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RESEARCH ARTICLE

SCREENING AND EVALUATION OF BRINJAL VARIETIES /CULTIVARS AGAINST ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA*.

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Abstract

Out of one hundred fifty brinjal varieties/cultivars screened against root-knot nematode, only twenty varieties have shown resistant reaction with least gall index (1.1 to 2.0), fifty eight varieties/cultivars moderately resistant with gall index of 2.1 to 3.0, forty seven varieties were susceptible having gall index of 3.1 to 4.0 and twenty five were found highly susceptible with highest gall index of 4.1 to 5.0 against the test nematode. Plant height of brinjal varieties were decreased by 9.04, 18.48, and 23.50 per cent in varieties Pusa Kranti, Kantabaigan and Pusa Purple Long, respectively over un-inoculated control and the formation of giant cells and galls in the roots of both resistant and susceptible brinjal varieties had shown decrease of shoot weight (34.08 %) and root weight (31.67 %) of the susceptible brinjal cultivars, Pusa Purple Long which was different from other two resistant varieties showing resistance reaction against the test nematode.

INTRODUCTION

Root knot nematodes (*Meloidogyne* spp.) infecting particularly vegetable crops are one of the most wide spread pathogens limiting world agricultural productivity. Vegetable crops are attacked by all the four major species of root knot nematodes viz. *Meloidogyne incognita, M. javanica, M. arenaria* and *M. hapla*. Among these, *M. incognita* is the major problem in brinjal under the climatic conditions of Orissa, India. It causes considerable damage to brinjal plants (Kamalvanshi *et al*., 2004) and results in extensive losses in yield and quality. Though the nematicides are quite effective against nematodes but these are hazardous to health, soil and environment. Use of resistant cultivars is an economical and eco-friendly option for the management of nematode diseases under field conditions.

Brinjal commonly known as eggplant (*Solanum melongena L)* is one of the most widely grown vegetable crops in India as well as in all parts of Orissa. Its fruits are good sources of calcium, phosphorus, iron and vitamins particularly vitamin 'B'. It is also rich in medicinal values generally being used as an excellent remedy for those suffering from liver complaints and is employed as a cure for toothache. The green leaves of brinjal plant are the main source of antiscorbutic, Vit.C. Among various biotic constraints limiting brinjal production, root-knot nematode, *Meloidogyne incognita*, is one of the most potential plant parasitic nematodes which cause about 27.3 to 32.0% yield loss in brinjal (Bhatti and Jain, 1977; Darekar and Mahase, 1988). The infection caused by these nematode results in yellowing of leaves and poor plant growth. This nematode has a wide host range which reduces the effectiveness of crop rotation for its management. The nematode can also be managed by use of nematicides but due to high cost and unavailability make them unsuitable for farmers in subsistence farming system. Therefore, an alternative source of ecologically sound and viable option to avoid the losses caused by the nematodes is the use of resistant cultivars / lines. In the present investigation, 150 cultivars/ lines were screened in phased manner under pot culture condition to locate the resistant source among various germplasms.

MATERIALS AND METHODS

In the present study, seeds of one hundred fifty brinjal genotypes were procured from the Vegetable Improvement project (VIP), OUAT, Bhubaneswar and local areas. Egg masses of *M.incognita* were collected from pure culture already maintained on brinjal plants. Second stage juveniles used in these experiments were obtained from egg masses raised on infected brinjal plants. The experiment was carried out in screen house of the Nematology Department. Earthen pots of 15cm dia. were filled with denematised, sterlised sandy soil, FYM and sand mixture in 2:1:1 ratio @1Kg/pot. Seeds of each genotype were sown in the earthen pots containing steam sterilized soil. After germination, these were thinned to single plants in each pot with three replications in each case. One week old seedlings of brinjal genotypes were inoculated with freshly hatched larvae of root knot nematode (*M. incognita*) @ $1000J_2$/ pot by exposing the roots. Brinjal plants were uprooted from the pots after 45 days of inoculation and screening of brinjal germplasm for resistance and susceptibility against root knot nematode (*Meloidogyne incognita*) was done by adopting 1-5 scales as Highly Resistant (1= no gall/egg mass per plant), Resistant (2=1-10 galls/ egg mass per plant), Moderately resistant (3= 11-30 galls / egg mass per plant). Susceptible (4= 31-100 galls/ egg mass per plant) and Highly Susceptible (5 = more than 100 galls/egg masses per plant) as per Root-knot Index scale given by Gaur et al.2001

EVALUATIONS OF THREE KNOWN RESISTANT BRINJAL VARIETIES AGAINST ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA*

Seeds of three brinjal varieties of known resistance obtained from screening process were surface sterilized by treating with 0.1 % $Hgcl_2$ solution for about four minutes followed by five risings with sterile water. For evaluation purpose inoculations and observations were followed as done before in screening process.

RESULTS AND DISCUSSION

Screening of brinjal varieties/cultivars against root-knot nematodes.

The Table 1 revealed that out of one hundred fifty brinjal varieties/cultivars screened against root-knot nematode, only twenty varieties have shown resistant reaction with least gall index (1.1 to 2.0), fifty eight varieties/cultivars moderately resistant with gall index of 2.1 to 3.0, forty seven varieties were susceptible having gall index of 3.1 to 4.0 and twenty five were found highly susceptible with highest gall index of 4.1 to 5.0 against the test nematode according to Gaur et al.2001

Effect of nematode infections on plant growth parameters

Plant height: Due to infection of root-knot nematode plant height of brinjal varieties were decreased by 9.04, 18.48, and 23.50 per cent in varieties Pusa Kranti, Kantabaigan and Pusa Purple Long, respectively over un-inoculated control.

Shoot weight and root weight: The infection of root-knot nematode and formation of giant cells and galls in the roots of both resistant and susceptible brinjal varieties had shown decrease of shoot weight (34.08 %) and root weight (31.67 %) of the susceptible brinjal cultivars, Pusa Purple Long which was different from other two resistant varieties showing resistance reaction.

Table 1. Root-knot Index Scale (Gaur et al.2001)

Root-knot Index Scale	Number of Galls/ egg mass per root	Reactions
1	0	HR
2	1-10	R
3	11-30	MR
4	31-100	S
5	>100	HS

Table2. Reaction of brinjal cultivars / lines against root knot nematode, *Meloidogyne incognita*

Sl. No.	Reactions based on Root-knot index	**Cultivars / lines**
1.	Resistant (1.1 to2.0)	Gachhabaigan, Azadkranti,Kantabaigen, Athagara Local, Kamaghara local, Solanum indicum , PBR 129-5, ARU-1, BB1-3, BB 45-C, BB-49, KS-224, Utkal madhuri, BR-112, LB-13, LB-25, LB-28, LB-30, LB-44, LB-55 (20 numbers)
2.	Moderately Resistant (2.1 to 3.0)	Pusakranti, Bhanjanagar local, Mukata Keshi, Ghatikia White, Keonjhar Local, BB.Sel.2, Pusa Sel.-2, BB-6, PBR-5, BB 3-2, BB-3, BB-5, BB 5-2, BB-9, BB-48, Pant samrat, Rajendra Baigan-II, HYK-1, Muktakeshi, Black beauty, Long white cluster, Suchitra, Banararas, Pant Samarai, JC-2, Round-4, Long-13, Neelam long (Var.6.03), CH-167, Rajendra Anupama. Pant Rituraj, Hazari, Baramunda Local, DBSR-9, JE-64-1-2, DBSR-330-1-4, DBSR-412-16, BB-1, BB-2, BB-16-3, BB-3-3, Brinjal (Cross-99) Brinajal 1-2-3, (F_1-hybrid), Blue kajal (Improved), ARU-2C, BB-5-2, LB-31, LB-38, LB-39, T_3, Arkanidhi, Arka Keshar, Syamala, DBSR-91, JE-64-1-2, JE-412-16,PBR-129-5 (58 number)
3.	Susceptible (3.1 to 4.0)	H_4,Blue Kajal ,Brinjal Green star, Blue diamond,LB-13,KT-4,BB-44,BB-60,BB-13,BB-7,Nayagarh Local,BB-13-2,SBP White,MHB-2,MHB-72-31,MHB-40-4-8-1,MHB-683,NDB-487,NDB-484-2, Arun-682, ARBH-201, BH-2, BH-1, Nishaimproved (F_1-hybrid) Brinjal Greek Rocket, Blue Diamond,BB-5-1, BB-3,BB-1, PBR-5, PBR-6, PBR-7, PBR-91-2, NHB-35, Round Brinjal, Phule hybrid-2, C-2, EC-305065, EC-305061, EC-305067, IC-127027,BB-52,SM-6-6,Sel-9-4,LAB-2,JB 64-1,BB 16-2(47numbers)
4.	Highly susceptible (4.1 to 5.0)	Dhauli- P, BB-26, Blue Samrat, Green Samrat, JC-7, NDB-26-1, Pusa Hybrid-13, PLR-1, MHB-1, Arnapurna-I, II, III, Arnapurna Blue Master, Brinjal Green Star, Green Diamond (Long), Long-13, BR-13, AB-2, Sel.-3, P-5-8, Local Makra, IC-127088, IC-127020,IC-127027(25 numbers)

Table 3.Effect of root-knot nematode, *M. incognita* on plant height of three brinjal cultivars as compared to control plant (H)

Varieties	Plant height (cm)		% Increase (+) or % decrease (-) over control
	Healthy	Inoculated	
Pusa Kranti	23.66	21.52	-9.04
Kantabaigen	29.00	23.64	-18.48
Pusa Purple Long	26.33	20.14	-23.50
CD (5 %)	0.151	0.047	-

Table 4.Effect of root-knot nematode, *M. incognita* on shoot weight of three brinjal cultivars as compared to control plants (H)

Varieties	Shoot weight (g)		% increase (+) or % decrease (-)
	Healthy	Inoculated	
Pusa Kranti	73.66	52.63	-28.55
Kantabaigen	43.86	38.82	-11.49
Pusa Purple Long	49.00	32.30	-34.08
CD (5 %)	0.163	0.254	-

Table 5.Effect of root-knot nematode infection on the root weight of three brinjal cultivars as compared to healthy plants (H)

Varieties	Dry root weight (g)		% increase (+) or % decrease (-)
	Healthy	Inoculated	
Pusa Kranti	20.50	14.62	-28.68
Kantabaigen	23.40	16.23	-30.64
Pusa Purple Long	17.90	12.23	-31.67
CD (5 %)	0.359	0.107	-

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