

## **METHYL BROMIDE ALTERNATIVES FOR VINEYARD REPLANT – ASSESSMENT OF CONTROL EFFICACY, FUMIGANT MOVEMENT, AND CROP RESPONSE**

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Common soil problems associated with wine, raisin, or table grape replant include compaction, pH and nutrient imbalances, salinity, and soil-borne diseases and pathogens including phylloxera, plant-parasitic nematodes and fungi. Soil fumigation with either methyl bromide (MeBr) or 1,3-dichloropropene (1,3-D) and chloropicrin (CP) is used by the grape growers in central California to control these soil-borne pests. However, MeBr has been found to destroy stratospheric ozone and its production and importation as a soil fumigant in the United States has been terminated except for critical use exemptions (CUE). In addition to its direct toxicity to humans and the ecosystem, 1,3-D/CP is also highly regulated because the chemicals contribute to overall volatile organic compounds (VOCs) emissions which react with nitrogen oxides in the ambient air under sunlight to form ground level ozone harmful to people and plants. The overall objective of this project was to assess current and new soil fumigation methods for pest control efficacy, fumigant emissions and movement in the soil, and crop responses; and demonstrate a small selected set of alternative techniques in growers' fields. The project is part of the USDA-ARS Pacific Area-Wide Pest Management Program for Methyl Bromide Alternatives. This is the first year of a three year project and the first year field study was scheduled for October 2007. In this report, approaches for the project and current progress are summarized.

Approach: Seven main treatments are devised to address specific project objectives on pest control efficacy, emission reductions, and crop response.

Treatment 1 = Untreated, Bare soil  
Treatment 2 = Untreated, Cover crop  
Treatment 3 = Shank, Methyl bromide (448 kg/ha), HDPE  
Treatment 4 = Shank, Telone C35 (610 kg/ha), Bare soil  
Treatment 5 = Shank, Telone C35 (305 kg/ha), Bare soil/Manure  
Treatment 6 = Shank, Telone C35 (305 kg/ha), VIF  
Treatment 7 = Drip, InLine (305 kg/ha), VIF/Bare soil

Where HDPE represents high density polyethylene film, VIF is virtually impermeable film, both Telone C35 and InLine contain 1,3-D and 35% CP.

Treatment 5 will be split between bare soil and surface manure applications; treatment 7 split between VIF tarp or no tarp covers. The seven treatments will be replicated three times in a randomized-block experimental design. Treatment 2, 4, and one out of treatment 5-7 that would show good efficacy and low emissions will be demonstrated on a grower's field in the second and third year. During the fumigation experiment, soil moisture and soil temperature will be monitored at several depths, and replicated soil samples will be taken for texture analysis (sand, silt, clay, organic matter).

Pest control assessment includes monitoring native pests and counting the survival rate of nematodes, fungi, and weed seeds in buried sachets. Fumigant emissions will be measured with flux chamber measurements because of the relatively small size of each experimental treatment plot. Determination of crop response to fumigation treatments will be measured in vine growth rate, the pruning biomass when pruned back to a 2-bud spur after the second year, and grape yield from the third year on forward. Statistical comparisons will be made to determine treatment effects on crop growth and yield parameters. Cost assessments will be carried out on the alternative fumigation treatments.

Progress: This research was initiated in summer 2007 with a field study planned for October 2007 at the USDA-ARS San Joaquin Valley Agricultural Sciences Center located near Parlier, CA. Grape vines were removed in a one-hectare field area. Soil native nematode and fungal pathogens will be determined before and at various elapsed times after fumigation. The fumigation study is planned to occur in mid-October. Replanting will occur in March 2008. The experiment will be repeated in a nearby field in fall 2008.