FIELD VALIDATION OF 1,3 DICHLOROPROPENE + CHLOROPICRIN AND PEBULATE AS AN ALTERNATIVE TO METHYL BROMIDE IN TOMATO

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Eight experiments were conducted on commercial farms during the spring and fall of 1996 and the spring of 1997 to validate results of small plot research with 1,3 dichloropropene + chloropicrin (Telone C- 17) and pebulate (Tillam) as an alternative to methyl bromide for soil fumigation in fresh market tomato *(Lycopersicon esculentum* Mill.) production in Florida. One experiment involved cherry tomatoes, while the others focused on the standard, large fruited fresh market tomato. Experiments were located on commercial farms in west central and southwest Florida and plot size ranged from 0.8 to 2.0 ha. Pebulate was sprayed on the soil surface and incorporated approximately 10 cm deep within 10 minutes of application with either a rototiller, a disk, or a field cultivator (s-tine harrow with crumbler bars), with the exception of one test where it was incorporated in a bed-over technique with bedding disks. In most trials it was incorporated immediately after application with a field cultivator. In all cases, it was applied either just before or just after application of starter fertilizer and prior to formation of the initial rough bed (false bed). The alternative fumigant, 1,3 dichloropropene + chloropicrin (17% by weight), was applied at 327 $L \cdot ha^{-1}$ through 3 chisels per row with the fumigant placed 20 cm deep in the 60 to 90 cm wide beds spaced 1.5 to 1.8 m apart. Methyl bromide + chloropicrin (33%) mixtures were applied at 393 $kg \cdot ha^{-1}$ in the same fashion to soil which had not received pebulate. Fumigant application occurred anywhere from 20 minutes to 2 days after pebulate application with the more common time frame being within 1 hour of pebulate application.

Tomatoes were grown using either seepage or drip irrigation with standard commercial practices, including stakes and polyethylene film mulch. Each test was monitored for the presence of soilborne diseases, nematodes, and weeds and yield data were collected, either from the actual field harvest or from 20 plant subplots arranged in a paired t test and replicated 6 times. Fruit were harvested by commercial pickers at the typical mature green stage of development with the number of harvests per season determined by market conditions. Fruit were graded by quality and size in the spring 1997 experiments, whereas results in 1996 are reported as bins (454 kg) per roll of mulch film (732 m).

There was no difference in weed control in most studies. Purple nutsedge (Cyperus *rotundus* L.) and sweet clover *(melilotus alba* L.) control were better with the combination of 1,3 dichloropropene + chloropicrin and pebulate than with methyl bromide in one study; whereas, in another experiment, nutsedge control was not different, but control of eclipta *(Eclipta alba* L.), goosegrass *(Eleusine indica* Gaertn.), and pigweed *(Amaranthus retroflexus L.)* was better with methyl bromide.

Soilborne disease was not a factor in these experiments. Fusarium wilt was scattered in the fields and there was no difference in incidence between the two treatments in any experiment. Root knot nematode was found in one experiment, wherein among the replicated plots there was no difference in incidence or severity of gall formation; although, on a field-wide basis it appeared that methyl bromide provided slightly better control.

Tomato plants were often shorter in height in areas treated with 1,3 dichloropropene + chloropicrin and pebulate. This reduction in size was believed related to pebulate and not the fumigant. Plant vigor was similar with both treatments when pebulate was incorporated with a field cultivator, disk harrow, or rototiller, but when

incorporated in a bed-over technique with bedding disks, it reduced plant vigor, growth and fruit yield. Fruit production was similar in most studies, but it was observed that maturity was delayed as much as 4 to 7 days in some experiments. This is an important consideration for growers when scheduling planting for market windows. In one study more large fruit were produced with the alternative treatment, while in another methyl bromide produced more large fruit. Production of cherry tomatoes was greater with 1,3 dichloropropene + chloropicrin and pebulate.

Results indicate that 1,3 dichloropropene + chloropicrin and pebulate constitute a viable replacement for methyl bromide for fresh market tomato production in Florida. The only change required in standard production practices would be the application and incorporation of pebulate prior to bed formation. Grower acceptance of this alternative appears to be high as they are introduced to it. This work is continuing to further define any limitations and the costs associated with this alternative.