

Special Research Report #122: Disease Management

Phytophthora Species Attacking Floriculture Crops in North Carolina

Jaesoon Hwang¹, Post-Doctoral Student, M.K. Hausbeck², Professor,

K. Lamour², Post-Doctoral Student, and D. M. Benson¹, Professor

¹Department of Plant Pathology, North Carolina State University, Raleigh 27695, ²Department of Plant Pathology, Michigan State University, East Lansing 48824



Phone: 703-838-5211

Fax: 703-838-5212

E-mail: afe@endowment.org

Website: www.endowment.org

BACKGROUND

Phytophthora diseases affect a large number of not only floriculture crops but also other ornamental crops and trees. At present, there is not a clear picture of the species diversity of *Phytophthora* affecting floriculture crops, and their sensitivity to commonly used fungicides. The interchange of plant material in floriculture provides an avenue for movement of pathogens including fungicide resistant strains. A survey of *Phytophthora* species attacking floriculture crops and their sensitivity to fungicides is needed.



Crown rot of African violet caused by *Phytophthora nicotianae*

MATERIALS AND METHODS

From 2001 to 2002, 29 greenhouses in 17 counties across NC were surveyed for crops with symptoms of Phytophthora root rot, crown rot, and blight. Isolations were made in the lab from representative symptomatic plants. Subsequently, the isolates were identified to *Phytophthora* species by morphological and DNA characteristics.

Isolates were characterized for compatibility (sexual) type and sensitivity to mefenoxam, a widely used fungicide in the floriculture industry for Phytophthora control.

Crops sampled. Although 41 plant species were represented from a total of 3,831 plant samples, *Phytophthora* spp. were recovered only from eight. They are: African violet, dusty miller, English ivy, gerbera daisy, lavender, pansy, petunia, and vinca. The isolates came from up to seven greenhouses depending on crop and from six NC counties.



Crown rot of gerbera daisy caused by *Phytophthora cryptogea*.

Phytophthora species. The diversity of *Phytophthora* species identified from floriculture crops in NC was surprisingly narrow. The two most common species were *P. cryptogea* and *P. nicotianae*. *Phytophthora cryptogea* was isolated from dusty miller and gerbera daisy, while *P. nicotianae* was recovered from African violet, lavender, pansy, petunia, and vinca. *P. palmivora* was recovered only from English ivy.

Compatibility type. In heterothallic *Phytophthora* spp., hyphae from two different sexual types must interact for oospore formation. Oospores survive long periods and may have different genetic characters than the parent strains. Only the A1 type of *P. cryptogea* and *P. palmivora* was found. Thus, oospores would not be expected in the disease cycle of these pathogens on the crops sampled.

However, for *P. nicotianae* both A1 and A2 types were found but not on the same crop. So even with *P. nicotianae*, a greenhouse operation would have to produce a range of crops for the possibility of oospore production to occur.

Genetic diversity comparison.

Isolates of *P. nicotianae* from African violet in NC were compared by DNA pattern with isolates from bacopa, dusty miller, fuchsia, snapdragon, and verbena from other states. The isolates from the NC crop were genetically different from the isolates from the hosts in other states. The lack of genetic diversity of *P. nicotianae* within a specific crop implies that the pathogen is spreading asexually (sporangia, chlamydo spores, or hyphae in infected plants) within a greenhouse facility. Also, evidence was obtained that specific strains of *P. nicotianae* were moving on infected plant material between growers.

Fungicide sensitivity.

Slightly over 50% of the *Phytophthora* isolates recovered (248) were sensitive to mefenoxam. For *P. cryptogea*, 3% of isolates were sensitive, whereas, 31% were intermediate, and 66% were insensitive to the fungicide. For *P. nicotianae*, 79% of the isolates were sensitive to mefenoxam, but the remainder were insensitive. All isolates of *P. palmivora* were sensitive to mefenoxam. This large percentage of isolates of

P. cryptogea and *P. nicotianae* that are not sensitive to mefenoxam is alarming. Nationally it warrants more attention to see if this state trend is occurring across the country.

CONCLUSIONS

- Phytophthora diseases were limited to a number of floriculture crops grown in the NC.
- Of 41 crops represented in over 3800 plant samples, *Phytophthora* spp. were isolated only from African violet, dusty miller, English ivy, gerbera daisy, lavender, pansy, petunia, and vinca.
- A rather limited number of *Phytophthora* spp.; including *P. cryptogea*, *P. nicotianae* and *P. palmivora*, were attacking floriculture crops in NC.
- Asexual reproduction by means of sporangia and chlamydo spores was indicated, due to lack of different compatibility types of *Phytophthora* spp. on the same crop.
- Almost 50% of the *Phytophthora* isolates recovered from the various floriculture crops in NC were not sensitive to the fungicide mefenoxam.

IMPACT TO THE INDUSTRY

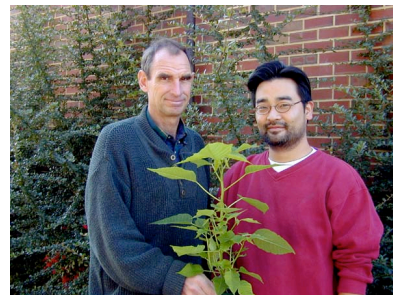
1. Even though *Phytophthora cryptogea* and *P. nicotianae* have wide host ranges on floriculture crops, *Phytophthora* diseases occurred

on relative few floriculture crops in North Carolina.

2. Growers should be aware that *Phytophthora* pathogens are moving between greenhouse locations on infected plants. Thus, monitoring of pre-finish plant material is very important.

3. Failure of mefenoxam based fungicides to control *Phytophthora* outbreaks may be due to fungicide insensitive strains. Thus, other classes of fungicides may be needed.

Meet the researchers



Mike Benson & Jaesoon Hwang
919-515-3966
mike_benson@ncsu.edu



M.K. Hausbeck
Michigan State University



Kurt Lamour
University of Tennessee