POPULATION STRUCTURE AND HOST PREFERENCE OF *MACROPHOMINA PHASEOLINA* ON STRAWBERRY

Frank Martin[1], Steve Koike[2], Renee Arias[3] and Marina L. Ramon[1]
[1]USDA-ARS, Crop Improvement and Protection Research Unit, Salinas, CA 93905, [2]University of California Cooperative Extension Monterey County, Salinas, CA 93901, [3]USDA-ARS National Peanut Research Laboratory, Dawson, GA 39842

Summary: Population analysis using SSR markers of 266 isolates recovered from different hosts in California combined with results previously reported on East coast isolates recovered from a variety of hosts (Arias et al. 2011) identified a single clade containing 98% of the strawberry isolates. Four strawberry isolates didn't group with the rest of the isolates from this host, three of these represent new genotypes recovered from Ventura County in the 2014 season. Five isolates from cantaloupe, almond and pistachio from California and sunflower from Tennessee also grouped within the main strawberry clade. Genotypic analysis of 62 isolates recovered from adjacent fields in Santa Maria revealed 60 of the isolates were clonal. A similar analysis of 28 isolates from the same field in Salinas revealed more diversity, with two main groupings and 3 singletons that were similar to one of the groupings. Pathogenicity tests with a subset of isolates recovered from strawberry were virulent on this host but did not cause disease on the other plant species tested; however, the strawberry isolate collected in 2011 that did not group with the rest of the isolates from this host exhibited low virulence on strawberry. Additional pathogenicity tests are in progress to better evaluate if there is a correlation between genotype and host range.

Background: Beginning at least as early as 2005 the California strawberry industry has seen the significant increase of charcoal rot caused *by Macrophomina phaseolina*. The problem was initially confined to two counties, Orange and Ventura. However, by 2014 the pathogen had been confirmed by researchers in all the major strawberry producing regions as well as in other parts of the state that have smaller acreage. Confirmed counties are the following: San Diego, Orange, Ventura, Santa Barbara, San Luis Obispo, Monterey, Santa Cruz, San Benito, Santa Clara, Alameda, Sacramento, and Fresno. In addition to the increasing list of counties reported to have diseased strawberries, for each county the number of infected fields likewise increases each season. Symptoms consist of wilting of foliage, plant stunting, and drying and death of older leaves, though the central youngest leaves often remain green and alive. Plants can eventually collapse and die. When plant crowns are cut open, internal vascular and cortex tissues are dark to orange brown. In locations where the disease has occurred for more than one season, the patches can be quite large and appear to have spread from the initial problem area. In some parts of California (Ventura County,

primarily*) M. phaseolina* and *Fusarium oxysporum* together cause significant plant decline. It is noteworthy that in these cases we have never isolated other important, well known pathogens such as *Colletotrichum*, *Phytophthora*, or *Verticillium* spp.

In California, there is a strong correlation between fields most seriously affected by these plant collapse problems and the use of pre-plant, bed-applied alternatives rather than the standard methyl bromide + chloropicrin broadcast applications. With the shift away from available, effective fumigants that have been historically used by the strawberry industry, this disease situation is a critical threat to the long term health of the strawberry industry. The ten year spread of *M. phaseolina* to previously uninfested parts of California indicates that charcoal rot is currently the number one threat to the industry which at present does not have satisfactory plant resistance with which to combat the pathogen.

References

Arias, R.S. Ray, J.D., Mengistu, A. and Scheffler, B. E. (2011) Discriminating microsatellites from *Macrophomina phaseolina* and their potential association to biological functions. Plant Pathology 60:709-718.

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