

# Special Research Report #111: Disease Management Biology, Epidemiology, and Integrated Management of *Fusarium* Crown and Stem Rot of *Lisianthus*

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## 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.



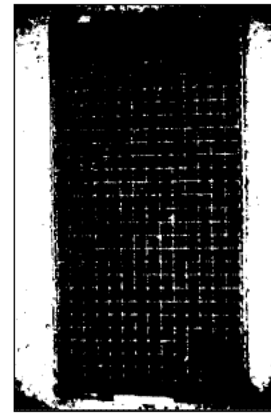
## METHODOLOGY & RESULTS

**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*.

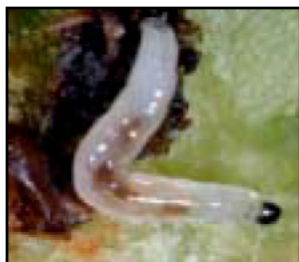
**Epidemiology.** It was concluded that the major factor in outbreaks of *Fusarium* crown and stem rot was infected *Lisianthus* transplants. We investigated the modes of survival and spread of *F.avenaceum*. The fungus survives poorly in soil in central Florida. We also were unable to confirm infection 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 disinfestation, 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

a minor role in epidemics of crown and stem rot. On the other hand, we found that *F. avenaceum* can be spread on pruners and by fungus gnats (*Bradysia* sp., see larva below).



### Integrated management.

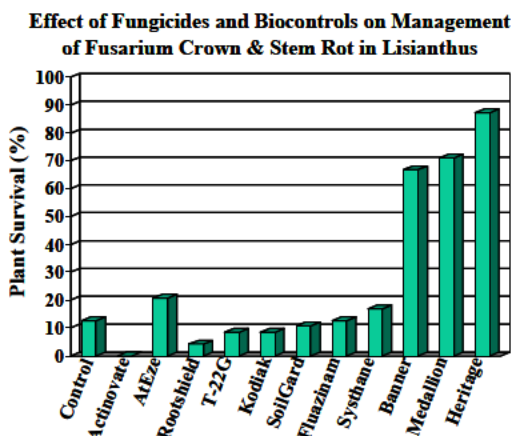
A number of commercial fungicides and biocontrols were tested. Heritage 50 WG, Medallion 50 WP and thiophanate methyl (Domain, 3336 50 WP, etc.) provided acceptable control when applied preventatively. Systhane and Banner Maxx were generally less effective or inconsistent, and the biocontrols and other 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.



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.

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