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EVALUATION OF CORIANDER GENOTYPES FOR RESISTANCE TO CORIANDER APHID *HYADAPHIS CORIANDRI* (DAS)

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ABSTRACT

Twelve genotypes of coriander were evaluated against coriander aphid *Hyadaphis coriandri* (Das) during 2015-16 and 2016-17. The genotypes viz., RCr-435, RCr-436, RCr-446 and RCr-684 were categorized as least susceptible; RCr-475, RCr-480, RCr-728 and UD-856 as moderately susceptible; RCr-20, RCr-41, UD-857 and Local as highly susceptible. The days taken for 50% flowering, plant height and days to maturity positively influence the aphid incidence, whereas, umbels/ plant and seeds/ umbel influence it in a non-significant manner. The biochemical constituents viz., total phenol and volatile oil exhibit non-significant correlation with aphid incidence.

Key words: Coriander, *Hyadaphis coriandri*, resistance, genotypes, susceptible, plant height, umbels, biochemical constituents, total phenol, volatile oil

Coriander (*Coriandrum sativum* L.) is one of the important seed spice crop in India especially in Rajasthan and Gujarat states, covering an area of about 0.624 million ha with the production of 0.673 million tonnes (Anonymous, 2016). Insect pests are one of the major limiting factors for higher yield and quality. Among these, the coriander aphid *Hyadaphis coriandri* (Das) is a regular and major pest, and both the nymphs and adults cause qualitative and quantitative losses to seed yields by sucking cell sap from inflorescences/ umbels during February-March (Pareek et al., 2013; Meena et al., 2017). The use of resistant varieties is an ecofriendly IPM option as some varieties are more preferred. Hence, the study of the incidence of aphid on different genotypes of coriander is required find out the least susceptible genotypes (Tetarwal et al., 2012; Purti et al., 2017). The present study evaluates the resistance in some coriander genotypes to *H. coriandri*.

MATERIALS AND METHODS

The field experiment was laid out in a randomized block design (RBD) at the Agronomy Farm, SKN Collage of Agriculture, Jobner. The seeds of 12 genotypes were sown on 30th October and 2nd November during 2015-16 and 2016-17, respectively and each replicated thrice. The plot size was of 3x 2 m, keeping row to row and plant to plant spacing of 30 cm and 10 cm, respectively. The observations on the aphid incidence were made soon after appearance of the aphid at weekly intervals. Morphological characters of plants viz., days of 50% flowering, days to maturity, number of umbels/ plant and plant height were recorded during the crop growth and at harvest of the crop from five randomly selected plants. Total phenols in leaves were estimated by the method described by Bray and Thorpe (1954). 500 mg of fresh leaf material of each variety was homogenized in 5 ml of hot 80% ethanol and was centrifuged at 5000 rpm for 10 min. The supernatant fraction thus separated was cooled and final volume was made 10 ml with 80 % ethanol. Out of this, 0.5 ml was made up to one ml with distilled water. Follin and Ciocalteu's reagents (0.05 ml) were added and kept at room temperature for 3 min. One ml of freshly prepared 20% sodium carbonate solution was added to this and the volume of mixture was made with distilled water to 10 ml. Test tubes containing the mixture were placed in boiling water bath for 1 min. After cooling, absorbance was measured at 650 nm with a spectrophotometer. Standard curve was prepared by taking the known amount of the phenol (tanic acid, 100 µg/ ml), whereas, phenol quantity in known sample was estimated using the standard curves.

Volatile oil in seeds was estimated by essential oil distillation assembly i.e., Clevenger apparatus (A O A C, 1970). One hundred grain seed sample was weighed and ground finely with electric grinder. The seed powder was transferred in assembly flask (1 l). 540 ml water was added to fill the flask up to half of its capacity and placed on heating mantle. Heating was done for 5-6

hr continuously. The volatile oil was collected in the graduated side arm of the assembly. Two consecutive readings were taken at 30 min interval until there was no change in oil content. The volume of volatile oil obtained in terms of ml/ 100g seed sample directly revealed % oil content in the seeds. The data on aphid incidence were subjected to ANOVA after transforming them into $\sqrt{x+0.5}$ values, and susceptibility was determined to categorized them with the formula: $\overline{X} \pm \sigma$, $\overline{X}$ = mean aphid counts, σ = standard deviation of mean incidence. Below $\overline{X}$ - σ as least susceptible, X - σ to $\overline{X}$ + σ as moderately susceptible and above $\overline{X}$ + σ as highly susceptible.

RESULTS AND DISCUSSION

Twelve coriander genotypes including Local were screened for their relative resistance to *H. coriandri*. The mean incidence (pooled data) revealed that it ranged from 77.64 (RCr-436) to 109.18 (Local)/ 5 plants, and it least was on variety RCr-436 (77.64) at par with RCr-446 (79.68) and RCr-684 (81.20); while maximum infestation was on Local (109.18) followed by RCr-41 (105.85) and RCr-20 (103.92) which stood at par (Table 1). Thus, the genotypes, RCr-435, RCr-436, RCr-446, and RCr-684 were found to be least susceptible. These observations are in close conformity with that of Meena et al. (2002) who observed that RCr-436 and RCr-446 as least susceptible and RCr-41 and Local as highly susceptible. Lekha and Jat (2007) reported that none of the genotypes was resistant, with RCr-436, RCr-446, RCr-684 categorized as least susceptible and Local cultivar and RCr-41 as highly susceptible. Tetarwal et al. (2012) reported significant differences among the genotypes in their susceptibility, and found RCr-436 and RCr-684 as least susceptible and RCr-41 as highly susceptible.

The morphological characters, viz., days to 50% flowering, umbels/ plant, number of seeds/ umbel and plant height indicated aphid incidence has significant positive correlation with days to 50% flowering, plant height and days to maturity; and non-significant with umbels/ plant and seeds/ umbel; incidence increased with delay in flowering and because of that in the vegetative growth stage of crop, it remained succulent and hence, preferred by the sap sucking insects (Table 2). Bana (2007) and Purti et al. (2017) found positive

Table 1. Screening of coriander genotypes for resistance to *H. coriandri* (2015-16. 2016-17, pooled)

S. No.	Genotypes	*Mean aphids incidence/ five plants										
		I	II	III	IV	V	VI	VII	VIII	IX	X	Mean
1.	RCr-20	0.50	4.13	21.88	150.88	171.75	270.63	301.75	78.63	36.13	2.88	103.92
		(1.0)**	(2.15)	(4.73)	(12.30)	(13.12)	(16.47)	(17.39)	(8.90)	(6.05)	(1.84)	(10.22)
2.	RCr-41	1.63	4.50	22.88	152.00	174.75	275.63	304.38	80.25	38.25	4.25	105.85
		(1.46)	(2.24)	(4.84)	(12.35)	(13.24)	(16.62)	(17.46)	(8.99)	(6.22)	(2.18)	(10.31)
3.	RCr-435	1.00	2.25	14.13	126.88	141.50	236.00	250.13	51.00	23.38	0.00	84.63
		(1.22)	(1.66)	(3.82)	(11.29)	(11.92)	(15.38)	(15.83)	(7.18)	(4.89)	(0.71)	(9.23)
4.	RCr-436	0.38	1.00	11.50	117.75	126.13	222.00	235.88	42.38	19.38	0.00	77.64
		(0.94)	(1.22)	(3.46)	(10.87)	(11.25)	(14.92)	(15.37)	(6.55)	(4.46)	(0.71)	(8.84)
5.	RCr-446	0.00	1.63	12.88	119.38	128.50	227.50	240.63	44.75	21.50	0.00	79.68
		(0.71)	(1.46)	(3.66)	(10.95)	(11.36)	(15.10)	(15.53)	(6.73)	(4.69)	(0.71)	(8.95)
6.	RCr-475	1.50	2.88	18.25	139.13	156.63	255.25	275.75	67.13	29.75	1.25	94.75
		(1.41)	(1.84)	(4.33)	(11.82)	(12.54)	(15.99)	(16.62)	(8.22)	(5.50)	(1.32)	(9.76)
7.	RCr-480	0.25	2.63	16.75	134.13	153.25	255.00	264.38	63.13	27.13	1.25	91.79
		(0.87)	(1.77)	(4.15)	(11.60)	(12.40)	(15.98)	(16.28)	(7.98)	(5.26)	(1.32)	(9.61)
8.	RCr-684	0.75	1.88	13.25	121.50	130.25	230.38	243.25	48.75	22.00	0.00	81.20
		(1.12)	(1.54)	(3.71)	(11.05)	(11.43)	(15.19)	(15.61)	(7.02)	(4.74)	(0.71)	(9.04)
9.	RCr-728	0.00	2.38	16.88	134.13	143.38	247.13	262.38	59.25	25.25	0.00	89.08
		(0.71)	(1.70)	(4.17)	(11.60)	(11.99)	(15.74)	(16.21)	(7.73)	(5.07)	(0.71)	(9.46)
10.	UD-856	0.00	2.88	19.63	141.63	163.50	266.75	282.75	72.25	32.25	2.00	98.36
		(0.71)	(1.84)	(4.49)	(11.92)	(12.81)	(16.35)	(16.83)	(8.53)	(5.72)	(1.58)	(9.94)
11.	UD-857	0.00	3.38	20.00	143.00	168.50	265.13	293.63	69.88	34.75	2.00	100.03
		(0.71)	(1.97)	(4.53)	(11.98)	(13.0)	(16.30)	(17.15)	(8.39)	(5.94)	(1.58)	(10.03)
12.	Local	3.50	5.88	24.88	154.00	179.63	283.13	308.38	85.88	40.63	5.88	109.18
		(2.0)	(2.53)	(5.04)	(12.43)	(13.42)	(16.84)	(17.57)	(9.29)	(6.41)	(2.53)	(10.47)
	SEm±	-	0.12	0.16	0.22	0.21	0.23	0.24	0.17	0.15	-	0.19
	CD (p=0.05%)	-	0.34	0.47	0.67	0.59	0.69	0.72	0.51	0.43	-	0.53

* Mean of three replications; ** Figures in parentheses $\sqrt{x+0.5}$ values

Table 2. Biophysical and biochemical constituents of coriander genotypes

S. No.	Genotypes	Aphid incidence (at peak)	Biophysical parameters					Biochemical constituents	
			Days to 50% flowering	Umbels/ plant	Seeds/ umbel	Plant height (cm)	Days to maturity	Total phenol (%)	Volatile oil (%)
1.	RCr-20	301.75	76.25	35.95	26.15	74.05	162	3.05	0.29
2.	RCr-41	304.38	78.25	29.95	42.05	117.95	160	3.17	0.31
3.	RCr-435	250.13	71.25	34.05	31.95	71.05	158	3.54	0.43
4.	RCr-436	235.88	61.50	31.95	30.05	56.15	155	3.86	0.35
5.	RCr-446	240.63	69.75	30.45	33.95	68.25	162	3.44	0.42
6.	RCr-475	275.75	72.50	32.35	29.55	69.55	170	3.23	0.36
7.	RCr-480	264.38	75.50	26.05	31.95	83.15	164	3.12	0.38
8.	RCr-684	243.25	70.75	31.95	30.95	72.05	164	4.33	0.47
9.	RCr-728	262.38	83.25	29.65	31.45	82.20	178	3.16	0.40
10.	UD-856	282.75	75.55	34.05	31.95	76.05	162	3.23	0.42
11.	UD-857	293.63	76.00	32.95	37.95	91.95	163	3.19	0.39
12.	Local	308.38	84.75	28.95	42.55	84.90	160	2.99	0.32
Correlation coefficient (r) with aphid incidence			0.847*	-0.381	-0.583	0.726*	0.597*	-0.512	-0.208

*Significant at p= 0.05%.

correlation between aphid incidence and days to 50% flowering, plant height and days to maturity, and non-significant correlation with umbels/ plant corroborating with the the present findings. Biochemical constituents play an important role in imparting the resistance- total phenols (in leaves) and volatile oil (in seed) of indicated non-significant correlation with aphid incidence (Table 2). Present findings agree with those of Ramdhari et al. (1995) and Choudhary and Jat (2007) on the total phenol content.

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