

Developing Best Management Practices for Anthracnose Disease on Annual Bluegrass Putting Green Turf

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Objectives:

1. Four field studies on annual bluegrass putting green turf were designed to evaluate the main effect and interactions of (1) irrigation quantity, (2) lightweight rollers and mowing equipment, (3) topdressing and foot traffic, and (4) nitrogen fertilization on anthracnose disease.

Start Date: 2008

Project Duration: 3 years

Total Funding: \$90,000

Anthrachnose, caused by *Colletotrichum cereale*, is a destructive disease of annual bluegrass putting green turf throughout the United States. The frequency and severity of anthracnose outbreaks on putting greens has increased over the past two decades and management practices employed to improve playability (green speed) on putting greens have been observed to be partly responsible.

Research completed in 2008 and 2009 generated these major conclusions: (1) deficit irrigation (40% daily ET_0 replacement) causing wilt stress increased the severity of disease compared to greater irrigation quantities; (2) both sidewinder and triplex mounted vibratory rolling reduced disease severity compared to non-rolled turf under moderate disease pressure; (3) sand topdressing reduced disease severity regardless of foot traffic level; unexpectedly, foot traffic decreased anthracnose regardless of sand topdressing level; (4) frequent summer soluble N fertilization applied at the highest rate (0.1 lb per 1,000 ft^2 every 7 days or 0.2 lb per 1,000 ft^2 every 14 days) had the greatest reduction in anthracnose severity.

A study was initiated in 2009 to identify the rate of soluble N fertilization applied during the summer that would produce the greatest reduction in anthracnose severity. During the first half of the season, N fertilization of 0.4 lb/1000 ft^2 every 7 days consistently produced the lowest anthracnose severity. During the last half of the season (mid-July to mid-August), however, 0.4 and 0.5 lb/1,000 ft^2 every week increased disease and only 0.2 lb/1,000 ft^2 every week was needed for the greatest reduction in anthracnose severity. Integration of data over the entire season (AUDPC) indicated that 0.2 lb/1,000 ft^2 N



Management practices (lower mowing height) used to increase green speed have been partly responsible for the recent increase in outbreaks of anthracnose

applied every week had the best overall reduction in disease severity.

A nitrogen programming study examined spring and autumn N fertilization (granular) in combination with summer soluble N fertilization. Spring granular N fertilization reduced disease severity compared to autumn granular N fertilization on all but two rating dates (August 26, 2009 and May 21, 2010). The rate of granular N fertilization also affected disease severity; N applied at an annual rate of 4.5 lb/1,000 ft^2 had less disease than plots that received N at 3.0, 1.5, and 0 lb/1,000 ft^2 . An interaction between season and granular N rate indicated that spring N fertilization in combination with greater granular N rates had the greatest reduction in disease severity while autumn granular N fertilization rate had little influence on disease severity.

Soluble N fertilization during the summer also influenced disease severity in both years of this trial. Nitrogen applied at 0.375 lb/1,000 ft^2 /month had the greatest reduction in anthracnose severity compared to N fertilization at 0, 0.094, and 0.188 lb per 1,000 ft^2 per month. Plots that received no summer soluble N fertilization had the greatest anthracnose severity.

A study to determine the effect of soluble N sources on anthracnose severity was initiated in the summer of 2010. Six soluble N sources (ammonium nitrate,

ammonium sulfate, calcium nitrate, potassium nitrate, urea, UMAXX 47-0-0) were applied at 0.1 lb/1,000 ft^2 every week or biweekly for 12 weeks. The first year of data indicated that N applied every week compared to biweekly reduced anthracnose severity on two out of the four sampling dates. The nitrogen source effect was also significant on three out of four rating dates.

Summary Points

- Deficit irrigation (40% ET_0) induced wilt stress and intensified anthracnose severity. Irrigation at 80% ET_0 often resulted in the lowest anthracnose severity and best turf quality.
- Lightweight rolling every other day with either roller type (i.e., sidewinder or triplex mounted vibratory) increased ball-roll distance and decreased anthracnose severity under moderate disease pressure.
- Sand topdressing reduced anthracnose severity under both foot traffic and non-trafficked conditions. Moreover, daily foot traffic decreased anthracnose severity regardless of sand topdressing level. The lowest disease severity and best turf quality occurred on plots receiving the combination of daily foot traffic with weekly sand topdressing.
- From the short-term perspective of early in the season (spring), anthracnose severity decreased linearly as the rate of N fertilization increased up to approximately 0.4 lb/1,000 ft^2 /week. Over the course of the entire growing season, however, anthracnose severity decreased linearly as the rate of N fertilization increased up to 0.2 lb/1,000 ft^2 /week, after which greater N rates increased disease severity.
- Spring granular N fertilization, particularly at greater N rates, contributed to the suppression of anthracnose severity more than autumn fertilization. Increasing the monthly soluble N rate during the summer also decreased anthracnose severity regardless of the granular N regime.