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Bio-efficacy of insecticides against pod borer complex of pigeonpea under field conditions

Priyanka Ramteke, VN Nandanwar and Pooja Bharkade

Abstract
A field experiment was conducted at a field of Entomology section, College of Agriculture, Nagpur (Maharashtra), India during *kharif* season of the year 2018-2019. The bio- efficacy of eight newer insecticidal molecules were treatd. The treatments were NSE 5% @ 50g/l, Neem oil 2% @ 20ml/l, HaNPV 500 LE/ha @ 1ml/l, Spinosad 45 SC @ 0.6 ml/l, Acetamiprid 20SP @ 0.4 g/l, Rynaxypyr 18.5SC @0.25ml/l, Emamectin benzoate 5 SG @ 0.2 g/l Among above insecticides under study, rynaxypyr 18.5 SP @ 0.25ml/l was most effective insecticide in minimizing the larval population of pigeonpea pod borers viz., gram pod borer, plume moth. The treatment application of rynaxypyr 18.5 SP @ 0.25 ml/l shown the lowest pod damage (14.42 per cent) due to pigeonpea pod borer complex and recorded highest grain yield of pigeonpea (14.72 q per ha) over control.

Keywords: *Helicoverpa armigera*, bio-efficacy, Pigeonpea, insecticides

Introduction
Pigeonpea (*Cajanus cajan* (L.) Millsp.) is one of the most important legume crop of the tropics and subtropics of Asia and Africa. Pigeonpea, also known by names such as redgram, arhar and tur in India, offers nutritional security due to its richness in protein (21%) along with mineral supplements viz., iron and iodine. India is the world's largest producer and consumer of pulses including pigeonpea (Bambawale *et al*. 2011) [1] India is the primary centre of origin and diversification for pigeonpea. It is also cultivated in Kenya, Uganda, Malawi, China, Myanmar and Nepal. It is an important source of protein and vitamin B. Pigeonpea seeds are used as green peas, whole grain or split peas. Its seed husks and leaves are used as nutritious animal feed, while the stem is used as fuel and also for making baskets, fencing and huts. Pigeonpea fixes nitrogen in the soil and also reduces soil erosion. It is a hardy, widely adapted and drought tolerant crop with a large temporal variation (97-299 days) for grain maturity (Singh, 2014) [2]. Over 250 species of insects recorded on a crop, only few are economically important as a pests (Lal, 1998). [3] Although number of insect pests were reported to attack Pigeonpea crop, the pod borer complex including Gram pod borer, *Helicoverpa armigera*, plume moth, *Exelastis atomosa* and pod fly, *Melanagromyza obtusa* cause considerable losses in grain yield ranging 30 to 100% by attacking the reproductive parts of the plant. The loss due to *H. armigera* alone contributes up to 50% (Thakare, 2001) [4]. The main thrust of cultivators has been towards application of insecticides for the management of insect pests because of convenience and easy availability of chemicals (Thakare, 2001) [4]. An insect pest specially pod borer complex is the major limiting factor in getting higher yield of pigeonpea and hence becomes vitally important to study tactics dealing with management of pod borer complex. Keeping in view the losses inflicted by pod borer, the present investigation was planned to generate the information of some approaches for the management of borer complex of pigeonpea to reduce yield losses.

Materials and Methods
A field experiment was conducted on Tur crop during the *Kharif* seasons 2018-19 using variety PKV TARA in field. The experiment was laid out in a randomized block design with eight treatments and three replications. Treatments comprise commercial insecticide as well as botanicals. The treatments were Neem seed extract 5% @ 50g/l, Neem oil 2% @ 20 ml/l, *Helicorpa armigera nuclear polyhedrosis virus* 500 LE/ha @ 1ml/l, Spinosad 45 SC @ 0.6 ml/l, Acetmiprid 20SP @ 0.4 g/l,Rynaxypyr 18.5SC @0.25ml/l, Emamectin benzoate 5 SG @ 0.2 g/l along with water spray as control.

The plot size was kept 18.48 m2 with a spacing of 60 × 30 cm between rows and plants. The application of first spray was initiated at 50 Percent flowering stage, second spray were given at pod formation stage of the crop. The observations were recorded on the number of *H. armigera* larvae, *E. atomosa* larvae per plant on randomly selected 5 tagged plants and 3 twigs of 10 cm/plant, per plot from net plot and were recorded 24 hrs before and 3rd, 7th and 10th days after every treatments of insecticides. Pod damage due to pigeonpea pod borer complex was calculated at harvest. Per cent pod damage was calculated by using following formula.

$$\text{Per cent pod damage} = \frac{\text{Number of damaged pods}}{\text{Total number of pods}} \text{ X } 100$$

Grain Yield and Economics of Different Treatments

In order to compare efficacy of different treatments the grain yield of net plot from each treatment were recorded after harvest of crop. Thus, obtained yield per plot were converted into quintals per hectare.

Results and Discussion

The data on various in larval population of gram pod borer, *H. armigera* on pigeonpea is presented in Table 1. The treatment application of rynaxypyr 18.5 SP @ 0.25 ml/l found as the best treatment which recorded minimum larval population of *H. armigera* on three, seven and ten days after spray (DAS) i.e. 0.20,0.12and 0.009 larvae per plant, respectively. This was followed by all other remaining treatments i.e. Spinosad 45SC 0.6ml/l, except control having at par effect with each other, respectively; while maximum larval population was observed in untreated control i.e 0.83,0.84,0.85 larvae per plant on three, seven and ten days after spray, respectively.

The results in relation to larval population of *H. armigera* are in accordance with the Patange (2017) [5] rynaxypyr 18.5 SP @ 30 g a.i./ha was most effective insecticide in minimizing the larval population of pigeonpea pod borers viz., gram pod borer, plume moth and pod fly. The treatment application of rynaxypyr 18.5 SP @ 30 g a.i. per ha shown the lowest pod damage (5.59 per cent) due to pigeonpea pod borers.

Table 1: Effect of inssecticides against *H. armigera on* Pigeonpea.

S. No.	Name of treatments	*H. armigera* larvae per plant		
		3 DAS	7 DAS	10 DAS
1	NSE 5%	0.53(1.01)	0.50(1.00)	0.48(0.99)
2	Neem oil 2%	0.47(0.98)	0.42(0.96)	0.39(0.94)
3	HaNPV 500 LE	0.35(0.92)	0.31(0.90)	0.28(0.88)
4	Spinosad 45 SC	0.21(0.84)	0.15(0.80)	0.12(0.79)
5	Acetamiprid 20SP	0.61(1.05)	0.61(1.05)	0.59(1.04)
6	Rynaxypyr 18.5 SC	0.20(0.83)	0.12(0.79)	0.09(0.77)
7	Emamectin benzoate 5 SG	0.25(0.86)	0.18(0.82)	0.15(0.80)
8	Control (water)	0.83(1.15)	0.84(1.15)	0.85(1.16)
Test		Sig	Sig	Sig
SE(m)±		0.042	0.044	0.046
CD@5%		0.13	0.13	0.14

Figures in parenthesis are √x+0.5 transformed values

The data on larval population of plume moth, *E. atomosa* on pigeonpea is presented in Table 2.

The treatment application of rynaxypyr 18.5 SC @ 0.25 ml/l found as the best treatment which recorded minimum larval population of *E. atomosa* on three, seven and ten day after spray i.e. 0.12, 0.08 and 0.07 larvae per plant, respectively. This was followed by all other remaining treatment i.e. Spinosad 45 EC 20 @ 0.6 ml/l, Emamectin benzoate 5 SG @ 0.2g/l, HaNPV 500 LE/ha @ 1 ml/l, Neem oil 20% @ 20ml/l and NSE 5% @ 5 g/ha except control.

having at par effect with each other, respectively; while maximum larval population was observed in untreated control i.e. 0.49, 0.50, and 0.50 larvae per plant on three, seven and ten days after spray, respectively. The results in relation to larval population of *E. atomosa* are in accordance with Patange (2017) [5] Who reported that rynaxypyr 18.5 SP @ 30 g a.i./ha was most effective insecticide in minimizing the larval population of pigeonpea pod borers viz; gram pod borer, plume moth and pod fly. Similarly, Satpute and Barkhade (2012) [6] reported rynaxypyr 20 SC as most effective against the pod borer complex *(Helicoverpa armigera, Melangromyza obtusae* and *Exelastis atmosa)* of pigeonpea

Table 2: Effect of insecticides against *Plum moth* on Pigeonpea.

S. No.	Name of treatments	Plum moth larvae per plant based on two spray			
		3 DAS	7 DAS		10 DAS
1	NSE 5%	0.25(0.86)		0.23(0.85)	0.20(0.84)
2	Neem oil 2%	0.21(0.84)		0.19(0.83)	0.17(0.82)
3	HaNPV 500 LE	0.29(0.89)		0.27(0.88)	0.26(0.87)
4	Spinosad 45 SC	0.13(0.79)		0.10(0.77)	0.09(0.77)
5	Acetamiprid 20SP	0.36(0.92)		0.38(0.94)	0.40(0.95)
6	Rynaxypyr 18.5 SC	0.12(0.78)		0.08(0.76)	0.07(0.75)
7	Emamectin benzoate 5 SG	0.14(0.80)		0.12(0.79)	0.11(0.78)
8	Control (water)	0.49(0.99)		0.50(1.00)	0.50(1.00)
Test		Sig		Sig	Sig
SE(m)±		0.020		0.028	0.029
CD@5%		0.06		0.09	0.09

(*Figure in parentheses are the corresponding square root transformed values (√x+0.5), DAS= Days after spraying.)

The data on pod damage due to pigeonpea pod borers and pigeonpea grain yield is presented in Table 3. The treatment application of rynaxypyr 18.5 SC @ 0.25ml/l found as the best treatment which recorded lowest pod damage i.e. 14.42 per cent and this was followed by all other remaining treatments i.e. Spinosad 45 SC @ 0.6 ml/lit (18.51 per cent), Emamectin benzoate 5 SG @ 0.2g/l(18.51 per cent), HaNPV 500 LE/ha (23.17 per cent), Neem oil 2% @ 20 ml/l(24.28 per cent), NSE 5%@ 50 g/l(29.31 per cent), Acetamiprid 20SP @ 0.4g/l (32.05 per cent) having at par effect with each other, respectively; while maximum pod damage was observed in untreated control i.e. 40.30 per cent. Effectiveness of different newer molecules to minimize the pod borers infestation was reflected by grain yield. The highest yield (7.60 q per ha) was obtained from the plot receiving treatment sprays of rynaxypyr 18.5 SC @ 0.25 ml/l (14.72q/ha) and was followed by Spinosad 45 SC @ 0.6 ml/lit(12.44q/ha), Emamectin benzoate 5 SG @ 0.2g/l (10.39 q per ha), Neem oil 2% @ 20 ml/l(8.19 q/ha), HaNPV 500 LE/ha (7.15q/h),NSE 5%@ 50g/l(5.97 q/ha) acetamiprid 20 SP @ 0.4g/l (4.77 q/ ha), having at par effect with each other, respectively; whereas lowest yield (3.00 q per ha) was recorded from control. The results in relation to percent pod damage due to pigeonpea pod borers and the grain yield of pigeonpea are in accordance with the Patange and Chirangeevi., (2017) [5] Who reported the treatment application of rynaxypyr 18.5 SP @ 30 g a.i. per ha shown the lowest pod damage (5.59%) due to pigeonpea pod borers and recorded highest grain yield of pigeonpea (7.60 q per ha). Present findings are also agreement with Satpute and Barkhade., (2012) [6] Who reported rynaxypyr 20 SC as most effective treatment against the pod borer complex (*Helicoverpa armigera, Melangromyza obtusa and Exelastis atmosa)* of pigeonpea were found most effective in reducing the pod damage as well as the pest population.

The lowest yield of (3.00 q/ha) was recorded in control (water spray). The finding of above effectiveness of Rynaxypyr in recording the higher yield is in accordance with the report of Patange and Chirangeevi (2017) [6]. who reported that among the various insecticides studied rynaxypyr 18.5 SP @ 30 g a.i./ha was most effective insecticide in minimizing the larval population of pigeonpea pod borers *viz*., gram pod borer, plume moth and pod fly and recorded highest grain yield of pigeonpea (7.60 q per ha).

Halder *et al.* (2006) [7] tested performance of some newer insecticides against the major insect pest of short duration pigeonpea. The study revealed that, Spinosad 45 SC @ 73 g a.i/ha sprayed twice at 15 days interval gave highest protection from insect pests as well as maximum grain yield of 840 kg/ha followed by spinosad 45 SC @ 56.9 a.i/ha with 790 kg/ha.

Table 3: Effect of insecticides against pod damage due to pod borers and grain yield of pigeonpea.

S. No.	Treatments	Per cent pod damage	Yield (q per ha)
1	NSE 5%	29.31(32.76)	5.97
2	Neem oil 2%	24.28(32.76)	8.19
3	Hanpv 500 LE	23.17(29.50)	7.15
4	Spinosad 45 SC	18.51(25.47)	12.44
5	Acetamiprid 20SP	32.05(34.46)	4.77
6	Rynaxypyr 18.5 SC	14.42(22.30)	14.72
7	Emamectin benzoate 5 SG	19.73(26.35)	10.39
8	Control (water Spray)	40.30(39.35)	3.00
	F test	Sig	Sig
	SE (m)±	1.17	0.40
	CD @ 5%	3.58	1.24

(*Figures in parenthesis are arc sign transformed values.)

Conclusion

From the above results, it can be concluded that Rynaxypyr 18.5 SC was the most effective insecticide against pod borer and tur plum moth in Pigeonpea and reecorded lowest pod damage due to pod borers and higher grain yield.

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References

1. Bambawale, OM, Venkateswaralu B, Nadarajan N, Majumdar ND, Manual for pigeonpea surveillance, National Initiative on Climate Resilient Agriculture, 2011, 1-29.
2. Sing AK. Evalution of new molecule of insecticides against pod fly (*Melanogromyza obtusae*) of pigeonpea. SSRC J Agri. 2014; 12(1)89-95.
3. Lal SS. Insect pest in pulse crop challenges and solution Abst Proc. Nat. Symposium on management of biotic and abiotic stress in pulse crop, at IIPR, (India), 1998, 4.
4. Thakre SM. Evalution of some management tactics against pod borer complex of pigeonpea Ph.D. Thesis, 2001; Dr. PDKV, Akola, India. Sharma, OP, Bhosle BB, Kamble KR, Bhede BV aefnd Seeras NR. Management of pigeonpea pod borers with special reference to pod fly (*Melanagromyza obtusae*). Indian J Agri. Science. 2011; 81(6):539-543.
5. Patange NR, Chiranjeevi B. Bioefficacy of newer insecticides against pigeonpea (*Cajanus cajan*) pod borers. J. Entomology and zoology. 2011; 5(3):28-31.
6. Satpute NS, Barkhade UP. Evalution of Rynaxypyre 20SC against pigeonpea pod borer complex Journal of Food Legumes. 2012; 25(2):162-163.
7. Haldar B, Shrivastava CP, Joshi N. Cmparative of some newer insecticides against the major insect pest of short duration pigeonpea. pestology. 2006; 30(9):32-35.