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ON THE BIOLOGY OF THE APHIDOPHAGOUS SPECIES SCYMNUS SUBVILLOSUS (GOEZE, 1777)

Arabova Nodira Ziyodovna
Alfraganus University, Associate Professor

Burieva Khurshida Parda qizi
Turon University, Associate Professor
arabova_nodira@mail.ru
ORCID: 0000-0002-6299-2194

Abstract

Observations conducted on Scymnus subvillosus (Goeze, 1777) reveal its significant role as a natural predator of aphids in stone fruit crops within the Kashkadarya region. The study documents the species' life cycle, feeding behavior, and reproductive patterns. S. subvillosus emerges from hibernation in late April, with females requiring 4–6 days of feeding before egg-laying. Eggs are deposited individually on the underside of leaves within aphid colonies, with females laying up to 16 eggs per day over 3–15 days. The development of the beetle's pre-imaginal stages depends on temperature and food availability, with one generation completing in 18–20 days under favorable conditions. In natural environments, S. subvillosus produces four generations annually, predominantly on stone fruit trees, while additional generations were observed in laboratory conditions. Both larvae and adult beetles are voracious aphid predators, consuming substantial quantities of aphids daily. The species demonstrates synchronized development with aphid population dynamics, effectively suppressing aphid infestations. Despite its effectiveness, cannibalism among older larvae during food scarcity highlights the need for optimized habitat management to maintain predator populations. This study underscores the potential of S. subvillosus as a valuable biological control agent, promoting sustainable pest management practices in stone fruit orchards.

Keywords: Scymnus subvillosus, aphid predator, stone fruit crops, biological control, integrated pest management, Kashkadarya region, predatory efficiency, aphid population suppression, sustainable agriculture.

Introduction

Observations have shown that the larvae and beetles of Scymnus subvillosus (Goeze, 1777) feed on aphids found on stone fruits. Emergence from hibernation occurs in late April. Female beetles require additional feeding on aphids and flowers for 4–6 days for egg maturation before mating, which lasts between 3 and 9 minutes. Egg-laying begins 2–3 days after mating, with females mainly depositing eggs on the underside of leaves (on Persica vulgaris, Prunus communis, Armeniaca vulgaris, Cerasus vulgaris, and Cerasus avium) within aphid colonies. Eggs are laid singly, with females producing 8–16 eggs per day. The eggs are elongated, light green, and measure 0.6–0.7 mm.

The egg-laying period spans 3–15 days, with 4–5 separate rounds of egg-laying, each preceded by another mating. The pre-imaginal development stages of this predator depend on temperature and food availability. Under favorable weather and sufficient food supply, one generation develops in 18–20 days. In spring and autumn, this period extends to 23 days, while in hot weather, it shortens to 19 days. Individual stages last 4–6 days for eggs, 9–12 days for larvae, and 5–6 days for pupae. Throughout the growing season, four generations develop under natural conditions: three on stone fruit trees and one on intermediate plants like bulrush and, partially, poplar. Under laboratory conditions, two additional generations were obtained.

Both larvae and beetles are voracious and consume large numbers of aphids of various species, including reed aphid (Hyalopterus pruni Geoffr.), striped peach aphid (Brachycaudus prunicola Kaltenbach, 1843), black peach aphid (Brachycaudus persicae Passerini, 1860), thistle aphid (Brachycaudus cardi L.), almond aphid (Brachycaudus amygdalinus Schouteden, 1905), among others. One larva consumes the following numbers of aphid larvae and adults daily: 10–15 (first instar), 15–20 (second instar), 30–35 (third instar), and 35–45 (fourth instar). Adult beetles also prey on aphids, with each beetle consuming 20–25 aphids per day.

Cannibalism is observed among older larvae when food is scarce, as they may eat their pupating and immobile conspecifics. Pupation occurs in the soil beneath trees, lasting 3–6 days under natural conditions. In laboratory conditions, pupation on the leaves of greenhouse plants was more prolonged. Adult beetles of this species are present on all stone fruit trees from May to November. In late July, they migrate with aphids to wild and weed plants.

Aphid species appear in sequence, starting with reed aphid on plum, cherry plum, and almond in mid-April, followed by peach aphids on peaches and apricots. The predatory beetles of the Scymnus genus appear later, in late April, with the first larvae observed on these trees in early May. The peak aphid population occurs in the second

decade of May, with predator numbers peaking 10 - 15 days later, at the end of May. By late July, aphids are almost absent from fruit trees, and the predators move to bulrush and weeds. In July - August, predatory beetles and larvae continue to develop and feed on weed plants. A new wave of aphids and their predators reappears on stone fruit trees in October - November.

Thus, in the Kashkadarya region, the most widespread and numerous aphidophagous species on stone fruits belong to the genus Scymnus (Kugelann, 1794), effectively controlling harmful aphid species on these crops.

Conclusion

In conclusion, the study of Scymnus subvillosus reveals its critical role as a natural aphid predator on stone fruit crops, particularly within the Kashkadarya region. The beetle's life cycle and feeding patterns are synchronized with the population dynamics of aphids, demonstrating an adaptive strategy that allows it to effectively control aphid infestations across multiple hosts throughout the growing season. The species' ability to produce up to four generations annually under field conditions, with additional generations under laboratory conditions, underscores its potential as a biological control agent. However, environmental factors, such as temperature fluctuations and food availability, play a significant role in the development duration and reproductive cycles of S. subvillosus.

Moreover, this study highlights the high predatory efficiency of both larvae and adult beetles against various aphid species. Such feeding behavior not only contributes to aphid population suppression but also points to the importance of habitat conservation for maintaining and enhancing the predator populations in agricultural ecosystems. Given the observed cannibalism under food scarcity, future research could investigate optimal conditions that mitigate intraspecific predation and maximize aphid control efficacy. Ultimately, S. subvillosus exemplifies a viable entomophagous species with substantial potential for integrated pest management, promoting sustainable agricultural practices in fruit orchards by reducing the reliance on chemical aphicides.

REFERENCES

1. Bo'riyeva K.P., Mirzayeva G.S., Arabova N.A., Mansurkhudzhaeva M.U. Bioecological features of coccinellids in the southern Kashkadarya province, Uzbekistan // E3S Web of Conferences, Volume 284, 2021. Topical Problems of Green Architecture, Civil and Environmental Engineering (TPACEE-2021).

2. Bo‘riyeva K.P., Mirzayeva G.S. Distribution of coccinellids (Coccinellidae) in the biocenoses of southern Kashkadarya across various landscapes // Aspects and Innovations of Environmental Biotechnology and Bioenergy Materials of the International Scientific and Practical Conference. - Kazakhstan, 2021. - Pp. 129-131.
3. Bo‘riyeva K.P., Mirzayeva G.S., Arabova N.Z. The effect of insectoacaricides on coccinellids // Interscience Scientific Journal. - Moscow, 2021. - №8 (184). - Pp. 25-27.
4. Bo‘riyeva K.P., Arabova N.Z. The influence of external temperature on the life cycle duration and larval stage viability of the seven-spotted ladybird (Coccinella septempunctata L.) under laboratory conditions // Interscience Scientific Journal. - Moscow, 2021. - №8 (184). - Pp. 35-36.