Disease Management Program to Reduce Pesticide Use on Bentgrass Greens

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Objectives:

1. Verify the utility of using microclimate information for scheduling the use of fans, irrigation, and fungicides for disease management.
2. Develop the system, hardware, and software to monitor and analyze the microenvironment on golf courses.
3. Determine if fungicide applications can be reduced by using microclimate-based information for disease manage ment.

Start Date: 1998
Project Duration: 3 years
Total Funding: $74,752

Weather-based advisory models, which key fungicide application during periods of favorable conditions, have not been widely used on golf courses due to the lack of evidence that they are accurate. Turf managers often rely upon calendar-based spray schedules. An ideal fungicide application program would consider all environmental factors associated with disease activity, and treatments would be made only when conditions were most favorable for disease outbreak.

Determining specific environmental conditions most critical for disease outbreak and improving cultural practices and environmental conditions prior to these outbreaks could aid in reducing the number of chemical applications. The use of electric fans among turf managers has grown rapidly for use around “pocket greens” which has been observed to increase turf quality.

The objectives of this study were to: a) determine how wind velocities affect the turf microclimate, turf quality, and brown patch incidence and b) verify the relationship between weather-based advisories and disease progress.

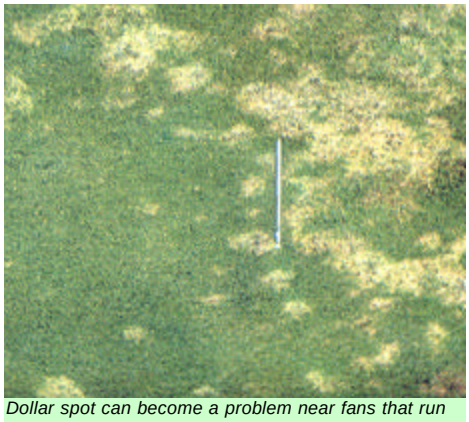
Fans used near the putting greens can significantly reduce the occurrence of brown patch.

In our studies, brown patch was dramatically reduced in the areas of greatest wind velocity. Where the fans were left on and irrigation was inadequate, dollar spot was more severe. Soil moisture, algae, leaf wetness, and canopy temperatures were all less in the area of greatest wind velocity. Turf quality was highest in the same area.

A regression equation was generated to define the relationship between wind velocity and brown patch (disease incidence = 0.816608 - 0.314186 * wind velocity (m/s)). This equation describes the effect wind has on decreasing the incidence of brown patch. A weather-based model (Fidanza model) was modified with this equation to determine if this will correct some of the problems it has in predicting disease.

In the 2000 growing season, a "wind modified" Fidanza model was correlated to disease incidence. It was concluded that fans appropriately placed on the putting surface are an effective means of reducing disease incidence. The wind modified Fidanza model did a better job of predicting disease incidence than the original version when wind speeds were relatively high and constant (i.e. in front of the fans).

Data from the 2000 field experiments are currently being analyzed to determine if the wind modified model improves the correlation with disease in ambient winds. Electron microscopy studies currently underway are revealing the mechanisms by which the wind has its effects.



Dollar spot can become a problem near fans that run constantly.

Field studies are now completed. Data analysis and weather-based model construction needs to be completed. Electron microscopy studies are near completion and images are currently being analyzed. A manuscript will be prepared for submission in a scientific journal (*Plant Disease*, American Phytopathological Society). An M.S. thesis will be published and distributed covering the topics above.

Summary Points

- Brown patch was dramatically reduced in the areas with greatest wind velocity created by fans.
- Where the fans were left on for extended periods and irrigation was inadequate, dollar spot was more severe.
- Soil moisture, algae, leaf wetness, and canopy temperatures were all less in the area with the greatest wind velocity.
- A regression equation was generated to define the relationship between wind velocity and brown patch incidence.
- The "wind modified" Fidanza model did a good job predicting the occurrence of brown patch.