

BIOLOGY OF APHID *LIPAPHIS ERSYMI* (KAT) ON CAULIFLOWER.

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ABSTRACT

The study of biology of Aphid *L. erysimi* (Kalt.), on cauliflower was carried out under the laboratory condition at College of Horticulture VCSG UHF, Bharsar, Pauri Garhwal during durin (Oct-Nov 2018). The experiment was conducted at Vegetable Research and Demonstration Block, during September- December 2018. The aphid nymph moulted four times to attain the maturity on cauliflower. The average duration of first instar, second instar, third instar and fourth instar nymph was 1.23 ± 0.40 , 1.55 ± 0.46 , 1.60 ± 0.80 , 2.35 ± 0.51 days respectively. The average total nymphal period was 5.80 ± 0.72 days. The average longevity of female was 6.16 ± 2.23 days and the total life cycle 8-17 days. The average pre-reproductive, reproductive and post-reproductive period were 0.72 ± 0.84 , 4.08 ± 1.03 and 0.38 ± 0.62 days, respectively.

INTRODUCTION

The word “cauliflower” is derived from Latin word “caulis” meaning stalk and “floris” meaning flower, belongs to family cruciferae and is one of the oldest cultivated vegetable crop. The major constraints for production loss are due to physiological disorders, pests and diseases. Of these, insect pests are prime important as it cause serious economic damage to this crop. Cauliflower is attacked by total of 24 insect pests (**Devjani and Singh, 2012**), in which mustard aphid *Lipaphis erysimi*, is one of the most important pests of cauliflower which belongs to the order Hemiptera and family Aphididae. This aphid has two modes producing young ones, fertilization of females by males resulting in production of eggs (sexual reproduction), and the birthing of live female nymph by adult females without fertilization by males (parthenogenesis). Reproduction through parthenogenesis seems to be the normal as males are very rare and females are almost exclusively viviparous (birth live young) throughout the year and males have only been observed in the cooler months (**Kawada and Mura, 1979**). The cauliflower aphid (*Lipaphis erysimi*) is a vector of about 10 non-persistent plant viruses, including cabbage black ring spot and mosaic diseases in cauliflower, radish and turnip (**Blackman and Eastop, 1984**). In case of severe infestation of the aphid (*L. erysimi*) caused extensive damage up to 54.2% to cauliflower crop (**Srivastava and Gularia, 2003**). The basic information on life history is necessary before deciding the strategy for management of any insect pest. Therefore paper discusses biology of aphid, *Lipaphis erysimi* under laboratory condition.

MATERIALS AND METHODS

Study on biology of *L. erysimi* on cauliflower was carried out under the laboratory condition during (Oct-Nov 2018). Suhasini a variety of cauliflower was considered as host genotype for conducting the present experiment.

Cauliflower plants (5-6 leaves or 6-7 weeks old) were transplanted individually into the field. Aphids were collected from the field of infested leaves of cauliflower and reared in glass Petri dishes measuring 10 cm and 2 cm diameter and height respectively. For studies on different stages of aphid, the newly hatched nymphs were carefully transferred to thirty Petri dishes with the help of fine moist camel hair brush. The Petri dishes were provided with moistened filter paper to keep the host leaves turgid for longer duration. The cauliflower fresh leaves were provided as food for aphid and the food was changed daily in the morning during the entire period of study. The change in instars was considered on the bases of presence of exuviae casted by the nymphs. The growth of nymphs, moulting and passing into next instar and the number of nymphs laid per female were also observed at an interval of 12 hrs. From these observations, duration of instar, total nymphal period, pre-reproductive, reproductive and post-reproductive period, longevity fecundity as well as total life cycle was recorded.

1. Total nymphal period. Nymphs were observed under olympus binocular microscope till they reach adult stage. Total nymphal period was calculated on the basis of birth of first instar to the end of fourth instar. The moulting was confirmed by the presence of exuviae on the leaf or on the posterior end of the nymphs.

2. Pre-reproduction period. A period between date of emergence of the female adult and date of produced young ones was considered as pre- reproduction period.

3. Reproduction period. The adult period in which it produced young ones was considered as reproduction period.

4. Post reproduction period. The adult period after reproduction up to the death was considered as post reproduction period.

5. Longevity. The longevity period was calculated from the date of emergence of adult to the death of adult.

6. Fecundity. The reproductive potential of female adult aphid was recorded by counting the number of individuals produced by each adult aphid during its reproduction period.

7. Total life cycle. The entire life period (Birth of young ones to death of adult) during the study, newly hatched nymphs were placed individually on a leaf of the cauliflower with the help of fine moist camel hair brush. The leaf was kept in a Petri plates and observations were recorded till the death of adult.

RESULT AND DISCUSSION

The nymph moulted four times to attain the maturity on cauliflower. The duration of first instar nymph was 1-2 days with an average of 1.23 ± 0.40 days. The average duration of second instar nymph was 1 to 2 days with an average of 1.55 ± 0.46 days. The duration of third instar nymph was 1-2 days with an average of 1.60 ± 0.80 days. The average duration of fourth instar nymph was 1-4 days with an average of 2.35 ± 0.51 days. Total nymphal period was 4 - 9 days with an average of 5.80 ± 0.72 days. The longevity of female adult was ranged from 6 to 9 days and the total life cycle 8-17 days with an average of 13.24 ± 2.27 days. The average pre-reproductive, reproductive and post-reproductive period were 0.72 ± 0.84 , 4.08 ± 1.03 and 0.38 ± 0.62 days, respectively. The average number of nymphs produced by a female was 21.04 ± 4.89 nymphs during its life cycle. Patel *et al.*, (2016) while study the bionomics of mustard aphid reported total nymphal period as 4-8 days with an average of 6.03 ± 0.89 days. Our result are comparable with the result of Pal (2015) who reported the total nymphal period of mustard aphid 6-9 days with an average of 6.82 ± 0.82 days. Vekaria and Patel (1999) also reported average nymphal period of 6-9

days. Sinha *et al.* (1998) reported total nymphal period in alate mustard aphid of 13.8 days.

Table 1: Duration of different stages of aphid, *L. erysimi* on cauliflower

Stages	Duration (Days)		
	Min.	Max.	Mean \pm S.D.
Nymph			
I instar	1	2	1.23 \pm 0.40
II instar	1	2	1.55 \pm 0.46
III instar	1	2	1.60 \pm 0.80
IV instar	1	4	2.35 \pm 0.51
Total nymphal period	4	9	5.80 \pm 0.72
Adult			
Pre-reproduction period	0	2	0.72 \pm 0.84
Reproduction period	3	8	4.08 \pm 1.03
Post-reproduction period	0	2	0.38 \pm 0.62
Adult longevity	6	9	8.63 \pm 1.17
Total life span	8	17	13.24 \pm 2.27

Table 2: Fecundity of aphid, *L. erysimi* on cauliflower

No. of nymphs/female		
Min.	Max.	Mean \pm S.D.
18	32	21.04 \pm 4.89

REFERENCES

- Blackman, R. L. and Eastop, V. F. 1984.** *Aphids on the Worlds Crops: An identification and information guide.* John Wiley and Sons Chichester, New York, Brisbane, Toronto, Singapore. pp: 466.
- Devjani, P. and Singh, T. K. 2012.** Insect pest and natural enemy complex of cauliflower in the agro-ecosystem of Manipur. *Indian J. Ent.* 64(3): 275-278.
- Kawada, K. and Murai, T. 1979.** Short Communication. Entomological experiment a list applicata. 26: 343-345.
- Srivastava, A. and Guleria, S. 2003.** Evaluation of botanicals for Mustard aphid *Lipaphis erysimi* (Kalt.) control in Brassica. *Himachal J. Agril. Res.* 29: 116-118.
- Patel, N. M., Godhani, P. H. and Gohel, R. 2017.** Bionomics of aphid, *Lipaphis erysimi* (Kaltenbach) on Cauliflowe. *The Bioscan.* 12(1): 39-42.
- Pal, S. 2015.** Biology of mustard aphid *Lipaphis eysimi* (Kalt.) on mustard CV. Jhumka in terai Agro-ecological conditions of West Bengal. A part of M.Sc. Thesis to the Uttar Banga Krishi Viswavidyalaya., West Bengal.
- Vekaria, M. V. and Patel, G. M. 1999.** Biology of mustard aphid, *L. erysimi* on North Gujarat. *Indian J. Ent.* 61(3): 261-264.
- Sinha, R. P., Yazadani, S. S., and Kumari, K. 1998.** Studies on biology of mustard aphid *Lipaphis erysimi* (kalt.) Aphididae: Hemiptera. *Journal of Applied Biology.* 8(1): 131-137.