



Biological and ecological characteristics of the cabbage aphid parasite

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ABSTRACT

This article provides a comprehensive analysis of the biological and ecological characteristics of major cabbage pests, particularly the cabbage aphid (*Brevicoryne brassicae* L.) and the cabbage bug (*Eurydema ventralis* Kol.), under the environmental conditions of the Khorezm region. The study is based on both field and laboratory experiments conducted during 2024–2025, focusing on their life cycle, reproductive capacity, seasonal development, and adaptation to environmental factors such as temperature and humidity. Special attention is given to the overwintering stages of the cabbage aphid, revealing that it survives in egg, larval, and adult forms within plant residues and cruciferous weeds. Early spring observations demonstrated the rapid activation and population growth of aphids, with peak reproduction occurring in moderate temperature conditions. Laboratory experiments showed that the average fecundity of a single aphid reached 39 larvae, with maximum productivity observed in spring and autumn seasons.

In addition, the bioecological features of the cabbage bug were investigated, including its feeding behavior, egg-laying patterns, embryonic development, and larval stages. The results indicate that environmental conditions significantly influence its reproductive activity and development rate. The duration of development from egg to adult stage varies seasonally, being longer in spring and shorter in summer. The findings of this research contribute to a deeper understanding of pest population dynamics in cruciferous crops and provide a scientific basis for developing effective, environmentally friendly pest management strategies.

Keywords:

cabbage aphid, cabbage bug, bioecology, reproduction, cruciferous crops, pest management, laboratory research, field experiment.

Introduction. Cabbage aphid - *Brevicoryne brassicae* L. is a widespread pest species, which is widespread in all regions where cruciferous plants, including cabbage, are grown.

Our research was carried out in the stationary field of the "Raximbergan Khoji Anvar" farm located in the Irdimzon region of the Khiva district during 2024-2025. The autumn research was aimed at identifying the stages of aphids that overwinter in plant

residues after harvest. The results of the research showed that the cabbage aphid overwinters in the egg, larval and adult stages in cabbage crop residues and cruciferous weeds.

As a result of special studies conducted in early spring (March, April), overwintering winged live-bearing females of cabbage aphids, larvae of all ages and eggs were recorded in the samples taken. The first hatching of larvae from overwintering eggs was observed in early April. With the increase in air temperature, the

reproduction of aphids accelerated somewhat. At the beginning of the third decade of April, large swarms of winged aphids were formed, which began to damage the cabbage of the following year. Studies to determine the sexual productivity of cabbage aphids were carried out in laboratory conditions.

Research Methodology. For this purpose, cabbage seedlings were grown in 20 greenhouses (insectariums), 1 adult cabbage aphid was planted on each leaf, and newly born aphid larvae were counted every day and picked from the leaf with a soft brush, separated from each female aphid, and the number of larvae was recorded separately. During the experiment, the temperature and relative humidity in the laboratory were regularly measured 4 times a day. The experiments continued from April to the end of October. Although the results differed slightly from month to month, the average sexual productivity of each cabbage aphid was 39 larvae. As a result of the experiments, the air temperature in the laboratory ranged from 12 °C to 27 °C, with a maximum of 35 °C, and relative humidity was 32-65%. If we look at the maximum reproductive productivity of cabbage aphids, the highest reproductive productivity of

aphids occurred in spring (April) and autumn (September, October). At this time, some parthenogenetic lice gave birth to up to 82 larvae. The average daily reproductive productivity of aphids was 3-5, and the maximum was 5-11. In laboratory conditions, wingless females lived from 14 to 43 days throughout the season (Table 1).

When the sexual productivity of winged parthenogenetic lice was studied, this indicator was somewhat lower than that of wingless lice (average 28, maximum 51 pieces). The process of live birth in cabbage lice lasts almost the entire life. However, it can also stop giving birth for several days, and then continue giving birth again. Such days lasted an average of 2-6, and in some cases 6-10 days. In our experiments, 32-35% of female lice died naturally the day after the end of the larval birth process. In a number of female lice in the experiment, after the end of the live birth process, they continued to feed. On average, such additional feeding lasted 3-5 days, up to a maximum of 10 days. On average, the complete development of one generation of cabbage aphids took 7-9 days in the summer months and 12-21 days in the early spring and fall months.

1 table
Cabbage aphid sexual productivity (Rahimbergan Khoji Anvar farm 2025 years)

Egg laying time	The day of death	Duration of stay (in days)	Number of eggs laid per day	Number of eggs laid		
				Life during	In one day	
					average	high
1	2	3	4	5	6	7
Wingless female						
15. III	27. IV	46	26	38	1.5	6
16. III	23. IV	40	18	62	3.7	10
3. IV	10. IV	14	27	15	2.5	9
20. IV	27. V	33	23	59	2.7	7
28. V	28. VI	32	20	66	3.5	11
7. V	11. VI	37	26	62	2.6	7
18. V	16. VI	30	20	78	4.2	12
3. VI	19. VI	14	11	22	2.2	6
18. VI	7. VII	13	5	20	2.2	7
7. VII	27. VII	18	11	21	1.4	8
17. VII	26. VII	12	6	14	1.5	5
6. VIII	21. VIII	14	7	24	2.4	7
9. VIII	29. VIII	22	11	17	1.4	6

28. VIII	13. IX	18	10	19	2.1	7
8. IX	27. IX	22	14	26	2.0	8
10. IX	28. IX	20	12	36	3.3	8
17. IX	28. X	43	31	57	1.8	9
18. IX	30. X	44	31	40	1.5	6
20. IX	4. XI	40	27	50	1.6	7
Winged female						
25. V	16. VI	23	16	44	3	9
7. V	20. VI	15	8	24	3.6	8
4. VI	23. VI	17	10	21	2.5	6
17. VI	13. VII	24	16	46	3.1	7
5. IX	27. IX	23	14	26	2.0	6
14. IX	10. X	28	18	46	2.7	8
15. IX	11. X	24	13	50	3.2	9
20. IX	12. X	24	12	23	2.1	5
21. IX	13. X	25	12	30	2.5	8
29. IX	22. X	21	9	10	4.0	9

2. Cross-flowered scaly - *Eurydema ventralis* Kol.

of the cross-flowered thornbush - *E. ventralis* Kol. - is found in the Khorezm oasis, but its bioecology has not been studied in these conditions.

This species of beetle is a serious pest of vegetable crops, including cabbage, in the conditions of the oasis where it is being studied. Among the cultivated cruciferous insects, the beetle feeds on cabbage, turnips, and radishes. Especially when the first and second generations of the beetle, adults and their 3-4-year-old larvae feed on the plant, they cause great damage to the crop.

Cabbage moths overwinter in the adult form under fallen leaves of trees and under the remains of wild cruciferous plants near gardens. The active life of the overwintered moth (emergence, feeding, mating, egg laying) directly depends on external environmental conditions. During the 2024-2025 research, the moth emerged from hibernation on March 10, and later fledging on March 25. The mass emergence of the moth from hibernation was observed at the end of the second decade of March. The moths that emerged from hibernation from early spring until the planting of cabbage seedlings gather and feed on wild

cruciferous plants: *Sinapis arvensis* L.; *Capsella bursa pastoris* (L.) Medik., etc.

The additional feeding of the ladybugs occurs in early spring on wild cruciferous plants. In the years of the research (2024-2025), the laying of eggs by the ladybugs was observed to continue until the end of the second decade of April (April 20). There is some information about the egg-laying behavior of the cabbage ladybug. In particular, it was noted that the ladybug lays its eggs only on plant leaves, on the stems and leaves of cruciferous plants, and in some cases on plants of other families.

In our laboratory studies, it was observed that the beetles lay their eggs in a random manner: on different parts of the plant, on the walls of the experimental vessel and on other substrates. However, it was also observed that the laying of eggs by the beetles depends on the humidity and temperature of the environment. This can be explained by the fact that the beetles lay their eggs on the top of the leaf in spring, on the bottom of the leaf in summer (at high temperatures) and between the head of cabbage and the leaf.

Laboratory and field studies have shown that the cabbage looper laid 6 to 12 eggs in each row, and in some cases 20 or even 24 eggs in one ball. It was found that each female lays an average of 20-25 eggs, a maximum of 35, and a

minimum of 11 eggs in a ball. As can be seen from the table, the average daily air temperature is from 13.9 °C to 26.8 °C, and the

incubation period of the cabbage looper lasts from 6 to 12 days (Table 2).

Table 2.
***Eurydema ventralis* Kol. (Khiva district, 2025).**

Months	Embryonic development by day	Air temperature °C		
		Average daily	Highest	The most low
April	9	13.9	27.0	3.0
May	12	20.3	30.0	12.0
June	5	25.3	38.0	15.0
July	7	25.8	40.0	15.0
August	6	26.8	38.0	15.0

Analysis and results: In natural conditions, we recorded the first larvae of the Kandala moth in wild crocuses at the beginning of the second decade of April. Laboratory studies have shown that the color of newly hatched larvae is

yellowish, and after 40-45 minutes they turn reddish, with black stripes running across the upper and abdominal parts of the body. The larva molts five times during its full development (Table 3).

Table 3
The process of hatching of cabbage looper larvae (Urgench district, 2025)

Experience	Larval hatching periods					Number of larvae killed
	I	II	III	IV	V	
1.	15.V	22.V	30.V	9.VI	19.VI	13
2.	18.V	26.V	3.VI	12.VI	22.VI	7
3.	29.V	6.VI	14.VI	23.VI	4.VII	4
4.	5.VI	12.VI	18.VI	27.VI	5.VII	7
5.	14.VI	20.VI	26.VI	4.VII	12.VII	7
6.	19.VI	24.VI	30.VI	7.VII	14.VII	6
7.	25.VI	2.VII	7.VII	13.VII	21.VII	8
8.	30.VI	5.VII	11.VII	19.VII	29.VII	9
9.	6.VII	11.VII	16.VII	22.VII	30.VII	6
10.	10.VII	15.VII	21.VII	28.VII	5.VIII	4

Conclusion. The first-instar larva of the cabbage looper takes 4-6 days to develop into the second instar, the second - 5-7, the third - 5-7, the fourth - 6-9, and finally the fifth instar larva takes 7-10 days to fully develop. The duration of development of this type of looper from egg to adult stage was 41 to 48 days in spring, and 27 to 33 days in summer, respectively. The cabbage looper is found in the

fields in its adult stage until late autumn (until the first half of November).

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