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Parasitic nematode problems in Malan

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ABSTRACT

Rice cultivars were studied against root-knot nematode and white tip nematode infection. Significantly lowest gall number of root knot nematode was recorded in genotype Kunjan-4 and highest gall number was recorded in genotype HPR-1156. Hybrid HRI-152 and HPR-2153 recorded significantly lowest and highest number of white-tip nematodes in grains, respectively. Beside this, root-knot nematode galls recorded in the wheat crops varied from 8 to 162galls/5g root.

Key words: *Rice, Meloidogyne, Malan, white tip*

Plant parasitic nematodes of rice are inviting the attention of the farmers and the agricultural workers alike recently, mainly because of the awareness about their potentiality to cause significant damage and economic loss. Water availability for rice cultivation, crop patterns and agricultural policies are influencing population dynamics of the parasitic nematodes (Coyne, 2000; Prot, 2000). Root-knot nematode, *Meloidogyne graminicola* has been reported to cause losses under different rice growing situations (Bridge and Page, 1982; Rao *et al*., 1985; Prasad *et al*., 1990; Sharma and Prasad, 1995; Prasad *et al*., 2006). Chandel *et al*. (2002) reported a root-knot nematode, *M. triticoryzae* affecting rice and other important crops including wheat. The white-tip nematode is seed borne and is widely distributed (Prasad *et al.,* 1987). This nematode was reported to cause spikelet sterility in association with mites and saprophytic fungi (Rao *et al*., 2000). Non specific symptoms such as stunted growth and ill emergence of panicles that could be attributed to white-tip nematode damage and sterility in panicles, were observed in the Rice and Wheat Research Centre, Malan, Himachal Pradesh.

Twenty five plants each of eight cultivars *viz*., Nagtota Purple, China-9888, Hasan Sarai, Kunjan-4, VL-221, HPR-1156, HPR-957 and Kasturi were carefully uprooted, washed and fixed in 4% formaline. The root were cut into small pieces (1-2 cm), mixed thoroughly and five samples of five g root were stained separately in lactophenol blue, cleared in lactophenol, observed under microscope and number of adults with eggmasses and the developing stages of the root-knot nematode were recorded.

Observations were taken in the following wheat (cv. HPW-155) crop to observe root-knot nematode infection. Starting from 20 days after sowing, fifteen wheat plants were pulled out carefully at fortnightly intervals from statistically randomized locations in the field, roots were washed free of soil, clipped off and five sub-samples of 5 g roots were made. Root-knot nematode caused gall numbers were recorded from each sub-sample and the average gall numbers were derived.

Twenty matured rice panicles were collected from 13 standing rice cultivars. Rice grains of each cultivar were pooled up separately and 100 grains, in ten replicates, were dehusked carefully in a glass petri-plate. The opened grains were allowed to soak in water for an hour and the white-tip nematode numbers were recorded by observing under a microscope.

The results revealed that all the rice cultivars were infected by the root-knot nematode, *M.graminicola* (Table 1). Significantly lowest gall number was recorded in genotype Kunjan-4 and highest gall number was recorded in genotype HPR-1156, in

Table 1. Population of root-knot nematodes in rice

Cultivar	Root–knot nematode		
	Gall No*	Adults with * egg masses	Larval stages*
Nagtota Purple	2.853 (7.8)	5.215 (26.8)	7.272 (52.4)
China-9888	4.423 (19.2)	7.828 (60.8)	11.262 (126.4)
Hasan Sarai	3.401 (11.2)	6.136 (37.2)	9.523 (90.20)
Kunjan-4	2.275 (4.8)	3.903 (14.8)	5.663 (31.60)
VL-221	2.978 (8.4)	5.410 (28.8)	7.409 (54.40)
HPR-1156	5.214 (26.8)	8.712 (75.4)	12.730 (161.60)
HPR-957	4.410 (19.0)	7.352 (53.6)	10.540 (110.60)
Kasturi	4.562 (20.4)	7.803 (60.4)	11.544 (132.80)
CD (P=0.05)	0.4847	0.2819	0.1579

*Figures in the parenthesis represent original values. *Sqrt transformed values

comparison to all other cultivars. Similar observations were recorded with respect of adults with egg masses and developing stages of the nematodes. During the root-knot nematode outbreak in Mandya district of Karanataka state also, all the rice cultivars grown in the region were found to be susceptible to the nematode (Prasad *et al.,* 2006).

Root-knot nematode numbers recorded in the wheat crops varied in between 8 to 162/5g root. Highest number of nematode galls (162) was recorded in second week of November, 2006 and the lowest (8) were recorded in second in second week of February, 2007. Temperature influenced the nematode buildup. With fall in temperature the numbers in nematode caused galls decreased steadily till the second week of February and increased with rising temperature. Chandel *et al.* (2002) observed infection of *M.triticoryzae* in wheat cv. HD 2329 and reported that lower temperature during the dry season limited the rate of population growth. They opined that the reproduction of nematode that occurred in dry seasons contributed to relatively higher equilibrium densities. Present investigations on *M.graminicola* are in line with the above observations.

Of the 13 entries tested, Hybrid HPR-152 and HPR-2153 recorded significantly lowest and highest number of nematodes in grains, respectively in comparison to all other entries (Table 2). White-tip nematode numbers recovered from HPR-1068, HPR-1156, Hasan Sarai, Kasturi, VL221 and HPR-957 were comparable. Since most of the entries are harbouring more nematodes than the ETL (Prasad *et al*., 1987),

Table 2. Population of white tip nematodes in rice

Cultivar	White-tip nematode numbers (Sq.rt. transformed values)
China -9888	15.519 (237)
Kunjan-4	10.048 (102)
Local purple	26.807 (713)
RP-2421	31.902 (1059)
HPR-1068	14.371 (207)
Palampur Purple	35.359 (1283)
HPR-1156	13.837 (200)
Hasan Sarai	13.505 (193)
Kasturi	14.153 (193)
VL-221	14.291 (200)
Hybrid HPR-152	7.205 (50)
HPR-957	14.237 (205)
HPR-2143	19.886 (429)
CD(0.05)=	2.2479

*Figures in the parenthesis indicate the original numbers

the damage was reflected in the form chaffy and ill-filled grains. Such wide spread symptoms were observed at Hyderabad during 1982 (Jeyaprakash and Joshi, 1979).

Since rice and wheat are widely grown in Himachal Pradesh, occurrence of the root-knot nematode, *M. graminicola* infecting both these crops in the state should be given a special attention and strategies should be devised to contain the spread of the nematodes in the state. Further, the prevalence the white-tip nematode in rice cultivars invites special attention in view of its important in the transboundary movement of rice.

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