

## **DMDS RETENTION BY TOTALLY IMPERMEABLE FILM AND ITS EFFECTIVENESS FOR TOMATO PRODUCTION**

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As fumigant costs rise and buffer zone distances are driven by application rates, an effective method to reduce fumigant application rates while maintaining efficacy would be advantageous to growers. The use of totally impermeable film mulch (TIF) may provide that advantage. If this film can maintain high fumigant concentrations within the bed, efficacy may be achieved with low application rates.

### **MATERIALS AND METHODS**

Trials were conducted in the Spring and Fall of 2009 in commercial tomato fields on the Eastern Shore of Virginia. The spring trial was initiated on 10 April, 2009 to compare the efficacy of three rates of dimethyl disulfide/chloropicrin (79% DMDS: 21% chloropicrin) to an untreated control all under black TIF mulch provided by Raven Industries. Fumigant was injected eight inches below the surface of a bed measuring eight inches tall by thirty inches wide. Soil temperature was around 60°F during fumigant application. Plot size was a single mulched row 40 feet long. A randomized complete block design was used with four replications. The tomato cultivar BHN 602 was transplanted 45 days post fumigant application. Weed emergence through plant holes and through the plastic as well as bacterial wilt incidence was taken prior to harvest. Tomatoes were harvested and graded by USDA grades.

The fall trial was initiated on 7 July, 2009 to compare multiple rates and formulations of DMDS under TIF and VIF plastic mulch. Treatments used were: 30 GPA DMDS/Pic under TIF, 40 GPA DMDS/Pic under TIF, 50 GPA DMDS/Pic under TIF, 43 GPA DMDS under TIF, 40 GPA DMDS/Pic under VIF, 50 GPA DMDS/Pic under VIF, 60 GPA under VIF. TIF mulch was provided by Raven Industries and was compared to white on black VIF Blockade mulch. The TIF mulch used was black mulch that was painted white after application. Bed dimensions were similar to those in the spring trial. Soil temperatures and VOC readings were taken twice daily until transplanting. VOC readings were taken using a Minirae 3000 with a four inch headspace in the bed, reading holes were covered with tarp tape after measurement. Plot size was a single mulched row 50 feet long. The tomato cultivar BHN 602 was transplanted 30 days post fumigation. Tomatoes were harvested and graded by USDA standards.

### **RESULTS AND DISCUSSION**

Although sequential VOC readings were not taken in the spring, they were taken to determine when it was safe to transplant. Readings remained high well past 30 days. At

40 days VOC readings were still high (> 5000 ppm) and in the interest of time, the mulch was perforated in order to aerate the soil and ensure plant safety. At 45 days readings were minimal and seedlings were transplanted. Data from the spring trial is still being analyzed and will be presented in November.

VOC readings obtained in the fall trial are presented in Figure 2 with corresponding soil temperatures presented in Figure 1. The TIF mulch in combination with 50 gallons/acre of DMDS/Chloropicrin maintained similar VOC readings to the 60 gallon rate of DMDS/Chloropicrin for ten days longer. All treatments under TIF mulch maintained fumigant concentrations longer than the high rate of DMDS/Chloropicrin under VIF mulch. The DMDS alone at 43 gallons/acre under TIF dissipated the quickest with safe planting concentrations being reached at 23 days post fumigation. Weed and yield data will be collected later in the season and presented in November.

The TIF mulch appears to be technology that will allow for reduced fumigant application rates. It is unclear thus far how low the rates can go while maintaining efficacy. One problem that will likely arise is the long plant back period that will be needed in the spring due to cold soil temperatures. Most growers have more flexibility with fall plantings due to the longer window for fumigant application and planting schedules. If the plant back periods cannot be reduced in spring plantings, TIF mulch will likely not be feasible.

## Soil Temperature Measurement at Various Depths and Times Under Plastic Mulch



