

Wintering Characteristics Of Coccinellids

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Annotation. Among predatory entomophages, representatives of the Coccinellid family play an important role in effectively eliminating most pests of agricultural crops.

Key words: Coccinellid family, agricultural crops, biological control.

The use of Coccinellids in the elimination of pests is considered one of the important tasks of today, and the issue of replacing the use of pesticides with biological means is a cross-cutting issue. However, due to insufficient information about this group of insects-entomophages in the studied oasis, insufficient attention was paid to their use against pests.

A planned study of the biology, life cycle and ecological features of the Coccinellid beetles can create an opportunity to find a solution to some important practical and theoretical problems.

V.V.Yakhontov [5], Z.K.Adilov [1] on the importance of coccinellids in the biological control of plant pests, showing the works of V.V.Yakhontov on their distribution in the area, protection of local species, increasing their effectiveness is riny. R.A.Alimdzhonov [2], V.V.Yakhontov [5], Z.K.Adilov [1], A.K.Mansurov, A.Sh.Khamrayev, Y.Q.Babanov [4] have studied the features of some coccinellid species that accumulate and winter.

Coccinellids (Coleoptera, Coccinellidae) are considered to be an effective natural killer of most pests of agricultural crops, and are of great importance in biological control. At first, the famous Swedish scientist Carl Linnaeus recommended the use of beetles and goldenrod against plant aphids. And E.Darwin advised to use beetles to clean greenhouses from plant juices. In England, it has been proposed to spread the beetles against the pest in the field and in greenhouses in order to eliminate plant aphids.

A number of large-scale studies have also been carried out on the distribution of coccinellid beetles within the area, preservation of local species and improvement of their effectiveness in pest control.

They also conducted a number of studies on the development period (cycle) of coccinellids. In particular, according to the results of the research of K.S. Hagen [11], coccinellids are divided into 5 types depending on the development cycle, namely:

Coccinellids overwinter in the beetle phase and lay eggs in early spring, a process that takes a month or more. New generation beetles come out in June and feed intensively. However, it flies away to winter in July-August without laying eggs, that is, it gives birth once a year. Such development cycles of coccinellids are more characteristic of regions with a medium climate, mainly of coccinellids in the forest region;

In warm regions, the development cycles of coccinellids begin earlier, their active period corresponds to early spring, and new generations of beetles fly to their wintering grounds in late May-June and remain in the dormant stage until next spring. Coccinellids characteristic of this development cycle are more common in eastern climatic regions;

Coccinellids that develop 2 generations one after another per year - these are mid-climate coccinellids;

Coccinellids lay eggs in April-May in regions with hot and dry summer and early spring. It produces 2-3 generations during the season, and the beetles leave for wintering in October-November. These cyclic coccinellids are mostly distributed around the Mediterranean Sea;

In years with high temperature and sufficient humidity, the development of beetles continues until autumn, giving several generations, and the generations complement each other. Coccinellids with this development cycle are distributed in humid subtropical and tropical countries.

Coccinellids of all the above development cycles only hibernate during the beetle period. But it should be noted that *Pullus impexus* Muls. the species hibernates both in the beetle and egg phases in Switzerland [7].

Many scientific studies have been carried out on the characteristics of coccinellids related to wintering [1,2,8].

According to the authors listed above, the main reason for the early migration of coccinellids in order to winter in mountainous areas is the lack of food in the second half of summer, including a sharp decrease in plant sap, etc. is considered

Winter diapause is characteristic of coccinellid beetles. It is characteristic that most species of coccinellids have many accumulations during the transition to such a diapause.

J. Hodek [12] divides the winter gathering of coccinellids into two types: hypsotactic and climotactic.

In hypsotactic aggregations, coccinellids choose hilly, dry sites, while in climotactic winter aggregations, they choose wet sites, including areas covered with forest floor.

However, in subsequent studies [4,6,7,8], cases of coccinellids wintering under the bark of trees, on the surface of the soil, and even in the houses of the population in the years of reproduction were recorded.

Studying the ecological characteristics of coccinellids, including the characteristics related to their wintering, is important from the point of view of their use in the fight against agricultural pests.

The main reason why coccinellids migrate early to winter in mountainous areas is their lack of food in the second half of summer, including a sharp decrease in plant sap in summer.

Monovoltine species go into diapause in the fall despite the availability of nutrients. For example, at the end of summer, the young beetles of *Semiadalia undecimnotata* move to the mountains, where they spend 8-9 months in a state of diapause, and at the end of May next year, the beetles that come out of diapause descend from the mountains to the lowlands. This type of coccinellids has been repeatedly recorded to accumulate in hilly and dry places during the winter [7].

It was also noted that coccinellids hibernate in the synanthropic type. In particular, in 1973-1974, *Adalia bipunctata* and *Synharmonia conglobata* species overwintered in the window frames of some houses. But from time to time there have been cases where the hibernating beetles wake up and starve to death due to cold weather and the early arrival of spring. This situation was also noted during 2022-2023.

Wintering of coccinellids in residential buildings coincides with the years when they are most numerous and occurs in many settlements. However, this phenomenon does not create a specific type of wintering. The reason for this phenomenon in the wintering process of coccinellids can be shown to be that most dominant species have the characteristic of choosing different places.

Wintering of coccinellids under tree bark

Our research conducted in 2022-2023 was conducted in Fergana Valley coccinellids *C. undecimpunctata* L., *Adalia bipunctata* L., *A. decepunctata* L., *Synharmonia conglobata* L., *Propylaea uatuordecimpunctata* L., *Semiadali notata* L., *Cjccinula elegantula* Ws., *Thea vigitiduopunctata* L. species reflect wintering under different tree barks.

Thus, most species of Coccinellidae overwinter in small clusters under the bark of trees, while some species - *E. undulatus*, *A. bipunctata*, *S. conglobata* - overwinter in larger clusters. .

Wintering of coccinellids under stones

For this purpose, we mainly observed the wintering of the species *C. septempunctata*. According to our data collected in January 2023, more than 590-617 wintering flocks of this species were recorded among the washed stones on the banks of the Kurgontepa reservoir.

In the conditions of the Fergana Valley, other species of coccinellid beetles wintered in rock crevices.

Coccinellids hibernate under the fallen leaves of plains, on the basis of shrubs and grasses.

In biotopes of this type, wintering species can be shown. The species *Coccinella septempunctata* is widespread, and it is not only nutritionally connected to such biotopes, but also has ecological connections. Beetles of this species overwinter on dried leaves and stems of wild herbaceous plants (from 7-8, up to 17-25, according to Recreation Park. 07.03.2024). Because the stems and leaves of these plants have heat-retaining properties.

Wintering beetles were observed in the gardens of the plains of the Fergana Valley, on the edges of cultivated fields, and it was observed that they spend the winter gathering in 50-100 and more numbers under the leaves around the trunks of mulberry trees and shrubs.

Overwintering of coccinellids on the soil surface

Wintering of coccinellids on the surface of the soil is characteristic of most of their species, and we often found them in gardens, among the lumps of soil around the stems of trees in cultivated fields, mainly under mulberry and apricot trees.

We also noted that *Coccinella septempunctata* and *Adonia variegata* species overwinter in soil cracks in most samples.

Coccinella septempunctata can winter in different conditions - on the plains, under stones, under rocks, among plants and bushes, in soil cracks, sometimes under tree barks.

Coccinella septempunctata is a result of the high ecological adaptability of this type of wintering. This allows it to spread widely and in different conditions. In addition, the *Coccinella septempunctata* species often has the characteristic of wintering by forming swarms. There are also atypical winterization features. However, it should be noted that the arrival of unfavorable weather, as well as the spread of fungal diseases among wintering beetles of this species, will lead to mass extinction of the populations of the main wintering type. However, some populations of this type of beetles wintering in atypical conditions have a good wintering period and will soon ensure the restoration of the species population. For example, under the bark of trees, in a hollow, under fallen leaves, under the remains of bushes and grass, under rocks, etc.

In general, it is clearly expressed that coccinellids accumulate a lot for wintering and move to wintering places. For example, such large migrations for wintering are especially characteristic of *Adalia bipunctata*, *Synharmonia conglobata* and *Coccinella septempunctata* species. Migration lasts from the end of August to the end of September.

But the migration of coccinellids to the ground is not only due to wintering, but also the sudden decrease of plant sap, which is their main food in the middle of summer, is the reason for their migration.

Thus, depending on the selection of wintering places of coccinellids of the Fergana Valley, they can be divided into the following types:

1. Wintering under tree bark;
2. Wintering under stones;
3. The plain areas are covered with bushes and grasses, wintering under the bed;
4. Winterers on the surface of the soil.

In addition, coccinellid wintering of the synanthropic type has been recorded. In general, the features of coccinellid gathering for wintering and migration to wintering places are clearly expressed.

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