Special Research Report #111: Disease Management
Biology, Epidemiology, and Integrated Management of Fusarium Crown and Stem Rot of Lisianthus
Robert J. McGovern¹, Brent K. Harbaugh¹, Wade H. Elmer², and David C. Geiser¹
¹Univ. of Florida-IFAS; ²Connecticut Agricultural Exper. Station; ³Pennsylvania State Univ.

American Floral Endowment
Funding Industry Solutions Today & Tomorrow
Phone: 628/892-0045
Fax: 618/892/4045
E-mail: afe@endowment.org
Website: www.endowment.org

BACKGROUND
A destructive crown and stem rot caused by the fungus Fusarium avenaceum became widespread in cut-flower and pot-flower production of Lisianthus throughout the US beginning in 1995. During 1996-1997, we found that plant losses up to 70% occurred in California and Florida.

METHODOLOGY & RESULTS
Biology. In an examination of the infection process, we found that F. avenaceum is primarily a cool (57-73°F) weather pathogen and that wounds and plant age enhance infection. Isolates of F. avenaceum from Lisianthus and other hosts from around the world were analyzed for relatedness and ability to infect Lisianthus. Genetic markers (internally transcribed spacer and elongation factor), vegetative compatibility grouping, and pathogenicity studies indicate that isolates of F. avenaceum represent a single group, and that most, regardless of original host, can cause crown and stem rot in lisianthus.

Epidemiology. It was concluded that the major factor in outbreaks of Fusarium crown and stem rot was infected Lisianthus transplants. We investigated the modes of survival and spread of F. avenaceum. The fungus survives poorly in soil in central Florida. We also were unable to confirm infection by F. avenaceum using selective media and a specific genetic assay (PCR) in over 40,000 seeds of 25 lisianthus cultivars. However, we could readily recover F. avenaceum from plastic trays that were being reused for transplant production and Styrofoam trays that served as a bench-top surface for replacement of diseased/weak Lisianthus transplants.

We also detected F. avenaceum following surface disinfection, by isolation and PCR in the symptomless root systems of a broad range of ornamentals including wax begonia, carnation, Exacum, Gerbera, Madagascar periwinkle, marigold, pansy, petunia, rudbeckia, salvia, and verbena one month following inoculation with the fungus. Potential dissemination of F. avenaceum spores was examined at a commercial transplant production facility using a spore trap, in growth chambers using plates of selective media, and at a cut-flower facility by mapping plant-to-plant spread. Our studies indicated that airborne or splash dispersal of the fungus may occur, but played
Integrated management.
A number of commercial fungicides and biocontrols were tested. Heritage 50 WG, Medallion 50 WP and thiophanate methyl (Domain, 3336 50 WP, etc.) provided acceptable control when applied preventatively. Systhane and Banner Maxx were generally less effective or inconsistent, and the biocontrols and other fungicides were ineffective. Figure 1 provides results of a typical fungicide-biocontrol experiment.
Forty-seven cultivars (16 each of blue and pink and 15 white commercial cultivars) of Lisianthus were evaluated to find sources of resistance to *F. avenaceum*. ‘Bridal Pink’, ‘Ventura Deep Blue’ and ‘Hallelujah Purple’, and ‘Heidi White’ appeared tolerant to the disease, indicating that breeding efforts may provide a useful strategy for managing Fusarium crown and stem rot.

CONCLUSIONS
We identified infected transplants as the source of primary inoculum for severe outbreaks of Fusarium crown and stem rot of Lisianthus in the US. Based on biological, epidemiological, and other

Figure 1.

Effect of Fungicides and Biocontrols on Management of Fusarium Crown & Stem Rot in Lisianthus

transplant growers to manage crown and stem rot. It includes:

- Preventive use of effective fungicides (Heritage, Medallion, thiophanate methyl fungicides).
- Sanitation (avoiding tray reuse, and disinfecting benches and other surfaces contacting transplants).
- Elimination of weeds and volunteer plants.
- Fungus gnat control.

INDUSTRY IMPACT
Outbreaks of Fusarium crown and stem rot in lisianthus caused by *F. avenaceum* have become rare and of low economic impact on the U.S. florists’ crops industry.

For additional information contact Robert McGovern at rjm@mail.ifas.ufl.edu

June 2003 © Copyright The American Floral Endowment. All Rights Reserved.