EVALUATION OF ROOTSTOCKS AND FUMIGANTS FOR CONTROL OF ALMOND REPLANT DISEASE

G. Browne*[1], J. Connell[2], H. Becherer[1], S. McLaughlin[1], S. Schneider[3], R. Lee[1], and E. Hosoda[4]

[1]USDA-ARS, Dept. of Plant Pathology, Univ. of Calif., Davis; [2]UCCE, Oroville, CA; [3]USDA-ARS WMRL, Parlier, CA; and [4]Cardinal Professional Products, Woodland, CA

Introduction. A severe replant disease (RD) has affected many first-year almond orchards in the upper Sacramento Valley. The disease is characterized by a failure to grow and death of almond trees that are planted at cleared field sites with a recent long-term history of almond culture. In severely affected blocks, RD has rendered more than 50% of the trees dead or commercially unacceptable. At the affected sites, the potential for RD does not apparently dissipate quickly with time; repeated attempts to establish trees in the affected orchards typically fail unless pre-plant fumigation is used. We conducted research to determine practical short-term control measures for the RD.

Materials and Methods. Duplicate trials were established in 2002 in two orchards affected by RD near Durham CA. The diseased trees were removed by October, and an tractor-mounted auger was used to loosen the soil at each cleared tree site. Pre-plant fumigation treatments were imposed on the tree sites in November, and the sites were replanted with almond on selected rootstocks in February 2003. Depending on experiment, there were 8 to 10 replicate trees per treatment, arranged in 4 to 5 replicate blocks. Efficacy of the pre-plant and rootstock treatments is being determined according to tree survival, tree vigor, and increase in tree trunk diameter over the course of the first growing season.

Results and discussion. All of the experimental trees grew satisfactorily until May 2003. By July 2003, most trees planted in non-fumigated sites stopped growth and exhibited moderate to severe RD symptoms (Figs. 1, 2; Orchard 1 and Orchard 2). Lovell, Nemaguard, and Marianna 2624 rootstocks all were affected, although symptoms were most pronounced on the latter (Fig. 1). In the first experiment at both orchards, pre-plant fumigation with either methyl bromide:chloropicrin (75:25, 1 lb per tree site) or chloropicrin (1 lb per site) generally prevented RD. In the second experiment at each orchard, several fumigant alternatives were equal to or better than MB for preventing RD (Fig. 2). In Orchard 2, chloropicrin effectively prevented RD when used at 0.25, 0.5, 1.0, or 2.0 lb per tree site (Fig. 3).

Risk of almond RD continues in the Upper Sacramento Valley, and our previous research indicates that it has biological causes other than plant parasitic nematodes. Current results indicate that Nemaguard peach, Lovell peach, and Marianna 2624 rootstocks all are subject to RD, but Marianna 2624 is especially susceptible. Diverse fumigant formulations, including Midas, Telone II, Telone C35, and chloropicrin all offer excellent promise as MB alternatives for control of almond RD, and continued work is justified to refine application protocols and determine minimum effective dosages and areas of treatment. Research continues on causes and cultural control measures for almond RD.

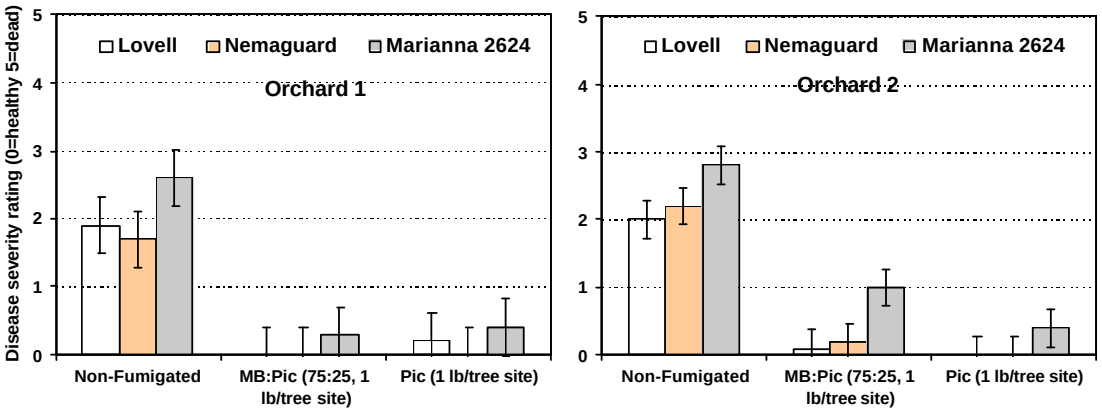

Fig. 1. Effects of almond rootstock and pre-plant fumigation treatments on severity of almond replant disease in two orchards near Durham, CA.

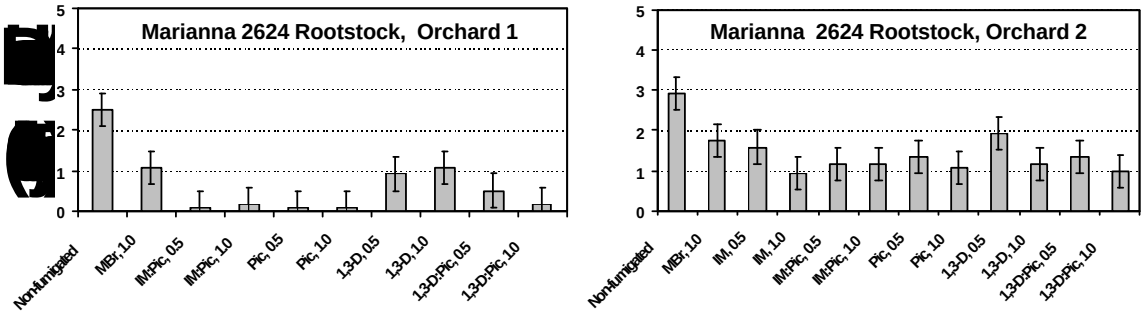

Fig. 2. Effects of pre-plant fumigation treatments on severity of almond replant disease in two orchards near Durham, CA (MBr=methyl bromide, IM=iodomethane, Pic=chloropicrin, 1,3-D=Telone II, 1,3-D:Pic=Telone C35; values indicate pounds per tree site).

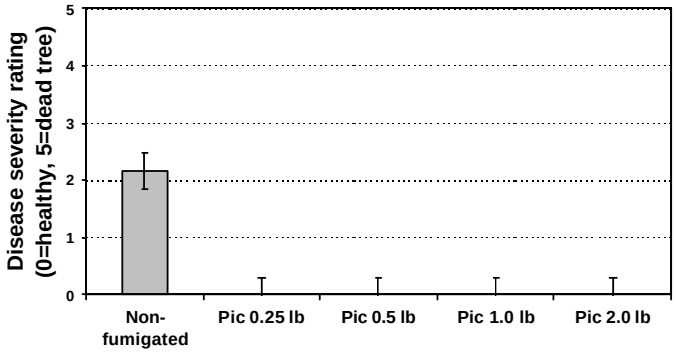

Fig. 3. Effect of chloropicrin rate (pounds per tree site) on incidence of almond replant disease in a trial near Durham, CA (Orchard 1) as of July 2003 in trees replanted in February 2003.

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