

Plant Protection Section, Department of Agriculture
Nicosia, Cyprus

CONTROL OF ROOT-KNOT NEMATODES AND *FUSARIUM* WILT OF TOMATOES BY SOIL FUMIGATION

by

C. PANAYIS

In Cyprus, root-knot nematodes and *Fusarium* wilt frequently cause considerable yield losses of tomato. Some growers practice crop rotation or summer fallowing to combat the pathogens. Others switch periodically to previously uncropped land but this method faces ever increasing costs and is becoming less profitable. Recently in other countries soil disinfestation with pesticides of broad spectrum activity have been used with varying success (Brodie *et al.*, 1968). The work described here compares the effect of such pesticides with those regarded as having only nematicidal action on the control of root-knot nematodes (*Meloidogyne* spp.) and *Fusarium* wilt incited by *Fusarium oxysporum* (Schlecht) f. sp. *lycopersici* in tomato crops grown in the field.

MATERIALS AND METHODS

The trial was undertaken at Kokkinotrimithia village in a field heavily infested with root-knot nematodes (*Meloidogyne* spp.) and *Fusarium* wilt. Six chemical treatments (Table I) were applied by means of a hand injector at 30 cm centres, except for *Di-Trapex* at 20 cm, and 20 cm deep between 6-8 May in plots measuring 6 x 1.5 m. Water was applied immediately after treatment to moisten the top 2.5 cm of soil and provide a seal for the fumigants. Plots fumigated with methyl bromide were covered with a polythene sheet for 48

hours after treatment; the soil temperature at the time of fumigation was 23-27° C. There were six replicates of each of the six chemical treatments and the untreated control and all plots were randomized independently within the experiment.

Four weeks after the treatments were applied, 12 tomato plants cv. Pearson 20-25 cm tall were planted in rows 50 cm apart in each plot. Plots were watered and fertilizer applied periodically to ensure good growth and commercial pesticides were applied as required to control foliage diseases and insect pests. Plants were supported on wooden poles and bis-budded according to normal commercial practice. Weights of marketable fruits were recorded.

At the end of the experiment the roots of all plants were examined and the degree of root-knot infestation recorded (Table I). The incidence of *Fusarium* wilt was recorded by the method of Dimond *et al.* (1952). The numbers of large discoloured vascular bundles were recorded for each internode, the counts summed and divided by the total number of bundles observed (three times the number of internodes) to provide an index ranging from 0 for healthy plants to 1 for plants dying because of *Fusarium* wilt. Data for root-knot and *Fusarium* were analyzed using Duncan's New Multiple Range Test.

RESULTS AND CONCLUSION

All of the treatments, with the single exception of Metham Sodium, gave excellent control of root-knot nematodes, as judged by yields of fruit although the roots showed some degree of galling (Table I). Although wilt infection in the DBCP treatment was not significantly less than the untreated control, many of the plants remained disease free. When the first fruits were produced, pronounced symptoms of nematode and wilt damage were observed on the haulms of the plants in Metham Sodium treated and control plots; the plants were chlorotic, stunted and wilted and there were subsequently fewer and smaller fruits. Such infected plants died in early October whereas the cropping period of the other treatments extended to mid-December when slow temperatures terminated the experiment.

Chemical soil treatments were generally effective in increasing yields compared with the untreated control, but the high cost of the broad spectrum fumigants methyl bromide and Di-Trapex may make them economical only for glasshouses. Under field con-

ditions the lower priced Telone and D-D nematicides are likely to be economical for control of the root-knot nematode/*Fusarium* wilt complex.

Table I - *Effect of soil fumigation on tomato yield and control of root-knot nematodes and Fusarium wilt.*

Treatment	Application rate a.i. (kg/ha)	Wilting index ¹	Root-knot index ^{1,2}	Yield per plot ¹ (kg)	Yield increase (%)
Control	—	0.5 a	5.0 a	8.4 a	0
Metham Sodium (Vapam)	108	0.4 ab	4.8 a	13.9 a	65
DBCP (Nemapaz)	32	0.3 abc	1.5 b	40.3 b	380
Dichloropropene-Dichloropropane (D-D)	268	0.2 bc	1.4 b	43.9 b	423
Dichloropropene (Telone)	268	0.2 bc	1.3 b	44.9 b	435
D-D and Methyl isothiocyanate (Di-Trapex)	575	0.2 bc	1.2 b	45.9 b	446
Methyl bromide (Dowfume Mc-2)	478	0.1 c	1.2 b	49.6 b	491

(¹) Any two means followed by the same letter are not significantly different ($P = 0.05$).

(²) Root-knot index: 1 = no root-knot; 2 = 1-25%; 3 = 26-50%; 4 = 51-75%; 5 = 76-100% roots galled.

Dr. J. Ph. Zyngas, Head of Plant Protection Section, Department of Agriculture, Nicosia is thanked for his advice and Mrs M. Dimova for technical assistance in the field and in the laboratory.

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Accepted for publication on 10 June 1977.