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Comparative Efficacy of Chemicals in the Control of Nematodes in Banana

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Tenekil-M (polychlorinated petroleum hydrocarbon) an indigenous compound, Furadon (carbofuran) and Rugby (Cadusafos) were applied for controlling *Helicotylenchus multicinctus, H. indicus, Hoplolaimus columbus, Pratylenchus coffeae, P. zeae* and *Tylenchorhynchus annulatus* in banana. After the application of Tenekil-M, population of nematodes was suppressed as compared to carbofuran and Cadusafos. Tenekil-M was significantly effective than Furadon and Rugby. Average weight of the harvested bunches of banana was greater in Tenekil-M treated plants than those treated with Furadon and Rugby and the control.

Key words: Nematodes, Banana, Tenekil-M, Nematicides.

Introduction

Banana constitutes one of the most ancient crop grown in several countries of the world mainly in tropical regions. Cultivation of banana started in Pakistan after the independence of the country. It is successfully grown in tropical and semi-tropical irrigated regions of the world where the soil is naturally humid and drained. Saeed and Ashrafi (1973), reported *Criconemella sphaerocephala, Helicotylenchus microdorus, H. multicinctus and Hoplolaimus columbus* from banana in Sindh. Naziruddin (1976) estimated that about 30,000 acres of land was under cultivation of banana. Its production has increased more than 50,000 acres. Naziruddin (1976) while reviewing literature on nematodes of banana pointed out that the yield of banana in the country was among the lowest in the world. The reduction in the yield of banana was due to the attack of nematodes beside other factors. Khan (1984) reported *Hemicriconemodes mangifera* (Siddiqi 1961) from banana during survey. Saeed *et al* (1979) reported *Helicotylenchus indicus* (Sher 1963), *Hoplolaimus indicus* (Sher 1963), *Basirolaimus seinerhosti* and *H.pararobustus.* Saeed *et al* (1979) collected *Radopholus similis* from around the roots of banana. Later Shahina and Maqbool (1992) again found *Radopholus similis* (Cobb 1918; Thorn 1949) and provided measurements of these nematodes.

Materials and Methods

The study was carried out on about one acre land at Applied Biology Experimental Farm, PCSIR Laboratories, Karachi. The soil was prepared by ploughing, manuring and other usual agricultural practices. Healthy banana suckers of William hybrid variety were obtained from Government Horticultural Research Institute, Mirpur Khas. They were transplanted 36 cm deep at plant to plant and row to row distance of 1.75 m with a number of 12 rhizomes per row. Pretreatment soil samples were collected at the depth of 6″-9″ around in vicinity of the roots of the plants. After two weeks of planting banana rhizomes four were treated with Tenekil-M @ 5 ml per plant, Rugby (Cadusafos) @ 3 g per plant, Furadon @ 5 g per plant and four rows of the plants were left untreated (control). These treatments were repeated after 16 weeks, 32 weeks and 48 weeks. Soil samples were collected and carried to the laboratory and placed at 5°C in an incubator. Later the nematodes were washed by Cobbs gravity method (1918) and then by improved Baermanns method (Oostenbrink 1960). Counting of nematode the population was made by Earlenmayers counting tray. During experiment, all plants were watered regularly and farmyard manure with DAP was given to the plants. The nematodes isolated were *Helicotylenchus multicinctus, H. indicus, Hoplolaimus columbus, Pratylenchus coffeae, P. zeae* (Graham 1951) *and Tylenchorhynchus annulatus*. The nematodes were relaxed by gentle heat, fixed in 4% formalin, left for 24 h and later processed to glycerine as recommended by Thorne (1961). Permanent slides were made in anhydrous glycerine and sealed with the zut cement. Nematodes were identified upto species level.

Results and Discussion

The results of this experiment clearly indicated that population level of plant-parasitic nematodes in Tenekil-M and Carbofuran treated plants were low and the plants were found to be healthy. The efficacy of Rugby was less and the population of parasitic nematodes was higher.

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Table 1
The efficacy of Tenekil-M in comparison with Carbofuran & Cadusafos for nematode population

Treatment	Post treatment counts			Yield (kg)	Plant height (m)
	After 16 weeks	After 32 weeks	After 48 weeks		
Tenekil-M 5 ml/plant	(61.0±0.55)	(22.5±0.80)	(10.50±0.45)	(22.5±0.45	(4.34±0.116)
Carbofuran 5 g/plant	(75±3.7)	(36±0.81)	(17.6±36)	(20.12±0.46)	(3.57±13)
Cadusafos 3 g/plant	(80.2±2.5)	(80.6±0.72)	(41.9±1.36)	(12.1±0.46)	3.52±18)
Control (No. Chemical)	(183±3.37)	(261±1.47)	(353±1.47)	(8.76±0.11)	(2.52±0.87)

The results indicated a significant reduction in the population of parasitic nematodes of the plants treated with Tenekil-M and with Carbofuran. Population of nematodes was also reduced in plants treated with Cadusafos. But later population level in Tenekil-M plot and Carbofuran was more significant than Cadusafos. Average weight of harvested bunches in Tenekil-M plot was 23.5 kg, 22 kg in Carbofuran plot, 13.5 kg in Cadusafos plot and 9.5 kg in the Control.

Appearance of flowers in Tenekil-M and Carbofuran was earlier than Cadusafos and the control. Maqbool and Qasim (1986) applied Aldicarb on apples 250 g per plant and Carbofuran 250 g per plant and reported 82-86% reduction in nematode population, whereas 62-81% population was reduced in the plants treated with Carbofuran. Charles *et al* (1985) used Carbofuran to control *Radopholus similis* (Thorne 1949) on banana cultivars and found Carbofuran more effective in the control of the population of burrowing nematodes. Phillis (1997) used Cadusafos (Rugby) and Carbofuran (Furadon) to control the population of *Pratylenchus penetrans* (Cobb 1918; Filipjev and Schuurmans 1941) in roots of potatoes and noted that the effect of this nematicide against ectoparasitic nematodes was not pronounced. Khan *et al* (1984) used Tenekil in dressing banana rhizomes against nematodess. Gul *et al* (1991) used Tenekil to control *Meloidogyne javanica* on tobacco and Okra in comparison with other compounds and observed about 124% increase in the yield of tobacco leaves and 25% in Okra. Khan *et al* (1998) used Tenekil-M and Carbofuran to control nematodes on *Piper betle* and noted Tenekil -M to be more significant than Carbofuran. Tenekil-M was found to be a significant nematicide comparable with a standard nematicide, Carbofuran.

References

Charles J S K, Venkitesan T S, Thomas Y 1985 Comparative efficacy of antagonistic intercrops with Carbofuran in control of burrowing nematodes *Radopholus similis* in the banana cultivar Rendran. *Ind J Nematol* **15** (2) 241-242.

Cobb N A 1918 *Estimating Nematode Population of Soil.* Cire Agric Technol Bur P and US Dept. Agric. 1-47.

Filipjev, Schuurman Stekhoven Jr J H 1941 *A Manual of Agricultural Hetminthology.* Leiden Netherland E J Brill pp 878.

Graham T W 1951 Nematode root rot of tobacco and other plants. *S C Agric Exp Stn Bull* 390 pp 25.

Gul A, Saeed M, Saifulla M 1991 A model action of various substances used for control of *Meloidogyne javanica* on tobacco and okra in NWFP. *Afro-Asian Jour of Nematol* **1**(1) 23-29.

Khan S A, Qamar F, Saeed M, Khan H A 1984 Dressing of banana rhizomes for protection during critical growth period. *Pak J Sci Ind Res* **27**(6) 352-354.

Khan H A, Khan S A, Qamar F 1998 Preliminary studies on the population of phytonematodes with betlevin *(Piper betle)* and their control by indigenous nematicides. *Pak J Sci Ind Res* **41**(6) 307-309.

Maqbool M A, Qasim M 1986 Control of plant parasitic nematodes associated with apples and Pistachio in Baluchistan Advance Plant Nematol. *Proc. of the* US *Pak. International Workshop on Plant Nem.* (April 6-8, 1986) Karachi, Pakistan.

Naziruddin M 1976 *Nematodes Potential Threat to our Banana Industry.* Report Banana Exhibition Thatta, pp 3.

Philis J 1997 Effect of Caudosafos and Carbofuran against *Pratylenchus penetrans* and other nematodes in field. *Cyprus Disease Management* pp 2-6.

Paramonov A A 1970 Osnovy, *Fitoqelmintologii,II.* pp 1-253.

Oostenbrink M 1960 Estimating nematode populations by some selected methods. In: *Nematology,* eds Sasser J N & Jenkins W R. Univ N. Carolina Press, Chapel Hil. 85 102.

Saeed M, Ashrafi S H 1973 On the occurrence of some plant-parasitic nematodes with special refrence to new hosts in Pakistan. *Pak J Sci Ind Res* **16** 128-129.

Saeed M, Khan H A, Saeed A, Qamar F 1979 Nematode problem of banana in Sind. *Pak J Sci Ind Res* **22** 209.

Shahina F, Maqbool M A 1992 Nematodes from banana fields in Sind with morphometric data on nine species with six representing new records of occurance in Pakistan. *J Nematol* **2** (1) 1-5.

Siddiqi M R 1961 Studies on the species of Criconematinae (Nematoda: Tylenchida) from India. *Proc Helminth Soc Wash* **28** 19-34.

Thorne G 1949 On the classification of the Tylenchida, new order (Nematoda: Phasmidia). *Proc Helm Soc Wash* **16** 37-73.

Thorne G 1961 *Principles of Nematology.* McGraw-Hill Book Co Inc, USA, pp 553.