SHORT COMMUNICATION

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Screening of breeding lines of rice for resistance against rice root-knot nematode *Meloidogyne graminicola* Golden and Birchfield

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ABSTRACT

Screening of rice germplasm at Central Rice Research Institute showed that rice cv. Ramakrishna is tolerant and Annapurna is highly susceptible to the Cuttack population of the rice root-knot nematode under artificial infection. F_2 plants of the cross Annapurna/Ramakrishna showed transgressive segregation of resistance. These F_2 plants were further advanced to F_8 and F_9 by single-seed-descent method. Screening of F_9 RILs under artificial infection conditions confirmed transgressive segregation and lead to identification of two lines, CR3003-184 and CR3003-1-186, highly resistant over the parent Ramakrishna both in reducing production of galls on the roots.

Key words: *rice, root-knot nematode, resistance, inbred lines*

Several biotic factors such as insects, nematodes, fungi, bacteria reduce rice yield. Among the biotic stresses, root-knot nematode (*Meloidogyne graminicola* Golden and Birchfiled), is a major constraint to rice production in upland, aerobic rice and direct sown medium land paddies in Asia and Southeast Asia causing as high as 70% loss in yield in rainfed conditions (Prot *et al.* 1994). Current methods of cultural control are not efficient due to internal habit of the pathogen. There are few options for chemical control due to ban of the fumigants like DBCP (1,2-dibromo-3-chloropropane) and EDB (ethylene dibromide) (Boerma and Hussey, 1992). Use of granular insecticides like furadan and phorate in high doses can be damaging to the environment and costly for the poor rice farmers. The most feasible alternative is the use of resistant varieties. Rice varieties, identified till date have very low level of resistance. The present investigation was undertaken to identify varieties lines with durable resistance for use in root-knot nematode resistance breeding programmes.

Genetic crosses were made between the highly susceptible cultivar, Annapurna and the tolerant Ramakrishna (a derivative of TKM6) and the F_2 plants were selfed and advanced to F_8 and F_9 recombinant inbred lines (RILs) by single-seed-descent method. Screening for rice root knot nematode (RRKN) resistance of the F_9 RILs was done under artificial infection conditions in the greenhouse at Central Rice Research Institute, Cuttack. Nine plants of each RIL, parents Annapurna, Ramakrishna, TN1 and TKM6 were grown singly in plastic pots containing 500 grams autoclaved sand and soil (1:1) mixture. When the plants were 10 days old, 1000 freshly hatched second stage juveniles of RRKN were inoculated to each plant by exposing the roots. Forty five days after inoculation, each plant was dislodged from the pot and the roots were washed of soil gently for counting the total number of galls in each plant.

The number of galls on Ramakrishna was 41.33, while CR3003-184 and CR3003-1-186 were having 15.88 and 19.22 galls, respectively. Screening for resistance showed that both the accessions showed significantly low number of galls compared to the resistant parent (Table1).

RRKN has become an important nematode pest in rice cultivation in the recent past. It has caused significant yield loss in upland, low land and aerobic rice eco-systems (Prot and Matias, 1995). Because of its wide host range, it could be a menace in aerobic

Table 1. Average number of galls in breeding lines

Replication	Annapurna galls plant^{-1}	Ramakrishna galls plant^{-1}	TN1 galls plant^{-1}	TKM6 galls plant^{-1}	CR 3003-184 galls plant^{-1}	CR 3003-11-186 galls plant^{-1}
R1	110	37	140	56	15	22
R2	105	40	180	36	15	20
R3	120	38	135	46	13	16
R4	120	40	180	60	12	18
R5	115	40	170	45	18	18
R6	110	43	147	50	20	19
R7	131	45	149	51	15	17
R8	120	45	140	53	18	20
R9	119	44	151	60	17	23
Mean	116.6	41.3	154.6	50.7	15.8	19.2
CD (P<0.05)	8.38					

rice too. Identification of quantitative genes can provide durable resistance over years and across large areas. The level of resistance is also very high as evident from production of galls. These two accessions may be good donors in a rice root-knot nematode resistance breeding programme.

REFERENCES

Boerma HR and Hussey RS 1992. Breeding plants for resistance to nematodes. J. Nematol. 24: 242-252

Prot JC and Matias DM 1995. Effect of water regime on the distribution of Meloidogyne graminicola and other root-knot parasitic nematodes in a rice field toposequence and pathogenicity of M. graminicola on rice cultivar UPLRi5. Nematologica 41: 219-228

Prot JC, Soriano IR and Matias DM 1994. Major root-parasitic nematodes associated with irrigated rice in the Philippines. Fudam. Appl. Nematol.17: 75-78