INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 11 | ISSUE 1 | APRIL, 2018 | 18-22

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

RESEARCH PAPER

DOI : 10.15740/HAS/IJPP/11.1/18-22

Evaluation of sequential application of insecticides against pigeonpea pod fly *Melanagromyza obtusa* (Mall)

■ S. D. Bantewad*, R. A. Chavan **and** J. E. Jahagirdar

Agricultural Research Station, Badnapur, **Jalna (M.S.) India**

ARITCLE INFO

Received : 18.09.2017
Revised : 03.03.2018
Accepted : 11.03.2018

KEY WORDS :
Insecticides, *Melanagromyza obtusa*, Pigeonpea, Pod fly

***Corresponding author:**
sdbantewad@rediffmail.com

ABSTRACT

The present investigation was conducted during *Kharif* 2016-17 on field of Department of Agricultural Entomology, Agril. Research Station Badnapur. The experiment was planned in Randomized Block Design with cultivar BSMR 736 and gross plot size 7.20 x 4.50 m^2 with eight treatments replicated thrice with the object to study the sequential application of insecticides against against pigeonpea pod fly, *Melanagromyza obtuse.* All the insecticides were found to be significantly superior in recording minimum population of pod fly over untreated control. Among different insecticides, chlorantraniliprole followed by flubendiamide and Dimethoate recorded the least population of pod fly at 3,7 and 14 days after spray and which was statistically at par with the sequential application of insecticides as chlorantraniliprole followed by indoxacarb and acetamiprid in respect of reducing the population , pod damage of pod fly and higher grain yield. These findings indicate that the pigeonpea crop required two sprays of insecticides from pod initiation stage at 20 days interval for the management of pigeonpea pod fly, *Melanagromyza obtusa.*

How to view point the article : Bantewad, S.D., Chavan, R.A. and Jahagirdar, J.E. (2018). Evaluation of sequential application of insecticides against pigeonpea pod fly *Melanagromyza obtusa* (Mall). *Internat. J. Plant Protec.*, **11**(1) : 18-22, **DOI : 10.15740/HAS/IJPP/11.1/18-22**.

INTRODUCTION

Pigeonpea is one of the major pulse crops of the tropics and subtropics. Though India is largest producer of pigeonpea, the productivity has always been concern. Pigeonpea is an important *Kharif* pulse crop grown in India. Area under pigeonpea in India is about 5.13 million hectare with an annual production of 4.23 million tones and productivity of 824 kg/ha. Area under pigeonpea in Maharashtra is about 13.34 lakh hectare with an annual production of 10.20 lakh tones and productivity of 764 kg/ha (Anonymous, 2016).

About 250 species of insects belonging to 8 orders and 61 families have been found to attack on pigeonpea, of this only few are economically important as pests (Lal, 1988). Although many insect feeds upon pigeonpea from the seedling stage, most of the economic damage is caused by the pests feeding upon the flowers and pods. Important pest of pigeonpea are pod borer, plume moth, pod fly and pod bug. Amongst these, insect pests associated with fruiting phase of crop especially, the pod borer complex *viz*., pod borer (*Helicoverpa armigera* Hubner), tur plume moth (*Exelastis atomosa* Walshingham) and pod fly (*Melanagromyza obtuse* Malloch) cause losses in grain yield ranging from 30 to 100 per cent (Adgkar *et al.*, 1993). *Melanagromyza obtusa* (Mall.) (Diptera :Agromyzidae) is a serious pest of pigeonpea in Northern Madhya Pradesh, Uttar Pradesh, Bihar, Delhi, Maharashtra, Gujarat, Orissa and Haryana (Bindra and Jakhmola, 1967). The young larvae of the fly damage to seeds. *M. obtusa* appears at pod initiation till maturity of crop. The losses inflicted by pod fly are higher on account of concealed damage habit and often remain unnoticed. The damage is evident on account of pin head exit holes on the pods. The affected grains are shriveled, discolored with fungal infection rendering them unsuitable for sowing and consumption (Shanower *et al*., 1998).

MATERIAL AND METHODS

The field experiment was conducted at Entomology Research Farm, Agricultural Research Station, Badnapur, VNMKV, Parbhani during *Kharif* season of 2016. The experiment was carried out in Randomized Block Design (RBD) using pigeonpea variety BSMR-736, with eight treatments and three replications in a plot size of 7.20 m x 4.50 m^2. Row to row and plant to plant spacing was maintained at 90 cm x 30 cm. The treatments T_1- acephate 75SP @ 750g a.i./ha, T_2- acetamiprid 20SP@ 20g a.i. /ha, T_3- chlorantraniliprole 18.5%SC @ 30g a.i./ ha>acephate 75SP @ 750g a.i./ha, T_4- chlorantraniliprole 18.5%SC @ 30g a.i./ha >acetamiprid 20SP@ 20g a.i. / ha, T_5- chlorantraniliprole 18.5%SC @ 30g a.i./ha >indoxacarb 15.8 EC @ 73g a.i./ha >acetamiprid 20 SP@ 20g a.i./ha, T_6- chlorantraniliprole 18.5%SC @ 30g a.i./ ha >flubendiamide20WG@ 73g a.i./ha >dimethoate 30 EC @ 600g a.i./ha, T_7- Dimethoate 30 EC@ 600g a.i./ ha and T_8- untreated control etc. were evaluated for their bio-efficacy against pod fly on pigeonpea. Crop was raised with recommended agronomic practices. The first spray was applied at pod initiation stage, second spray was administered at pod development stage of the crop through high volume hand operated knapsack sprayer. The sprays were applied at evening hours to minimize the toxicity for relative pollinators and support their conservation. The pre-treatment count was made a day before, while, post treatment counts were made on three, seven and fourteen days after each spray, respectively (Dhaka *et al*., 2011 and Patel and Patel, 2013).

The incidence of pod fly in pigeonpea was recorded on the basis of per cent pod damage. For this, 50 green pods were collected periodically from pod formation stage to till harvesting of the crop and pre-treatment observations were recorded 24 hours before application of treatments and 3rd, 7th and 14th days after spraying. Damaged pods were sorted out by detecting the presence of maggot or pupa, tunneled grains inside the pod and small pin hole window.

Pod and grain damage due to pod fly was calculated at harvest. About five plants were kept without plucking pods throughout the season for recording of actual yields and converted to q per ha. The data, thus, obtained were subjected to RBD analysis using AGRES package (Gomez and Gomez, 1984) for drawing meaningful conclusion. Per cent pod damage was calculated by using following formula (Naresh and Singh, 1984).

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

RESULTS AND DISCUSSION

Efficacy of sequential application of insecticides was evaluated against pod fly on pigeonpea. The results showed that the difference in maggots and pupae population of pod fly per plant among different treatments before spray was non-significant, the population of *M. obtusa* ranged between (8.33 to 21.66 maggots and pupa / 50 pods) which indicated that maggots and pupae population of pod fly was uniformly distributed in whole experimental plot (Table 1). All the tested insecticides were found significantly superior to control in reducing the maggots and pupae population in 3rd, 7th and 14th days after spray of two spray analysis.

The data presented in (Table 1) there were significant differences among the treatments on 3rd, 7th and 14th days after first spray. The population of *M. obtusa* in chlorantraniliprole 18.5%SC @30 g.a.i/ha >flubendiamide20WG @73 g.a.i/ha > dimethoate 30 EC@600 g.a.i/ha was recorded lowest (5.00, 6.66 and 13.33 maggots and pupa / 50 pods) which was found at par with chlorantraniliprole 18.5%SC@30 g.a.i/ha >indoxacarb 15.8 EC@73 g.a.i/ha >acetamiprid 20 SP@20 g.a.i/ha (8.33, 10.00 and 15.00 maggots and pupa / 50 pods) at 3rd, 7th and 14th days after spray, respectively

The highest population of *Melanagromyza obtusa* (21.66 , 25.00 and 30.00 maggots and pupa / 50 pods) was observed in untreated control.

The data presented in (Table 1) there were significant differences among the treatments three days after second spray. All the treatments recorded significantly lower population of *M. obtusa* than untreated control. The population of *M. obtusa* in chlorantraniliprole 18.5%SC @30 g.a.i/ha >flubendiamide20WG@73 g.a.i/ ha >dimethoate 30 EC@600 g.a.i/ha was recorded lowest (6.66, 6.66 and 11.66 maggots and pupa / 50 pods) which was found statistically significant and at par with chlorantraniliprole 18.5%SC@30 g.a.i/ha>indoxacarb 15.8 EC@73 g.a.i/ha >acetamiprid 20 SP@20 g.a.i/ha (8.33, 10.00 and 13.33 maggots and pupa/50 pods) followed by chlorantraniliprole 18.5%SC@30 g.a.i/ha >acetamiprid 20SP@20 g.a.i/ha (13.33, 13.33, 16.66 and 15.00 maggots and pupa/ 50 pods) and chlorantraniliprole 18.5%SC@30 g.a.i/ha > acephate 75SP@750 g.a.i/ha (13.33, 16.66 and 15.00 maggots and pupa/50 pods) at 3rd, 7th and 14th days after spray, respectively.

The experimental results revealed that chlorantraniliprole 18.5%SC@30 g.a.i/ha > flubendiamide 20WG @73 g.a.i/ha > dimethoate 30 EC@600 g.a.i/ha was effective in controlling Pod fly, (*M. obtuse*) population in all sprays. Similar results were given by Sreekanth *et al.* (2014) who reported on efficacy of novel insecticides to control Podfly *Melanagromyza obtuse* affecting pigeonpea they reported that the pod damage due to pod fly was lowest in spinosad 45% SC (10.2%), flubendiamide 480 SC (10.4%), profenophos 50% EC (10.9%) and chlorantraniliprole 20% SC (12.5%) with 76.7, 76.3, 75.1 and 71.5 per cent reduction over control (43.8%), respectively. Similarly, Wadaskar *et al.* (2013) reported efficacy of newer insecticides against pod borer complex of pigeonpea larval population, 7 and 14 days

Table 1: Efficacy of different insecticides against population of pod fly (maggots) after second and third spraying

Tr. No.	Treatments	Dose (g.a.i/ha)	Mean number of maggot per 20 green pods							
			First spray				Second spray			
			1DBS	3 DAS	7DAS	14 DAS	1DBS	3 DAS	7DAS	14 DAS
1	Acephate 75 SP	750	20.00	18.33	20.00	20.00	20.00	18.33	18.33	20.00
	@ 0.15 %		(26.07)	(25.30)	(26.45)	(26.56)	(26.14)	(25.30)	(25.30)	(26.45)
2	Acetamiprid 20 SP	20	20.00	15.00	16.66	18.33	20.00	15.00	16.66	18.33
	@ 0.004 %		(26.14)	(22.59)	(24.04)	(25.30)	(26.45)	(22.59)	(24.04)	(25.30)
3	Chlorantraniliprole	30	16.66	13.33	15.00	16.66	21.66	13.33	16.66	15.00
	18.5%SC	750	(24.04)	(21.14)	(22.59)	(23.74)	(27.52)	(21.14)	(23.85)	(25.00)
	>Acephate 75SP									
4	Chlorantraniliprole	30	15.00	13.33	15.00	16.66	20.00	13.33	15.00	16.66
	18.5%SC	20	(22.59)	(21.14)	(22.59)	(24.04)	(25.83)	(21.14)	(22.59)	(24.04)
	>Acetamiprid 20SP									
5	Chlorantraniliprole	30	10.00	8.33	10.00	15.00	16.66	8.33	10.00	13.33
	18.5%SC >Indoxacarb 15.8	73	(18.43)	(16.59)	(18.04)	(22.59)	(23.85)	(16.59)	(18.43)	(21.14)
	EC >Acetamiprid 20 SP	20								
6	Chlorantraniliprole18.5	30	8.33	5.00	6.66	13.33	20.00	6.66	6.66	11.66
	%SC >Flubendiamide	73	(16.59)	(12.92)	(14.76)	(21.33)	(26.45)	(14.76)	(14.76)	(19.30)
	20WG >Dimethoate 30 EC	600								
7	Dimethoate 30 EC	600	16.66	16.66	18.33	20.00	21.66	16.66	16.66	18.33
			(23.74)	(24.04)	(25.30)	(26.45)	(27.59)	(24.04)	(24.04)	(25.30)
8	Untreated control	-	21.66	21.66	25.00	30.00	28.33	23.33	26.66	33.33
			(27.59)	(27.59)	(29.68)	(33.16)	(31.93)	(28.66)	(30.67)	(35.11)
	S.E.±		2.65	1.98	2.45	1.91	2.99	2.26	2.48	2.43
	C.D. (P=0.05)		NS	5.99	7.41	5.79	NS	6.83	7.49	7.35
	CV %		19.84	16.06	18.55	13.08	19.23	17.99	18.72	16.73

Figures of percentage in parenthesis are angular transformed values, DBS- Day before spray, DAS - Days after spray, NS= Non-significant after the treatment, revealed superiority of Flubendiamide 20 WDG @ 0.5 g /l, which resulted in reduction to the extent of 96.1 and 95.4 per cent, over control, respectively. flubendiamide was also efficacious against plume moth larvae, 7 days and 14 days application, with 83.9 and 93.3 per cent reduction over control, respectively. The superior treatment effectively restricted the lepidopteran pod borer damage (4.4%), pod damage by pod fly (7.8%) and grain damage by pod fly (6.0%) to minimal, whereas, untreated control plot had 15.9 per cent pod damage due to lepidopteran pod borers, 14.2 per cent pod damage due to pod fly and 11.0 per cent grain damage by pod fly. Treatment with Flubendiamide also translated into realization of highest yield of 13.3 q per ha. As against 8.8 q per ha in untreated control.

Per cent pod and grain damage by pod fly:

Similarly, fifty pods each from five selected plants at harvest were randomly collected from each plot and carefully observed to determine the damage caused by pigeonpea pod fly. At harvest, fifty dry pods, each from five selected plants at harvest were collected from each treatment plot and grains were separated. These grains were examined for healthy and infested one and accordingly, the grains damage caused by pod fly was calculated.

The data presented in (Table 2) the least pod and grain damage with *M. obtusa* was recorded with the spray of chlorantraniliprole 18.5%SC @30 g.a.i/ha >flubendiamide20WG @ 73 g.a.i/ha >dimethoate 30 EC@600 g.a.i/ha (3.6 and 3.41%) and which was at par with chlorantraniliprole 18.5%SC@30 g.a.i/ha> indoxacarb 15.8 EC@73 g.a.i/ha >acetamiprid 20 SP@20 g.a.i/ha (4.5 and 4.96 %). The highest pod and grain damage by pod fly (18.1 and 20.99 %) was observed in untreated control. These findings are closely associated with Patel *et al*. (2015) who reported the spraying of chlorantraniliprole 18.5 % SC@30 g a.i./ha registered the lowest pod damage due to borer and pod fly and recorded the highest yield of pigeonpea.

The data regarding grain yield of pigeonpea in (Table 2) revealed that all the treatments were statistically significant in increasing grain yield over untreated control. The Grain yield of pigeonpea due to different treatments varied from 1620 to 2506 kg per hectare. The significantly highest grain yield (2506 kg per hectare) of pigeonpea was recorded in chlorantraniliprole 18.5%SC @30 g.a.i/ha >flubendiamide20WG@73 g.a.i/ha >dimethoate 30 EC@600 g.a.i/ha. and which was at par with chlorantraniliprole 18.5%SC@30 g.a.i/ha >indoxacarb 15.8 EC@73 g.a.i/ha >acetamiprid 20 SP@20 g.a.i/ha was superior (2410 kg per hectare).

The present findings are similar with, Sreekanth *et al*. (2013) who reported that the yield enhancement in pigeonpea with chlorantraniliprole treated plots (686.1 kg/ha) with 127.5 per cent increase over control, followed by flubendiamide (595.8 kg/ha) and spinosad (589.0 kg/ha) with 97.6 and 95.3 per cent increase over control, respectively as against the minimum yield of 301.6 kg/ha in the untreated check. Similarly, Deshmukh *et al.* (2010) reported that the yield enhancement in chickpea with treatment of flubendiamide 0.007 per cent (1850

Table 2:Per cent pod and grain damage by pod fly on pigeonpea

Tr. No.	The treatment	Per cent pod damage	Per cent grain damage	Grain yield (kg/ha)
		Pod fly	Pod fly	
1	Acephate 75 SP @ 0.15 %	10.6 (18.91)	10.33 (18.68)	1720
2	Acetamiprid 20 SP @ 0.004 %	10.0 (18.43)	10.11 (18.52)	1823
3	Chlorantraniliprole 18.5%SC >Acephate 75SP	8.8 (17.16)	7.06 (15.35)	2080
4	Chlorantraniliprole 18.5%SC >Acetamiprid 20SP	7.4 (15.62)	7.05 (15.40)	2310
5	Chlorantraniliprole 18.5%SC >Indoxacarb 15.8 E C>Acetamiprid 20 SP	4.5 (12.15)	4.96 (12.87)	2410
6	Chlorantraniliprole 18.5%SC >Flubendiamide20WG> Dimethoate 30 EC	3.6 (10.93)	3.41 (10.49)	2506
7	Dimethoate 30 EC	11.7 (19.97)	12.37 (20.33)	1620
8	Untreated control	18.1 (25.00)	20.99 (27.25)	1450
	S. E.±	1.24	1.32	55
	C.D. (P=0.05)	3.74	4.00	167
	CV %	12.45	13.22	15.73

Figures of percentage in parenthesis are angular transformed values kg/ha) followed by indoxacarb 0.0075per cent (1805 kg/ha), spinosad 0.009 per cent (1760 kg/ha) and emamectin benzoate 0.0015 per cent (1665 kg/ha).

REFERENCES

Adgkar, R. T., Satpute, U. S., Temude, A. M. and Mahorkar, A. P. (1993). Extent of available incidence and losses due to pod borer complex in promising cultivar of pigeonpea. *Pestology.* **17** : 45-47.

Anonymous (2016). All India Coordinated Research Project on pigeonpea, ICAR, during 2016-17.

Bindra, O.S. and Jakhmola, S. S. (1967). Incidence and losses caused by some pod infesting insects in different varieties of pigeonpea, *Cajanus cajan* (L.) Millsp. *Indian J. Agric. Sci.* **37** : 177-186.

Deshmukh, S.G., Sureja B.V., Jethva, D.M. and Chatar, V.P. (2010). Field efficacy of different insecticsides against *Helicoverpa armigera* (Hubner) infesting chickpea. Department of Agricultural Entomology, Junagadh Agricultural University, Junagadh-362 001. India. *Legumes Res*., **33**(4): 269-273.

Dhaka, S.S., Singh, G., Ali, N., Mittal, V. and Singh, D.V. (2011). Efficacy of novel insecticides against pod borer, *Etiella zinckenella* (Treitschke) in vegetable pea. *Crop Research,* **42** (1, 2, 3) : 331-335.

Gomez, K.A. and Gomez, A.A. (1984). *Statistical procedures for agricultural research*. Joh Wiley and Sons, New York., pp. 207-215.

Lal, S.S. (1988). Insect pest impulse crops challenges and solutions. In abst. Prof. Nat. symposium on management of biotic and abiotic stress in pulse crops. June 26-28, 1988. At IIRP, Kanpur (India) pp. 4.

Naresh, J.S. and Singh, J. (1984). Population dynamics and damage of insect pests in flowering pigeonpea (*Cajanus cajan* (L.) Millsp.). *Indian J. Entomol.,* **46** (4) : 412-420.

Patel, S.A. and Patel, R.K. (2013). Bio-efficacy of newer insecticides against pod borer complex of pigeonpea [*Cajanus cajan* (L.) Millspaugh]. *AGRES - An International e-J.,* **2** (3) : 398 - 404.

Patel, S.A., Patel, B.C., Patel, P.S. and Trivedi, J.B. (2015). Evaluation of newermolecules against pod borer complex of pigeonpea [*Cajanus cajan* (L.) Millspaugh]. *Internat. J. Agric. Sci.* , **7** (7) : 587-590.

Shanower, T. G., Lal, S. S. and Bhagwat, V. R. (1998). Biology and management of *M. obtusa* (Malloch) (Diptera: Agromyzidae). *Crop Protec*., **17**: 249-262.

Sreekanth, M., Lakshmi, M.S.M. and Koteswara Rao, Y. (2014). Efficacy of novel insecticides to control podfly *melanagromyza obtuse* affecting pigeonpea (*Cajanus cajan* L.). *J. Plant & Pest Sci*., **1**(1): 35-38.

Wadaskar, R.M., Bhalkare, S.K. and Patil, A.N. (2013). Field efficacy of newer insecticides against pod borer complex of pigeonpea. Pulses Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola-444 104, Maharashtra, India. *J. Food Leg*., **26** (1&2): 62-66.