

Sustainable Soil-Borne Disease Management:

A Study of the Effects of Soil Solarization and Biofumigation on *Sclerotinia sclerotiorum*

Michael Bomford and Brian Geier, Kentucky State University Community Research Service

Paul Vincelli, University of Kentucky Department of Plant Pathology

Biofumigation



Biofumigation is the use of natural chemicals to suppress soil pests. We are looking for mustard accessions with high levels of biofumigant chemicals called glucosinolates (GSL's), then testing them in a lab and on a farm for toxicity to our target disease. We treat soils by chopping and mashing the mustards by hand, then roto-tilling them into soil.



Disease: *Sclerotinia sclerotiorum*



Sclerotinia sclerotiorum is a soil borne disease that affects a broad range of crops. It thrives in cool, moist conditions like those inside high tunnels during winter months. Its reproductive bodies are small black "sclerotia" which can survive in soil for several years. With cool moisture, these can germinate small "apothecia" (mushroom-like structures) which spread spores and infect crops.



Solarization

By trapping solar heat in the soil with a cover of clear plastic, soil solarization can increase temperatures to a level that kills pests. We are testing solarization alone and in combination with biofumigation on *S. sclerotiorum*.

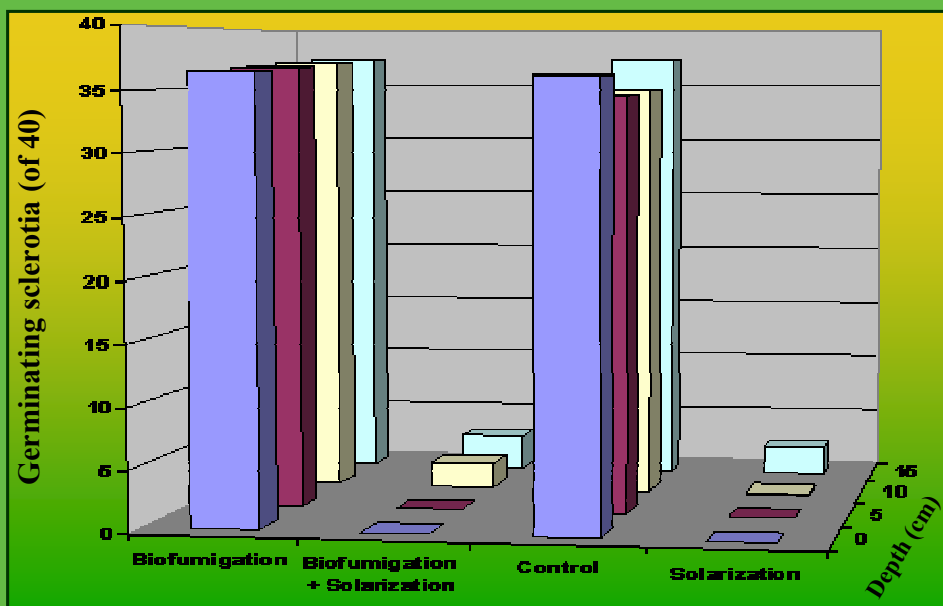


On Farm Experiment

Au Naturel Farm is a small diversified farm growing vegetables organically in Smith's Grove, Kentucky. In one of their high tunnels, we are exposing sclerotia to different soil treatments (Biofumigation, Solarization, Biofumigation + Solarization, and a Control). Bags containing sclerotia were buried at the soil surface, and 5, 10 and 15 cm below the soil surface in each treatment. Bags were recovered 2, 4, and 6 weeks later, and taken to a lab for germination tests.



Treatment and Soil Depth effects on Sclerotia Survival



2007 Results

In 2007, we found that consistent, high temperatures created by solarization nearly eliminated sclerotia populations down to 15 cm in the soil after 4 weeks of treatment. Biofumigation, by our methods, had no effect on populations of sclerotia.

In 2008, we will repeat this experiment with mustards that we find have higher level of glucosinolates. We will also increase the amount of macerated mustards used, in an attempt to release more GSL's into the soil.

Effects of Time, Depth, and Solarization on Soil Temperature

