



Biology and morphometrics of pod fly, *Melanagromyza obtusa* (Malloch) on pigeonpea variety bdn-711 under laboratory condition

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Abstract

A biological and morphometrical study on pod fly, *Melanagromyza obtusa* Malloch (Diptera: Agromyzidae) was studied on pigeonpea early variety BDN-711 during *Kharif*-2017 at Entomological Research Laboratory VNMKV, Parbhani. The incubation period varies from 2.85 ± 0.03 days. Eggs were glistening white in colour and measured 0.75 ± 0.03 , 0.20 ± 0.01 mm in length and width. There were three larval instars which took place within the pod and ranged from 8.22 ± 0.50 days to enter into pupal stage also the full grown maggot about 2.50 ± 0.05 , 1.22 ± 0.03 mm in length and breadth. The pupal period ranged from 10.80 ± 0.22 days and measured 2.99 ± 0.10 and 1.25 ± 0.06 mm in length and breadth, respectively. The life cycle of *M. obtusa* was completed in 28.59 ± 0.30 days. The mean longevity of the adult pod fly was 5.50 ± 0.45 days and average length and breadth of adult male fly 2.96 ± 0.08 , 1.40 ± 0.09 however female fly was 3.20 ± 0.07 , 1.55 ± 0.07 mm in diameter.

Keywords: pigeon pea, BDN-711, *M. obtusa*, biology, morphometrics

Introduction

India has virtual monopoly in pigeonpea production accounting to 90 per cent of world's total production and occupies an area of 3.88 million ha with a production of 3.29 million tonnes (Anonymous, 2014) [2]. Pigeon pea (*Cajanus cajan*) is one of the major pulse crops grown in India. As many as 250 insect species have been recorded to attack pigeon pea (*C. cajan*) (Upadhyay *et al.*, 1998) [11]. However, the most damaging pests of this crop are pod-borers which attack the reproductive parts of the plant. Amongst the pod borers, the pod fly, *Melanagromyza* which is a severe pest of pigeon pea is accountable for some of the major damage to the pods knowledgeable during winter and spring (Akhauri *et al.*, 1994; Shanower *et al.*, 1998) [1, 7]. This pest is broadly distributed all over India (Nagpur (MH), Bihar, Punjab, Madras, etc.) The pod fly oviposits in the tender pods and both the larval and pupal stages pass inside the pods. After hatching the larvae mine in the pods and feed on the soft seeds thus making the yield unfit for human consumption (Lal and Yadav, 1997) [4]. Regrettably, the journalism available on its biology provides only the fragmentary information on average duration of the life stages of the insect. Such study has not been conducted in Maharashtra particular to Marathwada region growing BDN-711 variety as a source of income to many farmers so far. Hence, the biological and morphometrical study of *M. obtusa* carried out in experimental laboratory.

Materials and Methods

For studying the biology of *M. obtusa*, pigeon pea crop cultivar BDN- 711 was used and pupae were collected from the pigeon pea field, after emergence males and females were sorted out by examining the genitalia. There after 5 pairs of male and female flies were released in 5 separate cages with

50 per cent honey solution provided to these adults soaked in cotton swab as a food. After release oviposition was ascertained then pods were dissected. Observations were made at 12hr intervals to record the incubation period. For studying the total larval, pre-pupal and pupal period, newly eclosed maggot were transferred to the seed of tender and green developing pods of the crop and kept inside numbered Petri plates in the laboratory. The total number of larval instars and duration of each instar were determined by examining the cast off skin (exuviae) and measurements of various stages were done with the help of Binocular Research Microscope and digital vernier caliper.

Result

Biology and morphometrics of *M. obtusa*

Duration of different developmental stages and data pertaining to morphometrics are presented in Table 1.

Table 1: Duration of different stages (days) and morphometrical dimension of *M. obtusa* on pigeonpea variety BDN-711

Biological Parameters		Morphometrical dimension (Mean \pm S.E.)		
Parameters	Mean \pm SE	Stages of pest	Dimensions	
			Length (mm)	Breadth (mm)
Incubation period	2.85 ± 0.03	Egg	0.75 ± 0.03	0.20 ± 0.01
Maggot	8.22 ± 0.50	Maggot	2.50 ± 0.05	1.22 ± 0.03
Pre pupal period	1.22 ± 1.80	Pre-pupa	2.89 ± 0.11	1.35 ± 0.05
Pupal period	10.80 ± 0.22	Pupa	2.99 ± 0.10	1.25 ± 0.06
Longevity of Adult	5.50 ± 0.45	Adult		
Total Life Cycle (Egg - adult)	28.59 ± 0.30	Male	2.96 ± 0.08	1.40 ± 0.09
		Female	3.20 ± 0.07	1.55 ± 0.07

Egg

The Incubation period was 2 to 3 days with an average of 2.85 days. Eggs were laid singly mostly in partially matured pods as compare to fully matured pods and eggs were glistening white in colour and measured 0.75 ± 0.03 mm in length and 0.20 ± 0.01 mm in width. The present results are in close agreement with the findings of Subharani and Singh (2010) ^[10] who studied incubation period 2.5 to 3.5 days with an average being 2.99 ± 0.16 days when reared on redgram. Also Singh and Rai (1984) ^[8] stated that incubation period lasted for about 3 and 2.95 days, respectively.

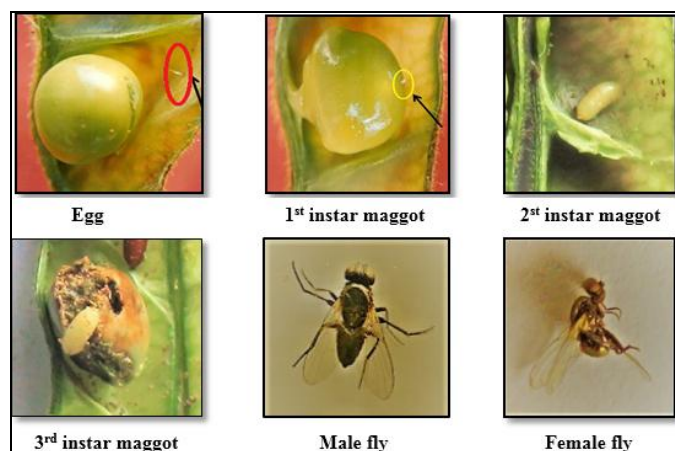


Fig 1

Larval stages First, Second and third instar maggot

There was three larval (Maggot) instars were observed. The details of the instars are discussed as follows.

The freshly hatch maggots whitish in colour and later on turned to pale yellow whitish in colour. The moulting from first to second instar took place usually within the seeds. The second instar maggot was sub-cylindrical but the full grown maggot was cylindrical in shape with pale yellow colour. The average total maggot period was about 8.22 ± 0.50 days and fully grown maggot about 2.50 ± 0.05 in length and 1.22 ± 0.03 mm in breadth. The present findings are in accord with Upadhyay *et al.* (1998) ^[11] and Subharani and Singh (2010) ^[10] who reported that three larval instars were observed and total larval period was about 7.75 ± 0.53 days when reared on redgram. Also Bindra and Singh (1972) ^[3] reported that full grown larvae measured about 3.5 to 4.00 mm in length and 1.25 to 1.50 mm in width.

Pre-pupa and pupal Stage

The fully mature maggot passed pre-pupal condition of about 1.22 ± 1.80 days, and altered into pupa inside the pod. Pupae were cylindrical yellowish or brown in colour but later turned into brown or brownish black. The pupal period lasted with an average of 10.80 ± 0.22 days and measured 2.99 ± 0.10 and 1.25 ± 0.06 mm in length and breadth, respectively. The present results are similar or less equal to Subharani and Singh (2010) ^[10] who reported that the pupal period was about 9 to 13 days with an average of 11.38 ± 0.74 days. However, Lal and Katti (1997) ^[5] and Upadhyay *et al.* (1998) ^[11] reported that the pupal period of pod fly ranges from 8 to 31 days when reared on redgram. Singh and Beri (1971) ^[9] also found the

pupal period of *M. obtusa* to range between 7 to 12 days depending on the climatic condition and the size was 2.36 mm \times 1.07 mm. Also similar observations were also made by Senapati *et al.* (2000) ^[6] who reported the pupal period to be about 4 - 13 days.

Adult longevity and Total life cycle

The adult fly was a shining and metallic black in colour. Adult longevity was 5.50 ± 0.45 days. The average length and breadth of adult male fly were 2.96 ± 0.08 , 1.40 ± 0.09 . Whereas female fly 3.20 ± 0.07 , 1.55 ± 0.07 mm. This is close agreement with the findings of Upadhyay *et al.* (1998) ^[11] who reported that the life span of the adult ranged from 3 to 5 days. The total life cycle of *M. obtusa* from egg to adult ranged from an average of 28.59 ± 0.30 days. The present findings slight agreement with Subharani and Singh (2010) ^[10] who reported that the total life cycle of *M. obtusa* was completed in 41.74 ± 0.81 days.

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