Society of Krishi Vigyan
www.iskv.in

J Krishi Vigyan 2025, 13(2) : 320-324

DOI: 10.5958/2349-4433.2025.00058.3

ISSN 2319-6432 (Print)
ISSN 2349-6433 (Online)

Efficacy of Pest Management Modules against Aphids and Pod Borer Complex of Indian bean

***R B Hirekurubar, Suvarna Patil, R Raghunatha, Rekha Chittapur and Shweta Hiremath**

Horticultural Research and Extension Centre, Hidkal Dam (Karnataka), India-591218

ABSTRACT

The field experiment was carried out at KRCCH (Kittur Rani Channamma College of Horticulture) Arabhavi, Karnataka during Rabi season of 2021and 2022 to investigate the comparative biological effectiveness of different modules against aphids and pod borer complex in Indian bean (*Lablab purpureus L.*). Among all the modules chemi intensive module (Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l – Spinosad 45 SC @ 0.3ml/l – Emamectin benzoate 5 SG @ 0.2 g/l) was most efficient in reducing aphid population after 10 days of second spray (0.45 aphids/plant) and it was followed by IPM module (Neem cake (1q/acre) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander grown at the border of main crop) which recorded 4.64 (aphids/plant). Chemical intensive module was also effective in reducing pod borer infestation by recording lowest mean percent pod damage of 7.11 and was followed by IPM module which recorded 9.92 percent pod damage. The highest yield, 14.37 (t /ha) was recorded from chemi-intensive module and IPM was next best module (13.40 t /ha). Additionally, highest B:C ratio (4.01) was found in chemi intensive module followed by IPM module (3.67). IPM module was found to be safe for predators (spiders and coccinellids) by recording highest number of natural enemies (3.29/plant and 3.47/plant, respectively) after two weeks of first day and fourth spray.

Keywords: Aphid, Pod borer, Thiamethoxam 25 WG, Azadirachtin, Indian bean.

INTRODUCTION

The Indian bean (*Lablab purpureus* L.) is an important pulse and vegetable crop in India and grown for its tender pods, seeds and also for fodder. The crop is cultivated in dry tropical parts of Asia, In India, Andhra Pradesh, Karnataka, Kerala Tamil Nadu and Assam are known for cultivating Indian bean (Anonymous, 2008). This crop is mainly affected by about 30 species of insects, among these pod borers *Helicoverpa armigera* Hubner, *Maruca testulalis, Adisura atkinsoni* (Moore) *Exelastis atomosa* are the most destructive, often leading to yield loss of up to 80-100 per cent (Sachan and Katti, 1994). Among sucking insect pests, *Bemisia tabaci* Gennadius, *Empoasca kerri* and *Aphis craccivora*, are causing considerable damage to leaves, buds, flowers and pods of Indian beans. Among them, *A. craccivora* causes a 25 to 80 per cent reduction in yield by sucking the sap from the ventral surface of tender leaves, growing shoots, flower stalks and pods. The chemical control of suckin pest and pod borer complex have been recommended by many workers on different beans to suppress their population effectively (Yadav *et al*, 2011). Since the pods are directly consumed as vegetables, the pest management especially the pod borer control has to be on organic basis, hence to reduce the pesticide load on crop the present research was undertaken to evaluate different pest controlling different modules like bio-intensive module, chemi-intensive module, integrated modules against pest of Indian bean.

MATERIALS AND METHODS

The present experiment on evaluation of different pest management modules against pest complex of Indian bean (*Lablab purpureus L)* was conducted during *Rabi* season of 2021 and 2022 at KRCCH, Arabhavi, Karnataka in medium black soil under irrigated conditions.

The experiment was laid out in simple randomized block design (RBD) with five modules and replicated four times each (Table 1). The each experiment module size was 5 x 20 m^2 with row to row and plant to plant distance of 60 and 30 cm, respectively. The bush type hybrid ASPL0063 was

Corresponding Author's Email - bhrenuka@gmail.com

Table 1: Treatment details followed.

Module	Treatment
M_1	Neem cake (2.50q/ha) – *Lecanicillium lecani* @ 5g/l - *Nomuraea rileyi* @5g/l (2 sprays each at 10 days interval) (Module 1)
M_2	Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l –Spinosad 45 SC@ 0.3ml/l – Emamectin benzoate 5 SG @ 0.2 g/l (Module 2)
M_3	Neem cake (2.50q/ha) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander as a border crop (Module 3)
M_4	RPP (Dimethoate 30EC @ 1.70 ml/l –Quinalphos 25 EC@2ml/l) (Module 4)
M_5	Untreated control (Module 5)

used for the experiment and was sown during October (*Rabi* season) 2021 and 2022. The Indian bean was grown using the specified agronomical practices. According to treatments, in module-1 and module-3, Neem cake (2.50q/ha) was applied to the soil at the time of sowing. After 15 days of sowing, in all modules biopesticides and insecticides were applied in sequence keeping 10 days interval by using knapsack sprayer. An untreated control block was also maintained for comparison.

Observations on aphids were recorded by counting aphid's nymphs and adults from five randomly selected and labeled plants of each module. Aphids were observed from three leaves top, middle and bottom and expressed as number per plant. Pods infestation was noted by counting the healthy and infested pods at each harvest. The pod borer infestation(%) was calculated.

Statistical analysis

The aphid population and pod damage data were transformed using the square root and arc sine transformation, respectively and subjected for statistical analysis by using ANOVA. The means were tested for significance using LSD at 5% level for interpretation using standard statistical techniques (Steel and Torrie, 1980).

Pod Yield and Economics.

Pod yield at each picking was recorded, cumulated to get total yield after completion of all pickings and later computed on a hectare basis. Before statistical analysis, cumulative pod yield data of each module was subjected to suitable statistical transformations. The total cost of cultivation was computed by adding common input cost of cultivation such as treatment costs and labour charges. The gross return per treatment was computed by multiplying the total yield per hectare by the current market price. While net returns for each module treatments were calculated by deducting the total cost spent towards treatments application from gross returns. Each treatment's benefit-cost (B:C) ratio was calculated by dividing gross returns from treatments total cost (Shabozoi *et al,* 2011).

RESULTS AND DISCUSSION

The aphid infestation at different time intervals after the initial spray is depicted in table 2. A day before first spray, the aphids per plant were in the range of 34.30 to 90.50. Significant aphid population data difference was not observed among the different treatments. However, after five days of the first spray found more effective with respect to aphid's population. Among all the modules evaluated the treatment M-2, chemi intensive module (Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l –Spinosad 45 SC@ 0.3ml/l – Emmamectin benzoate 5 SG @ 0.2 g/l) was effective in reducing aphid population after 5 days of first spray (16.47 aphids/plant) and it was followed by IPM module (Neem cake (1q/acre) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander as border crop) which recorded the 22.13 aphids per plant. Thereafter, the aphids count decreased after ten days of first spray and minimum aphid population was recorded in M-II (7.15 aphids/plant) followed by M-1 module (11.08 aphids/plant).

Five days after application of treatments at second time also M-2, chemi intensive module was efficient in reducing aphid population (0.68 aphids/plant) and next good module was M-3, which recorded 5.34 aphids per plant. After 10 days of second spray same trend was noticed in reducing aphid number, by recording lowest population (0.45

Table 2: Efficacy of different modules against aphids infestation in Indian bean.

Module	Treatment	No. of aphids/plant				
		I Spray			II Spray	
		DBS	5 DAS	10 DAS	5 DAS	10 DAS
M_1	Neem cake (2.50q/ha) – *Lecanicillium lecani* @ 5g/l - *Nomuraea rileyi* @5g/l (2 sprays each at 10 days interval) (Module 1)	34.30 (5.14)	16.97 (3.69)	11.08 (3.04)	8.91 (2.77)	6.27
M_2	Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l –Spinosad 45 SC@ 0.3ml/l – Emamectin benzoate 5 SG @ 0.2 g/l (Module 2)	90.50 (8.28)	16.47 (3.59)	7.15 (2.52)	0.68 (1.22)	0.45
M_3	Neem cake (2.50q/ha) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander as a border crop (Module 3)	34.90 (5.16)	22.13 (4.17)	19.42 (3.93)	5.34 (2.22)	4.64
M_4	RPP (Dimethoate 30EC @ 1.70 ml/l – Quinalphos 25 EC@2ml/l) (Module 4)	85.67 (8.04)	39.21 (5.47)	33.43 (5.09)	18.67 (3.87)	21.84
M_5	Untreated control (Module 5)	83.17 (7.94)	103.85 (8.78)	134.68 (10.07)	110.72 (9.10)	86.97
CD @ 5%		1.1	1.3	0.6	0.9	0.7
SEm ±		0.3	0.4	0.2	0.3	0.2

Note- DBS- Day Before Spray; DAS- Days After Spray and Figures in the parenthesis are square root transformed values

Table 3: Effictiveness of modules against pod borer complex in Indian bean.

Module No	Treatment	Percent pod damage (Picking wise)					
		I	II	III	IV	Mean	ROC (%)
M1	Neem cake (2.50q/ha) – *Lecanicillium lecani* @ 5g/l - *Nomuraea rileyi* @5g/l (2 sprays each at 10 days interval) (Module 1)	20.64 (26.98)	20.44 (26.82)	16.83 (24.19)	12.14 (20.29)	17.51	50.80
M_2	Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l –Spinosad 45 SC@ 0.3ml/l – Emamectin benzoate 5 SG @ 0.2 g/l (Module 2)	9.49 (17.89)	10.37 (18.63)	5.80 (13.88)	2.78 (9.57)	7.11	80.02
M_3	Neem cake (2.50q/ha) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander as a border crop (Module 3)	12.07 (20.27)	13.29 (21.35)	8.12 (16.54)	6.20 (14.14)	9.92	72.13
M_4	RPP (Dimethoate 30EC @ 1.70 ml/l – Quinalphos 25 EC@2ml/l) (Module 4)	18.28 (25.29)	19.55 (26.21)	11.78 (20.04)	9.35 (17.76)	14.74	58.59
M_5	Untreated control (Module 5)	30.37 (33.40)	34.94 (36.17)	39.19 (38.70)	37.88 (37.97)	35.59	--
CD @ 5%		2.6	3.4	2.6	2.7	-	-
SEm ±		0.8	1.1	0.8	0.9	-	-

Note- Figures in the parenthesis are arc-sine transformed values, ROC : Reduction over control

aphids/plant) in M-2 module and was followed by M3 module which recorded the 4.64 aphids per plant. Yadav *et al* (2011) also revealed that dimethoate, imidacloprid and thiamethoxam treatments were the most effective in decreasing the sucking insect pests of cluster bean.

Table 4: Impact of different modules on natural enemies and pod yield in Indian bean.

Module No	Treatments	No. of predators/plant*				Yield (t/ha)	IOC (%)	B :C
		Pre count	15 DAS (II Spray)	15 DAS (IV Spray)	Mean			
M1	Neem cake (2.50q/ha) – *Lecanicillium lecani* @ 5g/l - *Nomuraea rileyi* @5g/l (2 sprays each at 10 days interval) (Module 1)	1.05 (1.33)	2.76 (1.74)	3.80 (1.94)	3.28	13.10	31.67	3.57
M_2	Thiamethoxam 25 WG @ 0.2g/l – Fipronil 5 SC @ 1ml/l – Spinosad 45 SC@ 0.3ml/l – Emamectin benzoate 5 SG @ 0.2 g/l (Module 2)	1.99 (1.56)	0.13 (1.05)	0.45 (1.14)	0.29	14.37	44.45	4.01
M_3	Neem cake (2.50q/ha) - Azadirachtin 1500 ppm @ 4 ml/l – Difenthiuron 50 WP @ 0.5 g/l - Spinosad 45 SC@ 0.3ml/l with maize and coriander as a border crop (Module 3)	1.08 (1.33)	3.29 (1.85)	3.47 (1.90)	3.38	13.40	34.70	3.67
M_4	RPP (Dimethoate 30EC @ 1.70 ml/l –Quinalphos 25 EC@2ml/l) (Module 4)	2.17 (1.60)	0.38 (1.13)	0.65 (1.20)	0.56	13.15	32.12	3.59
M_5	Untreated control (Module 5)	1.53 (1.45)	3.14 (1.81)	5.37 (2.22)	4.26	9.95	--	2.47
CD @ 5%		NS	0.3	0.4	-	1.2	-	-
SEm ±		0.1	0.1	0.1	-	0.4	-	-

Note- DBS- Day before Spray; DAS- Days after spray and Figures in the parenthesis are SQRT transformed values
*Spiders and coccinellids.
IOC: Increase over control: B: C: Benefit:cost ratio

The pooled data of per cent pod damage given in table 3, Chemical module (M-2) was very efficient, which recorded lowest per cent of pod damage (7.11) by reducing 80.02 per cent pod damage over control followed by M-III which recorded 9.92 per cent of pod damage and highest 35.59 per cent of pod damage was observed in Module 5, untreated control.

The highest pod yield of 14.37(t/ha) was obtained from chemi-intensive module and IPM was next best module (13.40 t/ha). There was 44.45 per cent rise in yield compared control (M-5) was noticed in M-2 module. The next group in order of efficacy consist of M-4 (Dimethoate 30EC @ 1.70 ml/l –Quinalphos 25 EC@2ml/l), M-1 (Neem cake (2.5q/ha) – *Lecanicillium lecani* @ 5g/l - *Nomuraea rileyi* @5g/l) and M-5 (untreated control). The maximum returns per rupee of expenditure (cost: benefit ratio) of 4.01 was obtained from chemi-intensive module and was followed by IPM module (3.67) compare to rest of the modules (Table 4). Singh and Singh (2017) concluded that Spinosad 60g a.i./ha followed by Emamectin benzoate 8g a.i./ha were the best treatments in minimizing *Maruca vitrata* larval population infesting greengram. Byrappa *et al* (2014) reported that among biopesticides, sequential application of NSKE-HaNPV-Bt was effective against insect pests. HaNPV was also efficient against *Helicoverpa armigera* (Hubner) larvae. IPM module (M-3) was found be safe for predators (spiders and coccinellids) by recording highest number of predators (natural enemies) after 15 days of first day and fourth spray (3.29/plant and 3.47/plant respectively).

CONCLUSION

The results of the present study clearly revealed that chemi-intensive module proved superior in managing sucking pest and pod borer complex in Indian bean and next best module was integrated pest management approach module which serves as a alternative to chemicals in managing sucking pest and pod borer complex in Indian beans.

REFERENCES

Anonymous (2008). Package of practices for Agricultural crops. Pp 145. University of Agricultural Sciences, Bangalore, India.

Byrappa A M, Kumar N G and Divya M (2014). Impact of biopesticides application on pod borer complex in organically grown field bean ecosystem. *J Biopest* **5**(2): 148-160.

Parmar S G and Ghetiya L V. (2023). Population dynamics of insect pests of Indian bean in relation to abiotic factors in South Gujarat. *The Pharma Innov J* **12**(4): 1141-1144.

Sachan J N and Katti G (1994). *Integrated pest management.* In: Proceedings of International Symposium on Pulses Res. 2-6 April 1994 IARI New Delhi India: 23-26.

Singh S and Singh P S (2017). Bioefficacy of Certain Insecticides and Biopesticides against Spotted Pod Borer, *Maruca vitrata* Infesting Greengram. *Int J Agric, Environ and Biotech* **10**(6): 785-792.

Shabozoi N U K, Abro G H, Syed T S and Awan M S (2011). Economic appraisal of pest management options in okra. *Pak J* **43**:869-878.

Steel RGD and Torrie JH (1980). *Principles and procedures of statistics.* McGraw-Hill Book Company, New York.

Yadav S R, Kumawat K C and Khinchi S K (2011). Efficacy of new insecticide molecules and bioagents against sucking insect pests of cluster bean, *Cyamopsis tetragonoloba* (Linn.) Taub. *J Plant Prot and Environ* **8**(1):115 -122.

Received on 3/3/2025 Accepted on 15/5/2025