METHYL BROMIDE ALTERNATIVES IN TOMATO PRODUCTION SYSTEMS IN NORTH CAROLINA

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Introduction: Methyl bromide is used in over an estimated 85% of the tomato acreage in the Southeastern United States (e.g. GA, NC, SC, TN, VA). Tomato production accounts for over $150 million in farm gate income and an estimated loss of $6 million per year when MB will be discontinued.

Soilborne Pathogens in North Carolina: The most important soilborne pathogens of tomato are highlighted in Table 1. Most growers rely on fumigation to manage many of these pathogens. In the mountain production region in Western North Carolina, *Verticillium dahliae* race 2 is one of the primary disease problems on land with a history of intensive tomato production. Experience has shown methyl bromide fumigation delays the onset of disease and enables growers to harvest the majority of fruit before plants begin to wilt and die. *Fusarium solani* race 3 also has been recently introduced on numerous farms. The cultivar "Floralina" offers good resistance and growers fumigate fields to manage this pathogen where other varieties are grown. Southern bacterial wilt (*Ralstonia solanacearum*) is more of a problem in the Piedmont and Coastal production regions but has appeared on several farms in the Mountains.

Table 2A (2001) and Table 2B (2002) list the methyl bromide alternatives used in trials at the Mountain Horticultural Research Station (NCSU) in Fletcher NC. Twelve different soil treatments with four replications arranged in a randomized complete block design were applied each year. 'Mountain Fresh' seedlings were planted late June. Plots of 100 ft were fumigated, the fifteen plants were planted in center portion of each plot (5 ft row spacing, 2 ft plant spacing). Foliar ratings for Verticillium wilt were conducted. Standard fertility and foliar pest management practices were followed. Plots were harvested weekly and data included are marketable and total tomato yields for vine-ripened production. Disease pressure was relatively low in 2001 (Verticillium wilt 2-19%; data not shown) as were nematode and weed counts. Heavier Verticillium pressure was experienced in 2002.

Treatments were designed to compare broadcast applications to drip applications, when such comparisons were feasible (e.g. for metam sodium, Telone-C35, and chloropicrin) and at rates consistent with label recommendations. Compost included in these studies was produced aerobically and was incorporated into the plots prior to plastic mulch application. Our positive experience in other trials has

shown that compost should be part of a total management system that may need to include cover crops and crop rotations to be a viable alternative to methyl bromide. This trial has provided information concerning the viability of alternative fumigants and the technical challenge growers may need to consider when choosing to shank apply or drip-apply chemical fumigants.

Table 1: Important soilborne diseases in North Carolina and some management options practiced by growers.

Pathogen	Management Strategy					
	Resistance	Avoidance	Cultural practices	Fumigation	Chemical (fungicide)	Other
Verticillium race 1	*					
Verticillium race 2				*		
Ralstonia solanacearum	*	*	*	*		
Fusarium race 1& 2	*					
Fusarium race 3	*	*		*		
Sclerotium rolfsii			*	*	*	*
Root knot nematodes	*			*	*	
Phytophthora capsici			*	*	*	
Pseudomonas corrugata			*			
Pythium root rot			*	*	*	

Table 2A: Fletcher MB alternatives fumigant trial results for tomatoes 2001 field season. Yield values followed by the same letter are not significantly different from one another.

Treatment	Application Method	Date of application	Rate (broadcast)	Marketable Tomato Yields (tons/A)	Total Tomato Yield (tons/A)
Non-fumigated				46.5 b	58.9 bc
MB: chloropicrin (67:33)	Shank	5/31/01	400 lbs/A	52.6 ab	65.5 abc
Telone-C35	Shank	5/31/01	35 gal/A	55.3 a	67.0 ab
Telone-C35 "InLine"	Drip	6/1/01	26 gal/A	50.9 ab	62.6 abc
Metam sodium	Broadcast + Till	5/31/01	75 gal/A	46.8 b	57.7 c
Metam sodium drip	Drip	6/1/01	75 gal/A	51.1 ab	64.3 abc
MI: Chloropicrin (60:40)	Shank	5/31/01	300 lbs/A	56.0 a	66.4 ab
Compost	Broadcast + Till	6/5/01	30 yd^3/A	52.0 ab	63.7 abc
Chloropicrin (96%)	Shank	5/31/01	8 gal/A	54.5 ab	66.7 ab
Chloropicrin (96%)	Shank	5/31/01	15 gal/A	54.6 ab	67.3 ab
Chloropicrin EC	Drip	5/25/01	200 lbs/A	52.3 ab	66.9 ab
ChloropicrinEC followed by Metam sodium	Drip, 1 week delay	Chloropic 5/25/01 Metam sodium 6/1/01	200 lbs/A 75 gal/A	55.1 a	67.8 a

Table 2B: Fletcher MB alternatives fumigant trial results for tomatoes 2002 field season. Yield values followed by the same letter are not significantly different from one another and represent the first 4 harvests only (remainder of data in analysis at time of publication).

Treatment	Application Method	Rate (broadcast)	Verticillium Wilt Rating (e.g. 7/17/02)	Marketable Tomato Yields (tons/A)
Methyl bromide chloropicrin 67:33	Shank	400 lbs/A	4.9 bc	48.6 abc
Telone-C35	Shank	35 gal/A	10.6 bc	50.0 a
InLine	Drip	26 gal/A	24.6 ab	46.3 abc
Metam sodium (broadcast/rototilled)	Broadcast + Till	75 gal/A	9.3 bc	46.2 abc
Metam sodium (drip)	Drip	75 gal/A	13.4 abc	47.7 abc
Iodomethane:chlorpicrin (60:40)	Shank	300 lbs/A	0.0 c	48.6 ab
Chloropicrin (shank applied)	Shank	15 gal/A	0.0 c	50.6 a
Compost+Trichoderma	Broadcast + Till	30 yd^3/A	36.8 a	40.7 de
Compost	Broadcast + Till	30 yd^3/A	27.0 ab	43.8 cd
Untreated control			22.5 abc	38.0 e
Chloropicrin EC (drip applied)	Drip	200 lbs/A	17.6 abc	44.3 bcd
Chloropicrin EC (drip applied) + Metam sodium	Drip, 1 week delay	200 lbs/A 75 gal/A	15.1 abc	45.2 bcd