



Nursery Crop Pathogens and Beneficial Re-use of Nursery Irrigation Water

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Why NJAES investigators initiated this field research

In 2003, given the risks of recycled water use spreading plant pathogens, the risk of causing crop nutrient imbalances, and the costs and efficacy of fungicides, NJAES field researchers started asking questions about these practices.

New Jersey nursery farmers are being encouraged to install retention ponds and configure their operations to beneficially re-use nursery irrigation water in plant production. USDA NJ-NRCS offers cost-sharing incentives for constructing recycling practices through the federal Environmental Quality Incentives Program (EQIP). The State of NJ DEP is proposing to codify water re-use in their agricultural water use regulations.

What did we expect to find?

Phytophthora blight diseases are extremely destructive to ornamental crops and farmers' livelihoods. Phytophthora caused the blight of the Irish Potato Famine, and all farmers, including nursery, are rightly fearful of the economic destruction Phytophthora blights can wreak. NJAES initiated this field survey research out of concern for, and expecting to find, *Phytophthora cinnamomi*.

Recycled water from nursery retention ponds at 5 New Jersey nurseries were surveyed on 5 sampling dates, using 3 different "baits" to attract plant pathogens. The baits were apples, pears, and lemons, which were buried at the edge of the nursery ponds. After about 1 week, field technicians or students dug up the plant disease baits, brought them to the laboratory, isolated from lesions, and plated out samples to



Ornamentals became New Jersey's largest agricultural industry in 1985, and have continued, accounting for about \$300,000,000 farm gate sales by 2004. Azalea is an ornamental crop susceptible to Phytophthora.

identify what infectious plant pathogens were in the nursery retention pond water.

What did our initial results reveal?

By the middle of the season, it became evident unusual preliminary results were being found that have important implications for New Jersey's industry. No *P. cinnamomi* was isolated from the pond baits. The investigators did find *P. cactorum*, *P. dreschlerii* (a complex of minor Phytophthora fungi), and *P. parasitica* (which we commonly see as Buckeye rot of tomatoes in gardens and fields).

These initial results have implications for cost and effectiveness of fungicides used on New Jersey nurseries. Early results show *P. cinnamomi* might not be transmitted around nurseries, but rather is being imported on plant materials or from neighboring local plants.



Sabrina Tirpak, Senior Laboratory Technician of the Rutgers Plant Diagnostic Laboratory and Nematode Detection Service prepares rhododendron sample for *Phytophthora* analysis.

We need research funding support to complete the epidemiological picture.

It may turn out some lesions farmers see on their plants are coming from outside the nursery. With further nursery sampling, our investigators may find the lesions farmers are now treating with expensive fungicides like Subdue® are not *Phytophthora cinnamomi*. We need field research support to complete the epidemiological picture. For example, on azaleas, the No. 1 die back problem is *P. cactorum*, not *P. cinnamomi*.

Our work has implications for residential gardeners with dying plants in their home landscapes, and the garden centers and landscapers providing services. Why? Fungicides suppress symptoms of *Phytophthora* plant diseases, but do not kill dormant infections on, or in, the plants. When the plants are then placed into landscapes and no longer treated, the disease emerges, injuring or killing that plant, and spreading to others in the landscape.

Fungicides are tremendously important. Fungicides reduce infection levels, reduce the rate of plant infections, and reduce the expression of symptoms. What fungicides are not doing is producing pathogen free plants, which is what farmers want to be doing, and what we want to be selling to consumers. People purchase a plant, put it in their landscape, and don't spray. The plant starts showing symptoms, spreads disease, and dies.



Pear bait sample from nursery retention pond is cultured for *Phytophthora*.

Together, let's find out what is really causing diebacks and lesions in our nurseries.

Going forward, NJAES investigators, and New Jersey farmers will want to learn more about this relationship.

1. We first need to start screening to get proper accurate diagnoses. What really are the lesions on ornamental crops New Jersey farmers believe are *Phytophthora* and treating for? If samples farmers are calling *Phytophthora* are found to be a different disease, everyone wants to know.
2. Since plant material moves widely, and the fungicide treatments are masking symptoms but not eliminating dormant infections, the industry in the U.S. may be moving *P. cinnamomi* rather than spreading it within nursery operations. We do know that the destructive *Phytophthora ramorum* spreads by moving plant materials.
3. Understanding plant nutrients in nursery recycled water use is an important complement to the plant diseases potentially in water. These studies are being conducted and reported by Extension Specialist in Nursery Management, Gladis Zinati.

If you are interested in making tax-deductible support gifts toward specific projects or supporting the advance of farm size neutral technologies sustaining New Jersey farms, please contact Jack Rabin, Associate Director – Farm Services (732) 932-5000 ext.610 or rabin@aesop.rutgers.edu.