ACROLEIN AND DMDS AS METHYL BROMIDE ALTERNATIVES IN TOMATOES

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Introduction: Fumigation for tomatoes in Western North Carolina (WNC) and surrounding areas is standard practice in order to suppress Verticillium wilt (race 2; VW) and weed pressure. Verticillium race 2 has been prevalent throughout the WNC production region and no commercial sources of resistance have been identified. Fumigation reduces inoculum to a depth sufficient to produce an economical harvest, although the disease invariably affects tomatoes toward the end of harvest, even in fumigated plots. Both Acrolein and DMDS were evaluated as pre-plant fumigant treatments as alternatives to methyl bromide. Weed control, disease pressure and crop yields were evaluated for each of the chemical treatments.

Materials and Methods: The study was conducted at the Horticultural Crops Research Station in Fletcher, NC using the tomato variety *Mountain Fresh*, a commercial line that is common in the region. Acrolein plots were formed on 30 May 2006 with two drip tapes to facilitate the drip application of the product. Acrolein treatments were made on 31 May 2006 by injecting the chemical directly into the irrigation system at three rates over a period of 2.5 hours. This injection time, along with the two drip tapes per bed, allowed the beds to be adequately treated without excessive water application. Indicator tomato plants were planted into the Acrolein plots 1, 7 and 14 days after application. DMDS treatments were applied and covered using a VIF film. Methyl bromide treatments were applied at a full rate under LDPE and ½ rate under VIF. Control plots of LDPE and VIF were also formed. All DMDS, methyl bromide and control plots were installed on 1 June 2006 using standard shank application equipment. Transplants were set into the field on 22 June 2006 for all plots which corresponded to 22 days after the Acrolein treatments and 21 days after the DMDS and methyl bromide treatments. Standard management practices were used in the trial including foliar disease and insect management, fertilizer recommendations and staking and stringing of plots. Tomato fruit were harvested weekly and to date have been harvested four times, but at lease two more harvests are anticipated before the end of the season. Harvest data were sorted into marketable categories: jumbo, extra large, large, medium, small and into cull fruit which included damaged misshapen or diseased fruit. Total marketable yields and VW incidence were assessed weekly; weed incidence was assessed during the first five weeks. The experiment was designed as a randomized complete block design with 4 replications per treatment. The internal section of each treated plot (50 ft) was planted to 12 plants

spaced 18 in between plants and the 8 in raised beds were 24 in wide with the center spaced at 5 ft intervals.

Results: To date, harvests are still in progress and a complete analysis of the data has not been conducted, but some preliminary results are presented here. Tomato transplants in the Acrolein plots that were planted 1, 7 and 14 days after application were monitored and evaluated for phytotoxicity. No signs of phytotoxicity were seen in any of the plants during the study. Weed data were collected by counting the number of plant holes that contained weeds, and then quantifying the number of broadleaves and grasses which were present. Figure 1 shows the percent plant holes with weeds, and significant treatment effects were noted. No significant differences in total weed control were noted between the methyl bromide treatments, the 75, 63 and 50 gal/A DMDS and the acrolein 200 lb/A treatments.

Yield data to date indicates that there is a yield reduction on the VIF film compared to LDPE film. There are no significant differences between any of the acrolein treatments or the methyl bromide or control on the LDPE film. On the VIF film, there were no significant differences between the methyl bromide treatment and the 38 and 50 gallon per acre DMDS rates (Figure 2).

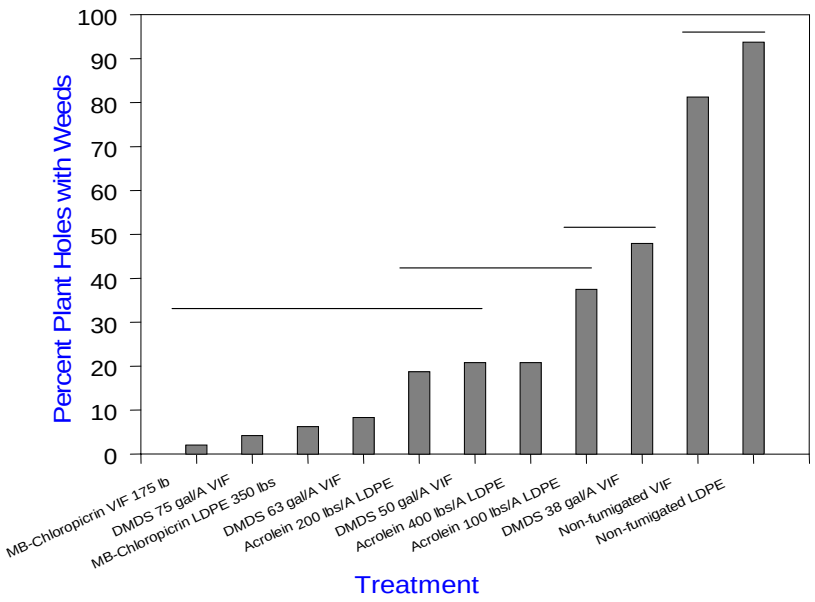

Figure 1. Percent of plant holes containing weeds during the first five weeks of the trial. Treatments with the same line on top are not significantly different (p=0.05).

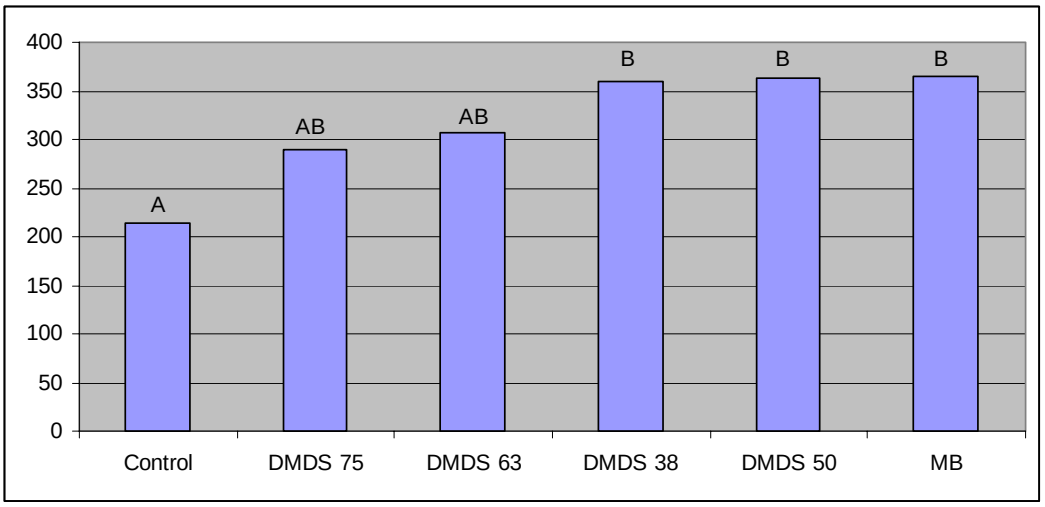

Figure 2. Tomato yields in pounds of marketable fruit on VIF plastic treatments. Treatments with the same letter are not significantly different (p=0.03).

Summary: Data will continue to be collected for this study through October, so the yield data is incomplete at this time. Currently, it appears that disease pressure this year was very low and yield differences were not expressed on LDPE plastic between treatments. VIF film appeared to reduce yields compared to LDPE plastic, and within the VIF treatments, the 2 lower rates of DMDS yielded similar to methyl bromide. Weed control for the higher rates of DMDS and Acrolein were similar to methyl bromide. No phytotoxicity was noted in any plants during this study, including the 1 day after treatment planting into the Acrolein treatments.