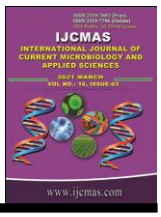
Int.J.Curr.Microbiol.App.Sci (2021) *10*(03): 113-117

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 10 Number 03 (2021)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2021.1003.017

Screening of Coriander Genotypes against Stem Gall Disease Caused by *Protomyces macrosporus*

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Keywords

Genotypes, Coriander, *Protomyces macrosporus*, Stem gall

Article Info

Accepted:
04 February 2021
Available Online:
10 March 2021

A B S T R A C T

Twenty-eight accessions of coriander (*Coriandrum sativum* L.) were screened for resistance against stem gall, a severe disease caused by *Protomyces macrosporus* Unger, with the goal to find out the resistant cultivars. Among various genotypes; ICS4 was found resistant, eleven genotypes, JD-2, JCR-389, JCR-401, 30 WFPS 48.2, RKC-17.1, CS 211, CS 228, CS 245, LCC 200, LCC 276 and RD-417 were moderately resistant and sixteen genotypes *viz.*, RCr-728, UD-856, UD-857, WFPS 48.1, RKC-155, LCC 275, ACr-4, ACr-5, NDCOR-86, NDCOR-100, H. Anand, DH-318, DH-281, RD-416, PD-1 and JD(SI)1 were found moderately susceptible, while none of the genotypes was susceptible to stem gall.

Introduction

The coriander (*Coriandrum sativum* L.) is an important spice crop of India. Its seeds (fruits) and leaves are extensively used as natural additives in cooking, added to food in order to improve its appearance, flavor as well as appetite. India is the largest producer of coriander in the world, accounting for about 80 per cent of the global production (Sharma et. al. 2014). In India, coriander is the 2nd highest export earner next to cumin (Malhotra et. al 2016). Coriander crop suffers from a number of diseases of fungal origin in which stem gall of coriander caused by *Protomyces macrosporus* is responsible for reduction and uncertain yield of coriander. The symptoms of the disease first appear as gall like appearance on the lower part of stem, which gradually extends upwards to flower and seeds. Soil and infected seed material serve as a source of primary inoculum and the disease appears continuously every year in the field causing heavy loss to the crop. Lakra (1999) estimated 16.6–50 percent seed yield loss due to stem gall disease with 22 to 66 percent disease intensity in a field trial. The disease is prevalent in all coriander-growing areas of India and is considered as a limiting factor for successful cultivation of the crop. Efforts

have been made time to time to screen and select resistant varieties of coriander against the stem gall disease in field and greenhouse experiments (Gupta and Sinha, 1973: Singh *et al.*, 2003) on a limited scale.

Biotic stresses such as diseases have impeded coriander cultivation both in the tropics and subtropics (Lehrawan and Gupta 2019). Since host plant resistance is an effective, economic and environmentally safe component in an integrated approach to keep plant diseases below the threshold level therefore, an attempt has been in present study to screen the some recently developed and popular varieties of coriander against *P. macrosporus*.

Materials and Methods

Twenty eight genotypes of coriander were screened for resistance against stem gall of coriander (*Protomyces macrosporus*) under natural conditions in randomized block design (RBD) with three replications in sick plot area of CCS HAU Hisar. Recommended level of NPK fertilizers were applied in each plot equivalently before sowing. The seeds were sown (30x20 cm) on 8th November. Ten plants were selected after germination from each plot and. The disease incidence and severity on various plant parts (stem, pedicels and fruits) was recorded in ten selected plants in each plot at the maturity stage. The disease intensity was recorded as per scale proposed by Lakra (1991). The genotypes were grouped in different categories by adopting 0-4 scale (from resistant to susceptible) as follows (Table 1).

Results and Discussion

In the present study, different varieties of coriander showed variable degree of resistance to stem gall disease Disease symptoms caused by *Protomyces macrosporus* appeared in the form of small to large tumor like swellings on above ground parts of the plant (Fig. 1).

The results showed that out of 28 genotypes, none of the genotypes was completely free from stem gall of coriander, while one genotype viz., ICS4 showed resistant behavior (1-5% disease severity). Eleven genotypes viz., JD-2, JCR-389, JCR-401, 30 WFPS 48.2, RKC-17.1, CS 211, CS 228, CS 245, LCC 200, LCC 276 and RD-417 showed moderately resistant (5.1-20% disease severity) and sixteen genotypes viz., RCr-728, UD-856, UD-857, WFPS 48.1, RKC-155, LCC 275, ACr-4, ACr-5, NDCOR-86, NDCOR-100, H. Anand, DH-318, DH-281, RD-416, PD-1 and JD(SI)1 were moderately susceptible (20.1-50 % disease severity), while none of the genotypes was susceptible (more than 50% disease severity) (Table 2).

Table.1 Categorization of entries based on disease reaction of coriander genotypes

Rating	Per cent Area covered by the disease	Reaction
0	0	Disease Free
1	1-5.0	Resistant
2	5.1-20	Moderately Resistant
3	20.1-50	Moderately Susceptible
4	> 50	Susceptible

Table.2 Screening of different coriander genotypes against stem gall

S. No.	Genotype	Average No. of plants	Disease incidence (%)	#Disease severity (%)
1	Rcr-728	140	7.71	22.50
2	JD-2	145	8.50	16.66
3	JCR-389	130	7.67	14.16
4	JCR-401	120	9.67	14.16
5	UD-856	120	5.55	20.83
6	UD-857	125	17.66	20.83
7	WFPS 48.1	132	10.05	24.16
8	WFPS 48.2	150	4.88	20.00
9	RKC 17.1	132	8.31	17.50
10	RKC-155	164	6.87	21.00
11	CS 211	115	6.91	13.33
12	CS 228	110	8.16	11.66
13	CS 245	150	5.34	15.83
14	LCC 200	126	8.93	15.83
15	LCC 275	104	12.15	24.16
16	LCC 276	135	7.36	20.00
17	ACr-4	130	9.20	21.66
18	ACr-5	150	9.33	25.00
19	NDCOR-86	135	13.03	26.66
20	NDCOR-100	150	15.11	26.66
21	H. Anand	142	9.15	21.66
22	DH-318	140	11.63	26.66
23	DH-281	145	15.61	24.16
24	RD-416	130	18.45	24.10
25	RD-417	145	9.85	18.33
26	ICS-4	130	10.73	5.00
27	PD-1	130	7.16	20.83
28	JD(SI)1	140	10.20	20.83

Disease severity for ten tagged plants

Fig.1 Stem gall of coriander caused by *Protomyces macrosporus*

In order to keep plant diseases below the threshold level, use of resistant varieties is the most economical, easily adaptable and environmentally safe component of plant disease management. In the present investigation, different varieties of coriander evaluated showed variable degree of resistance to *P. macrosporus*. Out of twenty eight coriander genotypes screened for their relative resistance to stem gall under natural conditions, none of the genotypes was found completely free from stem gall, while one genotype *viz.*, ICS-4 showed resistant reaction. Eleven genotypes exhibited moderately resistant reaction and sixteen genotypes were found moderately susceptible. In corroboration to the present study, Naqvi (1986) screened 20 varieties of coriander against stem gall disease and only four were reported to be moderately resistant. Kalra *et al.*, (1999) reported only two varieties (C-1 and Pant-1) out of sixteen selected to be highly resistant against the disease. Tripathi *et al.*, (2002) reported seven varieties *viz.*, UD-1, CS-362, CS-4 Comp-1, Comp-2, Gwalior and Moreccon as susceptible, having 25-50% disease intensity, while five varieties *viz*., JD-1, G-5365-91, Pant Haritma, UD-20 and Rcr-41 out of 20 varieties as resistant having less than 10% disease intensity. Singh *et al.*, (2003) screened seventy genotypes of coriander for resistance against stem gall with the aim to select the resistant cultivars and found PH-7, Pant Haritima, Dhania-8, COR-17, COR-2, COR-2, DH-13, DH19-M-4 and DH-19-M-11-2 highly resistant. Kumar *et al.*, (2016) evaluated 102 germplasm of coriander against stem gall under natural conditions and found thirty five genotypes as moderately susceptible and sixty seven susceptible. Similarly Khan and Parveen (2016) screened twenty seven varieties of coriander and found four varieties as resistant against stem gall and also observed overall yield loss as 27.87 per cent directly related to stem gall intensity.

In conclusion host plant resistance is an effective, economic and environmentally safe component in an integrated approach to keep stem gall disease below the threshold level. The present study was also an attempt to select the resistant varieties of coriander against *P. macrosporus*.

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How to cite this article:

Vijaykumar, S., Kushal Raj and Tehlan, S. K. 2021. Screening of Coriander Genotypes against Stem Gall Disease Caused by *Protomyces macrosporus*. *Int.J.Curr.Microbiol.App.Sci.* 10(03): 113-117. doi: https://doi.org/10.20546/ijcmas.2021.1003.017