RESIDENT BIOLOGY RESTRICTS *MACROPHOMINA PHASEOLINA* IN BRASSICACEOUS SEED MEAL AMENDED SOIL

Mark Mazzola[*1], Xiaowen Zhao[2], and Michael F. Cohen[3]

[1] USDA-ARS Tree Fruit Research Lab, Wenatchee, WA; [2]Washington State University TFREC, Wenatchee, WA; [3]Sonoma State University, Rohnert Park, CA

Numerous studies have attempted to develop economically viable non-fumigant soilborne disease control programs. Often times, plant-derived or manure-based amendments have been the foundation of such programs. However, in the majority of instances the potential of such a strategy has not been realized due to a lack of understanding of functional mechanisms resulting in an inability to utilize organic amendments with predictable outcomes. The objective of this research program is to garner a greater capacity to manage and predict development of native soil biology-mediated processes that contribute to disease suppression in strawberry production systems. In this study, the relative contribution of the resident soil biology to the suppression of *Macrophomina phaseolina* in response to brassicaceous seed meal amendments was determined.

Seed meals were sourced from *Brassica napus* (canola), *Sinapis alba* (white mustard) and *Brassica juncea* (oriental mustard). *M. phaseolina* was sensitive to allyl isothiocyanate generated in soils amended with *B. juncea* seed meal (Fig. 1). When inoculated with *M. phaseolina* all seed meal amended soils limited persistence of the pathogen relative to the non-treated control. This was observed irrespective of whether a biologically active chemistry (e.g. allyl isothiocyanate by *B. juncea*) was produced in response to the seed meal amendment (Fig. 2). In contrast, after two weeks all three seed meal amended soils possessed elevated biomass of *M. phaseolina* relative to that in the control soil (Fig. 3). At six weeks, apparent biomass of *M. phaseolina* had diminished substantially in soil amended with *B. juncea* seed meal, but remained elevated in both *S. alba* and *B. napus* amended soils (Fig. 3). These initial data suggest that the resident soil biology is active in the suppression of *M. phaseolina* that is achieved in response to brassicaceous seed meal amendments.

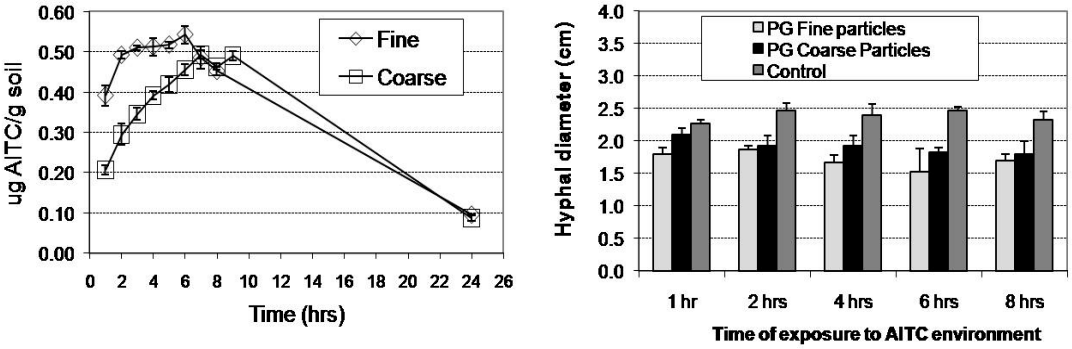

Figure 1. Emission of allyl isothiocyanate from soil amended with coarse or fine particles of *Brassica juncea* seed meal (left panel) and hyphal growth of *Macrophomina phaseolina* after exposure to the emitted AITC for the denoted time period (right panel).

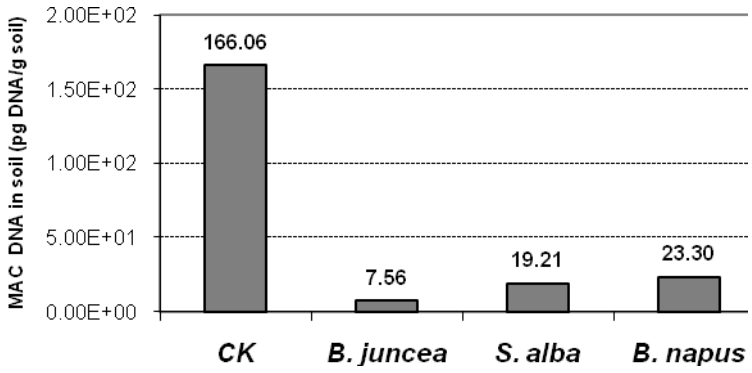

Figure 2. Relative abundance of *Macrophomina phaseolina* in native soil amended with brassicaceous seed meal as determined by real-time quantitative PCR.

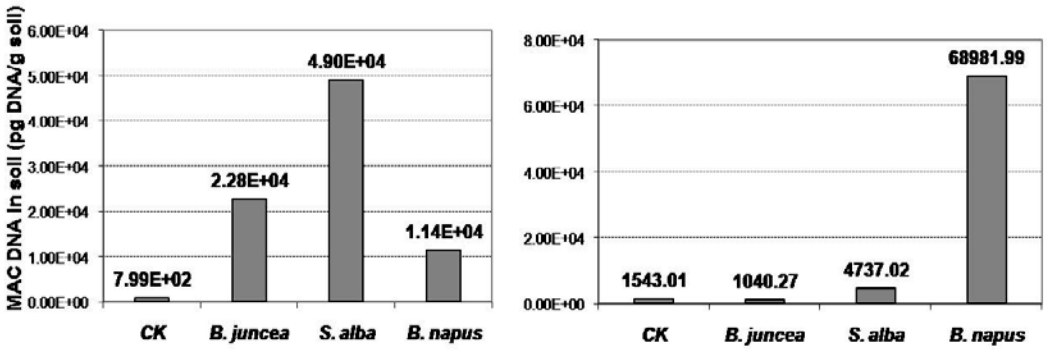

Figure 3. Relative abundance of *Macrophomina phaseolina* in pasteurized soil amended with brassicaceous seed meal as determined by real-time quantitative PCR after two (left panel) and six (right panel) weeks incubation.