

## COMPARATIVE STUDIES OF DIFFERENT NEMATICIDES AGAINST PLANT PARASITIC NEMATODES IN COTTON (*GOSSYPIUM HIRSUTUM* L.) IN PAKISTAN

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Three nematicides viz. rugby, furadan and tenekil-M were tested for comparison against plant parasitic nematodes i. e. *Helicotylenchus indicus*, *Hoplolaimus indicus*, *Longidorus elongatus* *Pratylenchus brachyurus* and *Rotylenchulus reniformis* are attacking cotton. After 16 weeks of the experiment the number of plant parasitic nematodes recovered from rugby were 42, furadan 153, tenekil-M 165 and control 525 per 100 ml of the soil the average yield of cotton was 370 g in rugby, 252 g in furadan, 370 g in tenekil-M and 245 g in control.

**Key words:** Plant parasitic nematodes, Rugby, Furadan and teneki-M.

### Introduction

Pakistan is the fourth largest cotton growing country of the world and cotton is the main source of foreign exchange earning. It is grown in an area of about more than 2.651 million hectares and 9.0 million bales are prepared from it [1] Cotton crop is very sensitive to pests and diseases mostly insects and fungi. Nematodes are also parasites of cotton because of their microscopic size and are neglected by the growers. Nematodes also play an important role in aggravating fusarium wilt, disease of cotton, Hilloch and Bridge [2] in a survey which was conducted in Tanzania showed that *Meloidogyne incognita*, *Scutellonema* spp. *Rotylenchulus reniformis* and *Pratylenchus* spp; were main nematodes associated with cotton plants showing the symptoms of fusarium wilt. Darekar *et al.* [3] conducted a survey of cotton growing areas of Maharashtra state in India and identified *Helicotylenchus indicus*, *Hoplolaimus indicus*. *Tylenchorhynchus* spp., *Rotylenchulus reniformis* and *Pratylenchus* spp., associated with the crop. Gazaway and Armstrong [4] reported that *Hoplolaimus columbus* was present in high frequency in cotton fields (284/100 cm<sup>3</sup>) of soil and the crop suffered approximately 20% yield losses. Kirkpatrick *et al.* [5] surveyed 714 cotton fields in U.S.A during 1989-1990 and showed frequent presence of *Helicotylenchus* spp., *Hemicyclophora* spp., *Meloidogyne* spp., *Pratylenchus* spp., and *Tylenchorhynchus* spp. Martin *et al.* [6] identified eleven species of plant parasitic nematodes during a post harvest survey of 1219 cotton fields.

Several reports indicate nematode infestation of cotton fields and yield losses but there are few attempts for their management. Gazaway [7] tested nematicides for reniform nematode control in cotton. Aldicarb was applied at planting stage in the furrows at 5 or 7 lb/Acre. Oxamyl was also applied Aldicarb treatment reduced *Rotylenchulus reniformis*

population. All nematicide treatments produced significant yield increase over control.

The present paper is an attempt to show comparative studies of three nematicides viz., rugby, furadan & tenekil-M (Polychlorinated compound) for the management of nematodes in cotton crop (*Gossyplum hirsutum*). Post-plantation soil samples were taken to determine the final nematodes population level.

### Material and Methods

A plot of land measuring 16m x 6m was prepared for cotton plantation at the experimental farm, PCSIR Labs. Karachi. After amending the soil with farmyard manure the plot was divided into 12 miniplots each 4m x 2m. All the miniplots were kept weed-free throughout the experimental period. The experiment was done in complete randomized block design (CRBD). Soil samples were collected from each miniplot in polythene bags for the determination of initial nematode population i.e. pre-plantation count. Soil was washed by Cobb's gravity method and later by improve Baermann's funnel technique. Nematode were isolated and counted under stereoscopic binocular microscope, after killing and fixing in 4% formalin. Rugby, furadan and tenekil M was selected for comparison at a dosage rate of 3g, 3g & 3 ml/plant respectively. Each treatment consists of three replicates. Two week-old seedlings of cotton var. Kalandri (K-68-9) raised in nematode-free soil in pots were transplanted to experimental field after one week of nematicide application. Fifteen plants were transplanted in each miniplot in five rows. Care was taken to transfer the seedling of approximate height and thrift. Each plot received irrigation separately but all on the same day at regular intervals. Yield was picked after 16 weeks and the experiment was terminated. Four plants of approximate size from each miniplot were uprooted. Fresh

weight of roots and shoots recorded. Weight of cotton (seeds + fibre) was also noted. Post-plantation soil samples were taken to determine the final nematode population level.

### Results and Discussion

Three nematicides i. e. rugby, furadan and tenekil-M were applied to control nematodes population in cotton and also to evaluate the comparative efficacy of these nematicides. Rugby, furadan and tenekil-M significantly reduced the population level of *Helicotylenchus indicus*, *Hoplolaimus indicus*, *Longidorus elongatus*, *Pratylenchus brachyurus* and *Rotylenchulus reniformis*. After 16 weeks of treatment more significant results were observed with rugby. The calculated value of 't' in rugby was 3.18 and tabulated value was 2.776 at 0.05P. In Tenekil-M calculated value of 't' was 2.16 and tabulated value was 2.132 at same level. In furadan calculated value of 't' was 2.20 and tabulated value was 2.132 at 0.05 P. The calculated value in three nematicides was higher than tabulated values. Therefore 't' was significant in all the cases.

The average height of plant was 50 cm in rugby, 45 cm in tenekil-M, 40 cm in furadan and 30 cm in control. The average yield in rugby was 370g/plant, in furadan 252.6 g and in tenekil M 370 g. Where as the average yield in control was 254 g/plant. The average weight of root, and shoot in all treatments and control plot showed that nematicides used to control the nematodes significantly improved the plant growth. Tenekil-M and rugby were most effective (Table 1).

Husain *et al.* [8] tried carbofuran (furdan), aldicarb, phenamiphos and tenekil in three variable concentrations to control root-knot nematodes and noted that tenekil was less significant than furadan, aldicarb and phenomiphos. Husain *et al.* used tenekil rather than tenekil-M. Khan *et al.* [9] studied the comparative efficacy of tenekil and furadan and aldicarb and showed that furadan was most effective than tenekil and aldicarb in controlling nematodes in chillies. As calculated by the dose used by Khan *et al.* [9] is less from the prescribed dose of tenekil. Qamar *et al.* [10] have also

TABLE 1. MEAN ( $\pm$ SD) OF VARIOUS NEMATODES IN DIFFERENT NEMATICIDES.

Nematodes species	Rugby	Furadan	Tenekil-M
<i>Helicotylenchus indicus</i>	110 $\pm$ 90	125 $\pm$ 75	140 $\pm$ 60
<i>Hoplolaimus indicus</i>	80 $\pm$ 70	115 $\pm$ 35	100 $\pm$ 50
<i>Longidorus elongatus</i>	41.5 $\pm$ 33.5	45 $\pm$ 30	47.5 $\pm$ 27.5
<i>Pratylenchus brachyurus</i>	36 $\pm$ 24	37.5 $\pm$ 22.5	35 $\pm$ 25
<i>Rotylenchulus reniformis</i>	26 $\pm$ 14	25.5 $\pm$ 13.5	26.5 $\pm$ 13.5
(b) Average wt. of shoot	85.5 $\pm$ 23.5g	130 $\pm$ 59g	148 $\pm$ 20g
(c) Average wt. of root	9.5 $\pm$ 2.5g	16 $\pm$ 2g	19.5 $\pm$ 5.5g
(d) Average height of plants	50cm	40cm	45cm
(e) Average yield/plant	370g	252g	370g

Number are means  $\pm$  Standard deviation of 3 replicates.

shown that tenekil was found significant like furadan and aldicarb when used in prescribed dose.

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