

Tomato and Pest Response to Acrolein (2-propenal)

J. L. Belcher, R. H. Walker, R. Rodriguez-Kabana, E. Guertal and L. Simmons
Alabama Agricultural Experiment Station, Auburn University 36849-5412
belchjl@auburn.edu

Results from greenhouse studies were presented in 2004 (MBAO Orlando) that showed acrolein (Magnacide H, Baker Petrolite) was effective for control of plant parasitic nematodes (Rodriguez-Kabana) and weeds (Belcher and Walker). Rates needed for yellow nutsedge (*Cyperus esculentus*) control ranged from 672 - 784 kg ai/ha while nematode control could be achieved with a 50 to 70% reduction in these rates. Two field studies were initiated in 2005 with the objective of determining potential of acrolein to replace methyl bromide in tomato production. In the first study, (Shorter, AL) acrolein at 672 kg ai/ha was shank injected (5 shanks on 20-cm spacing) into a well tilled fine sandy loam soil to a depth of 10-15 cm followed by bedding and tarping (1 mil black LDPE). It is estimated that acrolein was 20 to 25 cm deep after the bedding operation. Methyl bromide 67/33 was shank injected at 448 kg ai/ha. Tomato (>Florida 47') was transplanted 15 days after application (DAA). Plots were 9 m in length and contained 20 tomato transplants. There were four replications of treatments. Water and fertilizer were applied through a single drip tape per bed. Sethoxydim and an experimental herbicide were applied postemergence for control of annual grasses and *Cyperus strigosus* in the acrolein treatment. Results showed that acrolein alone did not provide effective weed control. This was most likely due to the deep placement within the beds. However, Fusarium crown and root rot [*Fusarium oxysporum* f. sp. *radicis-lycopersici* (FORL)] was effectively controlled. Methyl bromide provide poor control of this disease. Tomato flower clusters/plant averaged 13.1, 3.1, and 3.3 for acrolein, methyl bromide and non-treated on July 12, 2005 (42 days after transplanting), respectively. Tomato root weights for acrolein averaged 26.2 g/plant while methyl bromide and the check averaged 13.5 and 9.8 g/plant, respectively. Root conditions [1-5 (poor) scale] averaged 1.6 for acrolein and 3.3 and 3.5 for methyl bromide and check, respectively. In a second study, (Brewton, AL) acrolein was applied at 224, 448, and 672 kg ai/ha shank injected (prebed) as previously described. Soil at Brewton is a fine sandy loam and acrolein was applied to a well prepared seedbed. The final depth of placement after bedding was estimated to be 15 cm. Three rates of acrolein were shank injected as described previously with final depth of placement after bedding estimated to be 15 cm. A total of 2.54-cm of water was applied to all beds over a 2-day period. Methyl bromide 67/33 was applied as above at 392 kg ai/ha. Tarp at this location was a 1.25 mil white/black HDPE. Tomato (>Florida 91') was transplanted August 8, 2005, 14 DAA. Nine days after transplanting, tomato vigor ratings [1-5 (excellent) scale] for the 224, 448, and 672 kg ai/ha rates averaged 4.1, 3.7, and 3.2, respectively. Average vigor for the non-treated was 3.1 and 2.3 for methyl bromide. Vigor ratings improved for the August 25 rating and acrolein at 224, 448 and 672 rates averaged 4.7, 4.6 and 4.0, respectively. The check and methyl bromide averaged 3.3 and 2.6, respectively.