www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(8): 1913-1916

www.thepharmajournal.com
Received: 22-06-2022
Accepted: 25-07-2022

Anjana B Prajapati
Department of Nematology,
B. A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Tulika Singh
Department of Nematology,
B. A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Corresponding Author
Anjana B Prajapati
Department of Nematology,
B. A. College of Agriculture,
Anand Agricultural University,
Anand, Gujarat, India

Studies on different host range of *Meloidogyne graminicola*

Anjana B Prajapati and Tulika Singh

Abstract
Studies on host status of root-knot nematodes infecting rice revealed that *Oryza glaberrima* line 44, sorghum (HJ 541), bajra (HHB 67), onion, *Dactyloctenium aegyptium* and rice (PB 1121) were found host of *M. graminicola*. *Oryza glaberrima* line 06, *Oryza glaberrima* line 33, brinjal (BR-112), Tomato Sel.7 and *Leptochloa chinensis* were found non host of *Meloidogyne graminicola*.

Keywords: Host, rice, *Meloidogyne graminicola*, weed, cereals

Introduction
The genus *Meloidogyne* is considered the most important mainly due to its wide host range that includes more than 3,000 species of wild and cultivated plants (Hussey & Janssen, 2002). Recently, *Meloidogyne graminicola* (Golden and Birchfield) causing rice root knot disease has emerged as a major pest throughout the world due to its broad host range and ability of posing potential yield loss. The losses caused by *M. graminicola* may vary from negligible to heavy depending on the severity of disease. Completion of life cycle of *M. graminicola* is highly temperature dependent and may vary from 15-51 days. The main symptoms of root knot disease of rice are yellowing, dwarfing and gall formation on the roots of rice plants. Weed host, *Amaranthus spinosus*, *Bidens pilosa*, *Portulaca oleracea* (Brito *et al*., 2008) [2], *Cyperus rotundus*, Amaranthus spp., *Chenopodium album* and *Digitaria* spp. are often cited in the literature (Myers *et al*., 2004) [6]. Due to its wide polyphagia, *M. graminicola* survives and reproduces in off-season on weeds and forage crops growing on fallow plants, contributing to increase of inoculum in the soil, and then parasitizing rice cultivation. (Pokharel *et al*., 2007) [8]. Among other weeds, the barnyard grass *Echinochloa* spp. is reported as good plant host of *M. graminicola* (Siciliano *et al*., 1990; Sperandio & Amaral, 1994) [12, 14]. It was first reported on barnyard grass, *Echinochloa colonum*. Subsequently, it was found that it readily attacks several grasses, bush bean, oats, sorghum, pearl millet, wheat and oats. Rice being considered as a major economically important host. Anamika *et al*. (2011) [1] assessed the disease incidence and intensity of root-knot disease on rice and vegetable crops in 21 districts of Uttar Pradesh (India).
However, little is known about the development and reproduction of this nematode in this species. Therefore, the present investigation was carried out to check the host suitability of plant species, which often found in off-season and during rice cultivation against root-knot nematode, *M. graminicola*.

Materials and Method
For the host range studies, various cereals, vegetable crops and monocot weeds were screened for their host status with regard to rice root-knot nematode, *M. graminicola* during 2018-19. The studies were conducted in earthen pots of 15 cm diameter filled with nematode infested soil (1000 J_2/kg soil/pot). Three seeds of each crop/weed were sown in each pot. On germination, plants were thinned down to one plant/pot with three repetitions. Watering and plant protection measures were given as per requirement. Forty days after inoculation, numbers of galls per plant were counted. The galls were dissected to count No. of eggs and juveniles. The reproductive factor was calculated and the test plants were categorized as host and non host. Calculated Rf value (Pf/Pi) and categorized the test plants as hosts (Rf> 1) and non-hosts (Rf<1).

Results and Discussion

Data presented in the Table 1 indicated that among six cereals crops, less number of galls/plant observed in the *Oryza glaberrima* line 33 followed by *Oryza glaberrima* line 06 and *Oryza glaberrima* line 44. Rice (PB 1121) recorded 8.50 galls/plant. Sorghum (HJ 541) and bajra (HHB 67) remained at par with each other. Among the vegetable crops, onion recorded maximum number of galls/plant (7.50) whereas tomato sel.7 was found free from galls. Among monocot weeds, *Dactyloctenium aegyptium* recorded less number of galls (3.25); while, *Leptochloa chinensis* was found free from galls.

Perusal data presented in Table 2 revealed that among the different tested host plants, *Oryza glaberrima* line 44, Sorghum (HJ 541), bajra (HHB 67), onion, *D. aegyptium* and Rice (PB 1121) were found host of *M. graminicola*. *Oryza glaberrima* line 06, *Oryza glaberrima* line 33, brinjal (BR-112), tomato sel.7 and *L. chinensis* were found non host of *M. graminicola*.

Occurrence of *M. graminicola* on cereals *viz;* rice, wheat, bajra, oats and barley were reported by many scientists (Steiner 1934; Golden and Birchfield, 1965; Roy 1978; Pankaj *et al*., 2010; Dabur *et al*., 2004; Salalia *et al*., 2013) [15, 4, 10, 7, 3, 11]. Several weeds like *E. crusgalli*, *E. indica* and *C. rotundus* were found infected by *M. graminicola*. Dabur *et al*. (2004) [3] reported that rice, sorghum, pearl millet, wheat and oats were good hosts of *M. graminicola.* Brinjal, tomato, okra, green gram and barley did not support the multiplication of this nematode. *Cyperus rotundus*, *Dichanthium annulatum*, *Echinochloa crusgalli*, *E. colona*, *Eleusine indica*, *Eclipta alba*, *Trigonella polycerate* and *Melilotus alba* were found to be very good hosts of this nematode. Galls but no egg masses were found on *Cynodon dactylon* L., and *Euphorbia hirta* L. (Rao *et al*., 1970) [9]. Singh and Patel (2016) [13] reported that *Dactyloctenium aegyptium* was found to be good host of this nematode.

Table 1: Effect of different hosts on number of galls per plant during 2018-19

Treatments	Host plants	R_1	R_2	R_3	R_4	Total	Average
T_1	*Oryza glaberrima* line 06	0	0	1	2	3	0.75
T_2	*Oryza glaberrima* line 33	2	0	0	0	2	0.50
T_3	*Oryza glaberrima* line 44	3	3	2	3	11	2.75
T_4	Sorghum (HJ 541)	23	17	21	37	8	24.5
T_5	Bajra (HHB 67)	16	26	18	29	89	22.25
T_6	Brinjal (BR- 112)	0	1	0	2	3	0.75
T_7	Tomato- Sel. 7	0	0	0	0	0	0.00
T_8	Onion (*Kharif*)	7	3	11	9	30	7.50
T_9	*Dactyloctenium aegyptium*	6	2	4	1	13	3.25
T_{10}	*Leptochloa chinensis*	0	0	0	0	0	0.00
T_{11}	Rice (PB 1121) - Check	9	12	7	6	34	8.50
S. Em.±							1.80
C.D. (0.05)							5.18
CV %							55.71

Table 2: Reaction of cereals and weeds against *M. graminicola*

Treat.	Host plants	R_1	R_2	R_3	R_4	Total	Avg.	Reaction (Host/ Non host)
T_1	*Oryza glaberrima* line 06	0.91	0.73	0.58	0.94	3.16	0.79	Non Host
T_2	*Oryza glaberrima* line 33	0	0	0	0	0	0	Non Host
T_3	*Oryza glaberrima* line 44	2.09	2.57	1.19	0.67	6.52	1.63	Host
T_4	Sorghum (HJ 541)	1.36	1.57	1.49	1.38	5.8	1.45	Host
T_5	Bajra (HHB 67)	1.13	0.84	1.67	1.09	4.73	1.18	Host
T_6	Brinjal (BR- 112)	0.35	0	0	0.47	0.82	0.20	Non Host
T_7	Tomato- Sel. 7	0	0	0	0	0	0	Non Host
T_8	Onion (*Kharif*)	2.19	1.63	1.49	1.93	7.24	1.81	Host
T_9	*Dactyloctenium aegyptium*	1.03	2.15	1.57	1.51	6.26	1.56	Host
T_{10}	*Leptochloa chinensis*	0	0	0	0	0	0	Non Host
T_{11}	Rice (PB 1121) - Check	2.19	2.29	1.13	1.43	7.04	1.76	Host
S. Em.±							0.19	
C.D. (0.05)							0.55	
CV %							40.21	

Different hosts and non hosts for *M. graminicola*

Acknowledgement
The authors are highly thankful to Project Coordinator, AICRP on nematodes in Agriculture for providing seed material and financing support.

References

1. Anamika Simon S, Singh KP, Ghosh G. Distribution of root-knot nematode on major field crops in Uttar Pradesh (India), Arch. Phytopathology Plant Protect. 2011;44(2):191-197.
2. Brito JA, Kaur R, Cetintas R, Stanley JD, Mendes ML, McAvoy EJ, *et al*. Identification and characterization of *Meloidogyne* spp. infecting horticultural and agronomic crops, and weeds in Florida. Nematol. 2008 Jan 1;10(5):757-766.
3. Dabur KR, Taya AS, Bajaj HK. Life cycle of

Meloidogyne graminicola on Paddy and its Host range studies. Indian J Nematol. 2004;34(1):80-84.
4. Golden AM, Birchfield W. *Meloidogyne graminicola* (Heteroderidae) a new species of root knot nematode from grass. Proc Helminth Soc Wash. 1965 Jan 1;32(2):228-231.
5. Hussey RS, Janssen GJW. Root-knot nematodes: *Meloidogyne* species. In: STARR, J. L.; COOK, R.; BRIDGE, J (Ed.). Plant resistance to parasitic nematodes. Wallingford: CAB International; c2002. p. 43-70.
6. Myers L, Wang KH, McSorley R, Chase C. Investigations of weeds as reservoirs of plant-parasitic nematodes in agricultural systems in Northern Florida. Proceedings of 26th Annual Southern Conservation Tillage Conference for Sustainable Agriculture. North Carolina Agricultural Research Service Technical Bulletin TB-321; c2004. p. 258-267.
7. Pankaj, Sharma HK, Prasad JS. The rice root-knot nematode, *Meloidogyne graminicola*: An emerging problem in rice-wheat cropping system. Indian J Nematol. 2010;40(1):1-1.
8. Pokharel RR, Abawi GS, Duxbury JM, Smat CD, Wang X, Brito JA. Characterization of isolates of *Meloidogyne* from rice-wheat production fields in Nepal. J Nematol. 2007;39(3):221-230.
9. Rao YS, Israel P, Biswas H. Weed and rotation crop plants as hosts for the rice root-knot nematode, *Meliodogyne graminicola* (Golden and Birchfield) *Oryza*. 1970;7(2):137-142.
10. Roy AK. Host suitability of some crops to *Meloidogyne graminicola*. Indian Phytopathol. 1978;30:483-485.
11. Salalia R, Kumar MU, Walia RK. Spectrum of hosts for rice root-knot nematode *Meloidogyne graminicola* (Haryana population) under green house conditions. Proceedings of National Symposium on Nematode: A friend and foe of Agri-horticultural crops, held at Solan; 2013 Nov 21-23. P. 91.
12. Siciliano SR *et al*. Hospedabilidade de plantas a *Meloidogyne graminicola* no Brasil: Primeira parte. Nematol. Bras. 1990;14(1):121-130.
13. Singh, Tulika, Patel BA. Studies on host range of *Meloidogyne graminicola*. Current Nematology. 2016;27(2):181-185.
14. Sperandio CA, Amaral AS. Occurrence of the rice root-knot nematode, *Meloidogyne graminicola*, on irrigated rice in Rio Grande do sul. Lavoura Arrozeira. 1994;47:18-21.
15. Steiner G. Root-knot and other nematodes attacking rice and some weeds. Phytopathol. 1934;24:916-928.