SHORT COMMUNICATION

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Screening of rice germplasm lines against rice root-knot nematode *Meloidogyne graminicola*

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ABSTRACT

The rice root-knot nematodes infest rice plants and cause considerable yield loss to the tune of 17-30 % to rice cultivation. In order to identify resistant source against them,414 rice cultivars were tested by artificially inoculating fifteen-day-old pot-grown seedlings with 100 second stage juveniles. Only two entries from breeding lines, 127-28-1-1-1 &183-6-1-1-3 were found resistant with score 2. Two lines from NBPGR collection and 4 aerobic cultivars were tolerant to root-knot nematode leaving all other in susceptible and highly susceptible category.

Key words: *Meloidogyne graminicola, screening, resistance, aerobic varieties*

The rice root-knot nematode, *Meloidogyne graminicola* has been reported as a pest of rice causing 17-30 % yield losses due to poorly filled kernels (Jain *et al*., 2007). Though this nematode is common in uplands, they also thrive well in submerged condition. The potentiality of its threat to agriculture was observed after the outbreak of this nematode in farmer's field in Mandya district of Karnataka (Prasad *et al*. 2001). The infective juveniles (second stage larvae) penetrate near the root tip, then migrate intercellularly through cortex and invade the phloem tissues. The invaded cells become the multinucleate giant cell with unidirectional flow of nutrients. Thereby, the nematode disturbs both the flow of nutrients and photosynthates in the plant.

In view of its obnoxious nature and poor awareness among the farmers, the only effective management option is breeding for resistance varieties. Several nematode tolerant cultivars have been identified but still a strong resistant source has not been identified. Therefore, to identify strong resistant donor lines against this nematode. Henceforth, 414 rice cultivars including 262 breeding lines, 68 lines from national bureau of plant genetic resources, New Delhi, 81 aerobic varieties and 3 hybrids were evaluated against this nematode under net house condition, for identification of resistant lines.

The rice plants were grown in earthen pots with a pot mix of autoclaved soil and sand (1:1). Inoculation was done on 15th day after sowing with second stage infective juveniles at the rate of 100 nematodes plant^{-1}. Three replicates were maintained for each cultivar and the extent of gall formation was estimated based on the scale given by All India Coordinated Rice Improvement Project. Rating was done as 1 for no galling (highly resistant); 2 for 1-10% galling (resistant); 3 for 11-30% galling (tolerant); 4 for 30-50% galling (susceptible); 5 for more than 50% galling (highly susceptible). Annapurna and TN 1 were used as susceptible check. The cultivars were categorized as resistant or susceptible types on the basis of Gall Index (GI).

$$\text{Gall index} = \frac{\text{score of test cultivar}}{\text{score of check}} \times 5$$

Out of 414 rice genotypes screened, only two entries from breeding lines, 127-28-1-1-1 and 183-6-1-1-3 were found resistant with score 2. Two lines from NBPGR collection (IC NO. 298563; 2159) and 4 aerobic cultivars (Solani; Sathia; Laxmansal; Mugi) were tolerant to root-knot nematode leaving all other in susceptible and highly susceptible category (Table 1).

Table 1. Reaction of rice cultivars to rice root knot nematode, *Meloidogyne graminicola*

Status of resistance	Breeding lines	NBPGR accessions	Aerobic varieties and Hybrids
Resistance	127-28-1-1-1; 183-6-1-1-3		
Moderately resistance or Tolerant		IC No. 298563; 2159	Solani; Sathia; Laxmansal; Mugi
Susceptible	153-33-1-1-1; 168-15-1-1-1; 182-2-1-1-1; 121-5-1-1-1; 159-11-1-1-1; 182-3-1-1-1; 183-6-1-1-4; 123-46-1-1-1; 157-27-1-1-1; 153-33-1-1-3; 183-1-1-1-1;	IC No. 279361; 282454; 309993; 311862; 335399; 337558; 337578; 344726; 362108; 383441; 384159; 384176; 384190; 497109; 282444; 282515; 298580; 311014; 311021; 326126; 326202; 282825; 328581; 330422; 332037; 337552; 337556; 346200	Gandheswari; Karnasal; Banshpati; Sitasal; Kedaragauri; Badaharisankar; Bhasa manic; Maguramauji; Khudikhasa; Thakulsal; Bhibisona; Banshpata; Raktabijuli; Jungalijata; Dhulia; Chandrakanta; Sukasan; Khoda; Biradibankoi; Maachandi; Bourani; Harisankar; Sundarvatlar; Baghdhipa; KH12 Latasal; Gaudhamalati;
Highly susceptible		IC No. 260937; 260961; 267428; 278777; 281508; 283262; 313140; 334180; 337587; 337593; 346846; 356419; 363746; 384200; 497093; 497111; 497120; 497121; 497164; 282386; 298569; 298570; 311025; 316312; 320871; 320960; 321674; 326420; 328524; 330066; 331166; 332058; 337563; 337564; 340683; 346199; 350207; 344730	Paan; Mahadi; Kalomoti; Chakramala; Nonakekti; Bhandi; Rajamali; Baghjhapta; Baula; Nata; Nazin man; Dhalakakri; Ratanchudi; Rangiarai; Tulasibhog; Anushabankata; Lunadhan; Letasal; Majhijhular; Motana; Jhuli; Ghasriar; Keshabsal; Mayurkanth; Kalamula; Sitabhog; Rahashpanjar; Vasumati;Kalashree; Luni farm; Champa; Kankni; Matiaharisankar; Mugaisal; Baiddulan; Champapuni; Srabantisal; Lalsara; Beganamanjia; Pimpudibasa; Lalita; Badakalamula; Jagabalia; Nona 30; Malabati; Panikosili; Ajirman; Kolkatta var. Jungalijhata; Machakanta; Malabati; Rahash farm; Ajay; Rajalaxmi; CRH 32

It is evident from the results that only a very few lines from farmers' field are tolerant to rice root knot nematode leaving many cultivars to highly susceptible category. The two breeding lines can be used as a donor parent in resistance breeding against rice root knot nematode.

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