VINEYARD REPLANT UPDATE – PACIFIC AREA-WIDE PROGRAM FOR METHYL BROMIDE ALTERNATIVES

D. Wang*[1], J.A. Cabrera[1], J. Gerik[1], S. Gao[1], B. Hanson[2], G. Browne[3], K. Klonsky[2], S. Vasquez[4]

[1]USDA-ARS, Water Management Research Unit, Parlier, CA; [2]University of California, Davis, CA; [3]USDA-ARS, Davis, CA; [4]University of California Cooperative Extension, Fresno, CA

Grape growers in central California contract commercial fumigators to shank inject 1,3-D to control soil-borne plant parasitic nematodes during vineyard replant. The application depth is usually 46 cm and the soil surface is not covered with a plastic tarp. Potential 1,3-D emission losses have not been studied under this cropping system. To ascertain continued accessibility of 1,3-D products as a soil fumigant in grape replant, it is important to determine its pest control efficacy and reduce potential emission losses under the current fumigation practice. It is also critically important to evaluate other fumigation methods with different delivery and containment techniques to enhance fumigant distribution in the soil for pest control efficacy and emission reductions. According to an economic impact comparing fumigation with methyl bromide, grape growers in the Central Valley of California already suffer about 5% yield losses on acreage treated with 1,3-D. About 15% yield loss would be expected if without 1,3-D. The objective of this project was to determine the needs and alternatives for soil fumigation with methyl bromide for rape replant. The project is part of the USDA-ARS Pacific Area-Wide Pest Management Program for Methyl Bromide Alternatives.

In the past three seasons, we have conducted three field trials - two plot scale experiments at the USDA-ARS Parlier facility and one at a grower field demonstration trial near Fresno, CA. In all these trials, previous grape vines were removed, fumigation treatments were applied then replanted with new vines.

Plot Experiments at USDA-ARS Parlier

The first plot experiment was initiated in summer 2007 and repeated in 2008 and 2009 in a field (block 24 southeast in 2007/2008 and 24 southwest in 2008/2009) previously planted with grapes that exhibited root damage from nematodes and/or soilborne pathogens. Existing grape vines were removed, and the field was deep tilled to approximately 90 cm. Eight treatments were devised and implemented in a randomized block design with three replications. The treatments were:

- Non fumigated, Bare soil
- Non fumigated, Mustard cover crop
- Methyl bromide (MB), 448 kg/ha, HDPE tarp
- Telone C35, 610 kg/ha, Bare soil
- Telone C35, 305 kg/ha,, Bare soil
- Telone C35, 305 kg/ha, VIF tarp
- InLine, 305 kg/ha, subsurface drip application, Bare soil

- InLine, 305 kg/ha, subsurface drip application, VIF tarp

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

Earlier results have shown that live citrus nematodes were found only in the non-fumigated field plots (Treatment 1 and 2) and the 100% citrus nematode mortality achieved in all fumigation treatments indicated the effectiveness of nematode control with both MB and Telone C35 at low rates. New caliper vine diameter readings, measured in January 2010, from the 2009 replant in field 24 southwest showed that only the non fumigated plots (Treatment 1 and 2) appeared to have smaller vine diameter readings, a result likely caused by replant diseases.

Grower Field Demonstration Trial

A field demonstration trial was initiated in fall 2008 in a grape grower field near Fresno, CA. The field was about 3.5 ac in size and was previously cropped with Thompson seedless grapes for > 70 years. The experimental design was a randomized block with three replications for each treatment, and summarized in the following table:

- Non fumigated, Bare soil
- Methyl bromide (MB), 448 kg/ha, HDPE tarp
- Telone C35, 305 kg/ha,, VIF tarp
- Telone C35, 153 kg/ha, VIF tarp

Shank injection of methyl bromide and Telone C35 was done by TriCal on October 24, 2008. To estimate nematode control with these fumigation treatments, soil samples were taken prior to fumigation and sampled again at planting (March 11, 2009) and in the winter (December 9, 2009). The March 11 nematode data was previously presented, the December data was new (Figure 1). As can be seen, live nematodes were found only in the untreated control from the top 5-60 cm soil depth. Four types of nematodes were present in the soil: ring (*Mesocriconema xenoplax*), pin (*Paratylenchus hamatus*), stubby root (*Trichodoridae minor*), and dagger (*Xiphinema americanum)*. Because of just first year growth, no yield data can be collected. The caliper vine diameter readings also showed slower growth in the untreated control.

Figure 1. Average number of live nematodes found in the 5 to 60 cm soil profile from the untreated control treatment at the grower demonstration field on December 9, 2009. No nematodes were found in any fumigated plots.