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Research Progress and Impact

MICHIGAN AGRICULTURAL EXPERIMENT STATION
Michigan State University

# GUARDING MICHIGAN FRUIT AND NUT TREES AGAINST ROOT ROT

January 2005

## Summary of Research Accomplishments

- Launched a field test site dedicated to *Armillaria* root rot research next to the MAES Northwest Michigan Horticultural Research Station. The site, near Traverse City, is in the heart of the state's cherry industry.
- Improved understanding of *Armillaria* biology, which will make it easier to fight the disease effectively.
- Applied tools from modern molecular biology and genetics to speed detection of the fungus.
- Evaluated new biological and chemical controls.

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For questions about this or other MAES publications, contact Geoff Koch (kochg@msu.edu; 517-355-0123).

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*All USDA projects are peer reviewed.*

**www.maes.msu.edu**

Ray Hammerschmidt/MSU

*Armillaria*, a soil-borne fungus, first attacks the roots before eventually killing the entire tree. Here, a sour cherry tree succumbs to the disease.

Ray Hammerschmidt/MSU

MAES researchers launched a dedicated test site near Traverse City — the heart of Michigan's cherry industry. The new site will make it easier to conduct the kinds of multi-year tests that are most likely to produce fungus-resistant root-stocks.

For more information →

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Researchers at the Michigan Agricultural Experiment Station are working to find long-term and sustainable solutions to *Armillaria* root rot — a soil-borne fungal disease that threatens Michigan's $70 million-per-year cherry industry. The scientists' goals are to develop rot-resistant cherry rootstocks and to create management tools that growers can use to control *Armillaria*.

## RESEARCH ACCOMPLISHMENTS

**Launched a field test site dedicated to *Armillaria* root rot research next to the MAES Northwest Michigan Horticultural Research Station. The site, near Traverse City, is in the heart of the state's cherry industry.** Root rot afflicts a variety of fruit and nut trees in Michigan. Accordingly, several cherry species, along with apple, plum, grape and chestnut species, are being evaluated for *Armillaria* resistance. The dedicated test site is critical because the disease is slow to develop and requires years of continuous study to obtain fungus-resistant rootstocks.

Ray Hammerschmidt/MSU

MAES researchers are using tools from modern molecular biology, including polymerase chain reaction (PCR), to diagnose and study *Armillaria*. Here, *Armillaria* is grown in a lab dish for later analysis.

**Improved understanding of *Armillaria* biology, which will make it easier to fight the disease effectively.** *Armillaria* forms spidery tendrils called rhizomorphs that infect tree roots. To grow, the fungus also requires a food base, such as the decaying roots of fruit or nut trees. MAES researchers have made significant strides in understanding rhizomorphs, including:

- identifying the compounds in decaying roots that can stimulate rhizomorph formation,
- showing how *Armillaria* can break down a tree's natural fungus defenses,
- determining the relationship between the virulence of the fungus and its ability to form rhizomorphs,
- and developing a means to infect trees in the test plot that closely mirrors (making it easier to understand) how trees are infected in commercial orchards.

**Applied tools from modern molecular biology and genetics to speed detection of the fungus.** Identifying *Armillaria*-infested sites can be difficult. MAES researchers are using polymerase chain reaction (PCR) to assist in the molecular diagnosis and detection of the pathogen. PCR is the rapid copying of small amounts of genetic material, so the technique makes it possible to detect even tiny amount of fungus. The PCR test will be useful in orchard surveys and in determining which fallow fields might be infected with the fungus.

**Evaluated new biological and chemical controls.** MAES researchers have identified a fungus-fighting species of bacteria that grows in Michigan's soils and is compatible with cherry production. Use of the bacteria could lead to biologically-based sustainable control of the fungus.



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