



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(4): 1767-1769

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Received: 27-05-2018

Accepted: 29-06-2018

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## Efficacy of different insecticides against aphid in cumin

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### Abstract

A field experiment was conducted to study the bio-efficacy of different insecticides against cumin aphids [*Myzus persicae* (Sulzer) and *Hyadaphis coriandri* (Das)]. For the purpose, cumin [Gujarat Cumin 4 (GC-4)] crop was grown at Anand Agricultural University, Anand in first year one and second year two sprays were applied. First spray of insecticides was made at initiation of pest and second spray was given after 15 days. Among the evaluated insecticides, flonicamid 50 WG 0.015%, clothianidin 50 WDG 0.02%, carbosulfan 25 EC 0.04% and thiacloprid 24 SC 0.024% emerged out as the best treatments on the basis of efficacy against aphid, yield and economics.

**Keywords:** Cumin, aphid, insecticides

### Introduction

India, 'the land of spices' enjoys a pre-eminent position in the worlds spice trade. Over 60 per cent of all spices are grown in India in almost every State and Union Territory. It is mostly cultivated in arid regions of Gujarat and Rajasthan state where agro climatic and edaphic conditions are most congenial to cumin cultivation. Average yield of cumin is 0.5 t/ha, which is quite low, and can be potentially increased to 0.7-0.8 t/ha by protecting the crop against pests and disease and by using improved varieties. Among various pests aphids [*Myzus persicae* (Sulzer) and *Hyadaphis coriandri* (Das)] has been reported as major pest of cumin. Aphid has been observed to attack 220 host plant belonging to 46 families throughout the world [1]. Owing to high rate of reproduction of this pest and continuous misshaping of the flower, the grain formation is very much reduced. In case of severally infested umbels, the seed not set at all or poorly developed. Secondly, they excrete honeydew like substance. The excessive excretion of honeydew by the aphids led to growth of black sooty mould on the leaves which inhibit the photosynthetic activity of the plants. Thus, it is posing a threat to cumin cultivation under Gujarat conditions. Lonely dependence on synthetic chemical for the control of aphid is very well known. In spite of regular occurrence of aphid in cumin growing regions, no any systemic work has been done on various aspects of such an important pest of cumin in Gujarat State. Keeping this in view, to overcome lacunae and to develop an effective pest management strategy, the present study was carried out with an objective of evaluation of the efficacy and economics of different insecticides against aphid on cumin grown in middle Gujarat.

### 2. Material and Methodology

Cumin [Gujarat Cumin 4 (GC-4)] crop was grown at Anand Agricultural University, Anand in plot size of 3.6 x 4.5 m using Randomized Block Design with 3 replications by following all the recommended agronomical practices except pest control measures. First spray of insecticides was made at initiation of pest and second spray was given after 15 days, if required. The population of aphid was recorded before first spray and 5, 10 and 15 days after each spray. For the purpose, five plants were selected randomly from each net plot area. Number of aphids present on three 10 cm twig per plant were recorded and mean number of insects per twig was calculated. The data on aphid and seed yield were subjected to ANOVA.

### 3. Results

All the insecticidal treatments were significantly superior to control during different periods in both the years, pooled over periods as well as in pooled over years analysis.

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Data on pooled over periods of the year 2015-16 showed that significantly lower population (8.50/twig) of aphid was found in the treatment of flonicamid 0.015% which was at par with clothianidin 0.02%, carbosulfan 0.04% and thiacloprid 0.024% having 8.68, 8.92 and 9.1 aphids/twig, respectively. Next best treatments were diafenthiuron 0.06% (12.68 aphids/twig), flonicamid 0.0075% (12.90 aphids/twig) and dimethoate 0.03% (13.12 aphids/twig) followed by clothianidin 0.01% (17.43 aphids/twig), carbosulfan 0.02% (17.48 aphids/twig), thiacloprid 0.012% (18.25 aphids/twig) and diafenthiuron 0.03% (18.86 aphids/twig).

Pooled over periods of first spray of the year 2016-17 showed that the lowest (9.93 aphids/twig) population of aphid was found in flonicamid 0.015% and it was at par with clothianidin 0.02% (10.26 aphids/twig), carbosulfan 0.04% (10.59 aphids/twig) and thiacloprid 0.024% (10.99 aphids/twig). Diafenthiuron 0.06%, flonicamid 0.0075% and dimethoate 0.03% treated plots registered more or less similar efficacy and found at par with each other by recording 15.02 to 16.06 aphids/twig. Among the evaluated insecticides, the highest (22.54 aphids/twig) population of aphid was recorded in plots treated with diafenthiuron 0.03% and it was at par with carbosulfan 0.02% (20.75 aphids/twig), clothianidin 0.01% (21.22 aphids/twig) and thiacloprid 0.012% (21.97 aphids/twig).

Pooled over periods of second spray of the year 2016-17 showed that the lowest (8.03/twig) population of aphid was observed in plots treated with flonicamid 0.015% and it was at par with clothianidin 0.02%, carbosulfan 0.04% and thiacloprid 0.024% by recording 8.62, 9.11 and 9.61 aphids/twig, respectively. The next best effective insecticides were diafenthiuron 0.06% (13.26 aphids/twig), flonicamid 0.0075% (13.86 aphids/twig) and dimethoate 0.03% (14.48 aphids/twig). Carbosulfan 0.02%, clothianidin 0.01%, thiacloprid 0.012% and diafenthiuron 0.03% found inferior in controlling aphid population by recording 18.95, 19.57, 20.20 and 21.03 aphids/twig, respectively.

The data on population of aphid pooled over years revealed that the lowest (4.93) aphid population was noticed in plots treated with flonicamid 0.015% and it was at par with clothianidin 0.02% (5.16 aphids/twig), carbosulfan 0.04% (5.55 aphids/twig) and thiacloprid 0.024% (5.80 aphids/twig). Diafenthiuron 0.06% (8.44 aphids/twig), flonicamid 0.0075% (8.86 aphids/twig) and dimethoate 0.03% (9.23 aphids/twig) emerged out as next effective treatments as difference between them were non-significant. Carbosulfan 0.02%, clothianidin 0.01%, thiacloprid 0.012% and diafenthiuron 0.03% were found inferior in managing aphid population on cumin by recording 12.46, 12.90, 13.64 and 14.32 aphids/twig, respectively.

**Table 1:** Efficacy of different insecticides against aphids and its effect on yield and economics

S. No.	Insecticides	No. of aphids/ 10 cm twig				Seed yield (q/ha)		ICBR
		2015-16*	2016-17**		Pooled over years***	2015-16	2016-17	
			First spray	Second spray				
1	Flonicamid 50 WG, 0.0075%	3.66b (12.90)	4.02b (15.66)	3.79b (13.86)	3.06b (8.86)	6.38b	6.53bcd	1:34.52
2	Flonicamid 50 WG, 0.015%	3.00a (8.50)	3.23a (9.93)	2.92a (8.03)	2.33a (4.93)	7.65a	8.18a	1:34.47
3	Carbosulfan 25 EC, 0.02	4.24c (17.48)	4.61c (20.75)	4.41c (18.95)	3.60c (12.46)	5.14c	5.46cde	1:28.45
4	Carbosulfan 25 EC, 0.04%	3.07a (8.92)	3.33a (10.59)	3.10a (9.11)	2.46a (5.55)	7.56ab	7.77a	1:45.96
5	Clothianidin 50 WDG, 0.01%	4.27c (17.43)	4.66c (21.22)	4.48c (19.57)	3.66c (12.90)	4.89c	5.44de	1:13.62
6	Clothianidin 50 WDG, 0.02%	3.03a (8.68)	3.28a (10.26)	3.02a (8.62)	2.38a (5.16)	7.61a	7.92a	1:18.94
7	Thiacloprid 24 SC, 0.012%	4.33c (18.25)	4.74a (21.97)	4.55c (20.20)	3.76c (13.64)	4.87c	5.20e	1:20.84
8	Thiacloprid 24 SC, 0.024%	3.11a (9.17)	3.39a (10.99)	3.18a (9.61)	2.51a (5.80)	7.54ab	7.62ab	1:34.55
9	Diafenthiuron 50 WP, 0.03%	4.40c (18.86)	4.80c (22.54)	4.64c (21.03)	3.85c (14.32)	4.63c	5.00e	1:15.95
10	Diafenthiuron 50 WP, 0.06%	3.63b (12.68)	3.94b (15.02)	3.71b (13.26)	2.99b (8.44)	6.46ab	6.56bc	1:21.50
11	Dimethoate 30 EC, 0.03%	3.69b (13.12)	4.07b (16.06)	3.87b (14.48)	3.12b (9.23)	6.34b	6.50cd	1:50.17
12	Control	5.60d (30.86)	5.44d (29.09)	5.50d (29.75)	5.51d (29.86)	3.17d	3.10f	--
	S. Em. ± T	0.10	0.10	0.09	0.10	0.36	0.33	--
	P	0.05	0.05	0.04	0.04	--	--	--
	T X P	0.17	0.18	0.17	0.15	--	--	--
	C.V. %	7.92	7.44	7.49	7.92	10.26	9.14	--

**Notes:** Figures in parentheses are retransformed values; those outside are  $\sqrt{X+0.5}$  transformed values  
Treatment means with the letter(s) in common are at par as per DNMRT at 5% level of significance

\*Only one spray, presented data are pooled over periods of first spray

\*\*Two sprays, presented data are pooled over periods of first and second spray

\*\*\*Pooled over both the years

#### 4. Discussion

The present findings are partially in conformity with that of [2] who reported that carbosulfan 25 EC at 1250 ml/ha effectively reduce the population of sucking pests in cumin. Flonicamid provided excellent efficacy against melon aphids (*Aphis gossypii*) in a chrysanthemum, green peach aphids (*Myzus persicae*) in lettuce, cabbage, broccoli, bell pepper and collard [3, 4] in their lab trial tested thiacloprid @ 0.144/litre of water and revealed that it can be used for the management of black bean aphid, *Aphis fabae* Scopoli [5]. Noticed that imidacloprid and thiacloprid at 1 µl/ml, thiamethoxam at 0.35 mg/ml and flonicamid at 0.1 mg/ml showed the highest mortality of *Aphis punicea* in

pomegranate [6]. tested efficacy of the neonicotinoid pesticide, clothianidin against *M. persicae* and found that clothianidin, applied to pelleted sugar beet seeds at 30, 45, 60 and 90 g a.i./unit, resulted in excellent control of green aphids for up to 10 weeks after sowing.

#### 5. Yield of cumin

In case of yield of cumin, the highest yield was received from the treatment of flonicamid 0.075% and it was at par with clothianidin 0.02%, carbosulfan 0.04%, thiacloprid 0.024% and diafenthiuron 0.06% during year 2015-16 as well as 2016-17.

## 6. Economics

The realization over control was found highest (86040 Rs./ha) in the treatment of flonicamid 0.015% followed by clothianidin 0.02% (83340 Rs./ha), carbosulfan 0.04% (81540 Rs./ha) and thiacloprid 0.024% (80010 Rs./ha). These treatments found more effective in controlling aphids in cumin. The highest (1:50.17) ICBR was registered in dimethoate 0.03% followed by carbosulfan 0.04% (1:45.96), thiacloprid 0.024% (1: 34.55), flonicamid 0.0075% (1:34.52), flonicamid 0.015% (1:34.47), carbosulfan 0.02% (1:28.45) and diafenthiuron 0.06% (1:21.50). However, dimethoate 0.03%, flonicamid 0.0075%, carbosulfan 0.02% and diafenthiuron 0.06% found less effective in controlling cumin aphid.

## 7. Conclusion

Considering the efficacy of different insecticides against cumin aphid, the treatments of flonicamid 50 WG 0.015%, carbosulfan 25 EC 0.04%, thiacloprid 24 SC 0.024% and clothianidin 50 WDG 0.02% were found effective, which reflected on yield and economics.

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