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Study the natural enemies associated with pigeonpea pod fly

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Abstract

The experiment were carried out under field conditions during two consecutive crop season *Kharif*, 2018-19 and 2019-20 at Student's Instructional Farm at Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.). During the course of investigation "Study the natural enemies associated with pigeonpea pod fly" The extents of larval and pupal parasitism 100 pods were started to collect randomly from first fortnight of January 2019 to first fortnight of April and brought to the laboratory of entomology department. The *Torymoides* spp. and *Ormyrus orientalis* spp. was recovered for the first time from the pods collected on second fortnight of February from cultivar Narendra Arhar 1 and the level of parasitization was 14.28 per cent, respectively. The parasitization in pod fly ranged between 14.28 to 25.71 per cent. The parasitization increased on first fortnight of March and reached to its maximum level 25.71 per cent, respectively. The parasitization was constant in first fortnight of April during *Kharif*, 2018-19. During *Kharif*, 2019-20 parasitization 18.18 per cent was recorded first fortnight of February in the cultivar Narendra Arhar 1, respectively. The parasitization increased on first fortnight of March and reached to its maximum level 25.00 per cent, respectively. The parasitization decreased gradually and reached to 12.50 per cent in first fortnight of March. The parasitization in pod fly ranged between 12.50 to 25.00 per cent.

Keywords: Pods, *Kharif*, parasitism, podfly & fortnight

Introduction

Pigeonpea (*Cajanus cajan* (L.) Millspaugh) is one of the major pulse crop of the tropics and subtropics. It is the second most important pulse crop of India, after chickpea (Nene *et al.*, 1990) [5]. It is commonly known as arhar in Hindi and popularly known as red gram in English. Pigeonpea crop grown extensively for its rich protein content and forms important constituent of our daily diet. Since pulses are cheaper than meat (animal protein), they are often referred as "poor man's meat" in developing countries. The per capita availability of pulses decreased from 60.7 gram per day in 1951 to 35.9 gram per day during 2008 (Franklin *et al.*, 2008) [4]. In India, among the pulses, pigeonpea, *Cajanus cajan* (L) Millsp. was one of the major pulse crop occupying second position in area and production. The area under pigeonpea was 5.39 million hectares with the production of 4.60 million tonnes and productivity of 854 kg/ha (Anonymous, 2018) [1].

M. Obtusa is basically a hidden pest completing its entire life cycle e.g. egg, maggot and pupa within the pods and enormity of the damage caused in realized only at the time of threshing and winnowing. Thus, this pest is most difficult to handle for its effective control. *Melanagromyza obtusa* females produce up to 80 eggs and lay them individually into developing pods. Development of the immature stage under field conditions include 3-5 days for the egg stage, 6-11 days for the three larval instars, and 9-23 days for the pupal stage. Adults live up to 12 days when fed with honey and about half as long without food. Narrow host range and feeding niche of *M. obtuse* govern its population dynamics. In India, Pigeonpea pods are available in the field from approximately October to April, and infestations increase rapidly over a relatively short period. Fewer eggs are laid in December and January when temperatures are low, and populations increase as temperature rises (Srivastava *et al.*, 1991) [8]. Long duration pigeonpea, which matures in March or April, may be heavily damaged.

Melanagromyza obtusa may survive the off-season on alternate hosts such as *Rhyncosia minima*, which have been found to be infested with eggs, larvae, and/ or pupae between April and November.

Materials and Methods

- 1. Experiment site:** All the agronomic practices were adopted as per the recommendations of the Department of Entomology and Student's Instructional Farm are situated in main campus of University on the left side of Ayodhay- Rai Bareilly road at a distance of 42 km from Ayodhay district head quarter, Narendra Nagar (Kumarganj).
- 2. Parasitization of *M. obtusa*:** In order to study the natural enemies associated with pigeonpea pod fly for determination of extent of larval-pupal parasitism in pigeonpea crops variety Narendra Arhar-1 (NA-1). The 100 pods was plucked and brought to the laboratory at fortnight intervals. The collected pods, bearing larvae and pupae was kept in covered petridishes for the rearing of parasitoids in the temperature range varying from 23 °C to 33 °C and humidity range varying from 75 to 85 percent.

Results and Discussion

To know the extents of larval and pupal parasitism 100 pods were started to collect randomly from first fortnight of January 2019 to first fortnight of April and brought to the laboratory of entomology department. It is revealed from data given in Table -1 that *Torymoides* spp. and *Ormyrus orientalis* spp. was recovered for the first time from the pods collected on second fortnight of February from cultivar Narendra Arhar 1 and the level of parasitization was 14.28 per cent, respectively. The parasitization in pod fly ranged between 14.28 to 25.71 per cent. The parasitization increased on first fortnight of March and reached to its maximum level 25.71 per cent, respectively. The parasitization was constant in first fortnight of April during 2018-19, when crop was ready to harvest (Table-1).

Parasitization 18.18 per cent was recorded first fortnight of February in the cultivar Narendra Arhar 1, respectively. The parasitization increased on first fortnight of March and reached to its maximum level 25.00 per cent, respectively. The parasitization decreased gradually and reached to 12.50 per cent in first fortnight of March. The parasitization in pod fly ranged between 12.50 to 25.00 per cent. One month later there was no parasitization recorded during *Kharif*, 2019-20. Polled during *Kharif*, 2018-19 & 2019-20, parasitization in pod fly ranged between 8.69 to 25.37 per cent. The parasitization increased on first fortnight of March and reached to its maximum level 25.37 per cent. Minimum parasitization level 8.69 per cent in first fortnight of February. The present findings are in partial agreement with the finding of Singh (1991) [7] who found that the three parasitoids, *Euderus lividus*, *Ormyrus orientalis* and *Eurytoma* sp. from immature stages of *M. obtusa* infesting both early and late varieties of pigeon peas. *M. obtusa*, *E. lividus* usually lays eggs through the exit hole made by final instar larvae of *M. obtusa* in the wall of pigeon pea pods. This findings are in partial agreement with those of Yadava *et al.* (1991) [9] who reported that *Ormyrus orientalis* and *Eurytoma* sp. as larval pupal parasitoid of *M. obtusa*. The present findings are also in accordance with the finding of Dar *et al.* (2005) [3] who found that the parasitoid species. *Ormyrus orientalis* was recorded as the key parasitoid of pod fly. The mean parasitization by all the three species in 2000-01 was (24.0%) on NA-1 followed by Bahar (22.5%) and SL12-1 (8.4%). Similarly, in the following year, the mean parasitization was (25.0%) on NA-1. The present findings are also in partial agreement with the findings of Pillai and Agnihotri (2013) who observed the peak level of weekly per cent parasitization (18.18%) was during 51st standard week while minimum level of weekly per cent parasitization (6.52%) was during 47th standard week against *M. obtuse*. The present findings are in partial agreement with the finding of Chakravarty *et al.*, (2016) [2] who revealed that the *Ormyrus orientalis* were recorded on pod fly. Maximum natural parasitization (17.3%) of *M. obtusa* by these parasitoids was observed during 51st SW.

Table 1: Pupal parasitoids associated with *Melanagromyza obtusa* (Malloch) during *Kharif*, 2018-19 & 2019-20.

S. No.	Month	Fortnight	2018-19			2019-20			Pooled		
			No. of maggots/ Pupae/100 pods	Parasitoids emerge Number	Per cent	No. of maggots/ Pupae/100 pods	Parasitoids emerge Number	Per cent	No. of maggots/ Pupae/100 pods	Parasitoids emerge Number	Per cent
1.	January	I	0	0	0	0	0	0	0	0	
		II	0	0	0	0	0	0	0	0	
2.	February	I	12	0	0	11	2	18.18	11.5	1	8.69
		II	28	4	14.28	24	5	20.83	26	4.5	17.30
3.	March	I	35	9	25.71	32	8	25.00	33.5	8.5	25.37
		II	33	5	15.15	28	4	11.42	30.5	4.5	14.75
4.	April	I	15	3	27.27	8	1	5.88	11.5	2	17.39

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