

# Special Research Report #112: Disease Management

## Epidemiology and Control of *Fusarium* Wilt of Cyclamen

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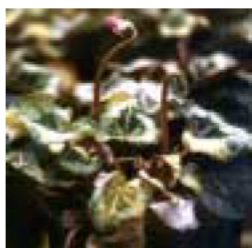
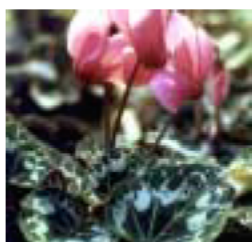
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### BACKGROUND

*Fusarium* wilt is one of the most common diseases of cyclamen and one of the hardest to manage. When disease symptoms appear late in the production cycle, growers have few options other than heavy use of fungicides.



**Healthy & diseased cyclamen**

The fungus causing the disease is *Fusarium oxysporum* f. sp.

*cyclaminis*. While it may not be seed borne, per se, it has been found in seed packages. If established in a greenhouse, it can spread on tools and infested soil. The role of fungus gnats and shore flies has not been investigated.

### METHODOLOGY & RESULTS

#### Effect of nonpathogenic *F. oxysporum* isolates on *Fusarium* wilt

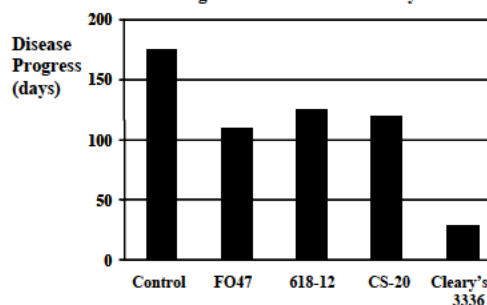
Nonpathogenic isolates of *F. oxysporum* have been selected from soils from around the world for their ability to protect plants from *Fusarium* wilts. Experiments were designed to test three isolates from France (FO47), Holland (618-12) and the US (CS-20).

**Results:** All three isolates gave some protection against *Fusarium* wilt, but did not compare favorably with the fungicide Cleary's 3336. (Chart 1).

#### Effect of combining biologicals with chemicals

By themselves, biological fungicides have not been as efficacious as chemical fungicides in managing the disease, but combinations and rotations of biological and chemicals may enhance protection. Four experiments were conducted and repeated to assess the effectiveness of combinations of biocontrols and chemicals.

Chart 1 Effect of Nonpathogenic isolates of *Fusarium oxysporum* on Disease Progress of *Fusarium* wilt of cyclamen



Companion®, PlantShield®, or MycoStop®) were applied, followed by conventional fungicides (Cleary's 3336®, Heritage®, or Medallion®), and vice versa.

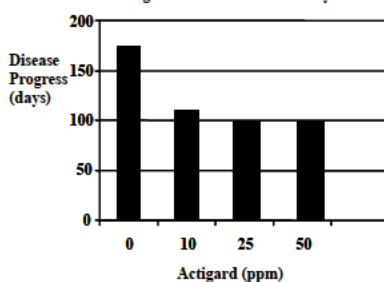
**Results:** When cyclamen plugs were initially treated with biologicals followed by chemical fungicides, only the chemical fungicides produced acceptable control. When plugs were first treated with fungicides, and then biologicals, protection was enhanced and growth was slightly better than with chemicals alone. The efficacy of the biocontrols was very variable, but all influenced the disease.

#### **Effects of products that induce disease resistance.**

Products, such as chitosan, salicylic acid, and acibenzolar-s-methyl (Actigard®) have been reported to induced disease resistance to Fusarium diseases, but they had not been evaluated against Fusarium wilt of cyclamen. Four studies were conducted and repeated to assess the efficacy of these products as root drenches or sprays.

**Results.** Actigard reduced disease when sprayed on plugs. However, Chitosan and salicylic acid were ineffective in suppressing Fusarium wilt. (Chart 2).

Chart 2. Effect of Actigard on Fusarium wilt of cyclamen



**Role of fungus gnats and shore flies in spread of Fusarium wilt.** The potential role of fungus gnats (*Bradysia* sp.) and shore flies (*Scatella* sp.) in the spread of Fusarium wilt was investigated. Fungus gnats and shore fly colonies were reared on autoclaved millet. Adults were released into nylon mesh cages containing healthy and diseased cyclamens. Similar cages with no adult flies served as controls.

**Results:** After four weeks, the Fusarium wilt fungus was isolated from adult fungus gnats and shore flies and enlarged hypocotyls (tubes) of previously healthy plants. Plants in cages where fungus gnats and shore flies were not released did not develop vascular discolorations.

#### **CONCLUSIONS**

When used alone, none of the biological control products available for suppression of Fusarium wilt were as effective as a standard chemical fungicide, Cleary's 3336. However, biologicals improved plant growth when combined with chemicals. This regime may help plants compensate for soilborne diseases such as Fusarium

wilt. Products, such as Actigard, that induce resistance have potential as another tool for managing Fusarium wilt. Lastly, spread of the disease can be minimized by managing fungus gnats and shore flies.

#### **INDUSTRY IMPACT**

New tools were identified for management of Fusarium wilt in cyclamen including the use of plant resistance activators, and rotation of chemical fungicides with biological fungicides. Fungus gnats and shore flies were shown to be important vectors of the Fusarium wilt fungus.

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