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Biorational management of cumin pests

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Abstract
Cumin is an important spice crop which is affected by various biotic factors including insect-pests. Among which sucking pests (aphid and thrips) are major one. An experiment was carried out to evaluate efficacy of biorational pesticides against major sucking pests at Entomology farm, B. A. College of Agriculture, AAU, Anand during year 2016 and 2017. Among various biorational pesticides, neem oil 1%, garlic bulb extract 5% and ginger rhizome extract 5% were found as effective as imidacloprid 17.8 SL 0.004% in managing thrips and aphids in cumin.

Keywords: Biorational, aphid, cumin, coccinellids, thrips

Introduction
Cumin (*Cuminum cyminum* L.) is an important spices crop grown in north, middle and *saurashtra* region of Gujarat. Among the various biological factors responsible for its low yield, the insects and diseases are of prime importance. The crop is mainly attacked by sucking pests' *viz*., aphid [*Myzus persicae* (Sulzer) and *Hyadaphis coriandri* (Das)] and thrips [(*Thrips tabaci* Lindeman) and *Scirtothrips dorsalis* (Hood)]. Since last few years, the infestation of aphids and thrips showed increasing trends and become the key pests of cumin. The nymphs and adults of the aphid suck the cell sap from plants mostly from the umbels. Due to copious production of honeydew, the leaves gives a glistening appearance in the beginning, but later covered with sooty mould fungus. Shoot and leaves misshaped due to infestation of aphids which may identified from boundaries. Both nymphs and adults of thrips lacerate the plant surface and cause the damage. Now-a-days number of new molecules of insecticide are available in the market but the main problem with the insecticides in spices are their residues. Therefore, present experiment was conducted to evaluate some ecofriendly pesticides for the control of aphid and thrips infesting cumin.

Material and Methods
The experiment was carried out at Entomology Farm, B. A. College of Agriculture, Anand Agricultural University, Anand during *Rabi*, 2016 and 2017. Cumin variety GC-4 (Gujarat Cumin 4) was sown in plot size of 5.0 x 4.0 m by broadcasting method in Randomized Block Design with three replications. The first spray of respective insecticide was made at initiation of pest(s) using 500 litres of solution. The second spray was given after 10 days of first spray. The population of thrips and aphids were recorded before first spray and 3, 7 and 10 days after each spray. For the purpose, five plants were selected randomly from each net plot area. For recording aphid population, 3 shoots each of 5 cm from each plant were observed critically. Number of thrips present on plant were recorded by tapering method. Population of coccinellids (grubs and adults) present on each selected plant were recorded.

Results and Discussion
Aphid
Aphid population was found lowest (1.96 aphids/shoot) in plots treated with neem oil 1% and it was at par with garlic bulb extract 5% (2.16 aphids/shoot) during first year. Application of ginger rhizome extract 5% (2.39 aphids/shoot) and imidacloprid 17.8 SL 0.004% (2.56 aphids/shoot) were equally effective in reducing the aphid population followed by safflower oil 1% (3.50 aphids/shoot). Sesame oil 1%, *Lantana camara* 10%, NSKE 5% and mustard oil 1% treated plots recorded 5.16 to 5.65 aphids/shoot and proved less effective in managing aphids in cumin. During the year 2017, the lowest (3.03 aphids/shoot) population of aphid was found in plots treated with neem oil 1% followed by garlic bulb extract 5% (3.26 aphids/shoot), ginger rhizome extract 5% (3.50 aphids/shoot), imidacloprid 17.8 SL 0.004%

(3.62 aphids/shoot), safflower oil 1% (4.65 aphids/shoot), *Lantana camara* 10% (6.95 aphids/shoot), sesame oil 11% (6.95 aphids/shoot), NSKE 5% (7.01 aphids/shoot) and mustard oil 1% (7.51 aphids/shoot). The data on pooled over years revealed that plots treated with neem oil 1% recorded lowest (2.46 aphids/shoot) aphid population and remained at par with garlic bulb extract 5% (2.67 aphids/shoot), ginger rhizome extract 5% (2.92 aphids/shoot) and imidacloprid 17.8 SL 0.004% (3.07 aphids/shoot). Next best treatment was safflower oil 1% which recorded 4.04 aphids/shoot. Treatments of sesame oil 1%, *Lantana camara* 10%, NSKE 5% and mustard oil 1% recorded 6.00, 6.05, 6.10 and 6.58 aphids/shoot, respectively and were least effective.

Thrips

Thrips population was found lowest (5.60 thrips/plant) in plots treated with neem oil 1% and it was at par with garlic bulb extract 5% (6.16thrips/plant) and ginger rhizome extract 5% (6.52 thrips/plant) during the year 2016. Later two botanicals were found at par with imidacloprid 17.8 SL 0.004% (7.23 thrips/plant). Plots treated with safflower oil 1% recorded 9.30 thrips/plant and emerged out as next effective treatment. Sesame oil 1%, *Lantana camara* 10%, NSKE 5% and mustard oil 1% treated plots recorded 13.79, 13.79, 13.94 and 14.25 thrips/plant, respectively and found less effective in managing thrips. Of the tested botanicals, the lowest (5.50 thrips/plant) thrips population was registered in plots treated with neem oil 1% and it was at par with garlic bulb extract 5% (6.10 thrips/plant) and ginger rhizome extract 5% (6.52 thrips/plant) during the year 2017. Later two treatments were at par with imidacloprid 17.8 SL 0.004% (7.17 thrips/plant). Plots treated with safflower oil 1% recorded 9.23 thrips/plant and emerged out as next effective treatment. Sesame oil 1%, *Lantana camara* 10%, NSKE 5% and mustard oil 1% treated plots recorded 13.79, 13.86, 14.09 and 14.55 thrips/plant, respectively and found less effective in managing thrips. The data on pooled over years indicated that plots treated with neem oil 1% recorded lowest (5.55 thrips/plant) thrips population and remained at par with garlic bulb extract 5% (6.16 thrips/plant). Plots treated with ginger rhizome extract 5% (6.52 thrips/plant) was as effective as garlic bulb extract, but at par with imidacloprid 17.8 SL 0.004% (7.23 thrips/plant). Safflower oil 1% treated plots which recorded 9.30 thrips/plant. Treatments of sesame oil 1%, *Lantana camara* 10%, NSKE 5% and mustard oil 1% registered 13.75 to 14.50 thrips/plant and considered poor in their efficacy against thrips infesting cumin.

Effect on natural enemies

All the treatments were found at par with each other which shows there was no adverse effect of any treatment on coccinellids (grubs + adults) during both the years (2016 and 2017). The data on pooled over years revealed that the highest (1.06/plant) coccinellids (grubs + adults) population was observed in plots treated with sesame oil 1% and it was at par with remaining all the treatments except imidacloprid 17.8 SL 0.004% (0.56/plant).

Seed yield

The highest (6.90 q/ha) seed yield was recorded in the treatment of neem oil 1% and it was at par with ginger rhizome extract 5% (6.30q/ha), garlic bulb extract 5% (6.00 q/ha) and imidacloprid 17.8 SL 0.004% (5.98 q/ha) during 2016. While during 2017, plots treated with neem oil 1% registered the highest (7.70 q/ha) cumin seed yield and it was at par with garlic bulb extract 5% (7.10 q/ha), ginger rhizome extract 5% (6.80 q/ha) and imidacloprid 17.8 SL 0.004% (6.78 q/ha). Later three treatments were at par with safflower oil 1% (6.40 q/ha) and emerged out as next best treatment in terms of yield. The data on pooled over years indicated that the highest (7.30 q/ha) yield was recorded in the treatment of neem oil 1% and it was at par with garlic bulb extract 5% (6.70 q/ha), ginger rhizome extract 5% (6.40 q/ha), imidacloprid 17.8 SL 0.004% (6.38 q/ha) and safflower oil 1% (6.00 q/ha).

Botanically derived insecticides have gained favor in recent years. Also, they are comparatively safe to natural enemies. Among plant materials neem acts as broad-spectrum repellent, insect growth regulator and insect poison. Unlike most botanical insecticides, neem also possessed somewhat systemic effect (Reddy *et al.*, 2012) [1]. The present findings are in support with findings of Anitha and Nandihalli (2008) [2] noticed that neem seed kernel extract 5 per cent was effective in controlling aphid on okra followed by neem oil 2 per cent after 15 days of each spray. Gupta and Pathak (2009) [3] found that all neem formulations significantly reduced aphid population on coriander and were quite effective after 2, 7 and 15 days after spray. Among them neem oil 1 per cent was found most effective. Jat *et al.* (2009) [4] reported that among botanicals, neem oil (0.5%), neem seed kernel extract (5%) and neem leaf extract (5%) were found effective against *H. coriandri* on fennel but less effective as compared to synthetic chemical insecticides. Patil *et al*. (2011) [5] found that neem oil 0.5 per cent effective in controlling *A. gossypii* on isabgol. Iqbal *et al*. (2015) [6] concluded that neem followed by garlic significantly reduce the mean population of jassid (6.31, 6.86), whitefly (7.41, 8.21) and thrips (11.99, 12.43), respectively and showed the plants could be the possible alternate option in insect pest management in okra.

Table 1: Effect of different biorational pesticides on pests, coccinellids and seed yield of cumin

Sr. No.	Biorational pesticides	Conc. (%)	No. of aphids/5 cm shoot			No. of thrips/plant			No. of coccinellids/ plant			Seed yield (q/ha)		
			2016	2017	Pooled	2016	2017	Pooled	2016	2017	Pooled	2016	2017	Pooled
1	Neem oil	1	1.57a (1.96)	1.88a (3.03)	1.72a (2.46)	2.47a (5.60)	2.45a (5.50)	2.46a (5.55)	1.16ab (0.85)	1.18ab (0.89)	1.17bc (0.87)	6.90a	7.70a	7.30a
2	Mustard oil	1	2.48d (5.65)	2.83c (7.51)	2.66c (6.58)	3.84d (14.25)	3.88d (14.55)	3.86e (14.40)	1.23a (1.01)	1.22ab (0.99)	1.23ab (1.01)	3.89ecd	4.69c	4.29e
3	Sesame oil	1	2.38d (5.16)	2.73bc (6.95)	2.55c (6.00)	3.78d (13.79)	3.78d (13.79)	3.78e (13.79)	1.23a (1.01)	1.27a (1.11)	1.25a (1.06)	4.55bc	5.35c	4.95d
4	Safflower oil	1	2.00c (3.50)	2.27ab (4.65)	2.13b (4.04)	3.13c (9.30)	3.12c (9.23)	3.13d (9.30)	1.20ab (0.94)	1.24ab (1.04)	1.22ab (0.99)	5.60bc	6.40b	6.00c
5	Garlic bulb extract	5	1.63ab (2.16)	1.94a (3.26)	1.78a (2.67)	2.58ab (6.16)	2.57ab (6.10)	2.58ab (6.16)	1.18ab (0.89)	1.21ab (0.96)	1.20abc (0.94)	6.30ab	7.10ab	6.70ab
6	Ginger rhizome	5	1.70b	2.00a	1.85a	2.65ab	2.65ab	2.65bc	1.18ab	1.20ab	1.19abc	6.00ab	6.80ab	6.40bc

	extract		(2.39)	(3.50)	(2.92)	(6.52)	(6.52)	(6.52)	(0.89)	(0.94)	(0.92)			
7	*Lantana camara*	10	2.39d (5.21)	2.73bc (6.95)	2.56c (6.05)	3.78d (13.79)	3.79d (13.86)	3.79e (13.86)	1.18ab (0.89)	1.18ab (0.89)	1.18abc (0.89)	4.32de	5.12c	4.72de
8	NSKE	5	2.40d (5.26)	2.74bc (7.01)	2.57c (6.10)	3.80d (13.94)	3.82d (14.09)	3.81e (14.02)	1.17ab (0.87)	1.16b (0.85)	1.16bc (0.85)	4.09de	4.89c	4.49de
9	Imidacloprid 17.8 SL	0.004	1.75b (2.56)	2.03a (3.62)	1.89a (3.07)	2.78b (7.23)	2.77b (7.17)	2.78c (7.23)	1.01c (0.52)	1.05c (0.60)	1.03d (0.56)	5.98abc	6.78ab	6.38bc
10	Control	-	2.84e (7.57)	3.59d (12.39)	3.21d (9.80)	4.93e (23.80)	5.33e (27.91)	5.13f (25.82)	1.13b (0.78)	1.17b (0.87)	1.15c (0.82)	2.94f	3.74d	3.34f
S. Em. ± Treatment (T)			0.04	0.05	0.06	0.08	0.07	0.05	0.02	0.02	0.02	0.31	0.31	0.19
Period (P)			0.02	0.03	0.09	0.04	0.04	0.03	0.01	0.02	0.02	-	-	0.09
T X P			0.08	0.08	0.06	0.14	0.13	0.09	0.05	0.04	0.03	-	-	0.31
C.V. (%)			9.89	9.90	9.93	10.07	9.63	9.85	10.36	10.20	10.27	10.65	9.19	9.87
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													

Conclusion

Neem oil 1%, garlic bulb extract 5% and ginger rhizome extract 5% were as effective as imidacloprid 17.8 SL 0.004% in reducing thrips and aphids in cumin. The effect of these treatments reflected on yield of cumin. There was no adverse effect of evaluated treatments on population of coccinellids except imidacloprid 17.8 SL 0.004%. There was no any kind of phytotonic effect observed on plants.

References

1. Reddy AV, Devi RS, Malathi S, Reddy VV. Role of neem (*Azadirachtin indica* A. Juss) in insect control. Pestology. 2012;36(10):18-24.
2. Anitha KR, Nandihalli BS. Utilization of botanicals and mycopathogens in the management of sucking pests of okra. Karnataka J Agric. Sci. 2008;21(2):231-238.
3. Gupta MP, Pathak RK. Comparative efficacy of neem products and insecticides against the incidence of coriander aphid, *Hyadaphis coriandri* Das. Agric. Sci. Digest. 2009;29(1):69-71.
4. Jat BL, Choudhary RK, Kumawat KC. Bioefficacy and economics of newer insecticides and neem products against aphid, *Hyadaphis coriandri* (Das) on fennel. Indian J Ent. 2009;71(2):133-136.
5. Patil SJ, Patel BR, Chaudhari RK. Efficacy of synthetic and botanical insecticide against aphid, *Aphis gossypii* Glover in isabgol crop. Pestology. 2011;35(5):32-34.
6. Iqbal J, Ali H, Hassan MW, Jamil M. Evaluation of indigenous plant extracts against sucking insect pests of okra crop. Pakistan Entomologist. 2015;37(1):39-44.