

Varietal Influence on the Biology of Mustard Aphid *Lipaphis erysimi* Kaltenbach in Laboratory*

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ABSTRACT

Comparative biology of *Lipaphis erysimi* Kaltenbach was studied on different cultivars of mustard at Department of Entomology, C. P. College of Agriculture, Sardar Krushinagar during Rabi 1995-96. The nymphal period was the shortest (Av. 5.88 ± 0.67 days) on cv. PM-67 and longest (Av. 6.58 ± 0.65 days) on GM-1. However, adult longevity (Av. 8.71 ± 0.69 days) and total life span (Av. 15.29 ± 0.69 days) were shortest on GM-1. The corresponding periods (Av. 10.36 ± 0.99 and 16.24 ± 1.09 days) were longest when *L. erysimi* was reared on PM-67. The fecundity of aphid was lowest on GM-1 moderate on Varuna and highest on PM-67.

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INTRODUCTION

Mustard aphid (*Lipaphis erysimi* Kaltenbach) is an endemic pest, causing 47.1 to 96.00 per cent losses in seed yields of *Brassica* crops in India (Bakhetia, 1986 and Suri *et al.*, 1988). Comparative biology of mustard aphid on different cultivars of *Brassica* sp. have been reported by Singh *et al.* (1966). However, such studies were not done under north Gujarat conditions and hence the investigations were carried out on various aspects of biology of the mustard aphid reared on three mustard cultivars.

MATERIALS AND METHODS

Comparative biology of *L. erysimi* was studied under the laboratory conditions on cvs.

GM-1 (Gujarat Mustard-1), Varuna and PM-67 (Patan Mustard-67) during the *rabi* season of 1995-96. Seeds of these cultivars were sown in small plots near the Department of Entomology to obtain fresh leaves for the aphid. Apterous aphids were collected from mustard field and reared in glass petri dishes of 4.5 cm diameter, provided with a blotting paper disc. Tender leaves of above stated cultivars were provided as food to the aphid. The leaf stalk was wrapped with cotton. The cotton on leaf stalk and blotting paper were moistened to keep the food material turgid. The petri dish was covered with a piece of muslin cloth securely held in position with the help of a rubber band, and then covered with a lid to prevent aphid escape and desiccation of food material. The food was changed daily in the morning during the entire period of

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study. The neonate nymphs produced by the laboratory reared aphids were transferred into separate petri dishes with the help of a wet hair brush and reared individually for further studies. The minimum and maximum temperature was 18.50 and 24.90 °C (Av. 21.92 $\pm$ 1.90 °C) and relative humidity ranged between 45 and 74 per cent (Av. 57.21 $\pm$ 6.65%) during the course of study. Observations on date of moulting were recorded on the basis of presence of exuvia. From these data, duration of different instars and total longevity were worked out. Number of nymph laid by each adult apterae female was recorded daily to work out the fecundity and birth rate of *L. erysimi*. The mean results based on study of 30 aphids on various aspects of biology are presented in Table 1.

RESULTS AND DISCUSSION

The nymph

The mustard aphid passed through four nymphal instars on all the three cultivars viz., GM-1, Varuna and PM-67 varieties of mustard. The average duration of first instar : 1.56 $\pm$ 0.51, 1.42 $\pm$ 0.50, and 1.38 $\pm$ 0.50 days : second instar : 1.67 $\pm$ 0.48, 1.56 $\pm$ 0.51 and 1.42 $\pm$ 0.50 days : third instar : 1.58 $\pm$ 0.50, 1.52 $\pm$ 0.51 and 1.48 $\pm$ 0.51 days and fourth instar : 1.71 $\pm$ 0.46, 1.64 $\pm$ 0.49 and 1.56 $\pm$ 0.51 days was observed on GM-1 Varuna and PM-67, respectively. The total nymphal period did not differ much on these three varieties of mustard. However, it was longest on cv. GM-1 and shortest on PM-67 (Table 1).

Total nymphal period

The total nymphal period varied from 6 to 8 (Av. 6.58 $\pm$ 0.65), 5 to 7 (Av. 6.12 $\pm$ 0.67) and 5 to 7 (Av. 5.88 $\pm$ 0.67) days on GM-1, Varuna and PM-67, respectively. Thus, longer nymphal duration was found on GM-1 and shorter duration on PM-67.

The adult

Pre-reproductive period

Pre-reproductive period ranged between 1 and 2 days with an average of 1.25 $\pm$ 0.44, 1.16 $\pm$ 0.37 and 1.08 $\pm$ 0.28 days, respectively, on GM-1, Varuna and PM-67. Thus, little variation was observed with regard to the pre-reproductive period of *L. erysimi* on the three varieties of mustard. However, Kalra *et al.* (1987) observed the shortest pre-reproductive period in *B. tournefortii* (Local) and longest in *B. rapa* var. *glauca* (Chamba 2).

Reproductive period

Reproductive period varied from 5 to 8 (Av. 6.58 $\pm$ 0.93), 5 to 9 (Av. 6.88 $\pm$ 1.01) and 7 to 10 (Av. 7.96 $\pm$ 0.89) days on GM-1, Varuna and PM-67 cultivar, respectively. It was considerably longest on PM-61 and shortest on GM-1. Kalra *et al.* (1987) and Singh *et al.* (1966) also reported that reproductive period differed significantly among different genotypes of rapeseed and mustard.

Post-reproductive period

Post-reproductive period varied from 0 to 2 days with an average of 0.88 $\pm$ 0.68, 1.28 $\pm$ 0.68 and 1.36 $\pm$ 0.64 days, respectively on GM-1, Varuna and PM-67. Thus, post-reproductive period showed little variation among aphids reared on different varieties of mustard.

Adult longevity

Longevity of adult (female) aphid varied from 8 to 10 (Av. 8.71 $\pm$ 0.69) 8 to 11 (Av. 9.32 $\pm$ 0.69) and 9 to 12 (Av. 10.36 $\pm$ 0.99) days on GM-1, Varuna and PM-67, respectively. Thus, adult lived longer when reared on PM-67, than on Varuna and GM-1 cultivars.

TABLE 1

Comparative life cycle of *L. erysimi* on different varieties of mustard (Jan-Feb., 1996).

Particulars	Duration (days)		
	Range (Av. $\pm$ S.D.)		
	GM-1	Varuna	PM-67
Nymph			
I instar	1.0-2.0 (1.56 $\pm$ 0.51)	1.0-2.0 (1.42 $\pm$ 0.50)	1.0-2.0 (1.38 $\pm$ 0.50)
II instar	1.0-2.0 (1.67 $\pm$ 0.48)	1.0-2.0 (1.56 $\pm$ 0.51)	1.0-2.0 (1.42 $\pm$ 0.50)
III instar	1.0-2.0 (1.58 $\pm$ 0.50)	1.0-2.0 (1.52 $\pm$ 0.51)	1.0-2.0 (1.48 $\pm$ 0.51)
IV instar	1.0-2.0 (1.71 $\pm$ 0.46)	1.0-2.0 (1.64 $\pm$ 0.49)	1.0-2.0 (1.56 $\pm$ 0.51)
Total nymphal period	6.0-8.0 (6.58 $\pm$ 0.65)	5.0-7.0 (6.12 $\pm$ 0.67)	5.0-7.0 (5.88 $\pm$ 0.67)
Adult			
Pre-reproductive period	1.0-2.0 (1.25 $\pm$ 0.44)	1.0-2.0 (1.16 $\pm$ 0.37)	1.0-2.0 (1.08 $\pm$ 0.28)
Reproductive period	5.0-8.0 (6.58 $\pm$ 0.93)	5.0-9.0 (6.88 $\pm$ 1.01)	7.0-10.0 (7.96 $\pm$ 0.89)
Post-reproductive period	0.0-2.0 (0.88 $\pm$ 0.68)	0.0-2.0 (1.28 $\pm$ 0.68)	0.0-2.0 (1.36 $\pm$ 0.64)
Adult longevity	8.0-10.0 (8.71 $\pm$ 0.69)	8.0-11.0 (9.32 $\pm$ 0.69)	9.0-12.0 (10.36 $\pm$ 0.99)
Fecundity (Nymphs/female)	23.0-42.0 (33.25 $\pm$ 4.97)	26.0-47.0 (36.80 $\pm$ 6.37)	32.0-53.0 (44.60 $\pm$ 7.34)
Rate of birth (Nymphs/female/day)	3.25-5.85 (5.08 $\pm$ 0.60)	3.71-6.10 (5.36 $\pm$ 0.58)	4.38-6.71 (5.60 $\pm$ 0.68)
Total life span	14.0-16.0 (15.29 $\pm$ 0.69)	14.0-17.0 (15.44 $\pm$ 0.82)	15.0-18.0 (16.24 $\pm$ 1.09)
	Minimum	Maximum	Av. $\pm$ S.D.
Temperature (C°)	18.50	24.90	21.02 $\pm$ 1.90
R.H. (%)	45	74	57.21 $\pm$ 6.65

n = 30 insects

Fecundity

The number of nymphs laid per female varied from 23 to 42 (Av. 33.25 ± 4.97) 26 to 47 (Av. 36.80 ± 6.37) and 32 to 58 (Av. 44.60 ± 7.34) when reared on GM-1, Varuna and PM-67. Thus, female aphid reared on PM-67 deposited relatively more number of nymphs. Impact of varietal difference of fecundity of *L. erysimi* has been reported Kalra *et al.* (1987) and Singh *et al.* (1996).

Rate of birth

The young ones produced by a single female per day varied from 3.25 to 5.85 (Av. 5.08 ± 0.60), 3.71 to 6.10 (Av. 5.36 ± 0.58) and 4.38 to 6.71 (Av. 5.60 ± 0.68), respectively on GM-1, Varuna and PM-67. The reproductive rate was higher in aphids reared on PM-67 than those reared on Varuna and GM-1, indicating less variations. Singh *et al.* (1966) also reported similar but little

differences in rate of reproduction of mustard aphid on different cultivars of rapeseed and mustard.

Total life span

The life span of *L. erysimi* varied from 14 to 16 (Av. 15.29 ± 0.69), 14 to 17 (Av. 15.44 ± 0.82) and 15 to 18 (Av. 16.24 ± 1.07) days on cvs. GM-1, Varuna and PM-67, respectively. Thus, total life span was little longer on PM-67 than on the remaining two cultivars.

From the overall results, it can be concluded that GM-1 was less suitable for mustard aphid which required longer period to complete nymphal development and laid lesser number of nymphs than on PM-67, though adult longevity and total life span was comparatively short on GM-1. Varuna was intermediate in almost all parameters of biology.

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