Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(1): 497-499

Received: 28-11-2020
Accepted: 30-12-2020

Nikitha Reddy Gaddam
Department of Entomology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Vivek Kumar Srivastava
Department of Entomology, KAPG College, Prayagraj, Uttar Pradesh, India

Anoorag R Tayde
Department of Entomology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Akhilesh Tripathi
Department of Entomology, KAPG College, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Anoorag R Tayde
Department of Entomology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Comparative efficacy of microbials and botanicals against diamondback moth (*Plutella xylostella* Linn) on cabbage

Nikitha Reddy Gaddam, Vivek Kumar Srivastava, Anoorag R Tayde and Akhilesh Tripathi

Abstract
The present investigation was conducted during rabi season of 2019-2020 at SHUATS, Prayagraj in randomized block design on three replications. Eight treatments comprised of botanicals *viz*. Neem seed kernel extract 5%, Neem leaf extract, Neem oil 10ml/lit and three treatments of Microbials i.*e*., *Beauveria bassiana* 3g/lit of water, *Bacillus thuringiensis* 1g/liter of water and Spinosad 45SC 0.32ml/lit, Indoxacarb 14.5SC 0.35ml/lit and one untreated control was taken. The observations on larval population 3,7 and 14 days at each spraying (1st and 2nd) were recorded for computing the percent larval reduction. The data revealed that highest percentage reduction of DBM larvae was observed in Spinosad 45SC (84.97%) followed by Indoxacarb 14.5SC (58.77%) and *Bacillus thuringiensis* (46.62%). The mean crop yield ranged between 298 q/ha to 228 q/ha in the insecticidal treatments, the highest yield was recorded in Spinosad 45SC (298 q/ha) followed by Indoxacarb 14.5SC (275 q/ha) and *Bacillus thuringiensis* (268 q/ha). The cost benefit ratio varied from (1:5.97) to (1:5.57) in different treatments, the highest was recorded in Indoxacarb14.5SC (1:5.97) followed by *Bacillus thuringiensis* (1:5.94) and Spinosad 14.5SC (1:5.86).

Keywords: Cabbage, spinosad, indoxacarb, microbials, botanicals, *Plutella xylostella*

Introduction
Cabbage (*Brassica oleracea* var. capitata) is one of the most popular Cole vegetables grown in India. It belongs to the family Cruciferaceae. It is commonly used fresh and as boiled vegetables, cooked in curries and process, salad, etc. It is known to possess medicinal properties and its enlarged terminal buds is a rich source of Ca, P, Na, K, S, Vitamin A, Vitamin C and dietary fibre. India is the second largest producer of cabbage after China. In India, West Bengal accounts highest production of cabbage in the world. The Brassica crop has a multiple insect pest complex. The important insect pest species are Diamondback moth (*Plutella xylostella* L.), Cabbage caterpillar (*Pieris brassicae* Linnaeus), Cabbage semi-looper (*Autographa nigrisigna* Walker), Tobacco caterpillar *(Spodoptera litura* Fabricius), Cabbage leaf Webber *(Crocodolomia binotalis* Zeller), Cabbage borer (*Hellula undalis* Fabricius) and Cabbage aphid *(Brevicoryne brassicae* W.). Among the insect pests, Diamondback moth, *Plutella xylostella* L. (Plutellidae: Lepidoptera) is the most destructive pest [3]. The caterpillar bore into the tissues from the underside of the leaves and feed in the tunnels. In India, [2] reported a 52% yield loss on cabbage due to Diamondback moth and also it has national importance on cabbage as it causes 50-80% annual loss in the marketable yield. Diamondback moth has developed resistance to almost all the group of chemical pesticides. This has necessitated the used of eco-friendly insecticides sustain the management of Diamondback moth. Due to their efficacy in controlling the target pests without adversely affecting their natural enemies, bio-agents and botanicals ensures effectiveness, safety and acceptability to mankind.

Materials and Methods
The trial was conducted at the central research field of Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India during Rabi 2019-2020. The experiment was conducted in Randomized Block Design (RBD) with 8 treatments including the untreated control with three replications. One-month old seedlings of cabbage

variety (Golden acre) were transplanted 2x2m area with 45x30cm spacing. Eight treatments out of which four treatments were of botanicals and three treatments were of bio pesticides and one insecticide and one untreated control. As the ETL 2-3 larvae per plant were crossed, application of the two rounds of insecticidal treatments were applied at 15 days interval. The population count of the larvae were counted after 3, 7 and 14 days after spraying and the larval count was recorded in the morning hours. Hand compression knapsack sprayer was used for imposing the treatments. The yield data in each treatment was recorded separately and subjected to statistical analysis to test the significance of mean yield variation in different treatments. The percent increase in yield over control in various treatments was calculated and benefit cost ratio was also calculated.

Results and Discussion

The results in (Table-1) revealed that the mean data on percent reduction of population of Diamond back moth in all the treatments significantly differed from the untreated control after 1st spray and 2nd spray. In the overall mean of 3, 7 and 14 days after 1st spray revealed that maximum percentage of larval reduction was observed in Spinosad (49.86%) followed by Indoxacarb (38.36%), *Bacillus thuringiensis* (35.53%) and least was observed in Neem leaf extract (18.89%). Similarly, after 2nd spray the highest percentage of overall mean reduction in larval population of Diamond back moth was noted in Spinosad (56.34%) followed by Indoxacarb (42.20%), *Bacillus thuringiensis* (34.41%) treated plot and the least was observed in Neem leaf extract (20.85%). With respect to the above findings [4] investigated that Spinosad was found to be most effective reduced up to 94.33 percent population followed by Indoxacarb (91.00%) and Flubendiamide (78.66%). [6] revealed that the maximum reduction per cent of Spinosad 45SC recorded highest reduction of Diamondback moth population i.e. (49.45%) which was significantly superior over control followed by Indoxacarb 14.5SC (45.305%).

All the treatments showed significant increase in the yield over untreated control (Table 1). Highest mean yield of cabbage was recorded in Spinosad (298q/ha) followed by Indoxacarb (275q/ha), *Bacillus thuringiensis* (268q/ha), Neem oil (243q/ha), *Beauveria bassiana* (235q/ha), NSKE5% (233q/ha) and Neem leaf extract (228q/ha) whereas lowest was recorded in untreated control (160q/ha) which agreed with the findings of [7] who revealed that Spinosad recorded the highest yield (275.15 q/ha) followed by *Bacillus thuringiensis* (Delfin) (200.13 q/ha). [1] also reported that the highest marketable yield of Cauliflower heads was recorded in Spinosad 45 SC (228.80 q/ha). [6] also reported that the highest yield was recorded in Spinosad 45SC (187.60 q/ha), followed by Indoxacarb 14.5SC (178.25 q/ha).

The highest cost benefit ratio was noticed (Table 1) in Indoxacarb (1:5.97), followed by *Bacillus thuringiensis* (1:5.94), Spinosad (1:5.86), Neem oil (1:5.81), *Beauveria bassiana* (1:5.76), NSKE (1:5.71), Neem leaf extract (1:5.57), and control (1:4.12). The present findings are in agreement with [1, 5] who reported the highest Cost Benefit (C: B) ratio of (1:69.85) was obtained with the treatment Indoxacarb 14.5SC. followed by Emamectin benzoate 5SG (1:60.18), Spinosad 45SC (1:30.13) and Flubendiamide 39.35SC (1:24.56).

Table 1: Comparative efficacy of microbials and botanicals against Diamond back moth (*Plutella xylostella*) on cabbage during rabi 2019-2020.

Sr.no	Treatment	Percent reduction in larval population								Yield in q/ha	B:C Ratio
		1st spray				2nd spray					
		3DAS	7DAS	14DAS	Mean	3DAS	7DAS	14DAS	Mean		
T_1	Spinosad 45SC @ 0.32ml/lit	30.37	49.10	70.11	49.86	33.3	51.67	84.97	56.64	298	1:5.86
T_2	Indoxacarb 14.5SC @ 0.35ml/lit	28.19	37.24	49.66	38.36	30.24	37.60	58.77	42.20	275	1:5.97
T_3	Neem Oil @ 10ml/lit	22.75	28.76	42.13	31.21	23.84	28.33	43.19	31.78	243	1:5.81
T_4	*Bacillus thuringiensis var. kurstaki* @ 1g/lit	26.34	34.31	45.94	35.53	25.7	30.93	46.62	34.41	268	1:5.94
T_5	*Beauveria bassiana* @ 3gm/lit	20.74	22.40	34.44	25.86	20.13	26.68	35.08	27.29	235	1:5.76
T_6	NSKE 5% @ 50g/lit	19.51	23.35	29.27	24.04	17.81	23.19	28.57	23.19	233	1:5.71
T_7	Neem Leaf Extract @ 50g/lit	14.52	17.96	24.19	18.89	16.68	20.85	25.03	20.85	228	1:5.57
T_0	Control	12.04	16.61	22.70	17.11	13.27	17.76	23.84	18.29	160	1:4.12
F- test		S	S	S	S	S	S	S	S		
S.E (m) ±		1.37	2.08	2.47	4.14	1.70	1.52	2.16	5.98		
C.D at 5%		2.972	4.454	5.302	8.887	3.64	3.255	4.627	12.824		

Conclusion

From the analysis of the present findings, it was concluded that among all the treatments Spinosad 45SC proved to be the best treatment which is followed by Indoxacarb 14.5SC, *Bacillus thuringiensis var kurstaki*, Neem oil, *Beauveria bassiana*, NSKE, Neem leaf extract in managing *Plutella xylostella* reduction. Therefore, Microbials and Botanicals may be useful in devising proper IPM strategy against Diamond back moth.

References

1. Harika G, Dhurua S, Suresh M, Sreesandhya N. Evaluation of Certain Insecticides against Diamondback Moth (DBM) *Plutella xylostella* on Cauliflower. International Journal of Bio-resource and Stress Management. 2019;10(1):070-076.
2. Krishnamoorthy A. Biological control of diamondback moth *Plutella xylostella* (L.), an Indian scenario with reference to past and future strategies. In Proceedings of the International Symposium Montpellier, France, CIRAD 2004, 204-11.
3. Krishna Kumar NK, Srinivasan K, Suman CL. Optimum control strategy of cabbage pests from a chemical control trial. Prog. Hort 1983;18:104-1
4. Krishna Kumar NK, Srinivasan K, Suman CL. Optimum control strategy of cabbage pests from a chemical control trial. Prog. Hort 1983;18:104-110
5. Krishna Kumar NK, Srinivasan K, Suman CL. Optimum control strategy of cabbage pests from a chemical control trial. Prog. Hort 1983;18:10
6. Mishra A, SVS Singh. Efficacy of some plant extracts against diamondback moth (*Plutella xylostella*) on cabbage. Annals of Plant Sciences 2014;3(08):797-798
7. Maity L, Padhi G, Samantha A. Population dynamics and

management of diamond back moth *Plutella xylostella* (L.) in cabbage ecosystem of West Bengal; International Journal of Chemical Studies 2018;6(1):381-385.
8. Mahla RS, Singh S, Chaudhary P. Management of diamondback moth, *Plutella xylostella* (L.) larvae by entomopathogenic fungus, *Metarhizium anisopliae.* Indian Journal of Entomology 2005;67:342-344.
9. Sharma P, Kumawat KC, Khinchi HC, Kumar V, Prasad B. Bio efficacy of different insecticides against diamondback moth. International Journal of Chemical Studies 2017;5(3):891-83.
10. Sandi P, Das BC, Sarkar S, Samanta A. Efficacy of newer insecticides against major lepidopteran pests of cabbage. Research on Crops 2016;17(1):144-150.
11. Stanikzi R, Thakur S. Efficacy of chemical insecticides and botanicals in the management of diamondback moth (*Plutella xylostella*) in cabbage (*Brassica oleracea* var. *capitata* L.). International Journal of Multidisciplinary Research and Development 2016;3(6):101-104.
12. Yadav SK, Raju SVS, Yadav MK, Srivastava AK, Dwivedi PK. Bio-efficacy of new insecticidal molecules against the Diamondback moth (*Plutella xylostella* L.) on cauliflower. Journal of Experimental Zoology 2017;20(1):465-469.