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A Report of *Hirschmanniella* sp. And *Tylenchus* sp. On Rice in Kashmir with a Control Strategy

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Abstract: Two nematode species namely *Tylenchus sp.* and *Hirschmanniella* sp. were met predominantly on rice in this temperate part of the world. The population densities were enormously present. The *Hirschmanniella* sp. commonly associated with rice in Kashmir valley is described with variations in its dimensions, probably for an altered habitat. The effect of Nemagon, Nemafos and Vapam for controlling these enormous population densities of these nematode pests was also worked out, in order to reach to a management strategy by calculating relative efficacy of these popular soil fumigants. The order of the efficacy of the chemicals was observed to be Nemagon = Nemafos > Vapam. Nematode population has been determined in replicated field trials by applying chemicals with water as drench and then making a comparison of the population.

Key words: Redescription · *Hirschmanniella* sp. Vepam · Control · Tylenchida · *Tylenchus sp.*

INTRODUCTION

Nematode diversity in rice based cropping systems vis-à-vis sustainable agriculture has been earlier worked out by Prasad [1]. It was seen by Mohanty *et al*. [2] that the treatment of chemical nematicides in the nursery and main field in Orissa reduced Hirschmaniella sp. population in both the conditions by 71.1 and 77.0% respectively.

Plant parasitic nematodes cause significant economic loses to a wide variety of crops. According to Sasser and Fackman [3] crop losses by nematodes range from 8 to 20 % on major crops around the world.

During a study, the species of plant parasitic nematodes infesting rice were worked out by Bridge *et al.* [4] where in Hirschmanniella sp. was found to be predominantly present among various other genera. Although disadvantageous as for as environment is concerned, chemical control is a widely used option for plant parasitic nematode management. Therefore successful control of soil borne pests by application chemicals has led to wide spread use of several highly potent chemicals in soil. However, while appreciating the necessity of chemical sterilization of soil for improving soil condition and crop yield, it is envisaged that proper evaluation with regard to extent of effectiveness and duration of lethal effects be studied for each commonly used soil sterilant.

MATERIAL AND METHODS

300 mesh sieve of pore size 53 µm was used. Nematode suspension was killed and fixed in one operation by using equal amount of double strength hot F.A.A. solution. The fixed material was left as such for 24 hrs. Nematodes were thus collected and dehydrated in glycerine-alcohol solution containing 95 parts of 70% alcohol and 5 parts of glycerine. Slides were prepared from the specimens. Nematodes were identified and counted under stereomicroscope.

The experiment was conducted in a rice field located in Kupwara in a randomized block design with three replications and three treatments. The treatment chemicals i, e Nemagon (1, 2dibromo-3-chloropropane, @ 11.5 lt/ha), Nemafos (0, 0-diethyl 0-2 pyrazinyl phosphorothionate, @ 12.5 lt/ha) and Vapam (Sodium n-methyl dithiocarbamate, @ 393.0lt/ha) were applied into soil with water as drench. The chemicals were measured in a 10lt capacity cane containing water which was uniformly sprinkled over the surface soil. Then the plots were irrigated thoroughly so as to bring the chemicals down to a depth of about 12-18cm. The control plots were drenched with water only. Nematodes populations were estimated by collecting soil samples at random from 12-18 cm zone of the field. The soil samples were processed by Cobb's modified decantation and sieving techniques. Post treatment

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determination of nematode population were obtained by screening soil samples at 20 days interval extending over a period of two months. The nematode counts per 250 g of soil obtained for each treatment by taking mean from three samples collected randomly from each replicated plot.

RESULTS

On the general survey nematodes which were predominantly met on rice were *Tylenchus sp*. and *Hirschmanniella sp*. The later species is herein redescribed with the intraspecific variations in dimentions and descriptions.

***Hirschmanniella microtyla* Sher, [5]**

Female: L = 0.94-1.37, a = 37.5-53.3, b = 8.1-10.0, c = 13-18, c' = 3.4-4.4, v = 57-59%, stylet = 17.9-21µ

Male: L = 0.96-1.145, a = 37-47, b = 8.6-10.6, c = 15.3-17.1, c' = 3.4-4.1, Stylet = 20.3-21.0µ.

Lip region hemispherical, 6 annules. Stylet knobs large, rounded, excretory pore slightly anterior to oesophago-intestinal valve. Intestine not overlaping rectum. Outer bands of lateral fields incompletely aereolated in posterior part of body. Body annules near tail terminus absent. Tail terminus with pointed peg like extension. Males appear to be rare in this species.

Habitat: The specimens were collected in the soil around roots of rice crop.

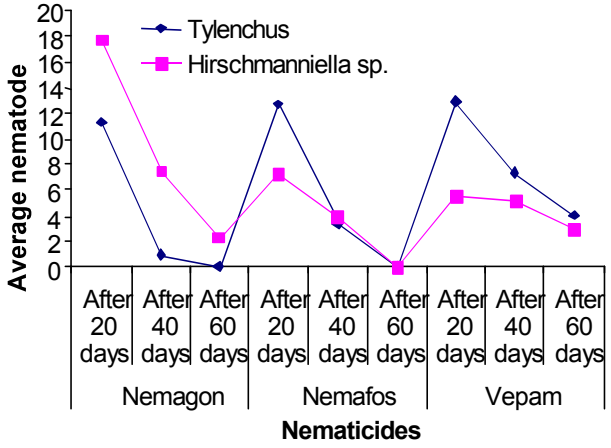

Fig. 1: Effect of chemicals on nematode population

Table 1: Mean Nematode Population Density per 250g of Soil after the treatments

Treatments	Post-treatment observations	*Tylenchus sp.*	*Hirschmanniella sp.*
Nemagon	After 20 days	11.3	17.75
	After 40 days	1.0	7.50
	After 60 days	0.0	2.30
Nemafos	After 20 days	12.7	7.30
	After 40 days	3.3	4.00
	After 60 days	0.0	0.00
Vepam	After 20 days	13.0	5.50
	After 40 days	7.4	5.20
	After 60 days	4.1	3.00

Remarks: The *H. microtyla* is being reported for the first time in the valley of Kashmir, hence forming new host, new place record of same. The species is earlier reported by Sher [5] on *Vallisneria americana*. The variation is in the value of V i.e. 57 per cent in the present specimens as compared to 53 per cent in the original dimensions and description as by Sher [5].

On the treatment it was found that the species of *Tylenchus sp.* and *Hirschmanniella sp.* were almost fully eradicated by the application of Nemagon treated plots two months after treatment. Other nematodes including *Tylenchorhynchus sp.* and *Psilenchus sp.* declined up to 40 days and then increased in their population up to the end of the experiment.

Tylenchus sp. and *Hirschmanniella sp.* population were completely eradicated from Nemafos treated plots and were not found at the end of 40 days. Other nematodes lowered at first but subsequently showed the exponential population growth. Vapam had the least effect among the three and the recovery of *Tylenchus sp.* and *Hirschmanniella sp.* declined considerably with the passage of time. In case of control plots (water drench only) the population level of *Tylenchus sp.* and *Hirschmanniella sp.* 92 per 250g of soil sample during the first 40 days and finally to 13 per sample by 2 months. In Vapam-treated soils, their population continued to remain at low level, possibly due to prolonged toxic effects of these chemicals. These results are more or less in agreement with the finding of others like Manzelli 1955., [6] Wilcox *et al.* 1956., [7] Endo and Sasser 1957., [8] Mukherjee 1966., [9] and Sutherland and Adams 1966., [10]. It appears from the trend of events in chemically sterilized soil that all the test chemicals are generally good nematicideds considerably reducing the rice soil nematode population at least up to 40 days. Nemafos produced best results and seems to be a promising

nematicide. In view of the experimental evidence provided by Rao and Panda [11] that if young rice seedling (up to 40 days old) are exposed to the population of parasitic nematode considerable reduction in yield (up to 65.5 percent) may result, whereas in case of older seedlings (70 days old) this effect is insignificant; there is a possibility, relevant to our experimental results, that if soil fumigation is done in the manner adopted here, 2-3 weeks before planting, the plants will avail almost a nematode-free period favorable for better growth and yield.

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