METHYL BROMIDE ALTERNATIVES FOR GRAPE REPLANT

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Soil fumigation with either methyl bromide (MB) or 1,3-dichloropropene (1,3-D) and chloropicrin (CP) is used by grape growers in California to control soil-borne pests. However, MB 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). The CUE for all grapes (wine, raisin, and table grapes) is included under orchard replant in the CUE. The CUE for orchard replant (including grape replant) is a short term solution until alternatives to MB are identified, and active research on MB alternatives is required for the approval of nominated CUE requests. Soil fumigation with 1,3-D and/or CP is highly regulated because the chemical contributes 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. Regulations are being developed and modified to limit total fumigant emissions in townships, and require buffer zones to reduce potential exposure to farm workers and bystanders. The objective of this project was to evaluate a number of alternatives for soil fumigation with methyl bromide for grape replant. The project is part of the USDA-ARS Pacific Area-Wide Pest Management Program for Methyl Bromide Alternatives.

In the past five seasons, we have conducted plot scale experiments at the USDA-ARS Parlier Station and a grower field demonstration trial near Fresno, CA. The plot experiments consisted of eight treatments:

Treatment no.	Chemical	Rate (kg/ha)	Application	Surface Cover
1	Untreated control			Bare soil
2	Cover crop			White mustard
3	Methyl bromide	448	Shank	HDPE
4	Telone C35	610	Shank	Bare soil
5	Telone C35	305	Shank	Bare soil
6	Telone C35	305	Shank	VIF
7	InLine	305	Subsurface drip	VIF
8	InLine	305	Subsurface drip	Bare soil

HDPE is high density polyethylene film, VIF is virtually impermeable film, Telone C35 contains 61.1% 1,3-D, 34.7% CP, and 4.2% inert ingredients, and InLine contains 60.8% 1,3-D, 33.3% CP, and 5.9% inert ingredients.

Wine grape nursery transplants (*Vitis vinifera* var. Cabernet Sauvignon) were planted in the plot experiments in spring 2008. Soil nematodes and yield were measured. Figure 1 shows the yield data collected from the USDA ARS field 24 southeast plot experiment. The data clearly indicates a positive fumigation effect on the yield. Relatively low yields were found in the non-fumigated field plots (Treatment 1 and 2) and the low rate bare soil plots (Treatment 5 and 8).

The grower field demonstration trial consisted of four treatments in a randomized block design with three replications:

Treatment no.	Chemical	Rate (kg/ha)	Application	Surface Cover
1	Untreated control			Bare soil
2	Methyl bromide	448	Shank	HDPE
3	Telone C35	305	Shank	VIF
4	Telone C35	153	Shank	VIF

HDPE is high density polyethylene film, VIF is virtually impermeable film, Telone C35 contains 61.1% 1,3-D, 34.7% CP, and 4.2% inert ingredients.

Raisin grape nursery transplants (*Vitis vinifera* var. Selma Pete) were planted in the grower field trial in spring 2009. Soil nematodes and yield were measured. Figure 2 shows the yield data collected from this fumigation trial. The yield results clearly showed lower yield values in the untreated control than in any of the fumigated crop rows. The two Telone C35 treatments appear to show similar yield to the methyl bromide control.

Figure 1. Grape yield at the USDA field 24se in 2010 (*Vitis vinifera* var. Cabernet Sauvignon). Treatment 1 = Untreated control, 2 = Cover crop, 3=MB at 448 kg/ha, 4=Telone C35 at 610 kg/ha no tarp, 5=Telone C35 at 305 kg/ha no tarp, 6= Telone C35 at 305 kg/ha VIF tarp, 7= InLine at 305 kg/ha VIF tarp, 8= InLine at 305 kg/ha no tarp.

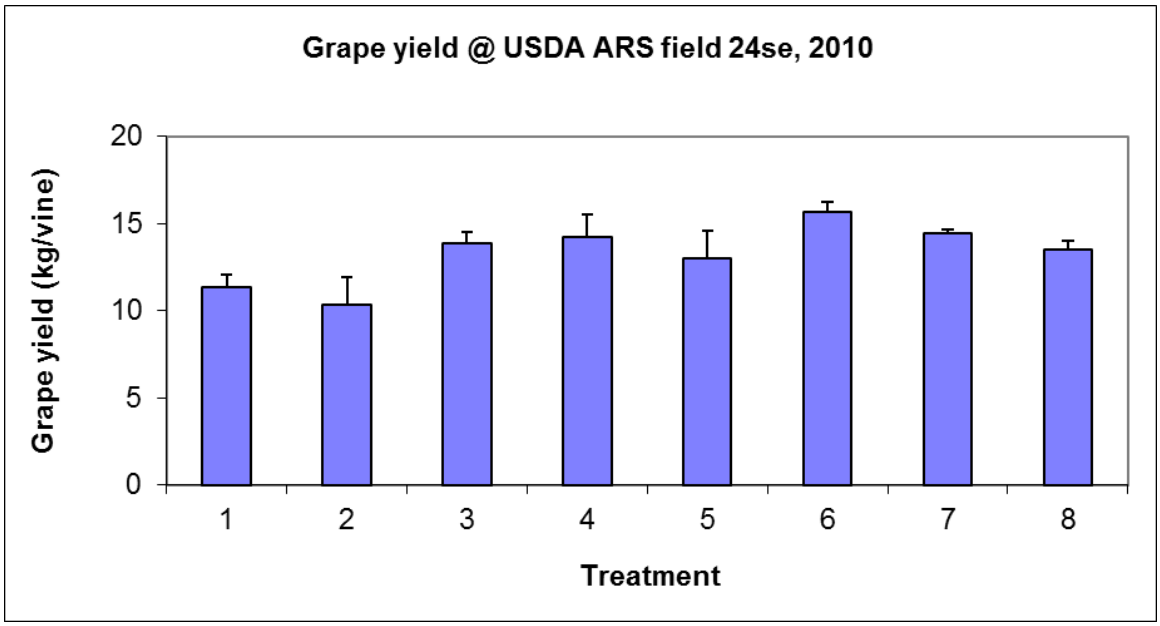

Figure 2. Grape yield at the grower demonstration field in 2010 (*Vitis vinifera* var. Selma Pete). Treatment 1 = Untreated control, 2 = MB at 448 kg/ha, 3 = Telone C35 at 305 kg/ha, 4 = Telone C35 at 153 kg/ha.