

# Special Research Report: # 124: Disease Management

## Integrated Management of *Fusarium* in Florist Crops

### Fusarium Wilt of China Asters

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#### BACKGROUND

Fusarium wilt of “China Asters” has been extremely difficult to control (Fig. 1). The pathogen (*Fusarium oxysporum* f. sp. *callistephi*) is seedborne, but once it is in the soil, it can persist for many years. Our objectives were: (1) to determine how prevalent the pathogen was in production areas and on commercial seed, (2) how effective seed disinfestation procedures can be, (3) whether or not the pathogen can cause damage on other cut flowers, and (4) if any resistance existed among commercial cultivars.



**Fig. 1**  
Fusarium Wilt of China Aster.

#### MATERIALS AND METHODS

**Surveys:** Two separate production cycles of China asters that represented 6-7 cultivars were surveyed in a Florida greenhouse operation for Fusarium wilt.

Symptomatic plants were counted and isolations were made onto selective agar. Seeds were also placed onto selective agar.

**Seed Isolations:** To assess how prevalent the pathogen is on commercial seed, we obtained seed from 25 cultivars and 100 seeds from each cultivar were placed on selective agar plates and incubated for 1 wk. Colonies were identified and all *F. oxysporum* colonies were tested for pathogenicity on healthy seedlings.

#### Seed Disinfestations:

One hundred seeds of a Fusarium-infested China aster ‘Matsumoto Light Blue’ was exposed to 1% NaOCL (household bleach) for 30 min and placed onto selective agar. Untreated seeds served as controls. After 10 days, the numbers of colonies were counted.

#### Host range:

Snapdragons, chrysanthemum, lisianthus, and China aster were inoculated with an isolate of *F. oxysporum* f. sp. *callistephi* and compared to uninoculated plants to determine if the pathogen could injure and/or persist on alternate hosts (Fig. 2).



**Fig. 2**  
Greenhouse trials. Plants on the right were inoculated with *F. oxysporum* f. sp. *callistephi*.

#### Cultivar Evaluations:

Forty-five commercially available cultivars were screened for resistance in the greenhouse in an artificially infested potting mix and then compared to an equal number of plants grown in a noninfested potting mix.

Resistance was confirmed in the field in two locations.

## CONCLUSIONS

**Surveys:** In both production cycles, the disease was found to occur between 6 and 70%. The pathogen was found on the seed.

**Seed Isolations:** Seven seed packages out of 25 had seed infested with the pathogen. The incidence was between 1 and 8%. Out of 16 isolates tested for pathogenicity, 11 (69%) were pathogenic.

**Seed Disinfestations:** When seed was surface disinfested, no *Fusarium* was found indicating that this treatment may eliminate the primary source of inoculum.

**Host range:** China asters were the most affected genera following inoculation, however, there was evidence that chrysanthemum, snapdragons, and lisianthus were stunted. The pathogen was reisolated from each host. These findings suggested that the pathogen could cause some damage on alternate hosts, but more importantly, that the pathogen could persist on these hosts.

**Cultivar Evaluations**  
No cultivar was ranked as highly resistant to *Fusarium* wilt. Of the 45 cultivars evaluated in the greenhouse and field, only four (see Table 1) were ranked as

having moderate resistance to wilt. Six cultivars were ranked as being moderately susceptible to wilt while the remaining 35 cultivars were ranked as being susceptible.

**Table 1**  
**Cultivar reactions to *Fusarium* wilt (MR = moderately resistant, MS = moderately susceptible, S= susceptible).**

|                                 |    |
|---------------------------------|----|
| Bouquet Puff Mix 2080           | MR |
| Stokes Aster Standy Mix         | MR |
| Finest Mixed 684                | MR |
| Astoria Mix Aster 2 087         | MR |
| Benary's Prin. Form. Mix        | MS |
| SC* Matsumoto Form. Mix         | MS |
| SC* Serenade Mix                | MS |
| Matsumoto Yellow 637E           | MS |
| Astoria Mix 632                 | MS |
| Starlight Mix 629D              | MS |
| Powderpuff                      | S  |
| Spider Chrysanthemum Mixed 7384 | S  |
| Fan Mix Aster 2089              | S  |
| Matsumoto Salmon 637L           | S  |
| Early Ostrich Plume 1454        | S  |
| Massagno mixed 612              | S  |
| Tiger Paws Mixed 635            | S  |
| Powderpuff Mixed colors         | S  |
| Opus -                          | S  |
| Dwarf Queen White 617F          | S  |
| Unicum mixed 615                | S  |
| Pot N' Patio Mix 628M           | S  |
| Unicum Mix                      | S  |
| Giant Ray Mid Blue 2555         | S  |
| Aster Crego Mixed colors        | S  |
| Aster Blue Ribbon 6085          | S  |
| Serenade Mixed 640              | S  |
| Crego Finest Mixed 630          | S  |
| Giant Ray Fiery Red 2545        | S  |
| Irresistible Mix                | S  |
| Rubens Improved Pompon mix      | S  |
| Aster Duchess Mixed 6123        | S  |

|                           |   |
|---------------------------|---|
| Dwarf Queen Mixed 617     | S |
| Mini-lady Mixed 654       | S |
| Lilliput Blue Moon 6993   | S |
| Aster Milady Mixed 1447   | S |
| Aster 'Red Ribbon' 2021   | S |
| Asteroid Mix 625S         | S |
| Asteroid Rose 625B        | S |
| Asteroid Light Blue 625D  | S |
| Pot N' Patio Pink 628D    | S |
| Pot N' Patio White 628 F  | S |
| Duchesse Formula Mix 639  | S |
| Mini-lady Blue 65 2       | S |
| Stokes Aster Serenade Mix | S |

## IMPACT TO THE INDUSTRY

*Fusarium* wilt of China Aster continues to be a devastating disease. Infested seed is the primary source of inoculum. However, our findings suggest that seed disinfestations could result in the complete eradication of the pathogen. More importantly, we identified four cultivars that exhibited moderate resistance to *Fusarium* wilt. If infested fields are cropped to chrysanthemum or snapdragon, growers should be aware that the fungus may persist.

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