THE COMPARISON OF METHYL BROMIDE, METAM SODIUM (VAPAM), AND TELONE C-17 SOIL FUMIGANTS WITH WATERMELON AND TOMATO IN THE COLUMBIA BASIN OF OREGON

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The use of soil fumigants is a common practice in vegetable production in many locations to control soilborne pathogens and pests. The Columbia Basin region of Oregon has for years supplied the region with watermelons during July-September. However, available production land not used previously for potatoes and melon, preferred by growers because of the reduced risk from soilborne pathogens, is very difficult to find. Losses due to wilt fungi in melons and those that occurred during production trials with tomatoes prompted the following research. The objective was to determine whether one or more of the commonly available fumigants would be effective disease control treatments.

Methods

Beginning in 1991, and generally repeated in 1992, three soil fumigants (metam sodium {MS [Vapam]}, methyl bromide + chloropicrin 67/33 (MC), and Telone C-17 (TC), were used singly or in combination at different rates. Treatments were compared for their effectiveness to reduce levels of three soilborne fungi (*Pythium, Fusarium ,*and *Verticillium dahliae*) and to simultaneously increase yields, in both in tomato and watermelon in 1991, and in watermelon in 1992. Treatments were as follows: (1) MB 300lb/a;(2) MB at 400lb/a; (3) MS 25 GPA + TC 12.5 GPA; (4) MS 25 GPA; and (5) no treatment. In 1991 MS 18 GPA + CT at 10 GPA was used but not MS alone; the lower rate of MS + CT was not used in 1992. In both years,"Royal Sweet" was the watermelon cultivar used, "Solar Set" was the tomato cultivar used in 1991. Transplants were produced in 96-cell trays using sunshine Mix #3. Watermelon were transplanted on 22 April and 30 April, for 1991 & 1992, respectively, and 29 April for tomato in 1991.

A randomized complete block design with four replications was used both years. Plots were 7 feet wide and 60 feet long. Half of each plot was used for each crop. Fumigation with MC was shank injected down to 9" and then mulch was applied. Metam sodium in 100 GPA of water was broadcast applied to the bed and then rototilled in just prior to the addition of mulch. Telone C-17 was injected using 2 shanks, 12" deep and 12" apart, and mulched. Fertilization and irrigation followed normal commercial practices for the area.

Soil collected from each replication was assayed for the above fungi at three times: prior to fumigation, just prior to transplanting, and late season. Number of colony forming units (CPU) were determined. Analysis of variance was used to identify

significant differences within the trial, and multiple range tests identified means significantly different from each other.

Results

Table 1 reports the results of soilborne fungal effects due to the different treatments in 1992. Data is similar but not as striking for 1991. Metam sodium alone, in combination with Telone (Telone C-17) and methyl bromide resulted in similar significant reductions over the untreated areas. Impact due to fumigation could be seen in some fungi throughout the season.

Total yield of marketable watermelon and tomato were significantly higher with fumigation than from untreated areas in 1991. For watermelon, total pounds ranged from 29-44 for treated areas and averaged 10 lbs for the untreated. For tomatoes, treated areas yielded 178-229 lbs, while the untreated yielded 124 lbs. In 1992, watermelon yields from fumigated treatments ranged from 29-44 lbs/plot, did not differ from each other but were significantly higher than the untreated control.

Conclusion

The use of methyl bromide plus chloropicrin, Telone C-17 plus metam sodium (Vapam) or metam sodium alone yield equal amounts of watermelon during two years of study. Metam sodium with C-17 yielded comparable levels of tomatoes to methyl bromide during one year of study.

Table 1. Fumigant impact on three soilborne fungi, 1992*

Treatment+	Pre *Pythium*	Pre *Fusarium*	Pre *Vert.*	Post *Pythium*	Post *Fusarium*	Post *Vert.*
1	414 A$	14,680 A	26 B	0 A	198 A	0 A
2	393 A	17,107 A	13 A	0 A	0 A	0 A
3	356 A	18,125 A	9 A	0 A	18 A	0 A
4	208 A	23,458 A	9 A	0 A	448 A	0 A
5	473 A	17,031 A	11 A	124 B	3835 B	20 B

* Colony forming units (CFU) per gram of dry soil prior to (Pre) or following (Post) fumigation, of either *Pythium, Fusarium,* or *Verticillium dahliae* (*Vert.*).
+ Treatments are identified in the text.
$ Means not followed by the same letter are significantly different.