EVALUATION OF METHYL BROMIDE ALTERNATIVE FUMIGANTS AND NONFUMIGANTS ON TOMATO UNDER POLYETHYLENE MULCH IN 1995.

D. W. Dickson, S. J. Locascio, and T. A. Kucharek, Departments of Entomology and Nematology, Horticultural Sciences, and Plant Pathology, University of Florida, Gainesville, FL 32611-0620.

Our objective was to compare two formulations of methyl bromide (MBr) with possible alternative multi-purpose soil fumigants and nonfumigants for management of root-knot nematodes, soil-borne diseases, and weeds on tomato grown in drip irrigated polyethylene mulch culture in north central Florida. The experiment was conducted in 1995 at the Agronomy Research Farm, University of Florida, Gainesville, FL. The soil was an Arrendondo fine sand (>92%). The site was infested with a high density of *Meloidogyne incognita* (southern root-knot nematode). Other plant-parasitic nematodes present, but in moderate numbers included *Paratrichodorus minor* (stubby root nematode), and *Belonolaimus longicadatus* (sting nematode). All three nematodes cause disease on tomato. The site was also infested with *Sclerotium rolfsii* (southern stem blight). There was a light infestation of *Cyperus rotundus* (purple nutsedge) and *C. esculentus* (yellow nutsedge). The winter cover crop was wheat cv. Florida 301, which was turned under and the field disked 6 weeks before the treatments were applied. Plots were single row, 9 m long on 1.8 m centers with a 0.91-m bed width. Plots were arranged in a randomized complete block and replicated six times. Beds were formed with a rototiller bed press apparatus, and starter fertilizer applied and incorporated. The beds were knocked down with a field cultivator. Dazomet was applied on a flat bed surface, incorporated 12 cm deep, irrigated with ca. 8 mm depth of water and left overnight before reforming beds and applying pebulate with a pressurized sprayer on the bed surface and incorporating 15 to 20 cm deep. Methyl bromide, chloropicrin, and 1,3-D/chloropicrin 17% were applied 28 days preplant with a bed press mulch laying machine (Kennco Mfg., Ruskin, FL) with three chisels space 30 cm apart over preformed bed and covered immediately with black polyethylene mulch. The 1,3-D XRM 5053 (DowElanco) formulation was applied 28 days preplant via drip tube. Metham sodium and fosthiazate were applied 18 and 4 days preplant via drip tube, respectively before transplanting and oxamyl was applied either weekly or biweekly beginning 16 days after transplanting. The plots were drip irrigated twice daily and fertilized via drip tube weekly.

All compounds except 1,3-D resulted in increased total marketable yields over the control ($P \leq 0.05$, Table 1). Although MBr treatments provided the highest numerical yields there was no statistical difference among the top six treatments and MBr treatments. Also, 1,3-D + oxamyl (applied either weekly or biweekly) provided yields equal to that attained with MBr. Four treatments (chloropicrin, 1,3-D/chloropicrin, and the 1,3-D + oxamyl weekly or biweekly) provided similar numbers of extra-large fruit to that with the MBr 98-2 treatment ($P \leq 0.05$). The extra-large fruit was similar to that with MBr treatment as with oxamyl applied either weekly or biweekly. Root-knot nematode galling

indices were lower in soil treatments of MBr, 1,3-D/chloropicrin, dazomet, 1,3-D/chloropicrin + metham sodium, and the high rate of fosthiazate than in the control ($P \leq 0.05$). Wilt induced by *Sclerotium rolfsii* was reduced by all treatments except 1,3-D compared with the control ($P \leq 0.05$). Colony forming units of *Rhizotonia solani*, *Macrophomina phaseolina*, and *Fusarium* spp. on tomato roots were reduced by all treatments except 1,3-D alone or plus oxamy or 1,3-D/chloropicrin + metham sodium compared with the control ($P \leq 0.05$). Based on these results it appears that chloropicrin, 1,3-D/chloropicrin, dazomet, and 1,3-D/chloropicrin + metham sodium would be suitable alternatives for methyl bromide in fields with root-knot nematode and southern stem blight infestations.

Table 1. Effect of multipurpose soil fumigants and nonfumigants on marketable yield, root-knot nematode, and soil-borne disease control on tomato cv. Agroset 761 in a field at the Agronomy Farm, Gainesville, Florida, Spring 1995.

Treatments[a]	Rate/ha	Marketable yield MT/ha		Galling index[b]	*Sclerotium rolfsii* hits[c]	Total CFU of fungi
		Extra large	Total			
Methyl bromide 98-2	448 kg	19.7 a	47.8 a	1.1 a	0.2 a	8.0 ab
Methyl bromide 67-33	392 kg	14.1 bcd	45.6 a	1.4 a	0 a	3.0 a
Pic + pebulate	375 L + 4.5 kg	16.7 abc	44.4 ab	5.8 cd	0 a	4.0 ab
C-17 + pebulate	327 L + 4.5 kg	15.7 abc	44.4 ab	2.6 a	0.3 a	3.5 a
1,3-D + oxamyl (biweekly)	124 L + 4.7 L	19.6 a	43.7 ab	7.0 cd	2.0 ab	--
1,3-D + oxamyl (weekly)	124 L + 4.7 L	18.4 ab	43.3 ab	7.3 cd	2.2 ab	9.0 abc
Dazomet + pebulate	448 kg + 4.5 kg	10.4 de	41.2 abc	3.5 ab	0.2 a	7.0 ab
C-17 + metham sodium	327 L + 702 L	9.5 de	40.7 abc	2.3 a	0 a	11.0 bc
Fosthiazate 900EC	3.5 L	14.1 bcd	36.8 bcd	7.1 cd	2.2 ab	--
Fosthiazate 900EC	5.3 L	12.9 cde	36.4 bcd	6.1 c	1.7 ab	--
Metham sodium + pebulate	935 L + 4.5 kg	8.0 e	34.5 cd	7.9 cd	1.2 a	3.3 a
1,3-D	124 L	9.9 de	29.4 de	9.0 d	4.0 bc	9.5 abc
Untreated		9.5 de	25.9 e	8.9 d	4.7 c	15.5 c

[a]Methods of application presented in text.
[b]Galling indices based on a 0-10 scale with 0 = no galls and 10 = 100% of root system galled.
[c]Each plant infected by *Sclerotium rolfsii* was counted as a hit. The plants were showing severe wilt symptoms.
[d]Total no. of colony forming units of pathogenic fungi infecting tomato roots included *Rhizoctonia solani*, *Fusarium* spp., and *Macrophomina phaseolina*. -- indicates no data taken.
Data are means of six replicates. Means within a column followed by a common letter are not different according to Duncan multiple-range test ($P \leq 0.05$).