Nematicidal Activity of Biosolarization Using Almond Waste Amendments

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California produces more than 80% of the world's almond supply (99% of domestic supply). As side effect, almond by-product is generated in the form of almond hulls and shells. Soil biosolarization (SBS) is a fumigation alternative that may be able to utilize residual almond biomass. SBS induces hydrothermal inactivation of soil pests by covering moist soil with clear plastic tarp to promote passive solar heating. In addition, biopesticidal microbial activity induced by organic soil amendments can complement the heat stress to enhance pest inactivation. The goal of this work was to assess the potential of almond hulls and shells as amendments in SBS to produce biopesticidal organic acids and to inactivate root lesion nematodes in the soil. Laboratory experiments assessed biosolarization using nonpareil hulls (BH) and a mix of pollinator hulls and shells (BHS, 70:30 dry mass equivalent) at different times and application rates. To measure the nematicidal activity of treated soils, LC50 tests (lethal concentration that will eradicate half of the target population) were performed on *Pratylenchus penetrans* (root lesion nematode). Water extracts were prepared from treated soils with different amendment rates (from 0.25% to 5% amendment by dry weight) following 8 days of incubation under SBS conditions. Results showed a linear positive correlation between organic acid accumulation and the amendment rate. Organic acid levels on the order of 292.17 and 297.04 mmol/g of soil were observed for BH and BHS, respectively, in soils amended with 5% biomass. Water extracts from these soils exhibited complete inactivation of root lesion nematodes within 6 hours. These preliminary results demonstrate the potential for almond residual biomass to be used in biosolarization to displace conventional fumigation. This study can motivate and inform field trials to confirm the nematicidal activity of SBS using such amendments.