GOLF COURSE MANAGEMENT

Alternatives to pesticides for summer decline

Substantial levels of disease control are possible using alternatives to fungicides.

Nigel M. Grech, Ph.D., Howard D. Ohr, Ph.D., Steven D. Campbell, Ph.D., Ray Festa, Tom Massy and **Albert Nunes**

KEY POINTS

- Fungicides still outperform non-chemical disease controls, but some of the alternatives perform well enough to use with fungicides.
- Nutrition and other cultural factors play a large role in anthracnose disease management.
- Anthracnose manifests in two forms: basal rot and foliar blight on bluegrasses.

The California golf industry is under intense pressure to reduce pesticide use. The movement is motivated by concerns about human health, environmental preservation and groundwater protection.

Because of intense disease pressures during summer and the restrictions on pesticides, the demand for alternative disease controls has increased. This article assesses several non-conventional approaches to the management of the summer decline disease complex over the last four seasons.

Morro Bay's cool and misty summers support anthracnose disease in *Poa annua* and creeping bentgrass.

Summer decline of mixed stands of annual bluegrass (*Poa annua*) and creeping bentgrass (*Agrostis palustris*) has been attributed to many factors, including nutrition (5), heat stress, turfgrass genotype and disease. Under central coastal California conditions, the major summer disease of annual bluegrass is anthracnose caused by *Colletotrichum graminicola*. This fungus causes serious disease losses on turf worldwide (6).

Anthracnose manifests in two forms: basal rot and foliar blight on bluegrasses. Basal rot is more serious because it rapidly kills plants by destroying their crowns (2). Anthracnose-infected stands are often also infected by *Pythium* species (1).

Anthracnose can be sporadic and vary widely between years. Management of the two diseases requires intense chemical programs.

Testing products

The marine climate at Morro Bay Golf Course in Morro Bay, Calif., produces summers that are cool and misty. Normally the mist dissipates by noon, and afternoons are warm, clear and dry. Greens typically receive daily irrigation during early evening. Our trials utilized a nursery green containing a fairly uniform mix of *Poa annua* and bentgrass. We were able to use this site for four years. This site had both forms of anthracnose.

During the four years of our trials, the major disease episodes occurred during August. We have observed several factors associated with the disease: aerification, heat, drought stress, excessive irrigation and soil compaction. All substantially enhance disease symptom expression.

Failure to maintain optimal nutrient levels during early summer results in substantially more disease. Researchers have reported that by reducing the application rates of nitrogen, disease levels can be reduced (2). Excessive nitrogen also inhibits root growth (4).

Many reports indicate that phosphorus reduces disease in turf (3). This has been particularly noticeable at Morro

Bay, where increased levels of both phosphorus and potassium prior to disease expression resulted in a lower disease rating. Early season conditions at Morro Bay -- including cool temperatures, low soil organic matter and high traffic -- are not conducive to optimal phosphorus uptake by grass roots. These conditions are worsened by the presence of *Pythium* on the roots and a lack of beneficial (mycorrhizal) fungi. The greens at Morro Bay had very low mycorrhizae populations, which may be a consequence of fungicides used at this course.

Product descriptions

Five brand-name products were tested in the Morro Bay experiments.

Greenex is based on a strain of *Bacillus subtilis*. Strains of this bacterium reportedly control pathogenic fungi and bacteria. This material has also been used to suppress algae on greens and in ponds.

Sincocin is derived from plant extracts. The material has bio-stimulant properties and may enhance natural plant defense mechanisms. This product is used primarily to suppress certain plant parasitic nematodes.

Nutri-Grow PK, developed by the University of California, is a low-salt, high-analysis (0-26-28) phosphorus and potassium foliar fertilizer with rapid root and foliar absorption.

Bp9a is a strain of the bacterium *Bacillus polymyxa*, also developed by the University of California as a root protectant against certain fungi.

Sustane organic fertilizer is derived from composted turkey litter. The material is aerobically composted and is supplied in fine and medium grades.

Each treatment was replicated four times for each trial, except in 1996 when six replicates were used.

Alone, biological control agents or nutritional supplements do not appear capable of maintaining golf greens in the pristine condition golfers expect. In the future, however, unconventional methods are likely to play an increasing role in turf health management, and biological and nutritional products will become more common weapons in the superintendent's disease suppression arsenal.

We've found that substantial levels of disease control are possible using alternatives to fungicides. While none of the materials controlled disease as well as the chemical standard we used for comparison, all were better than the untreated control. This indicates that these products have potential and may work well when integrated into the golf course management practices for summer decline.

Literature cited

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Nigel M. Grech, Ph.D., is now a representative of Pacific Plant Health Services of Riverside, Calif.
Howard D. Ohr, Ph.D., is professor emeritus, and Steven D. Campbell, Ph.D., is a researcher with the department of plant pathology at University of California, Riverside.
Ray Festa is superintendent of golf for San Luis Obispo County; Tom Massy is golf course supervisor at Morro Bay State Park GC; and Albert Nunes, formerly an intern, is a superintendent with the county of San Luis Obispo.

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Average health ratings

The average health ratings on Morro Bay research plots from mid-July to the end of August over multiple years indicate that non-chemical disease treatments are somewhat effective.

Treatments	Average rating	Years in average
1. Disease threshold	1.05	4
2. Untreated control	1.24	4
3. Greenex at 10 oz./1,000 sq. ft. in 8 gals. at 14-day intervals	0.52	4
4. Daconil at 6 oz./1,000 sq. ft. in 8 gals. at 14-day intervals	0.31	4
5. Nutri-Grow PK at 5 oz./1,000 sq. ft. in 8 gals. at 14-day intervals	0.34	3
6. Sincocin at 10 oz./1,000 sq. ft. in 8 gals. 14-day intervals	0.41	2
7. Sincocin at 1 oz./1,000 sq. ft. in gals. at 14-day intervals	0.49	2
8. Nutri-Grow PK (same rate as 5) and Sincocin (same rate as 7)	0.83	2
9. Sustane 5-2-4 at 20 lb. per 1,000 sq. ft. at 30-day intervals	0.56	2
10. Sustane 5-2-4 plus Fe at 20 lb./1,000 sq. ft. at 30-day intervals	0.37	1
11. Bp9a at 1.5 x 105 cells per milliliter applied in 4 gal./1,000 sq. ft. at 14-day intervals	0.6	1
12. Bp9a (rate same as 11) and Nutri-Grow PK (rate same as 5) at 14-day intervals	0.9	1