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RELATIVE SUSCEPTIBILITY OF DIFFERENT CORIANDER GENOTYPES TO APHID, *HYADAPHIS CORIANDRI* (DAS)

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ABSTRACT

Out of ten genotypes of coriander, *Coriandrum sativum* Linnaeus (RCr–41, RCr–20, RCr–435, RCr–436, RCr–446, RCr–684, UD–118, UD–480, UD–128 and Local) that were screened against aphid, *Hyadaphis coriandri* (Das), RCr–436 was found least susceptible; RCr–435. RCr–684, RCr–446 and UD–118 as moderately susceptible, RCr–41, UD–728, UD–480 and RCr–20 as highly susceptible; and Local as extremely susceptible. The morphological characteristics of the genotypes revealed positive significant correlation between the days taken for 50 per cent flowering and plant height. The biochemical constituents, *viz*., total phenols and volatile oil did not have any bearing on aphid population.

Key words: Genotypes, coriander, aphid, *Hyadaphis coriandri* (Das), susceptibility, infestation

Insect pests are one of the major limiting factors for higher productivity and quality production of coriander. The insect pests, *viz.*, *Hyadaphis coriandri* (Das), *Bemisia tabaci* (Genn.), *Agonoscelis nubilia* (Feb.), *Spodoptera exigua* (Hub.), *Myzus persicae* (Sulzer), *Chrotogonus trachypterus* (Blanch.) and *Thrips tabaci* (Lindemann) have been found infesting coriander crop, besides the mite, *Petrobia latens* (Muller). Among the various insect pests, the coriander aphid, *Hyadaphis coriandri* (Das) has been reported as a regular and major pest of coriander in Rajasthan and other parts of the country. Both nymphs and adults cause quantitative and qualitative losses. Growing of resistant varieties offers management of insect pests without incurring additional cost and forms an important component of IPM. In the present study, the newly evolved genotypes of coriander have been included to study the varietal preference by the aphid, *H. coriandri* (Das).

MATERIALS AND METHODS

Coriander was grown in a simple Randomized Block Design (RBD) for two consecutive years (2004–05 and 2005–06) at SKN College of Agriculture, Jobner, Rajasthan. Ten genotypes (RCr–41, RCr–20, RCr–435, RCr–436, RCr–446, RCr–684, UD–118, UD–480, UD–128 and Local) were sown on 30th October in both the years in two meter linear rows replicated four times. A row to row distance of 0.30 m and plant to plant distance of 0.10 m was maintained. The observations on insect pests were recorded on the crop in early morning hours (before 8.00 AM) at weekly intervals beginning after one week of germination till harvesting. For this purpose, five plants were randomly selected and tagged in each plot and the population of the aphid was counted visually (absolute counting), initially the population was counted on whole plant and in later observations, on three inflorescence/ umbels on each randomly selected tagged plants.

Morphological characters of plants *viz.*, days to 50 per cent flowering, umbels per plant, seeds per umbel and plant height were recorded during the crop growth and at harvest of the crop from five randomly selected plants. Total phenol in leaves was estimated by the method described by Bray and Thorpe (1954). Volatile oil content in coriander grains (seeds) was estimated by essential oil distillation assembly, *i.e.* Clevenger apparatus (A.O.A.C., 1970).

The data thus obtained on aphid population from the genotypes at weekly interval were subjected to analyses of variance after transforming them to $\sqrt{x + 0.5}$ values. The coriander genotypes were also categorized on the basis of peak aphid population during the crop season using following formula, $\overline{X} \pm \sigma$. Where, $\overline{X}$ = Mean of peak aphid population, and σ = standard deviation of peak aphid population. The data obtained after recording morphological and biochemical parameters of genotypes were subjected to analysis of variance and were also correlated with the peak aphid population.

RESULTS AND DISCUSSION

The data presented in Table 1 reveal that none of the tested genotypes was immune to aphid infestation, but

the degree of infestation varied with different genotypes. In the pooled observation of 29th January, the mean aphid population ranged from 11.0 to 22.00 per five plants on different genotypes. The minimum infestation was observed on RCr–436; whereas, it was maximum on RCr–41. The other genotypes existed in the middle order of infestation.

In the second observation (5th February), the mean aphid population ranged from 113.25 to 151.50 per five plants. The minimum infestation was observed on RCr–436 and was found at par with UD–118 and RCr–446. The maximum infestation was recorded on Local.

The third observation indicated that the mean aphid population ranged from 137.62 (RCr–436) to 172.12 (Local) per five plants. RCr–436 stood at par with UD–118 and RCr–446. The maximum infestation was recorded on Local followed by RCr–41, UD–728, RCr–20, UD–480 and RCr–684 and did not differ with each other. The genotype, RCr–435 ranked in the middle order of infestation.

In the fourth observation (19th February), the mean aphid population ranged from 220.00 (RCr–436) to 281.12 (Local) per five plants. Variety, RCr–436 remained at par with UD–118. The maximum infestation was recorded on Local, RCr–41, UD–728, UD–480 and RCr–20, and was at par to harbour the aphid population. The other genotypes existed in the middle order of infestation.

The fifth observation (26th February) was observed to be the peak in population. The mean aphid population ranged from 236.37 (RCr–436) to 316.37 (Local) per five plants. A significant difference was observed among the tested genotypes. RCr–436 had significantly the lowest population. The maximum infestation was recorded on Local followed by RCr–41 and UD–728 and was comparable to each other. The other genotypes ranked in the middle order of infestation.

The sixth observation was recorded on 5th March in which the mean aphid population ranged from 44.87 (RCr–436) to 78.87 (Local) per five plants. RCr–436 was significantly superior over all the genotypes with minimum population. The maximum infestation was recorded on Local followed by RCr–41, UD–728, RCr–20 and RCr–684 and did not differ among each other.

For the sake of convenience in interpreting the results, the pooled data of peak aphid population of different

Table 1. Screening of different coriander genotypes against coriander aphid, *Hyadaphis coriandri* (Das) (pooled, *rabi*, 2004–05 and 2005–06)

S.No.	Genotype	*Mean aphid population per five plants							
		22 Jan	29 Jan	5 Feb	12 Feb	19 Feb	26 Feb	5 March	12 March
1.	RCr–41	0.00 (0.71)	22.0 (4.73)	150.00 (12.24)	165.75 (12.86)	273.62 (16.43)	301.87 (17.37)	77.12 (8.79)	0.00 (0.71)
2.	RCr–20	0.00 (0.71)	13.87 (3.78)	139.37 (11.80)	160.75 (12.67)	260.50 (16.15)	283.75 (16.84)	70.62 (8.42)	0.00 (0.71)
3.		0.00 (0.71)	17.12 (4.16)	135.37 (11.64)	155.50 (12.46)	255.50 (15.99)	280.62 (16.75)	63.12 (7.95)	0.00 (0.71)
4.	RCr–436	0.00 (0.71)	11.00 (3.36)	113.25 (10.64)	137.62 (11.72)	220.00 (14.84)	236.37 (15.37)	44.87 (6.71)	0.00 (0.71)
5.	RCr–446	0.00 (0.71)	16.37 (4.00)	125.87 (11.22)	149.50 (12.22)	250.00 (15.82)	270.62 (16.45)	59.75 (7.74)	0.00 (0.71)
6.	RCr–684	0.00 (0.71)	12.87 (3.63)	136.62 (11.68)	157.87 (12.56)	255.62 (15.99)	276.87 (16.64)	68.87 (8.31)	0.00 (0.71)
7.	UD–118	0.00 (0.71)	13.62 (3.73)	120.12 (10.97)	144.50 (12.01)	239.25 (15.47)	259.75 (16.11)	54.00 (7.37)	0.00 (0.71)
8.	UD–480	0.00 (0.71)	17.50 (4.21)	138.50 (11.78)	160.50 (12.66)	261.12 (16.17)	284.12 (16.86)	65.87 (8.13)	0.00 (0.71)
9.	UD–728	0.00 (0.71)	20.50 (4.55)	147.37 (12.14)	163.37 (12.78)	272.87 (16.52)	296.50 (17.21)	76.62 (8.76)	0.00 (0.71)
10.	Local	0.00 (0.71)	21.75 (4.69)	151.50 (12.30)	172.12 (13.11)	281.12 (16.80)	316.37 (17.78)	78.87 (8.89)	0.00 (0.71)
	S.Em.±	0	0.20	0.24	0.21	0.25	0.24	0.20	0
	CD at 5%	0	0.58	0.72	0.58	0.72	0.68	0.59	0
	CV (%)	0	9.74	5.16	4.79	3.14	2.85	5.10	0

* Average of four replications; Figures in parentheses are $\sqrt{x + 0.5}$ values

coriander genotypes recorded on 26th February were categorized into different groups. Grouping of the genotypes was done on the basis of the general mean (= 280.69) and standard deviation (S.D. = 22.39) as given in Table 2. Taking the above criterion into account RCr–436 was found to be least susceptible, UD–118, RCr–446, RCr–684 and RCr–435 as moderately susceptible. RCr–20, UD–480, UD–728 and RCr–41 were categorized as highly susceptible and the Local proved to be extremely susceptible. These studies are in close conformity with that of Meena *et al.* (2002) who screened different genotypes of coriander for their relative susceptibility against *H. coriandri* and found RCr–446 and RCr–436 as less susceptible and RCr–41 and local as highly susceptible. Likewise, Lekha (2002) reported that none of the genotypes was resistant/ tolerant to aphid. Further she reported the coriander genotypes RCr–436, RCr–446, RCr–684 as less susceptible and RCr–20, RCr–480 as moderately susceptible and local cultivar and RCr–41 as highly susceptible. Similarly, Bana (2007) also categorized coriander genotypes RCr–436 and RCr–684 as moderately susceptible and UD–728 and RCr–41 as highly susceptible. Similar observation were made by Jain and Yadav (1988), Meena (1993), Meena (1999) and Patel *et al.* (2005) who reported significant differences among the coriander genotypes in their susceptibility to aphid infestation.

During the present study, the days to 50 per cent flowering ranged from 61.5 to 87.75 days in different genotypes and showed positively significant correlation (r=0.859) with the aphid population. The local genotype of coriander had highest days to 50 per cent flowering (87.75) harboured highest aphid population (289.75 aphids/ 5 plants). RCr–436 had minimum days to 50 per cent flowering (61.5) and registered minimum number of aphids

Table 2. Categorization of coriander genotypes against aphid, *Hyadaphis coriandri* (Das)

S. No.	Group	Aphid population/five plants	Genotypes
1.	Least susceptible	Below 258.30 $\left(< \bar{X} - \sigma\right)$	RCr–436
2.	Moderately susceptible	258.30 to 280.69 $\left(< \bar{X} - \sigma \text{ to } X\right)$	RCr–435, RCr–684 RCr–446, UD–118
3.	Highly susceptible	280.69 to 303.08 $\left(< \bar{X} \text{ to } \bar{X} + \sigma\right)$	RCr–41, UD–728 UD–480 and RCr–20
4.	Extremely susceptible	Above 303.08 $\left(< \bar{X} + \sigma\right)$	Local

Table 3. Biophysical and biochemical character of different coriander genotypes and their correlation with *Hyadaphis coriandri* (Das)

S.No.	Genotypes	Aphid population (at peak)	Biophysical characters				Biochemical characters	
			Days to 50% flowering	Umbels/ plant	Seeds/ umbel	Plant height (cm)	Total phenol (%)	Volatile oil content (%)
1.	RCr–41	286.75	87.25	29.95	42.05	117.95	3.17	0.31
2.	RCr–20	270.25	72.25	35.90	26.10	74.05	3.05	0.29
3.	RCr–435	267.75	71.25	34.05	31.95	71.05	3.54	0.43
4.	RCr–436	220.50	61.50	31.95	30.05	56.10	3.86	0.35
5.	RCr–446	260.00	70.00	30.00	33.95	68.00	3.44	0.42
6.	RCr–684	265.25	71.00	31.95	30.95	72.05	4.33	0.47
7.	UD–118	249.75	72.00	34.05	31.95	76.05	3.23	0.42
8.	UD–480	270.00	75.75	32.95	37.95	91.90	3.19	0.39
9.	UD–728	280.25	74.00	26.05	31.95	83.10	3.12	0.38
10.	Local	289.75	87.75	28.95	48.00	84.90	2.99	0.32
Correlation coefficient (r) with aphid population			0.859**	–0.372	0.572	0.724*	–0.508	–0.203

* Significant at 5% probability level; ** Significant at 1% probability level.

220.50 aphids/ 5 plants. The umbels per plant ranged from 26.05–35.90 in different genotypes. RCr–20 possessed highest number of umbels (35.90) and had 270.25 aphids per 5 plants. The variety UD–728 with minimum umbels per plant (26.05) registered 280.25 aphids/ 5 plants. A non–significant correlation between number of umbels and the aphid population was noted. The observations indicated that aphid population increased with more number of days taken for flowering, this was because of the fact that the crop remained succulent in the vegetative growth stage and, therefore, was preferred by the aphid. Choudhary (2006) and Bana (2007) found positive correlation between aphid, *H. coriandri* population and days to 50 per cent flowering in fennel and coriander crop, respectively.

The seeds per umbel ranged from 26.10–48.00 in different genotypes. The Local genotype which contained highest number of seeds per umbel (48.00) was infested with maximum aphid population (289.75/ 5 plants); whereas, RCr–20 with minimum seeds per umbel (26.1) registered 270.25 aphids/ 5 plants. A non–significant correlation was depicted between number of seeds per umbel and the aphid population.

Plant height showed significant correlation (0.724) with the aphid population. RCr–41 had highest plant height (117.95 cm) and was infested with high aphid population (286.75/ 5 plants). The genotype RCr–436 with minimum plant height (56.10 cm) registered minimum number of aphids (220.5/ 5 plants).

The total phenols were non–significantly correlated with aphid population. The data revealed that the phenols were in the range of 2.99–4.33 per cent in different genotypes. Similarly, a non–significant correlation was exhibited between volatile oil and number of aphids on coriander crop, however, it ranged from 0.29–0.47 per cent. Previous studies indicated negative correlation between total phenol and the mite, *P. latens* infesting coriander (Nitharwal and Sharma, 2007).

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