, and others.