Research Paper :

Efficacy of various insecticides against fruit fly, *Bactrocera cucurbitae* (Coquillet) infesting cucumber

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SUMMARY

Among the nine insecticides tested, malathion (0.1%) proved to be the most effective against fruit fly on cucumber under the field conditions which was at par with fenthion (0.1%). The fenitrothion (0.03%) and alfamethrin (0.005%) stood second in order in their effectiveness. The highest yield of cucumber fruits (8299 kg/ha) was recorded in the treatment of malathion (0.1%) which was at par with fenthion % (7982 kg/ha). While fenitrothion (0.03%) and alfamethrin (0.005%) gave 7648 and 7255 kg/ha yield, respectively. The application of malathion (0.1%) gave the highest and net realization of Rs. 19934/ha with cost benefit ratio of 1: 13.75 followed by endosulfan (0.05%) with net realization of Rs. 8609/ha and CBR 1: 10.44, fenthion (0.1%) with net realization of Rs. 18035/ha and CBR 1: 9.49 and fenitrothion (0.03%) with net realization of Rs. 16034/ha and CBR 1: 8.57.

Key words : Insecticides, Cucumber, Fruit fly, *Bactrocera cucurbitae*

Due to the most suitable and favourable agro-climatic conditions of Gujarat State, area under the cultivation of cucurbitaceous crops is increasing rapidly. Simultaneously, they are being attacked by a large number of insect pests. Among all the pests of cucurbits grown around Junagadh, fruit fly (*Bactrocera cucurbitae*) proved havoc to the cucurbit growers. The fruits damaged by the maggots of this notorious pest, not only remain unfit for human consumption, but also hit hard in the economy of the cultivators.

As all the cultivated cucurbits are vines or creepers, they provide ample hiding places to the insect pests. Even then, many research workers had strongly advocated the chemical control measures as the most effective and economical than any other method of insect control. Keeping all above factors in mind, the present investigation was undertaken to evaluate the efficacy of certain insecticides against fruit fly (*B. cucurbitae*) infesting cucumber crop under Junagadh conditions of Gujarat state.

MATERIALS AND METHODS

An experiment was conducted at College Farm, College of Agriculture, Junagadh Agriculture University, Junagadh (Gujarat) during summer season of 2007 in a Randomized Block Design to determine the efficacy of ten different insecticides against fruit fly, *B. cucurbitae* on cucumber cv. GREEN GOLD. The seeds were sown in a plot size (gross) of 6.00 m x 4.50 m with spacing of 1.50 m x 60 cm. All the recommended agronomic practices were adopted. Two sprays of each insecticide were given, first at the time of flowering stage and second at 15 days after first spray. Foliar application of insecticides was given with the help of knapsack sprayer.

For recording the observations, five plants from each net plot area were tagged separately. The fruits from these plants were harvested periodically as and when they attained the marketable size. The damaged and healthy fruits were sorted out at each picking and observations on per cent fruit infestation were taken by counting the healthy and damaged fruits at 4, 8 and 15 days after spraying. The data on per cent fruit infestation were statistically analyzed. The yield of fruits from net plot area was converted in hectare basis and the economics were worked out.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

First spray :

4th day after first spray :

The data (Table 1) indicated that,

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significantly minimum fruit infestation of 14.46 per cent was recorded in the treatment of malathion (0.1%). The treatments with fenitrothion (0.03%), triazophos (0.05%) and lambda-cyhalothrin (0.005%) stood next in order in their effectiveness by recording 19.28, 22.23 and 23.53 per cent fruit infestation, respectively. While, alfamethrin (0.005%), fenthion (0.1%), endosulfan (0.05%) and dichlorovos (0.05%) recorded 29.27, 31.18, 31.60 and 33.99 per cent fruit infestation, respectively. Quinalphos (0.05%) was found least effective with 35.39 per cent fruit infestation. In untreated control plots, maximum 44.42 per cent fruit damage was recorded.

8th day after first spray :

The lowest fruit infestation of 17.95 per cent was recorded in the plot treated with malathion (0.1%), which was at par with fenthion 0.1% and fenitrothion (0.03%) by recording 18.52 and 19.72 per cent fruit infestation, respectively. The plots treated with quinalphos (0.05%), lambda-cyhalothrin (0.005%) and alfamethrin (0.005%) stood second in order in their efficacy against the pest with 25.36, 26.55 and 28.01 per cent fruit infestation, respectively. Endosulfan (0.05%) stood at third in order with 30.34 per cent fruit infestation. While, dichlorovos (0.05%) and triazophos (0.05%) remained last in order by giving 36.38 and 39.16 per cent fruit infestation, respectively. While maximum fruit infestation of 49.03 per cent was recorded in control plot.

15th day after first spray :

Significantly minimum fruit infestation of 13.37 per cent was recorded in the plots treated with malathion (0.1%) and it was at par with fenthion (0.1%) which recorded 14.52 per cent fruit infestation. The effectiveness of fenitrothion (0.03%) and lambda-cyhalothrin (0.005%) ranked second with fruit infestation of 18.35 and 19.11 per cent, respectively. While, alfamethrin (0.005%), dichlorovos (0.05%) stood third in order in their efficacy with 25.19 and 27.53 per cent fruit infestation, respectively. Endosulfan (0.05%), triazophos (0.05%) and quinalphos (0.05%) stood last in order with the fruit infestation of 29.52, 29.92 and 34.43 per cent, respectively. The maximum 45.17 per cent fruit infestation was recorded in the control plot, where insecticides were not applied.

Table 1 : Efficacy of different insecticides against *B. cucurbitae* under field conditions

Sr. No.	Treatments	Per cent fruit infestation after spray						Yield of healthy fruits (kg/ha)
		First spray			Second spray			
		4th day	8th day	15th day	4th day	8th day	15th day	
1.	Malathion 0.1%	22.35*	25.06	21.45	25.12	22.76	21.45	8299
		(14.46)	(17.95)	(13.37)	(18.02)	(14.97)	(13.37)	
2.	Endosulfan 0.05%	34.21	33.43	32.91	34.34	35.05	32.81	6411
		(31.60)	(30.34)	(29.52)	(31.82)	(32.98)	(29.36)	
3.	Fenthion 0.1%	33.94	25.49	22.40	26.62	24.47	24.10	7982
		(31.18)	(18.52)	(14.52)	(20.08)	(17.15)	(16.67)	
4.	Quinalphos 0.05%	36.50	30.24	35.93	30.29	36.37	34.88	6093
		(35.39)	(25.36)	(34.43)	(25.44)	(35.17)	(32.69)	
5.	Fenitrothion 0.03%	26.04	26.36	25.37	33.74	30.98	29.82	7648
		(19.28)	(19.72)	(18.35)	(30.85)	(26.50)	(24.73)	
6.	Triazophos 0.05%	28.13	38.74	33.16	32.74	36.76	32.04	6469
		(22.23)	(39.16)	(29.92)	(29.24)	(35.82)	(28.14)	
7.	Dichlorovos 0.05	35.66	37.10	31.65	33.68	32.92	29.62	6897
		(33.99)	(36.38)	(27.53)	(30.76)	(29.53)	(24.43)	
8.	Lambda-cyhalothrin .005%	29.02	31.02	25.92	30.75	29.50	30.81	6100
		(23.53)	(26.55)	(19.11)	(26.14)	(24.25)	(26.23)	
9.	Alfamethrin 0.005%	32.75	31.95	30.12	31.89	30.20	31.64	7255
		(29.27)	(28.01)	(25.19)	(27.91)	(25.31)	(27.52)	
10.	Untreated control	41.79	44.44	42.23	34.68	38.48	38.93	4976
		(44.42)	(49.03)	(45.17)	(32.38)	(38.72)	(39.49)	
	S. E. ±	1.57	1.53	1.58	1.68	1.61	1.64	166
	C.D. (P=0.05)	4.65	4.54	4.69	4.98	4.79	4.87	493
	C. V. %	8.47	8.18	9.08	9.25	8.80	9.27	4.22

* Arcsin transformed value Figures in the parenthesis are retransformed values

Table 2 : Economics of different insecticidal treatments applied for the control of *B. cucurbitae* on cucumber

Sr. No.	Insecticide	Yield (kg/ha)	Cost of insecticide with labour charges (Rs.)	Gross Realization (Rs.)	Net realization over control (Rs.)	CBR
1.	Malathion 0.1 %	8299.00	1450	49794.00	19934.88	1: 13.75
2.	Endosulfan 0.05%	6411.43	825	38468.58	8609.46	1: 10.44
3.	Fenthion 0.1%	7982.43	1900	47894.58	18035.46	1: 9.49
4.	Quinalphos 0.05%	6093.86	1320	36563.16	6704.04	1: 5.08
5.	Fenitrothion 0.03%	7648.86	1870	45893.16	16034.04	1: 8.57
6.	Triazophos 0.05%	6449.29	1201	38695.74	8836.62	1: 7.36
7.	Dichlorovos 0.05	6897.00	1780	41382.00	11522.88	1: 6.47
8.	Lambda-cyhalothrin 0.005%	6100.00	1980	36600.00	6740.88	1: 3.40
9.	Alfamethrin 0.005%	7255.71	2146	43534.26	13675.14	1: 6.26
10.	Control	4976.52	---	29859.12	---	---

Market price of cucumber fruit: Rs. 6/kg Labour charges: Rs. 100/day

Second spray :

More or less similar observations were also reported after second spray. Thus, present findings are in agreement with the results reported by Patel and Vyas (1981), Anonymous (1992), Bhatnagar and Yadava (1992) and Khan *et al.* (1992).

Yield and economics :

The data (Table-2) on the yield of cucumber in different treatments were significantly higher over control and it varied from 4976 to 8299 kg/ha. The highest yield (8299 kg/ha) was recorded in the treatment of malathion 0.1% which was at par with fenthion 0.1% (7982 kg/ha). While the plot treated with fenitrothion 0.03% and alfamethrin (0.005%) produced the yield of 7648 kg/ha and 7255 kg/ha, respectively. These treatments stood in second in their yield performance. The treatment of dichlorovos (0.05%), triazophos (0.05%) and endosulfan (0.05%) ranked third in position with 6897 kg/ha, 6449 kg/ha and 6411 kg/ha yield, respectively. The treatments lambda-cyhalothrin (0.005%) and quinalphos (0.05%) produced 6100 kg/ha and 6093 kg/ha yield, respectively.

The results (Table 2) indicated that malathion 0.1% gave the highest cost benefit ratio of 1: 13.75 followed by endosulfan (0.05%) (1: 10.44), fenthion 0.1% (1: 9.49) and fenitrothion 0.03% (1: 8.57). The cost benefit ratio reported from the rest of the treatments was 1: 7.36, 1: 6.47, 1:6.26, 1:5.08 and 1: 3.40 in the treatments of triazophos (0.05%), dichlorovos (0.05%), alfamethrin (0.005%), quinalphos (0.05%) and lambda cyhalothrin (0.005%), respectively.

More or less similar observations were also recorded by Mote (1975) and Anonymous (1992). Thus, malathion 0.1% can be recommended for the control of fruit fly on cucumber starting from flowering to the crop maturity. Secondly, malathion is also considered as a safer insecticide for human being.

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