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Effect of insecticides on yield of cabbage

PD Mane, BB Singh and PK Singh

Abstract
The experiments were conducted at Nalanda college of Horticulture, Noorsarai, Nalanda during rabi seasons of 2019-20 and 2020-21. All the insecticidal treatments recorded significantly higher yield over control. The highest yield of cabbage was recorded in Spinosad (0.3 ml/lit.) treated plot followed by Indoxacarb (0.5 ml/lit.) in both the seasons. Regarding yield performance, the treatments, Novaleuron (T1), Flubendiamide (T3), Emamectin Benzoate (T5), Profenophos (T6) were at par with each other . In general, it can be concluded that spraying with Spinosad (0.3 ml/lit.), Indoxacarb(0.5 ml/lit.) and NSKE(5%) were effective measures for the control of Cabbage butterfly, Diamond back moth, Tobacco caterpillar and cabbage Head borer as well as for maximizing yield in both the seasons.

Keywords: cabbage, Novaleuron, Profenophos, spinosad indoxacarb, yield

Introduction
Among cruciferous vegetables, cabbage (*Brassica oleraceae* var. Capitata L.) is a most popular and widely cultivated winter crop throughout India. The productivity of cabbage is much lower due to various causes and among them, heavy attack of insect-pest is the major constraint. Among the lepidopteran insect-pests which attack on cabbage, diamond back moth (DBM), *Plutella xylostella* L. Is the most destructive pest. In India, diamond back moth has national importance on cabbage as it causes 50-80% annual loss in the marketable yield (Devjani and Singh, 1999; Ayalew, 2006) [2, 1] and a loss of US $16 million every year (Mohan and Gujar, 2003) [6]. Hence farmers are compelled to use chemical insecticides in order to cultivate lucratively as traditional and cultural practices alone cannot give satisfactory control over the pest menace. This has necessitated the use of newer insecticides to sustain the management of cabbage pest complex. Hence the present study was undertaken for assessment of newer insecticides in managing the cabbage pests and their effect on yield under field conditions

Materials and Methods
The investigations were carried out during the Rabi seasons of 2019-20 and 2020-21 at college farm of Nalanda college of Horticulture, Noorsarai (Nalanda) for management of major lepidopteran pests of cabbage. The experiment was laid out in a randomized block design (RBD) with eight treatments including untreated control replicated three times. The crop was raised with recommended agronomic practices with plot size 3m x 3m at 50 x 45 cm spacing. The transplanting dates were 20th December 2019 and 15th December 2020 respectively. The insecticides evaluated were Novaleuron (1ml/lit.), spinosad (0.3ml/lit.), Flubendiamide (0.4gm/lit.), Indoxacarb (0.5ml/lit.), Emamectin Benzoate (0.4gm/lit.), Profenophos (1.5 ml/lit) and NSKE(5%). Insecticides were applied with pneumatic knapsack sprayer using spray volume@500lit./ha. . Infested cabbage were counted separately for diamond back moth and tobacco caterpillar damage at harvesting from each replication. Healthy and damaged cabbage (weight and number basis) were recorded separately from each replicated plot at the time of harvest for calculation of yield. The data obtained from the different treatments were subjected to statistical analysis after suitable transformations.

Results and Discussion
The data (Table 1 & 2) revealed that all the insecticides under investigation were observed to be significantly superior over untreated control in reducing cabbage. The highest yield of cabbage was recorded in Spinosad (0.3 ml/lit.) treated plot followed by Indoxacarb (0.5 ml/lit.). Regarding yield performance the treatments, Novaleuron (T1), Flubendiamide (T3),

Emamectin Benzoate (T5), Profenophos (T6) were at par with each other in both the seasons. In general, it can be concluded that spraying with Spinosad (0.3 ml/lit.), Indoxacarb (0.5 ml/lit.) and NSKE (5%) were effective measures for the control of Cabbage butterfly, Diamond back moth, Tobacco caterpillar and cabbage Head borer as well as for maximizing yield in both the seasons.

The present results of Indoxacarb are in conformity with the findings of Kumar and Meena (2010) [4] who reported that Indoxacarb @ 75 gm.a.i./ha was the most effective treatment against diamond back moth in cabbage was reported by many workers (Liu *et al*, 2003, Gupta *et al.* 2008, Vaseem *et.al.* 2014) [5, 3, 7].

Table 1: Bio-efficacy of various insecticides on yield of cabbage in Rabi Season 2019

Sr. No.	Treatments	Dose	Yield (Qt./ha)			Mean
			R-I	R-II	R-III	
1.	Novaleuron	1 ml/lit.	520.35	512.88	508.96	514.06
2.	Spinosad	0.3 ml/lit.	**635.40**	**638.24**	**644.15**	**639.26**
3.	Flubendiamide	0.4 gm/lit.	540.28	535.35	544.20	539.94
4.	Indoxacarb	0.5 ml/lit.	**627.38**	**625.28**	**632.16**	**628.27**
5.	Emamectin Benzoate	0.4 gm/lit.	515.30	520.54	522.38	519.40
6.	Profenophos	1.5 ml/lit.	508.44	504.96	509.95	507.78
7.	NSKE	5%	472.28	465.70	462.28	466.75
8.	Control	-----	454.20	450.92	452.10	452.40
S.E.±	---	---	-----	-----	-----	8.75
C.D. at 5%	---	---	-----	-----	-----	25.96

Table 2: Bio-efficacy of various insecticides on yield of cabbage in Rabi Season 2020

Sr. No.	Treatments	Dose	Yield (Qt./ha)			Mean
			R-I	R-II	R-III	
1.	Novaleuron	1 ml/lit.	531.62	514.20	510.90	518.90
2.	Spinosad	0.3 ml/lit.	**644.96**	**642.35**	**649.36**	**645.55**
3.	Flubendiamide	0.4 gm/lit.	538.40	532.40	541.36	537.38
4.	Indoxacarb	0.5 ml/lit.	**631.45**	**630.32**	**634.25**	**632.00**
5.	Emamectin Benzoate	0.4 gm/lit.	518.40	525.64	527.45	523.83

Sr. No.	Treatments	Dose	Yield (Qt./ha)			Mean
			R-I	R-II	R-III	
6.	Profenophos	1.5 ml/lit.	511.30	506.40	513.25	510.31
7.	NSKE	5%	474.32	465.75	466.40	468.82
8.	Control	-----	459.35	452.84	455.32	455.83
S.E.±	---	---	-----	----	----	8.84
C.D. at 5%	---	---	-----	----	----	27.35

Conclusion

The highest yield of cabbage was recorded in Spinosad (0.3ml/lit.). treated plot followed by Indoxacarb (0.5 ml/lit.). Regarding yield performance, the treatments, Novaleuron (T_1), Flubendiamide (T3), Emamectin Benzoate (T5), Profenophos (T6) were at par with each other . In general, it can be concluded that spraying with Spinosad (0.3 ml/lit.), Indoxacarb (0.5 ml/lit.) and NSKE(5%) were effective measures for the control of Cabbage butterfly, Diamond back moth, Tobacco caterpillar and cabbage head borer.

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