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## Alternative Pest Management

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properties.

Currently, the fungal and bacterial populations from composts are being characterized and screened for disease suppression. Through successful refinement of the microbial biomass assay, repeatable standard curves from both inorganic phosphate and glycerol phosphate can be generated. During the first half of 1993, over 25 different materials will be assessed for levels of biomass and activity to determine whether this method will be suitable predicting disease suppressive properties of composts.

### *Iowa State University*

*Potential for Physiological Management of Symptom Expression by Turfgrass Infected by Bipolaris sorokiniana - Dr. Clinton F. Hodges*

Ethylene is generated inside the leaves of *Poa pratensis* in response to infection by *Bipolaris sorokiniana* and contributes substantially to the loss of chlorophyll from the infected leaves. This research project was initiated to determine if the ethylene, or its mode of action, can be manipulated to prevent the loss of chlorophyll in infected leaves and prevent yellowing. Prevention of ethylene induced yellowing could result in the control of symptom expression, specifically yellowing of infected turf, independent of the infection. This could reduce use of fungicides and provide a new approach to disease management.

Research conducted in the last year has concentrated on decreasing ethylene in infected leaves by applying ethylene inhibiting substances to roots of inoculated plants. The following materials have been evaluated for their effectiveness when applied to the soil:

- Aminooxyacetic Acid (AOA)
- Aminoisobutyric Acid (AIBA)
- Benzoic Acid (BNZ)
- Canaline (CAN)
- Carbonyl Cyanide m-Chlorophenylhydrazone (CCCP)
- Cobalt Chloride (COCL)
- Propyl Gallate (PGA)

Ethylene in healthy leaves ranged from 276 to 321  $\mu\text{L L}^{-1}$ . Ethylene within inoculated leaves increased after 24 hours, peaked at 48 hours (1476  $\mu\text{L L}^{-1}$ ), and then declined at 72 hours and 96 hours. CAN, AOA, CCCP, and PGA applied to

roots reduced leaf ethylene in response to infection.

Of the materials that decreased ethylene, only CAN and AOA prevented substantial loss of chlorophyll. Inoculated leaves of plants treated with CAN and AOA retained 74 and 80 percent of their chlorophyll, respectively. Preliminary results from leaf treatments with CAN and AOA show a greater decrease in the surge of ethylene associated with infection than that achieved with soil treatment. Ethylene levels have averaged 30 percent of that in inoculated controls with as much as a 91 percent retention of chlorophyll.

These observations suggest that manipulation of symptom expression in this host-pathogen interaction (and perhaps others) is feasible. Our 1993, studies will concentrate on the function and control of the senescence processes during pathogenesis. Understanding symptom response at this basic level may help develop new control measures or lead to genetic clues on how to develop resistant varieties.

### *USDA, Rutgers University, University of California*

*Biological Control of Turf Pests: Isolation and Evaluation of Nematode and Bacterial Pathogens - Dr. Michael G. Klein, Dr. Randy R. Gaugler and Dr. Harry K. Kaya*

The objectives of this project are to obtain new strains and species of nematodes and bacteria, which attack white grub insects and to characterize those with the greatest activity against grub larvae. The current need for better biological control agents for use against grubs, such as the Japanese beetle and masked chafers, creates an opportunity to license promising new pathogens to industries for development and commercialization. This cooperative effort between the U. S. Golf Association and a team of U. S. Department of Agriculture and university scientists in Ohio, New Jersey, and California has generated interest from the media and resulted in increased visibility for the USGA's Environmental Research Program.

During the first two years, more than 125 strains and potential new species of entomopathogenic nematodes (i.e., insect/disease causing) were recovered. Four described species, and several possible new species have been isolated by both Ohio and New Jersey scientists from golf course turf and scarab larvae. Additional strains, and possible new species from the two major genera of nematodes,