EFFICACY OF VAPAM AND KPAM FUMIGATION FOR FLORIDA TOMATOES

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South Florida is limited to two fumigants; Vapam and chloropicrin as replacement to methyl bromide by the year 2005. The purpose of this field study was to perfect the method of application of Vapam as well as evaluate efficacy of Vapam and Kapam when applied under plastic mulch, to reduce or eliminate the effects of soil-borne *Rhizoctonia solani* and root knot nematode (*Meloidogyne incognita*) on tomatoes.

The field trials were conducted in Krome gravely loam-limestone soils on February 15, 2001 on two farms, Knaus Farms gravely phase and Pine Island Farms sandy phase. Prior to fumigation, soil beds were formed 48 inches wide and 6 inches high on 6 ft centers on 7 Mar. Each treatment plot was 130 feet long, replicated four times, and planted with 'Florida 90' transplants. Fertilizer of the analysis 8-16-16 at 1500 lbs/A was banded on the bed and rototilled into the bed.

The fumigants were furnished in tanks by the Hendrix and Dale Company. The fumigation applicator was calibrated by the Hendrix and Dale technician as per the rates requested by AMVAC. Three soil fumigant treatments: Vapam at 60 gal per acre, Kpam at 75 gal per acre, and methyl-bromide at 235 lb. plus Chloropicrin at 120 lb. per acre were evaluated for disease and nematodes control on 15 June on the two farms (Tables 1 and 3). The fumigants were injected through five shanks, spaced 8 inches apart, at a depth of 6 inches. Immediately following injection of the fumigants, 1.5-mil polyethylene film was placed over the beds. After 7 days the plastic was perforated to allow venting and 12 days later plant house commercially raised tomato cultivar 'Florida 90' transplants were planted at a spacing of 12 inches in the row on rocky soil and 24 inches on the sandy phase soil.

Table 1. Fumigant evaluation for Rhizoctonia root rot and Root-knot nematodes tomato cv Florida 90 in rocky phase, Krome Gravely Loam Soil.

NO	TREATEMNT	RATE per acre	ROOT ROT[uvwx]	ROOT KNOT NEMATODES[uvwx]
1	UNTREATED CHECK		4.0a	3.0a
2	VPAM	60.0 gal	2.5b	2.7b
3	KPAM	75.0 gal	2.3b	2.1b
4	METHYL BROMIDE CHLOROPICRIN	235.0 lb 120.0 lb	2.9b	2.5b

[u]Mean of 4 replication.

[v]Means followed by the same letter are not significantly different at the 5% level according to Waller-Duncan's Bayesian k-ratio (LSD) rule.

[w]Horsfall-Barratt rating were 1=no disease and 10=100% disease.

[x]Root-knot index 0=no galls; 1=1 to 2 galls; 2=evidence of galls or lesions; 3=galls and/or lesions quite evident; 4=galls and/or lesions severe; 5=stunting and death of plant.

Table 2. Fumigant evaluation for Rhizoctonia root rot and Root-knot nematodes in tomato cv. Florida 90 in sandy phase, Krome Gravely Loam Soil.

NO	TREATEMNT	RATE per acre	ROOT ROT[uvwx]	ROOT KNOT NEMATODES[uvwx]
1	UNTREATED CHECK		4.3a	4.4a
2	VAPM	60.0 gal	2.9a	2.8b
3	KPAM	75.0 gal	2.8a	1.9c
4	METHYL BROMIDE CHLOROPICRIN	235.0 lb 120.0 lb	2.9a	1.7c

[u]Mean of 4 replication.
[v]Means followed by the same letter are not significantly different at the 5% level according to Waller-Duncan's Bayesian k-ratio (LSD) rule.
[w]Horsfall-Barratt rating were 1=no disease and 10=100% disease.
[x]Root-knot index 0=no galls; 1=1 to 2 galls; 2=evidence of galls or lesions; 3=galls and/or lesions quite evident; 4=galls and/or lesions severe; 5=stunting and death of plant.

The fruits were harvested from 40 plants in each of the treatment plots in the rocky phase soil and 20 plants from the sandy phase soil. Fruit harvest was on 30 May.

Following the fruit harvest 10 plants per plot were pulled for root evaluation. Vapam, Kapam, and Methyl bromide plus Chloropicrin provided statistically significant control of root rot and root knot nematode as compared with the untreated control on the Knaus Farm. There was no apparent phytotoxicity in any of the treatments.

The most serious effect on the two fields was the Tomato Yellow Leaf Curl Virus.
The virus reduced the yield by an untold amount by the loss of plant vigor. In the early stages of plant development it was hoped that the small number of virus infected plants could be factored out. However, as the crop progressed toward maturity the number of infected plants continued to increase, at an accelerated rate, in spite of diligent spray applications to control the Whitefly vector *Bemisia argentifolii*.

In conclusion, in spite of the virus, yield trends were encouraging especially with a single harvest yield of 600 to 700 boxes of fruit per acre from the fumigant treatments with the controls yielding 60% less. Tomato root samples showed the expected effect of methyl bromide plus chloropicrin, Vapam and Kapam on Root knot nematodes as well as root rot. The efficacy of Vapam and Kapam continues to perform in most cases equal to methyl bromide plus Chloropicrin.

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