EFFECT OF ACROLEIN CONCENTRATION APPLIED PREPLANT ON TOMATO AND BELL PEPPER

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Previous research conducted in tomatoes has demonstrated that acrolein could be considered a potential alternative to methyl bromide (MeBr). Data from these studies indicated that acrolein applied preplant has efficacy against many weed and pathogen species while providing yields equivalent to methyl bromide. These studies primarily evaluated acrolein when applied through drip tapes under plastic mulch in one acre-inch of water. This volume is ensures wetting across the growing beds for the soil type present at research locations. However, to date, no research has been conducted evaluating the effects of different concentrations of acrolein on vegetables and pests. Research presented here will attempt to address these questions.

A field study was initiated in April of 2007 to evaluate the effects of acrolein concentration on weed and nematode control as well as tolerance of tomato and bell peppers. The study was conducted at Brewton, AL in a fine sandy loam soil infested with root-knot nematode. Treatments included: acrolein at 200 and 400 lb ai/A, methyl bromide (MeBr 66/33) at 350 lb ai/A, and an untreated check. Both acrolein rates were applied through two drip tapes per bed in 0.25, 0.50, or 1.0 acre-inches of water, resulting in a high, medium, and low concentration for both rates. All plots were tarped with HDPE plastic. Tomatoes were transplanted at 14 and 21 days after treatment (DAT) while peppers were transplanted 21 DAT only. Data was collected for annual weed and yellow nutsedge (*Cyperus esculentus*) control. Due to a low population of yellow nutsedge, 10 nutlets were planted the day of application into plots for evaluation. Nematode counts were conducted 7 WAT and again at study completion. Data for root condition and amount of root galling were also taken. Yield data were compiled for both planting dates of tomatoes as well as bell pepper.

Annual weed species consisted primarily of crowfoot grass (*Dactyloctenium aegyptium*) and annual sedge (*Cyperus compressus*). Control of these annual weeds ranged from 83-99% with all acrolein treatments. Methyl bromide provided 6% control of these species. The authors have observed promotion of annual sedge with MeBr many times. Little difference in annual weed control was found between acrolein rate or among concentrations. Yellow nutsedge germination was lowest (0.25 tubers/plot) with 400 lb ai/A acrolein at the high concentration and highest (4.25 tubers/plot) with the 200 lb ai/A rate at the low concentration. However, no differences were found among concentrations within

a rate. Yellow nutsedge germination in the methyl bromide plots averaged 2.5 tubers.

The research area averaged 6000 root knot juveniles/100 cm3 of soil in 2006, but little activity was seen until final harvest in 2007. Samples taken 7 WAT showed almost no root knot larvae in the soil surrounding roots and little galling was evident at this point. At harvest, both soil and root samples contained root knot juveniles which ranged from 447 to 621 nematodes/100 cm^3s in soil, with no differences among treatments. Data collected from root samples reveal that MeBr had the poorest root condition with the most galling.

Yield data is reported as marketable fruit. For tomatoes, this includes jumbo, extra large, large and medium fruit. Bell pepper marketable yield includes fancy, number 1, and number 2 fruit. Yield numbers are based on eight plants harvested in each plot. For the 14-day tomato plantback, no significant differences were seen in either total number or total weight of marketable fruit. However, treatment differences were found in the 21-day plantback tomatoes. The 400 lb ai/A treatment yielded 123 marketable tomatoes with a weight of 51.5 lbs while MeBr yielded 101 marketable tomatoes with a weight of 43 lbs. When evaluating bell pepper yield, no significant differences were found.

Due to the lack of pest pressure, data presented here primarily represents tolerance tests for both tomatoes and bell peppers to acrolein applied preplant. Results from this study indicate that tolerance in these crops is not an issue when transplanting occurs at least 2 weeks after treatment. Future research will need to focus on establishing tolerance to acrolein for other crop species as well as the potential to use acrolein post-transplant in semi-perennial crops such as strawberries. While some research has been conducted at Auburn University addressing post-transplant options, more is needed to establish application recommendations.