SCREENING OF GERBERA CULTIVARS AGAINST ROOT-KNOT NEMATODE *Meloidogyne incognita*

ABSTRACT

Aims: To find out the source of resistance against root-knot nematode, *Meloidogyne incognita* in different gerbera cultivars and their evaluation

Study Design: Completely Randomized Design

Place and Duration of Study: Biswanath College of Agriculture, BiswanathChariali, Assam during rabi season2023

Methodology: Suckers of six gerbera cultivars were planted in pots and were inoculated with freshly hatched second stage juveniles of *M. incognita* (1 J_2/cm3 soil) fifteen days after planting.

Results: Upon observation 2 months after inoculation results showed that three cultivars *viz*. Pink Melody, Red Seven and ArkaKrishikawere recorded as susceptible with gall index 3.6, 3.6and 3.4 respectively. Other three cultivars *viz*. Orange Sun Brust, Pride of Sikkim and Saffron were recorded as moderately resistantwith gall index 3.0. Upon evaluation the cultivar Orange Sun Brut recorded maximum plant growth parameters followed by the cultivar Saffron and minimum plant growth parameters were recorded in the cultivar Pink Melody.

Conclusion: From this experiment it is concluded that no one cultivar found to be resistant against root-knot nematode. Three cultivars were found to be moderately resistant and others were susceptible. Moderately resistant cultivars can be planted in nematode infested areas as alternative to susceptible cultivars.

Key words: Cultivar, gerbera, root-knot nematode, susceptible

INTRODUCTION

Gerbera (*Gerbera jamesonii* Hook) is one of the most important commercial cut flower belongs to the family Asteraceae. It is perennial in nature and popularly known as Transvaal daisy. According to the global trends in floriculture, gerbera occupies fourth position among cut flowers [1]. Among the various limiting factors in commercial cultivation of gerbera, the plant parasitic nematodes are presently considered as one of the most important one. Several plant parasitic nematodes are found to be associated with gerbera elsewhere in the world [2]. Out of several plant parasitic nematodes associated with gerbera cultivation, the root-knot nematodes are predominant one[3].Root-knot nematode infested plant show characteristic symptoms *viz*., production of heavy root galling (Fig.1), general stunting and chlorosis of leaves(Fig.2).In India, yield losses due to root-knot nematode *Meloidogyneincognita* ingerbera was estimated to the tune of 31.1 per cent[4].Host plant resistance is effective management tool that increases yield in spite of nematode population densities that exceed the damage threshold [5].Resistant germ

plasm is considered to be eco-friendly, economically feasible and environmentally benign methods to combat root-knot nematode as compared to nematicides [6, 7, 8]. In integrated nematode management schedule resistant germplasm can also be integrate with other management practices. It has been found that root-knot nematodes may enter susceptible and resistant varieties of certain crops. Hence breaking of resistance in crop cultivars to root-knot nematodes may occur naturally or by selection containing one or more resistant genes [9]. Several research findings indicates that root-knot nematodes infecting gerbera can effectively managed by various methods [10,11]but very little information are available regarding screening of gerbera varieties against root-knot nematode.

Keeping these facts in view, the present investigation have been undertaken to find out the source of resistance through screening of gerbera cultivars in pot condition against root-knot nematode, *M. incognita*

Fig. 1. Galling on roots of gerbera Infestation of root-knot nematode

Fig.2 Chlorosis of leaves of gerbera due to

MATERIALS AND METHODS

A pot experiment was conducted in the nursery of Plantation Crop Garden, Biswanath College of Agriculture, AAU, BiswanathChariali, Assam during *rabi*season 2023 to assess the reaction of some gerbera cultivars against root-knot nematode, *Meloidogyne incognita*. Suckers of six gerbera cultivars each of 3 to 5g were collected from the Horticultural orchard of Biswanath College of Agriculture. Plastic pots of 1000 cc capacity were filled with sterilized soil, sand and cow dung mixture in the ratio of 2:1:1. After filling of pots a single sucker of different gerbera cultivars were planted in each pot. The pots were arranged in completely randomized design with five replications for each variety. Fifteen days after planting plants were inoculated with freshly hatched second stage juveniles of *M.incognita* @ $1000J_2$ per pot. Regular watering was done till the terminations of the experiment. Two months after inoculation plants were uprooted carefully and roots system was properly washed under running tap water to remove the adhering soil particles in roots. Different observations *viz.* number of galls per root system, plant height, root length, fresh and dry weight of shoot and root were recorded. The varieties were categorized as highly resistant (HR), resistant(R), moderately resistant (MR), susceptible(S) and highly susceptible (HS) on the basis of number of galls per plant following 1-5 gall indexscales furnishbelow [12].

List 1: Gall index (1to 5scales)

Scale	Particulars	Reaction
1.	No gall, no eggmass	Highly Resistant(HR)
2.	1-10 galls with eggmasse per plant	Resistant (R)
3.	11-30 galls with eggmasses per plant	Moderately Resistant(MR)
4.	31-100 galls with eggmasses per plant	Susceptible (S)
5.	Above 101 galls with eggmasses per plant	Highly Susceptible(HS)

For estimation of population of *M.incognita*, soil from each pot was mixed thoroughly and 200cc sample from each pot was drawn and extracted by modified Cobbs' sieving and decanting technique. After extraction nematodes were counted in a counting dish using stereoscopic binocular microscope. Data were analyzed statistically using analysis of variance and Fisher's least significant difference (FLSD) was calculated for separation of mean.

RESULTS AND DISCUSSION

Data presented in Table1 showed that out of six cultivars screened against *M. incognita*, three cultivars *viz*. Pink Melody, Red Seven and ArkaKrishikawere found to be susceptible and other three cultivars *viz*. Saffron, Orange Sun Brust and Pride of Sikkim were found to be moderately resistant. Maximum numbers of galls were recorded in the susceptible cultivar Pink Melody (33.80) followed by Red Seven (32.80) and ArkaKrishika(32.50) and minimum numbers of galls were recorded in the moderately resistant cultivar Orange Sun Brust (28.20). Similar trends of result were recorded in case of final nematode population in soil. Maximum final nematode population in soil was recorded in the susceptible cultivar Pink Melody (1450) followed by Red Seven (1366) and minimum was recorded in Orange Sun Brust(1262). This finding is in conformity with the findings made by Nayak *et al*.[13] (2018), who screened seven gerbera cultivars against *M. incognita* and recorded maximum number of galls and final nematode population in soil in the susceptible cultivar 'Seth' and minimum was recorded in the resistant cultivar 'Mammut. Similar findings were also recorded by Manju and Subramanian [14] in screening trial of gerbera varieties against root-knot nematode.

Further, the analysis of growth parameters on plant height (cm), root length(cm), fresh and dry weight of shoot and root(g) were evaluated and the variety Orange Sun Brust which showed moderately resistance reaction had maximum plant growth parameters followed by other moderately resistance cultivars *viz.* Saffron and Pride of Sikkim (Table 2). Minimum plant growth parameters were recorded in the susceptible cultivar Pink Melody. This finding clearly indicates that number of galls in root system and final nematode population in soil had directly related with increase and decrease of plant growth parameters. Maximum number of galls per root system and final nematode population in soil was observed in the susceptible cultivar Pink Melody, which recorded minimum growth parameters. This may be due to that most of the cortex area of root system is occupied with the giant cells. Further, deformation and blockage of vascular tissue at feeding sites of nematode limit translocation of nutrients and water resulting in suppression of plant growth parameters. The decrease of plant growth parameters is possibly due to improper uptake and transport of elements, nutrients and water resulted from maximum infestation with high population in soil. Similar trends of results were also recorded byMahantheshwara and Nayak[15], who evaluated different cowpea cultivars against root-knot nematode, *M. incognita*.

CONCLUSION

Results from the experiment it was found that no cultivars showed resistant reaction against root-knot nematode. Three cultivars *viz.* Orange Sun Brust,Saffron and Pride of Sikkim were found to be moderately resistant. In absence of resistant cultivars, these moderately resistant cultivars may be recommended for plantation in root-knot nematode infested areas.

Fig. 3. View of the experiment

Fig.4. Galls on the roots of different gerbera cultivars

Table1. Screening of gerbera cultivars against root-knot nematode, *M. incognita* (Mean of five replications)

Cultivars	Number of galls/plant	Root-knot index	Reaction	Final nematode population in soil* (200cc)
Saffron	28.80	3.00	Moderately resistant	1271 (35.665)
ArkaKrishika	32.50	3.40	Susceptible	1351(36.769)
Pride of Sikkim	29.60	3.00	Moderately resistant	1279(35.777)
Red Seven	32.80	3.60	Susceptible	1366(36.973)
Pink Melody	33.80	3.60	Susceptible	1450(38.091)
Orange Sun Brust	28.20	3.00	Moderately resistant	1262(35.538)
SE(d)	3.828	0.427		0.128
CD(0.05)	1.822	0.203		0.269

*Figures in parentheses are square root transformed values

Table 2. Evaluation of gerbera cultivars against root-knot nematode, *M. incognita* (Mean of five replications)

Cultivars	Plant height (cm)	Root length (cm)	Fresh shoot wt.(g)	Dry shoot wt.(g)	Fresh root wt.(g)	Dry root wt.(g)
Saffron	28.8	22.10	16.20	2.82	15.80	2.75
ArkaKrishika	26.6	19.10	13.20	2.76	13.00	2.62
Pride of Sikkim	27.4	19.50	13.40	2.88	13.20	2.76
Red Seven	25.6	17.00	12.40	2.64	12.80	2.30
Pink Melody	24.8	16.50	11.40	2.60	12.40	2.28
Orange Sun Brust	29.4	22.58	16.80	2.86	16.00	2.80
SE(d)	1.133	1.663	1.044		1.207	0.180
CD(0.05)	2.38	3.494	2.192	NS	2.535	0.378

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