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EFFECTS OF RAPESEED MUSTARD GENOTYPES ON THE BIOLOGICAL PARAMETERS OF *LIPAPHIS ERYSIMI*

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ABSTRACT

In this research, Mustard aphid, *Lipaphis erysimi* (kalt.) completed four nymphal instars on ten different genotypes at Hisar (Haryana). The total nymphal period, reproductive period and adult longevity was found minimum on BSH-1 with 8.1,15.7 and 27.0 days,respectively and maximum nymphal period, reproductive period and adult longevity on Purple mutant with 9.6,17.1 and 30.7 days, respectively. Fecundity was also highest on BSH-1(99.6nymphs/female) and lowest on Purple mutant (76.2nymphs/female).

Key words : *Biological parameters, Lipaphis erysimi, rapeseed mustard genotypes.*

The productivity of rapeseed mustard is low 1145kg/ha in India (1) compared to developed countries. Many factors are responsible for this low yield, Insect pest constitute major limiting factor and about 50 insect species have been found infesting these crops in India (2). Among these pest, mustard *Lipaphis erysimi* (Kalt.) is one of the key pest infesting rapeseed mustard (3). Heavy yield losses (11-96%)) have been reported under different agro climatic conditions of India by different workers (4,5,6,7,8). The present study on effects of rapeseed mustard genotypes on mustard aphid under lab conditions will help to know the development of aphid on different genotypes and its management.

MATERIALS AND METHODS

Biology of mustard aphid (*L. erysimi*) was studied on ten different rapeseed mustard genotypes on grown up /leaf stage of plant (45-50DAG) under lab conditions at Dept. of entomology, CCSHAU Hisar, Haryana. During leaf stage gravid females were collected from field grown genotypes and were reared separately in petridishes with moist filter paper laid under the leaf to maintain moisture. The leaves were changed daily in the morning and nymphs obtained were transferred to fresh leaf with wet camel hair brush. The data on various biological parameters were recorded at every 24 hours interval. Twenty freshly laid aphids (one day old) obtained from each female were reared in five individuals per replication (petridishes) The number and duration of nymphal instars was confirmed by exuvia casted off by the aphid in petridishes.

RESULTS AND DISCUSSION

Mustard aphid *L. erysimi* was found to complete four nymphal instars on all ten different rapeseed mustard genotypes under lab conditions (Table-1) at grownup plant stages/Leaf stage (45-50DAG).

Nymphal Instars duration : Under present studies the duration of first, second, third and fourth nymphal instars varied from 1.7 to 2.2, 2.2 to 2.6, 2.2 to 2.5 and 2.1 to 2.6 days respectively on different genotypes of rapeseed and mustard. (3) reported 2.0 to 2.2, 2.2 to 2.6, 2.4 to 2.5 and 2.6 to 2.9 days nymphal instars duration on different genotypes. (4) also recorded 2.0 to 2.2 (1st instar), 2.2 to 2.6 (2^{nd} instar), 2.4 to 2.5 (3^{rd} instar) and 2.6 to 2.9 days (4thinstar) duration, respectively on different genotypes of mustard.

Total nymphal duration : The total nymphal period was highest with 9.8 days on purple mutant and lowest on BSH-1(8.1 days) followed by 8.2, 8.6, 8.7, 8.7, 8.7, 8.8, 8.8, 9.6 days on RH-30, Divya-22, BAUM-2007, parasmani-2-10, SKM-301, SKM-526, Ashirwad and RH-7846 genotypes, respectively. (3) reported total nymphal duration of 8.6 days on BSH-1 and 8.0 days on RH-30. While (11) and (3) reported 8.0 days nymphal duration on purple mutant. (6) recorded 10 days nymphal duration on B.alba, 11.2 days on *B. nigra* and 11.5 days on *B. juncea* as compared to 15 days on *B. campestris* (BSH-1). While (7) observed that total nymphal period varied from 7.7 to 8.0 days. (15) reported mean nymphal duration of 6.84 ± 0.80 and 6.07±0.65 days. The differences in nymphal duration on different genotypes of rapeseed mustard may be due to the effect of cruciferous glucosinolates content both qualitatively and quantitatively reported that

Table-1: Development of mustard aphid, L. erysimi (nymph) at grown-up plant stage (leaves) of rapeseed-mustard genotypes under laboratory conditions.

Genotype	Mean* duration of nymphal instars (days)				Total nymphal duration (days)
	I	II	III	IV	
Ashirwad	1.8	2.2	2.3	2.5	8.8
BAUM-2007	1.9	2.1	2.2	2.5	8.7
BSH-1	1.8	2.0	2.2	2.1	8.1
Parasmani-2-10	1.8	2.3	2.2	2.4	8.7
Divya-22	1.9	2.1	2.3	2.3	8.6
SKM-301	1.9	2.3	2.2	2.3	8.7
SKM-526	1.8	2.3	2.3	2.4	8.8
RH-30	1.7	2.0	2.3	2.2	8.2
RH-7846	2.0	2.5	2.5	2.6	9.6
Purple Mutant	2.2	2.6	2.5	2.5	9.8
Mean	1.8	2.2	2.3	2.3	8.8
SE (m)	0.01	0.01	0.02	0.02	0.02
CD at 5%	0.03	0.03	0.06	0.06	0.07

* Based on 20 individuals (five individuals in four repeats)

nymphal duration was shorter on BSH-1 because of low amount of glucosinolates and phenols favored faster development.

Pre-reproductive period : It is the period of aphid from last moulting to the start of nymphal laying. Under present studies the pre-reproductive period varied from 1.0 to 1.4 days on different genotypes. Maximum duration of 1.4 days on purple mutant followed by 1.2 days on Ashirwad, BAUM-2007, SKM-526, RH-30, RH-7846 and 1.0 days on BSH-1, Parasmani-2-10, Divya, SKM-301, respectively. (3) reported that pre-reproductive period varied from 1.0 to 1.2 days on different genotypes of mustard. (4) also reported that pre-reproductive period varied from 1.3 to 1.5 days on different genotypes of mustard. This indicates that pre-reproductive period is not much affected by genotypes or varieties of mustard.

Reproductive Period : It is the number of days for which a given aphid continues to reproduce. In present condition reproductive period was recorded maximum 17.1 days on purple mutant and minimum 15.7 days on BSH-1 followed by 15.9, 16.2, 16.3, 16.3, 16.4, 16.5, 16.7 and 16.9 on RH-30, BAUM-2007, Ashirwad, SKM-301, Divya-22, Parasmani-2-10, SKM-516 and RH-7846, respectively. (3) also reported 16.6 days reproductive period on BSH-1 and lowest (9.0 days) on BIO-902 observed 10.6 to 12.6 days reproductive period on different genotypes of Brassica. (8) reported minimum reproductive period of 10.3 days on TMH-52 and 18.0 days on BSH-1. (4) reported that reproductive period varied from 14.3 to 15.4 days on different genotypes of mustard tested. Similarly (15) reported that reproductive period varied from 13.1 to 19.3 days on different genotypes. This indicates that reproductive period is very much affected by genotypes selected and this may be due to the quality and quantity of glucosinolates content present in different genotypes (19).

Post-Reproductive period : It is the period between the birth of last young one to adult mortality. Under present conditions post- reproductive period varied from 2.0 to 2.5 days on different rapeseed mustard genotypes. It was maximum (2.5 days) on purple mutant and minimum (2.0 days) on BSH-1, followed by 2.1, 2.1, 2.2, 2.2, 2.3, 2.4, 2.4, 2.5 days on SKM-301, BAUM-2007, SKM-526, RH-30, Divya, Ashirwad, Parasmani-2-10 and RH-7846, respectively. (10) reported that post- reproductive varied from 2.40 to 2.64 days on different mustard genotypes tested. (3) reported that post-reproductive period varied from 0.3 days (RH-30) to 1.30days (PCR-7),while it was 0.7, 0.7, 0.8, 0.8, 0.9 and 1.0 days on Varuna, Laxmi, BSH-1, BIO-902, T-6342 and Kranti, respectively. The above differences in post reproductive period may be due to the varieties or genotypes selected and

Table-2: Development of mustard aphid, L. erysimi (adult) at grown-up plant stage (leaves) of rapeseed-mustard genotypes under laboratory conditions.

Genotype	Mean* duration (days)					Mean*fecundity		Per cent survival (%)
	Pre-reproductive period	Reproductive period	Post-reproductive period	Adult longevity	Life span	Per female / day	Per female	
Ashirwad	1.2	16.3	2.3	19.8	28.6	5.23	85.3	86
BAUM-2007	1.2	16.2	2.1	19.6	28.3	5.50	89.2	80
BSH-1	1.0	15.7	2.0	18.5	27.0	6.35	99.8	96
Parasmani-2-10	1.0	16.5	2.4	19.9	28.6	4.88	80.6	82
Divya-22	1.0	16.4	2.2	19.6	28.2	4.90	80.4	83
SKM-301	1.0	16.3	2.1	19.6	28.3	4.98	81.2	84
SKM-526	1.2	16.7	2.2	19.9	28.7	4.82	80.5	81
RH30	1.2	15.9	2.2	19.3	27.5	5.69	90.5	90
RH-7846	1.2	16.9	2.4	20.5	30.3	4.57	77.4	77
Purple Mutant	1.4	17.1	2.5	21.0	30.7	4.45	76.2	75
Mean	1.16	16.4	2.24	19.8	28.6	5.10	86.8	83.4
SE (m)	0.1	0.02	0.1	0.2	0.4	0.03	0.07	-
CD at 5%	NS	0.07	NS	0.6	1.2	0.08	0.2	-

*Based on 20 individuals (five individuals in four repeats), NS=Non-significant

laboratory conditions maintained during the experiment.

Adult Longevity : The adult longevity of aphid varied from minimum (18.5 days) on BSH-1 and Maximum (21.0 days) on purple mutant. (3) reported 18.7 days adult longevity on BSH-1 followed by 17.6 days PCR-7 and 10.8 days on BIO-902 genotype. (10) also reported that adult longevity varied from 13.53 to 16.77 days on different genotypes of rapeseed mustard, while 16.20 days on BSH-1. (5) reported maximum 21.7 days adult longevity on BSH-1 followed by 19.0 days on Purple mutant and RH-7846. (8) reported 15.8 days longevity on purple mutant followed by 15.6 days on RH-7846 and RH-30, Maximum adult longevity of 20.2 days on BSH-1 genotype under screen house. The differences in duration of adult longevity on different genotypes may be due to quality and quantity of glucosinolates content i.e. it depends genotypes which are tested (9).

Life span : Under present studies, lifespan of the aphid was recorded minimum (27.0 days) on BSH-1 and Maximum (30.7 days) on purple mutant. (11) reported similar results of 28.0 days life span on BSH-1 and 23.8 days on purple mutant followed by 23.6 days on RH-7846 and RH-30 genotype. (3) also reported that lifespan of aphid varied from 18.87 to 27.30 days on different test genotypes. While it was 27.3 days on BSH-1. (10) reported that lifespan varied from 23.06 to 26.96 days on different brasssica genotypes, while it was 25.6 days on BSH-1 (5) also reported maximum 28.9 days on BSH-1 and 27.9 days on purple mutant .The above differences in results may be due to the genotypes or varieties tested or may be due the effect of quality and quantity of glucosinolates present in genotypes (9).

Aphid survival : Aphid survival was found maximum (96%) on BSH-1 and minimum (75%) on purple mutant followed by 77, 80, 81, 82, 83, 84, 86 and 90 percent aphid survival on RH-7846, BAUM-2007, SKM-526, Parasmani-2-10, Divya-22, SKM-301, Ashirwad and RH-30 genotype, respectively. (11) reported maximum (100%) aphid survival on BSH-1 followed by RH-30 (95%). The differences in aphid survival may be due to quality and quantity of glucosinolates (9).

Fecundity : The fecundity of aphid was found maximum (99.6 nymphs/female) on BSH-1 followed by 90.5, 89.2, 85.3, 81.2, 80.6, 80.5, and 77.4 nymphs/female on RH-30, BAUM-2007, Ashirwad, SKM-301, Parasmani-2-10, SKM-526, Divya, RH-7846 and least (76.2 nymphs/female) on purple mutant. Average fecundity was also found maximum (6.63nymphs/female/day) on BSH-1 and minimum (4.43nymphs/female/day)on purple mutant (6) reported 95.2±14.4 nymphs/female (fecundity) and 4.0 nymphs/female/day (average fecundity) on BSH-1. (8) reported maximum

(115.3 nymphs/female) fecundity on BSH-1 and Minimum (41.2 nymphs/female) on Purple mutant. They also reported that average fecundity was found maximum (6.2 nymph/female/day) on BSH-1, followed by 4.6, 4.7, 2.4 nymphs/female/day on RH-30, RH-7846 and purple mutant, respectively. (3) also reported that fecundity of aphid varied from 36.67 to 93.0 nymphs /female on different genotypes and average fecundity varied from 2.90 to 4.20 nymphs/female/day. (3) reported that fecundity was very high (114.6 nymphs/female) with 5.9 nymphs/female/day on BSH-1, closely followed by 103.6 nymphs/female, 6.02nymphs/female/day on purple mutant. (11) also reported higher fecundity of 66.9nymphs/female on BSH-1. (4) also showed maximum fecundity on BSH-1 compared to other hosts. This indicates that aphids like to fecund more on susceptible genotypes and the glucosinolates (both qualitatively and quantitatively) present in genotypes may affect fecundity of the aphid (9).

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