The Pharma Innovation Journal 2022; 11(10): 751-753

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(10): 751-753

www.thepharmajournal.com
Received: 17-08-2022
Accepted: 10-09-2022

AS Bade
Department of Agricultural Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India

SR Kulkarni
Department of Agricultural Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India

GB Kabre
Section of Agricultural Entomology, College of Agriculture, Dhule, Maharashtra, India

Corresponding Author:
AS Bade
Department of Agricultural Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India

Bio-efficacy of insecticides and bio pesticides against *Bactrocera cucurbitae* (Coquillett) infesting cucumber

AS Bade, SR Kulkarni and GB Kabre

Abstract
The experiment was carried out on field bio-efficacy of nine test insecticides and bio pesticides along with untreated check with three applications at ten days interval against *B. Cucurbitae* on cucumber crop at Experimental Farm of Dept. of Agril. Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri during *Kharif*, 2019 and *Kharif*, 2021. On the basis of pooled data of both the years, results revealed that the Lambda-cyhalothrin, Deltamethrin, Emamectin benzoate and Spinosad in the descending order of preference were most promising treatments followed by Azadirachtin, NSE, Acephate, Lufenuron followed by *Metarrhizium anisopliae*. ICBR was worked out in descending order as Lambda-cyhalothrin (1:9.95), Deltamethrin (1:9.26), Emamectin benzoate (1:5.18), Azadirachtin (1:1.78), Acephate (1:1.75), Spinosad (1:1.69), NSE (1:1.02), Lufenuron (1:1.68) and *Metarrhizium anisopliae* (1:1.08).

Keywords: Bio efficacy, insecticides, bio pesticides, *Bactrocera cucurbitae*, cucumber

Introduction
Cucumber, *Cucumis sativus* (Linnaeus) is one of the oldest vegetable and grown during *Kharif*, *Rabi* and *summer* seasons belonging to the family cucurbitaceous. It is originated in India from where it spreaded to Asia, Africa and Europe and has been in cultivation since 3000 to 4000 years (Patel, 1989) [12]. Just a single cup of cucumber slices contains 14 % to 19 % of the vitamin K which need for the day and also contains Vitamins B1, B2, B3, B5 and B6, folic acid, Vitamin C, calcium, iron, magnesium, phosphorus, potassium and zinc. Cucurbits are attacked by numerous pests *viz*., red pumpkin beetle, leaf miner, flea beetle, fruit fly, etc at different crop stages which affect the quality and quantity of produce unfavorably (Dubale *et al*., 2018) [6]. Fruit flies are one of the world's most destructive horticultural pests and pose risks to most commercial vegetable crops. Particularly Melon fruit fly (*Bactrcoera cucurbitae* C.) has been considered as serious pest. Quarantine laws aimed at preventing the entry and establishment of melon flies and hence reduce the export potential of crop produce (Ronald and Jayma, 2011) [13]. The melon fruit fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) is widely distributed throughout the temperate, tropical and subtropical regions of the world. It is the only tephritid species in India that is uniformly widespread, attacking a large range of cucurbit fruits. It has more than 81 host species, in which fruit losses can range from 30 to 100 % and consequently, it is considered as quarantine pest (Dhillon *et al*., 2005) [5]. 9 species out of 207 species of fruit flies found to be the major and economically important in India. The management of melon fruit fly is challenging as three of its life stages are hidden and the only adult stage is the usually targeted for its management and various control measures have been promoted in all over the world. But due to the cryptic nature of maggot of the fruit fly, they mostly remain unaffected by insecticides and further lead to increase in insecticide residues in the fruits which not only involves heavy expenditure on pesticides but also causes number of problems on human health and environment. Moreover, repeated use of toxic insecticides is not only hazardous to the environment but also directly affects the health of the farmers and consumers. Therefore, it is necessary to explore economically viable and environment-friendly insecticides for management of fruit fly.

Material and Methods
The field experiment was conducted at Experimental Farm of Department of Agricultural Entomology, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri during the *Kharif*, 2019 and 2021. Bio-efficacy of six synthetic, two biorational and one biological [*viz*., Deltamethrin 2.8 % EC, Spinosad 45 % SC, Lambda-Cyhalothrin 5 % EC, Emamectin benzoate 5 % SG, Lufenuron 5 % EC, Acephate 75 % SP, NSE 5%, Azadirachtin 10000 ppm,

Metarrhizium anisopliae (Soil Application)] insecticides along with untreated check were evaluated under field conditions in randomized block design with ten treatments and three replications. Five plants from each of the plot were randomly selected and sprayed with test insecticides and water spray (untreated check). The spray suspension of respective treatment made as per required concentration. The application of spay liquid @ 5 liters / 3 plots was done with the help of the knapsack sprayer. For recording observations, healthy, infested and total number of fruits recorded from randomly selected 5 plants from each of the plot before spray application and 3, 7 and 10 days after each application. Data, thus obtained were subjected to ANOVA for arcsine transformation to analyze the variance.

Fruit infestation and fruit yield / plot

To evaluate efficacy of nine test insecticides, total fruit count was taken in treated as well as control plots. From the total fruits, infested and healthy fruits / plot were counted and computed to work out the per cent fruit damage. Observations on fruit yield also have been recorded to work out yield of cucumber with increase in yield over control and avoidable yield loss.

The percent fruit damage on number was calculated by using following formula:

$$\text{Per cent infestation by number} = \frac{\text{Number of fruits infested per plot}}{\text{Total number of fruits per plot}} \text{x } 100$$

Economics of the test insecticides

In order to assess the economics of test insecticides evaluated against *B. cucurbitae* infesting cucumber, the Incremental Cost Benefit Ratio (ICBR) was worked out. For this purpose, additional income and additional cost of treatment per hectare including labour expenditure along with cost of plant protection were calculated for each treatment based on prevailing market price of pesticides.

$$\text{Incremental Cost Benefit Ratio (ICBR)} = \frac{\text{Net income (Rs./ ha)}}{\text{Total cost of protection (Rs./ ha)}}$$

Result and Discussion

Field bio-efficacy during *Kharif*, 2019 and 2021 (Pooled data)

At 3 DAS

Lambda-cyhalothrin (22.61 %) was observed to be predominant treatment and was on par with Deltamethrin (24.12 %), Emamectin benzoate (25.43 %), Spinosad (27.33 %) and Azadirachtin (29.05 %) followed by NSE (30.38 %), Acephate (32.40 %), Lufenuron (33.70 %) and *Metarrhizium anisopliae* (36.27 %).

At 7 DAS

Lambda-cyhalothrin (18.87 %) continued to be most promising which was on par with Deltamethrin (20.40 %), Emamectin benzoate (21.60 %) and Spinosad (23.14 %) followed by Azadirachtin (26.07 %), NSE (27.12 %) and Acephate (29.36 %) followed by Lufenuron (31.11 %) and *Metarrhizium anisopliae* (33.50 %) which were at par with each other except *Metarrhizium anisopliae*.

At 10 DAS

Supremacy of Lambda-cyhalothrin (19.88 %) was continued which was on par with Deltamethrin (21.55 %), Emamectin benzoate (22.96 %) and Spinosad (24.32 %) followed by Azadirachtin (27.03 %), NSE (28.48 %), Acephate (30.71 %), Lufenuron (32.55 %) and *Metarrhizium anisopliae* (35.22 %).

Table 1: Cumulative bio-efficacy of test insecticides during *Kharif*, 2019 and 2021

Treatments	Pooled Mean on Fruit Infestation (%)		
	3 DAS	7 DAS	10 DAS
Deltamethrin 2.8% EC	24.12 (29.41)*	20.40 (26.85)	21.55 (27.66)
Spinosad 45% SC	27.33 (31.52)	23.14 (28.75)	24.32 (29.55)
Lambda-Cyhalothrin 2.5% EC	22.61 (28.39)	18.87 (25.75)	19.88 (26.48)
Emamectin benzoate 5% SG	25.43 (30.28)	21.60 (27.69)	22.96 (28.63)
Lufenuron 5% EC	33.70 (35.49)	31.11 (33.9)	32.55 (34.79)
Acephate 75% SP	32.40 (34.7)	29.36 (32.81)	30.71 (33.65)
NSE 5 %	30.38 (33.45)	27.12 (31.38)	28.48 (32.25)
Azadirachtin 10000 ppm	29.05 (32.61)	26.07 (30.70)	27.03 (31.33)
Metarrhizium anisopliae (SA)	36.27 (37.03)	34.11 (35.74)	35.67 (36.67)
Untreated check	55.56 (48.19)	57.47 (49.30)	60.40 (51.00)
S.E(M) ±	1.44	1.20	1.21
CD at 5%	4.28	3.58	3.59
F test	SIG	SIG	SIG
CV	7.35	6.49	6.32

*Figures in parenthesis are arcsine transformed values

DAS – Days after Spray

The statistical analysis points out that amongst test insecticides, the field bio-efficacy in the descending order as Lambda-cyhalothrin, Deltamethrin, Emamectin benzoate and Spinosad > Azadirachtin, NSE, Acephate, Lufenuron > *Metarrhizium anisopliae*.

In the present studies carried out on cucumber, Lambda-cyhalothrin, Deltamethrin, Emamectin benzoate and Spinosad in the order of preference were found promising treatments. The findings in respect of Lambda-cyhalothrin are in agreement with that reported by Oke (2008) [10], Balas *et al.*

(2018) [1] and Sharma and Gupta (2019) [15]. In respect of Deltamethrin, the findings are in confirmation with that reported by Oke and Sinon (2013) [13]. In respect of Emamectin benzoate, the findings are in corroboration with that reported by Shinde *et al*. (2018) [16] and Sharma and Gupta (2019) [15]. In respect of Spinosad, the findings are in confirmation with that reported by Shivangi *et al*. (2017) [17] and Shinde *et al*. (2018) [16]. Findings in respect of Azadirachtin and NSE are in confirmation with that reported by Shivangi *et al*. (2017) [17]. Sawai *et al*. (2014) [14] advocated deltamethrin, emamectin benzoate and azadirachtin on ridge gourd. Bharadiya and Bhut (2017) [2] recommended emamectin benzoate on the sponge gourd. Bhowmik *et al*. (2014a) [3] and Bhowmik *et al*. (2014b) [4] advocated Deltamethrin and Spinosad on bitter gourd and pointed gourd, respectively. Nehra *et al*. (2019) [9] recommended Spinosad on round gourd. Gautam *et al*. (2021) [7] advocated Spinosad and Lambda-cyhalothrin on bottle gourd. Spinosad recommended by Meena *et al*. (2022) [8] on bottle gourd.

Conclusion

From the outcomes of the present study it can be concluded that Lambda-cyhalothrin, Deltamethrin, Emamectin benzoate and Spinosad were found promising treatments in the order of preference followed by Azadirachtin, NSE, Acephate, Lufenuron followed by *Metarrhizium anisopliae* amongst which ICBR was depicted higher especially in former three treatments. Thus, Lambda-cyhalothrin showed best performance among the tested chemicals and hence can be recommend for the effective management of the *B Cucurbitae*.

References

1. Balas TK, Virani VR, Parekh KM. Comparative efficacy of different insecticides against fruit fly, *Bactrocera cucurbitae* (Coquillet) on cucumber. Journal of Entomology and Zoology Studies. 2018;6(4):1434-1443.
2. Bharadiya AM, Bhut JB. Effect of different insecticides against fruit fly, *Bactrocera cucurbitae* Coquillett infesting sponge gourd. International Journal of Chemical Studies. 2017;5(5):1866-1868.
3. Bhowmik P, Mandal D, Chatterjee ML. Chemical management of melon fruit fly, *Bactrocera cucurbitae* Conquillett (Diptera: Tephritidae) on bitter gourd (*Momordica charantia* Linn.). Pesticide Research Journal 2014a;26(1):68-73.
4. Bhowmik P, Mandal D, Chatterjee ML. Biorational Management of Melon Fruit Fly, *Bactrocera cucurbitae* on Pointed Gourd. Indian Journal of Plant Protection. 2014b;42(1):34-37.
5. Dhillon MK, Singh R, Naresh JS and Sharma HC. The melon fruit fly, *Bactrocera cucurbitae*: A review of its biology and management. Journal of Insect Science. 2005;5(40):1-16.
6. Dubale MM, Jalgaonkar VN, Naik KV, Munj AY, Golvankar GM. Studies on incidence of fruit flies in relation to weather parameters on ridge gourd in Konkan region. Journal of Entomology and Zoology Studies. 2018;6(5):2012-2014.
7. Gautam M, Poude S, Dhungana N, Bhusal N. Comparative Efficacy of Different Insecticides against Cucurbit Fruit Fly (*Bactrocera cucurbitae*) on Bottle Gourd (*Lagenaria siceraria*) in Sarlahi District, Nepal. International Journal of Natural Resource Ecology and Management. 2021;6(2):27-37.
8. Meena DS, Acharya VS, Singh V, Mehra K and Rajput VS. Bio-efficacy of different insecticides/botanicals against fruit fly, *B. cucurbitae* on bottle gourd. The Pharma Innovation Journal. 2022;11(3):824-828.
9. Nehra S, Singh S, Samota RG, Choudhary AL. Bio-efficacy of newer insecticides and biopesticides against fruit fly, *Bactrocera cucurbitae* (Coquillett) on round gourd. Journal of Entomology and Zoology Studies. 2019;7(4):97-101.
10. Oke OA. Effectiveness of two insecticides to control melon fruit fly (*Bactrocera cucurbitae* Coq.) in cucumber (*Cucumis sativus* L.) crop at Anse Boileau Seychelles. European Journal of Scientific Research. 2008;22(1):84-86.
11. Oke OA, Sinon SG. Effectiveness of three insecticides to control *Bactrocera cucurbitae* (Diptera: Tephritidae) on the cucumber crop at Praslin, Seychelles. Florida Entomologist. 2013;96(1):120-123.
12. Patel NV. Biology of fruit fly, *Bactrocera cucurbitae* (Coquillet) on cucurbits and chemical control on bitter gourd. M.Sc. (Agri.) thesis submitted to G.A.U, Navsari; c1989.
13. Ronald FLM, Jayma LMK. Distribution and host range of *Bactrocera cucurbitae* (Coquillet); c2011. http://extento.hawaii.edu/kbase/crop/type/bactr oc.htm.
14. Sawai HR, Godse SK, Narangalkar AL, Haldankar PM and Sanas AP. Bio efficacy of some insecticides against fruit flies infesting ridge gourd. Journal of Soils and Crops. 2014;24(1):174-180.
15. Sharma N, Gupta D. Evaluation of some new insecticides molecules for the management of fruit fly, *Bactrocera* spp. infesting cucumber. Journal of Entomology and Zoology Studies. 2019;7(6):1172-1175.
16. Shinde PB, Naik KV, Golvankar GM, Shinde BD and Jalgaonkar VN. Bio-efficacy of insecticides against fruit flies infesting cucumber. International Journal of Chemical Studies. 2018;6(5):1681-1684.
17. Shivangi, Lekha, Swami H. Bio-intensive management of fruit fly, *Bactrocera cucurbitae* (Coquillett) in cucumber. Journal of Entomology and Zoology Studies. 2017;5(3):1823-1826.