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Efficacy of different chemical, biorational and botanical pesticides against cowpea pod borer, *Maruca vitrata* Fabricius

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Abstract
The lowest pod damage was recorded in plots treated with flubendiamide (4.31%) and remained at par with profenophos (4.96%), lambda cyhalothrin (5.76%), proclaim (6.05%) and thiodicarb (6.49%). The treatment with neem seed kernel extract (13.52%) exhibited significantly lower pod damage than control (22.13%), but higher than other synthetic insecticides. The grain yield of cowpea in different treatments varied from 361.11 to 680.55 kg/ha. All the treatments were significantly superior over control. The highest yield was achieved in flubendiamide (680.55 kg/ha) and it was statistically at par with profenophos (638.88 kg/ha), lambda cyhalothrin (624.99 kg/ha), proclaim (569.44 kg/ha) and thiodicarb (541.66 kg/ha). The next best treatments were nurelle D-505 (496.75 kg/ha), bifenthrin (486.11 kg/ha), indoxacarb (472.22 kg/ha), cartap hydrochloride (458.33 kg/ha), spinosad (430.55 kg/ha) and NSKE (416.66 kg/ha). The lowest yield was recorded in the untreated control (361.11 kg/ha).

Keywords: Insecticides, spinosad, pod damage, treatment, neem etc.

Introduction
Pulses have been recognized as a major source of protein as well as restorer of soil fertility by fixing the atmospheric nitrogen in to soil. It plays an important role for the predominantly vegetarian population of India. Among the pulses, cowpea [*Vigna unguiculata* (L.) *Walper*] is an ancient and nutritionally important crop, grown in the semi-arid and sub-humid tropics of Africa, Asia and Australia. It is also known as chowli, lobia, southern pea and black-eyed bean, belonging to family fabaceae and sub-family faboide is believed to be originated in Savannah region of West and Central Africa. The importance of cowpea pods and grains as food for the people is appreciated in tropics and sub-tropics of the world. The food value of cowpea is essentially due to its high protein content. From production of this crop, rural families variously derive food, animal feed and cash together with spillover benefits to their farm land. Cowpea grain on an average contains 23-25 percent protein and 50-67 percent starch (Quin, 1997) [5]. It can fix atmospheric nitrogen in the soil through symbiotic bacteria to a range of 64-131 kg/ha/year (Ayanaba and Dart, 1977) [1]. Thus, this crop is considered as a multipurpose crop and has a wide range of adaptability to agro-climatic conditions prevailing in India. The spotted pod borer is most important pest of cowpea (Nair, 1975; Srivastava, 1964) [3, 7] and causes severe yield losses (up to 60%) in the tropics and sub-tropics (Singh and Van Emden, 1979) [6]. The larvae of spotted pod borer are known to cause considerable damage to cowpea crop by attacking various parts *viz*., buds, flowers, pods and seeds.

Materials and Methods
To find out effective chemical insecticide against spotted pod borer (*M. vitrata*), a field experiment was conducted at the Main Pulses Research Station, S. D. Agricultural University, Sardarkrushinagar during kharif season.

Time and method of application
Foliar application of insecticides was made with the help of Knapsack sprayer. The untreated control plots were also kept for comparison, wherein water spray was made. Six lines were allotted for each treatment. The first application was given at 35 days after sowing and second application was given after 15 days of first application.

Table 1: Details of the Experiment

1.	**Experimental Design**	**Randomized Block Design (RBD)**
2.	Number of replications	3 (Three)
3.	Number of treatments	12
4.	**Plot size**	
	Gross	5.0 m x 2.7 m
	Net	4.0 m x 1.8 m
5.	Cowpea	var. GC-4
6.	Spacing	45 cm x 15 cm
7.	Method of sowing	Hand dibbling
8.	**Number of rows/plot**	
	Gross	6
	Net	4
9.	Fertilizer application	20: 40: 0 (kg/ha) N P K

Table 2: Details of insecticidal treatments

Sr. No.	Technical name	Trade name	Concentration	Insecticide use (ml/ 10 lit.)
1.	Profenophos	Proven 50 EC	0.05%	10 ml
2.	Chlorpyriphos + Cypermethrin	Nurelle D-505	0.055%	10 ml
3.	Lambda cyhalothrin	Karate 5 EC	0.005%	10 ml
4.	Thiodicarb	Larwin 75 WP	0.04%	5.5 g
5.	Indoxacarb	Avaunt 14 SC	50 g a.i./ha	0.9 ml
6.	Spinosad	Tracer 45 SC	73 g a.i./ha	0.30 ml
7.	NSKE	Local preparation	5%	500 g
8.	Emamectin benzoate	Proclaim 5% WSG	9.5 g a.i./ha	0.5 g
9.	Flubendiamide	RIL 20 WDG	50 g a.i./ha	0.5 g
10.	Bifenthrin	Talstar 10 EC	10 g a.i./ha	2 ml
11.	Cartap hydrochloride	Caldan 75 SP	0.15%	20 g
12.	Untreated control	-	-	-

Method of recording observation
Efficacy of different insecticides was evaluated on the basis of larval incidence, pod damage and yield of grain. For recording these observations three plants were selected randomly from net plot area and tagged. The observations of *M. vitrata* were recorded after first spray, second spray and at pod formation stage.

Larva
Number of *M. vitrata* larvae on pods and other plant parts were counted after first spray and second spray of insecticide.

Pod damage
All the pods of three selected plants in each plot were observed. The percent damage in each plot was calculated from the count of healthy and damaged pods.

Yield
The harvesting of crop was done manually with the help of labours. The produce of each plot harvested, threshed and cleaned separately. The grain yield obtained from each plot was weighed on electronic pan balance and then converted in to kilograms per hectare.

Results and Discussion
Larval population
The results on larval population, after first spray and second spray is presented in Table 3.

After first spray
The data on larval population after first spray exhibited significant difference. All the insecticides were significantly superior over control. The lowest larval population was recorded on flubendiamide (0.77 larvae/plant) and it was at par with profenophos (1.43 larvae/plant) and lambda cyhalothrin (1.51 larvae/plant). The treatment with proclaim has recorded 1.87 larvae/plant and remained at par with thiodicarb (2.09), nurelle D-505 (2.32), bifenthrin (2.56), indoxacarb (2.63) and cartap hydrochloride (2.77 larvae/plant). The treatment with neem seed kernel extract (3.07) exhibited significantly lower larval population than untreated control (3.42 larvae/plant) but higher than other synthetic insecticides.

After second spray
The data obtained after second spray exhibited significant difference. All the insecticidal treatments remained significantly superior over control. The lowest larval population was recorded on flubendiamide (0.71 larvae/plant). It was at par with profenophos (1.29 larvae/plant) and lambda cyhalothrin (1.32 larvae/plant). The treatment with proclaim has recorded 1.75 larvae/plant and it was found to be at par with thiodicarb (2.02 larvae/plant), Nurelle D-505 (2.18 larvae/plant), Bifenthrin (2.22 larvae/plant), indoxacarb (2.32 larvae/plant), cartap hydrochloride (2.56 larvae/plant) and spinosad (2.77 larvae/plant). Control plots exhibited the maximum (3.54) larval population.

Average percent pod damage
The data on percent pod damage by *M. vitrata* in various treatments are presented in table no. 3.

The data revealed that all the insecticidal treatments were significantly superior over control. The lowest pod damage was recorded in plots treated with flubendiamide (4.31%) and remained at par with profenophos (4.96%), lambda cyhalothrin (5.76%), proclaim (6.05%) and thiodicarb (6.49%). The treatment with neem seed kernel extract (13.52%) exhibited significantly lower pod damage than control (22.13%), but higher than other synthetic insecticides.

Yield

The grain yield of cowpea in different treatments varied from 361.11 to 680.55 kg/ha. All the treatments were significantly superior over control. The highest yield was achieved in flubendiamide (680.55 kg/ha) and it was statistically at par with profenophos (638.88 kg/ha), lambda cyhalothrin (624.99 kg/ha), proclaim (569.44 kg/ha) and thiodicarb (541.66 kg/ha). The next best treatments were nurelle D-505 (496.75 kg/ha), bifenthrin (486.11 kg/ha), indoxacarb (472.22 kg/ha), cartap hydrochloride (458.33 kg/ha), spinosad (430.55 kg/ha) and NSKE (416.66 kg/ha). The lowest yield was recorded in the untreated control (361.11 kg/ha).

On the basis of overall results flubendiamide 50 g a.i./ha was found to be most promising against spotted pod borer and it remained at par with profenophos 0.05%, lambda cyhalothrin 0.005%, proclaim 9.5 g a.i./ha and thiodicarb 0.04%. The results are in close agreement with the results reported by Degri and Chaudhary (1998) [2] and Prajapati *et al.* (2003) [4]. They have reported that endosulfan 0.07% and monocrotophos 0.04% followed by NSKE 3% were found effective against spotted pod borer and produced highest grain yield. Emamectin benzoate @ 11 g a.i./ha, flubendiamide @ 50 g a.i./ha and spinosad @ 73 g a.i./ha found effective against pod borer damage. Tenzubil (2005) reported that the lambda cyhalothrin was most effective for management of *M. vitrata* on cowpea.

Table 3: Pest incidence, pest damage and grain yield in various insecticidal treatments on cowpea (GC- 4)

Sr. No.	Treatments	Concentration (%)	Mean number larvae/plant		Mean percent damage	Yield (kg/ha)
			After first spray	After second spray		
1	Profenophos	0.05%	1.39* (1.43)	1.34* (1.29)	12.87** (4.96)	638.88
2	Nurelle D-505	0.055%	1.68 (2.32)	1.64 (2.18)	18.92 (10.51)	496.75
3	Lambda cyhalothrin	0.005%	1.42 (1.51)	1.35 (1.32)	13.89 (5.76)	624.99
4	Thiodicarb	0.04%	1.61 (2.09)	1.59 (2.02)	14.76 (6.49)	541.66
5	Indoxacarb	50 g a.i.	1.77 (2.63)	1.68 (2.32)	19.08 (10.69)	472.22
6	Spinosad	73 g a.i.	1.87 (2.99)	1.81 (2.77)	21.20 (13.08)	430.55
7	NSKE	5%	1.89 (3.07)	1.87 (2.99)	21.57 (13.52)	416.66
8	Proclaim	9.5 g a.i.	1.54 (1.87)	1.50 (1.75)	14.24 (6.05)	569.44
9	Flubendiamide	50 g a.i.	1.13 (0.77)	1.10 (0.71)	11.98 (4.31)	680.55
10	Bifenthrin	10 g a.i.	1.75 (2.56)	1.65 (2.22)	19.00 (10.60)	486.11
11	Cartap hydrochloride	0.15%	1.81 (2.77)	1.75 (2.56)	20.07 (11.78)	458.33
12	Untreated Control	-	1.98 (3.42)	2.01 (3.54)	28.06 (22.13)	361.11
	General mean		1.65	1.61	17.97	513.88
	S.Em.±		0.102	0.104	1.47	50.69
	C.D. at 5%		0.297	0.307	4.295	148.61
	C.V.%		10.67	11.37	14.159	17.047

* $\sqrt{x + 0.5}$ transformed vales. ** Angular transformed values, Figures in the parentheses are retransformed value

Conclusion

Flubendiamide 50 g a.i./ha was found to be most promising against spotted pod borer and it remained at par with profenophos 0.05%, lambda cyhalothrin 0.005%, proclaim 9.5 g a.i./ha and thiodicarb 0.04%.

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References

1. Ayanaba A, Dart DJ. In: Biological nitrogen fixation in farming systems of the tropics. Published by John Wiley and Sons, New York; c1977. p. 205.
2. Degri MM, Chaudhary JP. Chemical control of cowpea pod borer on cowpea in Bauchi-Nigeria. Indian Journal of Entomology. 1998;60(2):142-151.
3. Nair MRGK. Insect and mite of crop in India. ICAR, New Delhi, India; c1975. p. 404.
4. Prajapati BG, Dodia DA, Tikka SBS. Studies on bio-efficacy of synthetic and botanical insecticides against major pests of cowpea. In: Special Issue of Journal of Arid Legumes; c2003. p. 462-466.
5. Quin FM. Introduction. In: Advance in Cowpea Research. Edited by Singh, B.B.; Mohan Raj, D.R.; Dashiell, K.E. and Jackai, L.E.N., published by IITA and JIRCAS, IITA Ibadan, Nigeria; c1997. p. 9-15.
6. Singh SR, Van Emden HF. Insect pests of grain legumes. Annual Review of Entomology. 1979;24:255-278.
7. Srivastava BK. Pests of pulse crops. In: Pant, N.C. (Ed.) Entomology in India: 1938-1963. Indian J Ent., A Silver Jubilee Publication of Entomological Society of India, New Delhi; c1964. p. 83-91.
8. Tanzubil PB. Field evaluation of neem (Azadirachta indica) extract for control of insect pests of cowpea in Northern Ghana. Journal of Tropical Forest Production. 2005;6(2):165-172.