EFFECTS OF MULCH TYPE ON THE EFFICACY OF DRIP-APPLIED METAM SODIUM AS A SOIL FUMIGANT

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Virtually impermeable film (VIF) has been reported to improve retention of fumigants within the raised plastic-mulched bed. The purpose of this study was to determine if VIF can enhance the efficacy of Vapam (42% Metam sodium EC) as a soil fumigant in reducing the ability of *Rhizoctonia solani*, *Fusarium solani*, *Pythium aphanidermatum*, and *Phytophthora capsici* to survive in the soil in a tomato and squash plasticulture production system. Since VIF has the ability to retain fumigants for a longer time than low-density polyethylene (LDPE) does, it is possible that Vapam can be effective against the above pathogens when applied at lower rates.

MATERIALS AND METHODS

Field studies were initiated in April and May 2004 at the Black Shank Farm in Tifton, GA on a Fuquay loamy sand (loamy, siliceous, thermic Arenic Plinthic Paleudults). Vapam was applied at three different rates: 25, 50 and 75 gallons per acre (GPA) by drip irrigation to raised 76.2 cm-wide beds three weeks before transplanting tomato (cv. BHN 444) and squash (cv. Prelude). Beds were covered with either LDPE or VIF. The experiments were arranged in a split-splot design with the rates of Vapam application plus an untreated check (control) as the main plot and the mulch type as the subplot with five replications.

Treatment effects on pathogen survival were determined by inserting mesh packets containing 50 beet seeds colonized with either *R. solani*, *F. solani*, *P. aphanidermatum* or *P. capsici*. The packets were inserted into the soil at a depth of 25 cm at 10 cm and 20 cm away from the drip tape. Tomato and squash roots were assessed for root galling on a 0-10 scale (0 = healthy and 10 = maximum galling) and root rotting on a 1-5 scale (1 = healthy roots and 5 = maximum root rotting) at harvest. Analysis of variance was performed on the data and mean comparisons were performed by the least significant difference (LSD) test.

RESULTS AND DISCUSSION

There was no significant reduction in the survival of *F. solani* and *P.*

capsici due to VIF across all rates of Vapam applied at two locations of insertion from the drip tape (Table 1). The survival of *R. solani* and *P. aphanidermatum* was only reduced significantly by VIF at the highest level of Vapam application. Survival of *R. solani* was significantly reduced by VIF at 75 GPA of Vapam 20 cm away from the drip tape. The root gall and root rot indices were generally very low to be impacted by the treatments (Table 2). Squash and tomato yields also were not significantly increased by VIF nor by Vapam applications when treated plots were compared with the nontreated plots.

In conclusion, the use of VIF generally does not enhance the efficacy of Vapam in reducing the survival of the pathogens under study.