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Short Communication

Growth and development of podfly, *Melanagromyza obtusa* (Malloch) on resistant and susceptible genotypes of pigeonpea

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Pigeonpea podfly, *Melanagromyza obtusa* is one of the serious pests on late varieties of pigeonpea [*Cajanus cajan* (L.) Millsp.]. In Uttar Pradesh, the late maturing pigeonpea occupies 90% of the total pigeonpea area and causes maximum loss of 24.6% (3). Podfly is an internal feeder, oviposition takes place inside the tender pods and both the larval and pupal stages pass inside the pods. The average temperature (20°C) coinciding with podding stage of the crop is found to be favourable for egg laying (1). Resistant varieties can be used as primary method of control and as an adjunct to other control components. Lal and Sachan (4) identified podfly resistant lines *i.e.*, PDA 89-3E, PDA 88-3E, PDA 89-2E, PDA 88-1E, PDA 88-2E, ICP 8102, GP 3-3, SL 12-2, ICP 7946, ICP 7151, SL 42-3, ICP 1950, SL20-2 and SL 40-2. Resistant lines showed higher contents of hydrocarbons like hentriacontane, triacontane, sterols and β sitosterols while the susceptible lines were rich in alcoholic compounds like hexacosanol, hentriacontanol, *etc.* (5). The objective of this study was to quantify the influence of resistant and susceptible pigeonpea genotypes on developmental period and body measurements of podfly.

To study the developmental durations of podfly two resistant pigeonpea genotypes, *i.e.*, PDA 89 -2E and SL 12-1 and two susceptible genotypes, *i.e.*, Bahar and NA 1 (Narendra Arhar 1) were grown in earthen pots in July 2000 and July 2001 at Indian Institute of Pulses Research, Kanpur. At the time of flowering, the plants of each pot were caged with nylon nets (115 × 75 cm). Field collected podfly pupae were reared in laboratory. After the emergence of adults, male and female were sorted out and two pairs were released in each cage. Oviposition was ascertained after 24, 48, 72, 96 and 120 hours after the release of male and female flies by plucking and opening the pods. Ten pods were observed / dissected out at each stage to ascertain oviposition and various stages of the pest like incubation period, larval period, pupal period and number of generations. Size of different stages of podfly was measured with the help of micrometer and binocular. Each treatment (genotype) was replicated five times in a complete randomized design and each plant represented as one replication. For statistical analysis, one observation was taken from each replication.

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Efforts were made to collect information on different stages of podfly, on susceptible as well as resistant genotypes. The results are given in Table 1. Incubation period varied from 3.00 to 3.60 days in resistant and susceptible genotypes and there was no significant difference between resistant and susceptible genotypes during both the years. Larval period were 15.40 and 14.80 days in resistant genotypes, PDA 89-2E and SL 12-1, which were significantly higher than susceptible genotype, NA 1 (12.40 days). However, the larval period in resistant genotype, SL 12-1 was found at par with Bahar in 2000-01. Similar trend of larval period was found during 2001-02 and they showed statistically significant difference between resistant and susceptible genotypes. Pupal period was recorded numerically higher on resistant genotypes in comparison to susceptible genotypes and varied from 7.20 to 9.80 days on these genotypes during both the years. Maximum number of generations was recorded on Bahar followed by NA 1, SL 12-1 and PDA 89-2E. Singh and Rai (6) found that the average incubation, larval and pupal periods were 2.95, 5.94 and 10.5 days, respectively. The present study showed that total duration of life-cycle of podfly increased on resistant genotypes (PDA 89-2E and SL 12-1), whereas comparatively lower time was required for completion of life-cycle in susceptible genotypes (Bahar and NA 1). No significant differences were found in incubation period, pupal period and number of generations among these genotypes during both the years.

Mean size of different stages of podfly on resistant and susceptible genotypes during 2000-01 and 2001-02 are given in Table 2. No significant differences were found in size of eggs and first instar larvae. Size of eggs varied from 1.01 mm length × 0.15 mm width to 1.02 × 0.15 mm on resistant and susceptible genotypes. Maximum size of the second instar larvae was recorded on susceptible genotypes, Bahar and NA 1 (2.33 × 1.02 mm) followed by resistant genotypes, SL 12-1 (2.19 × 0.97 mm) and PDA 89-2E (2.18 × 0.97 mm). Resistant genotypes exhibited minimum size of the third instar larvae which were reared on PDA 89-2E (2.45 × 1.15 mm) and SL 12-1 (2.45 × 1.16 mm). However, susceptible genotypes promoted the size. on Bahar (2.65 × 1.25 mm) and NA 1 (2.64 × 1.25 mm). Pupal size was found higher on susceptible genotypes in comparison to resistant genotypes and varied from 2.33 × 0.98 mm to 2.54 × 1.14 mm. Length of female adults

Table 1. Duration of different life stages of podfly, *M. obtusa* on resistant and susceptible pigeonpea genotypes

Genotype	Incubation period (days)		Larval period (days)		Pupal period (days)		No. of generations	
	2000-01	2001-02	2000-01	2001-02	2000-01	2001-02	2000-01	2001-02
Resistant								
PDA 89-2E	3.60	3.60	15.40	15.20	9.40	9.80	3.00	3.00
SL 12-1	3.20	3.40	14.80	14.60	8.60	9.20	3.20	3.20
Susceptible								
Bahar	3.40	3.00	13.40	13.20	7.40	7.40	3.40	3.40
NA 1	3.00	3.20	12.40	12.80	7.60	7.20	3.20	3.20
CD (P=0.05)	N.S.	N.S.	1.44	1.48	N.S.	N.S.	N.S.	N.S.

Table 2. Body measurement of different stages of podfly, *M. obtusa* on resistant and susceptible pigeonpea genotypes (Mean value of the year 2000-01 and 2001-02)

Genotype	Size of eggs		Size of first instar larvae		Size of second instar larvae		Size of third instar larvae		Size of pupae		Length of male adults (mm)	Length of female adults (mm)
	Length (mm)	Width (mm)	Length (mm)	Width (mm)	Length (mm)	Width (mm)	Length (mm)	Width (mm)	Length (mm)	Width (mm)		
Resistant												
PDA 89-2E	1.01	0.15	0.68	0.16	2.18	0.97	2.45	1.15	2.33	0.98	2.73	2.96
SL 12-1	1.01	0.15	0.69	0.16	2.19	0.97	2.45	1.16	2.35	0.99	2.75	2.97
Susceptible												
Bahar	1.02	0.15	0.69	0.16	2.33	1.02	2.65	1.25	2.54	1.14	2.99	3.20
NA-1	1.02	0.15	0.70	0.16	2.33	1.02	2.64	1.25	2.53	1.13	2.98	3.20
CD (P=0.05)	N.S.	N.S.	N.S.	N.S.	0.04	0.02	0.03	0.03	0.03	0.03	0.09	0.06

on resistant genotypes, PDA 89-2E and SL 12-1 were recorded 2.96 and 2.97 mm, respectively. However, length of female adults on susceptible genotypes, Bahar and NA 1 was 3.20 mm. Size of the second and third instar larvae, size of pupae and length of male and female adults on susceptible genotypes were statistically higher than that on resistant genotypes. Size of eggs and first instar larvae was recorded statistically at par on resistant and susceptible genotypes. However, size of the second and the third instar larvae, size of pupae, and length of male and female adults were statistically higher on susceptible genotypes in comparison to resistant genotypes of pigeonpea. Jackson *et al.* (2) found that significant negative correlation between levels of total alkaloids of isogenic tobacco isolines and larval weights of tobacco bud worm, *Heliothis virescens*.

The results on developmental durations of podfly on both resistant and susceptible pigeonpea genotypes clearly indicated that the podfly has better survival on susceptible genotypes in comparison to resistant genotypes. Table 2 also revealed that variations in size of the second instar larva, the third instar larva, pupa, and length of male and female adults were found statistically lower on resistant genotypes and were found to be more on susceptible genotypes. It means that food material (chemical constituent of grains) on resistant genotype inhibited the growth of larvae, pupae and adults of podfly. It showed antibiosis means of resistance in resistant genotypes of pigeonpea.

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