EFFECT OF METAM SODIUM AND METHYL BROMIDE ON ROOT–KNOT WEEDS AND YIELD IN FLORIDA TOMATOES

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In south Florida the tomato farmer's most serious production problems are nematode, soil-borne fungi and nutsedge and many of the alternative fumigants do not adequately or consistently control all of these pests. However, metam sodium and chloropicrin are the only fumigants labeled for use on tomato and would provide tomato growers in south Florida with an alternative to methyl bromide. Chloropicrin alone will not provide adequate control of weeds or nematodes except at high rates which would be neither economical nor environmentally friendly. Metam sodium when applied at the 60 gallon per treated acre provides adequate control of soil-borne pest and reduces weed populations. Continued studies from 1980 to 1999 in regards to the delivery systems for metam sodium has shown that soil injections and drenches are consistently more effective for the control of soil-borne pests and weeds than injection through drip irrigation tube(s). The purpose of this field study was to evaluate consistency of metam sodium application and compare it with the standard methyl bromide soil fumigation.

The commercial field trial was conducted on Krome gravely loam in the spring of 1999. Prior to fumigation, soil beds were formed 38 inches wide and 6 inches high on 6-ft centers. Fertilizer at 30% of recommended N, K fertilizer and 100% of P fertilizer was banded and rototilled into the bed. Each treatment plot of methyl bromide and metam sodium was 8 acres. Within the 8 acre plots, subplots, 3 beds wide and 50 ft long, of control and fumigant, were selected at random and replicated 4 times.

Two soil fumigants, metam sodium and methyl bromide plus chloropicrin (MC33) were applied. Methyl bromide plus chloropicrin was injected at 250 lbs/acre. The fumigant methyl bromide plus chloropicrin was injected through 3 chisels, spaced at 9 to 10 in apart. The metam sodium was injected at the irrigation pump at 6 gpm for a 40min duration and allowing 45 min to clear the metam sodium from the lines. The metam sodium beds were covered with 1.5 mil polyethylene film and the single bi-wall drip tube was in place 12 hrs prior to the fumigant injection. After 72 hours the plastic was perforated in both the methyl bromide (MC33) and the metam sodium blocks to allow venting and 7 days later commercially greenhouse raised 'Florida 47'' tomato transplants were planted at a spacing of 24 inches in the row. Supplemental fertilizer applications of 70% of recommended N, K was fertigated through the drip irrigation tubing.

Weed biomass was determined at the termination of the field trial. The tomato roots were evaluated for root galls on a rating of 1 to 9 with1=0 galls to 9=80 to 100% galling at the termination of the field trial. Yields of marketable, extra large, large and medium were evaluated.

One commercial picking packout of 'Florida 47' from the methyl bromide 8 acre plot, packed out 522, twenty five pound, cartons per acre of extra large, large medium fruits. The metam sodium 8-acre plot packed out 609 cartons per acre of extra large, large and medium fruit. The early harvest of the sub plots of methyl bromide yielded 112 cartons of marketable, 78 cartons of extra large, and 25 cartons of large as compared to the control with 99 marketable, 51 extra large, and 28 large fruit. The metam sodium early harvest sub-plots yielded 380 marketable, 318 extra large, and 45 large as compared to the control with 142 marketable, 112 extra large, and 27 large fruits. The sub-plots within the 8 acre plot of methyl bromide after 3 pickings yielded 644 marketable, 238 extra large, and 269 large as compared to the control with 395 marketable, 78 extra large, and 157 large fruits. The metam sodium sub-plots yielded, after 3 pickings, 875 cartons of marketable, 468 extra large, and 341 large as compared to the control with 714 marketable, 270 extra large, and 284 large fruits.

The weed biomass in the methyl bromide 8-acre plot was 100 lbs dry weight per acre. The weed biomass in the metam sodium 8-acre plot was 150 lbs dry weight per acre. The root-knot gall rating in the methyl bromide 8-acre plot was 1.0 as compared to the metam sodium 8-acre plot root-knot gall rate of 8.9.

In conclusion, the metam sodium application of 60 gal. per treated acre through a single drip irrigation tubing increased yields over the control. The standard methyl bromide (MC33) increased yields over the control. The weed biomass from the metam sodium and the methyl bromide treatments were significantly reduced at the end of the harvest season. Weeds severely reduced yields in the methyl bromide and metam sodium control plots. The nematode root galling occurred late in the development of the tomato plants thus the yields were not adversely affected as compared to the control.

Metam sodium is still the only fumigant that can provide tomato growers with some degree of controlling the soil-borne problems that was easily taken care of by the application of methyl bromide (MC33).