Subject: ARS Project: BIOFUMIGATION OF BARK-BASED MEDIA WITH MUSCODOR ALBUS (413096) Annual Report

Date: July 12, 2014 1:28:02 AM EDT

Related Topics

Project Team

> Grunwald, Niklaus - *Nik*

Project Annual Reports

> 2010
> 2009
> 2008

Related National Programs

> Plant Diseases (303)
> Small Fruit Breeding
> Foliar Pathology
> Food Chemistry
> Grape Research

<img alt="DCSIMG" id="DCSIMG" width="1" height="1" src="//wt-

Research Project: BIOFUMIGATION OF BARK-BASED MEDIA WITH MUSCODOR ALBUS

Location: Horticultural Crops Research

2010 Annual Report

1a.Objectives (from AD-416)

Determine the conditions required for effective biofumigation of soilless bark-based media.

1b.Approach (from AD-416)

Bark media infested with Phytophthora citricola or Verticillium dahliae will be treated with Muscodor albus at different rates using two different formulations. Data on recovery of the pathogens from the media, plant disease development, and effects on plant growth will be evaluated. Documents Grant with Oregon State.

3.Progress Report

It was necessary to modify the project because of the non-availability of Muscodor albus cultures and inoculum, and in light of new information on the health hazard of volatiles released by M. albus. Initial biofumigation tests were completed with inoculum produced from a culture obtained from Montana State University. Meanwhile, Agraquest, Inc. (Davis, CA) obtained an exclusive license for use of M. albus. All experiments with M. albus, including those with cultures grown in university labs, required a Materials Transfer Agreement (MTA) with Agraquest, Inc. An MTA between Agraquest and Oregon State University, completed in Sept. 2009, stipulated that Agraquest would provide OSU with a rye formulation of M. albus. However, in the process of pursuing EPA registration, Agraquest discovered that volatiles produced by the fungus pose a significant human health hazard. Agraquest is no longer making or handling Muscodor formulations, is no longer pursuing EPA registration, and is discouraging the scientific community from working with this organism because of the toxicity of the active ingredient. A manuscript describing the active ingredient and its toxicology is being prepared for publication. The experimental approach of this grant was modified to examine other methods of substrate decontamination that could be used as an alternative to chemical fumigation. This includes in situ steam pasteurization, solarization, and use of two registered biological control agents, SoilGard and RootShield, to control soilborne diseases. Two experiments are being conducted in commercial greenhouses. The first factorial experiment consists of three substrate treatments (untreated, remove and replace, aerated steam in situ) and three

biocontrol treatments (no biocontrol, SoilGard, and RootShield). The second experiment tests the efficacy of solarization under two types of plastic film (3-mil polyethylene vs. 6-mil infrared polyethylene) followed by each of the biocontrol treatments. Substrate was sampled before and after treatment to bioassay viability of Pythium spp., Thielaviopsis basicola, and Rhizoctonia solani. Pathogen inoculum was also buried 10 cm deep in each of the plots prior to treatment, then plated after plot treatment to determine viability. Substrate temperatures were monitored at 4- and 10-cm depths. Plots were planted with woody cuttings and 20 plants per plot were rated for root quality and/or disease severity. The field experiments have been completed except for root ratings in the solarization experiment. Laboratory and greenhouse bioassays of the collected substrate are still underway. All experiments should be completed by October 2010 with a final project report available by December 2010.

Methods of ADODR monitoring included meetings, e-mail, and phone calls.