

2024

# Exploring New Solutions to Solve Old Problems



UNIVERSITY OF DELAWARE  
COOPERATIVE  
EXTENSION

## RELEVANCE

Phytophthora fruit rot caused by the oomycete \*Phytophthora capsici\* is a major challenge to cucurbit production within the Mid-Atlantic region.



Sandy Soil

Favors root-knot nematode \*Meloidogyne incognita\*,



Reduces yields in cucurbit hosts

Phytophthora fruit rot and root-knot nematode are well above high economic threshold levels



Innovative management strategies are needed

Biofumigation releases compounds into the soil that kill certain plant pathogens.



Current management practices recommend spring planting



Results in biofumigation occurring too late for watermelon or pumpkin

## RESPONSE

Through a research project funded by the Methyl Bromide Transition Program, UD is seeking to address if fall planted biofumigants can be optimized for fall incorporation to improve the feasibility of implementing this management approach.



### Molecular approach



Track if pathogen populations have been reduced

### Fall 2023 Field research started

- Disease trials
- Variety x planting date trials
- Nitrogen rate trials

Fall 2024 through the 2025 growing season

### October 2024

A field day was held to provide interested stakeholders with research updates and demonstrations.



## RESULTS

Losses due to Phytophthora Fruit Rot were reported as **10%** to more than **50%** over the past **5-year** period.

Field day participants represented **>3,200**



**100%** interested in reducing disease pressure using biofumigant crops



One participant, a grower with the necessary field equipment to plant biofumigant crops, said, **“Why not try it, nothing to lose, everything to gain.”**



**38%** Sept/Oct biofumigant seeding for overwintering and April biofumigation

**25%** August biofumigant seeding for October/early November biofumigation

**12%** March/April biofumigant seeding for late May biofumigation

**25%** Unsure of what timing would best fit their operation.



---

## RELEVANCE

Phytophthora fruit rot caused by the oomycete \*Phytophthora capsici\* is a major challenge to cucurbit production within the Mid-Atlantic region. Sandy soils in the Mid-Atlantic also favor the accumulation of root-knot nematode, \*Meloidogyne incognita\*, which significantly reduces yields across numerous cucurbit hosts and rotation partners. In recent years, the sporadic losses to Phytophthora fruit rot have increased in frequency and nematode populations are well above high economic threshold levels. There is a critical need for innovative management strategies for the sustained success of watermelon and pumpkin production in the Mid-Atlantic. Biofumigation involves growing specific crops, like mustards, and incorporating the green crop material into the soil. The chopped biofumigant crop material releases compounds into the soil that kill certain plant pathogens and nematodes, potentially resulting in reduced disease pressure and increased yields. Current management practices for the use of biofumigant mustard recommend a spring planting date, but this results in biofumigation occurring too late in the season for timely planting of watermelon or pumpkin crops in the same season in the Mid-Atlantic.

---

## RESPONSE

University of Delaware Cooperative Extension, through a research project funded by the Methyl Bromide Transition Program, is seeking to address if fall planted biofumigants can be optimized for fall incorporation or overwintered for early spring biofumigation to improve the feasibility of implementing this management approach. In addition to monitoring biofumigant crop establishment by assessing plant biomass and quantifying the release of biofumigant compounds, a molecular approach is being developed that aims to quantify pathogen DNA recovered from the soil before and after the use of a biofumigant crop to help track if pathogen populations have been reduced. Field research began in the fall of 2023 and has continued with two disease trials, two variety x planting date trials, and two nitrogen rate trials established for fall 2024 through the 2025 growing season. A field day was held in October 2024 to provide interested stakeholders with research updates and demonstrate the steps necessary for successful crop incorporation.

---

## RESULTS

Field day participants represented greater than 3,200 acres of watermelon production raised or scouted, and 100% were interested in the potential to reduce disease pressure using biofumigant crops. Losses due to Phytophthora Fruit Rot were reported as 10% to more than 50% over the past 5-year period. While the implementation of biofumigant crops has multiple barriers, this project is addressing biofumigant planting dates to see if fall planting can be used to avoid losing a cropping season. 38% of participants were interested in Sept/Oct biofumigant seeding for overwintering and April biofumigation, 25% in August biofumigant seeding for October/early November biofumigation, 12% in March/April biofumigant seeding for late May biofumigation, and 25% were unsure of what timing would best fit their operation.

One participant, a grower with the necessary field equipment to plant biofumigant crops, said, “Why not try it, nothing to lose, everything to gain.”

---

## PUBLIC VALUE STATEMENT

This project is providing valuable data to optimize use of biofumigant crops and assess the impact on pathogen populations. These findings support UD researchers' ability to refine guidelines on successful implementation of biofumigant crops to reduce disease pressure and yield loss.