FIELD VALIDATION OF A FUMIGANT ALTERNATIVE TO METHYL BROMIDE

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Four large-scale field demonstration trials were conducted in South Florida in cooperation with a commercial pepper/cucumber grower. The size of each trial ranged from 4.0 to 7.8 acres. Each trial consisted of a pepper primary crop followed by a cucumber second crop. The fumigant alternative consisted of a combined application of Chloropicrin (150 lbs/acre), 1,3-dichloropropene (Telone II, 10 gal/acre) and metam potassium (K-PAM HL, 65 gal/acre). Chloropicrin and 1,3-dichloropropene were shank applied at a 9 and 12 inch depth, respectively prior to the formation of beds (39 inches wide by 10 inches tall). Metam potassium was injected into the formed beds at a 4 inch depth using vertical coulters. The soil was immediately covered with a high barrier plastic mulch (Blockade, Pliant Corp). Fresh market pepper was cultivated as the primary crop. After completion of the final pepper harvest, the plants were mowed and cucumber was planted into the existing beds.

Data was collected on the incidence of soilborne diseases, the soil density of plant parasitic nematodes and the number of weeds emerging through the plastic mulched beds in areas treated with the 3-way fumigant alternative and in adjacent areas fumigated with methyl bromide:chloropicrin (50:50, 200 lbs/acre, covered with the same high barrier film. Marketable yields of pepper and cucumber were obtained from the commercial grower's pack-out data. The incidence of soilborne diseases including Phytophthora crown and root rot, *Aethelia rolfsii* stem blight, and Pythium root rot was less than 1% in both the methyl bromide:chloropicrin treated areas and areas receiving the 3-way fumigant alternative. The 3-way fumigant alternative had a significant affect on the growth of pepper with observed reductions in plant height ranging from 16% to 21%. Total Marketable yields of pepper were greater with the 3-way fumigant alternatives in 2 of the 4 trials (Table 1). However, a reduction in the marketable yield of the largest size fruit (Jumbo) was observed in all four trials. The 3-way fumigant alternative had a significant affect on the growth of pepper with observed reductions in plant height ranging from 16% to 21%. Observed differences in the growth and yield of pepper were correlated to elevated soil concentrations of potassium in the 3-way fumigant alternative (Table 2). Elevated soil potassium was attributed to contributions of the metam potassium treatment (121 lbs/acre of K_20). As a result, recommendations are being made to adjust soil fertility programs in order to accommodate the additional applications of K_20 from the metam potassium treatment.

Table 1. Effect of 3-way fumigant alternative on growth and yield of fresh market pepper and yield of cucumber double crop (relative to adjacent methyl bromide plots)

	Marketable yield – fresh market pepper			Plant height	Cucumber
Location	Jumbo	Extra- large	Total	Pepper	Marketable yield
1	-7.8%	28.5%	6.4%	-21.8%	1.2%
2	-1.9%	19.1%	-3.8%	-16.7%	2.5%
3	-17.4%	112.3%	7.0%	-18.2%	9.4%
4	-37.0%	24.3%	-15.0%	-17.4%	-11.2%

Table 2. Concentration of potassium in soil and leaf tissue at first pepper harvest.

	Soil		Leaf tissue	
Location	MB:Pic	3-way alternative	MB:Pic	3-way alternative
1	44 PPM	94 PPM	4.40%	4.20%
2	40 PPM	126 PPM	4.14%	3.97%
3	26 PPM	112 PPM	4.08%	3.96%
4	60 PPM	133 PPM	3.56%	4.28%