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THE FAUNA, DISTRIBUTION, AND INFLUENCE OF ANTHROPOGENIC FACTORS ON APHIDINEA SPECIES IN THE TERRITORY OF KOKAND STATE FORESTRY, FERGANA REGION

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Abstract: This article explores the taxonomic composition, biological and ecological characteristics, seasonal development, habitats, and the impact of anthropogenic factors on the aphid fauna (Aphidoidea) in the Kokand forestry area of the Fergana region. Based on field observations conducted between 2021 and 2023, a total of 113 aphid species were identified, belonging to five main families. The findings of this research hold significant scientific and practical value for biodiversity monitoring, bioindication, and the development of entomological control measures in the region.

Keywords: aphids, aphid fauna, Aphidoidea, Kokand forestry, biodiversity, ecology, seasonal development, taxonomy, anthropogenic impact

Introduction

According to the Decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev dated January 21, 2021, "On measures to develop science and promote scientific research in the field of forestry," a number of actions have been planned to implement the concept of developing the forestry system in Uzbekistan until 2030. The aims include ensuring integration of science and production in forestry, encouraging scientific research, and improving the system for training personnel with advanced foreign experience at the level of international standards [1].

Literature Review

In the initial stages of aphidological research, alongside faunistic studies, special attention was paid to studying the aphid fauna of forests, along with aphids harmful to agricultural crops. From the 1950s, results of research by A.G. Davletshina began to be published. Most of these works were dedicated to studying the morphology, biology, and taxonomy of Aphis gossypii, A. craccivora, and Acyrthosiphon gossypii. In her second publication in 1952, Davletshina gave a detailed description of the life cycle of Aphis catalpae, noting that it inhabits only catalpa throughout the season and does not migrate to other plants [5]. Her practical research provided the basis for assigning an independent taxonomic status to catalpa aphids, dispelling earlier beliefs that catalpa was the main host plant of A. gossypii [5].

In 1962, the Tajik aphidologist M.N. Narzikulov published an important monograph [4], which included comprehensive data on morphology, biology, taxonomy, vertical and zoogeographic distribution of aphids in Tajikistan and neighboring republics, as well as on the historical

formation of fauna. The theoretical conclusions and practical suggestions by the author were further expanded and enriched with new scientific evidence in subsequent works [9].
In 1964, a monograph dedicated to the taxonomy and biology of aphids belonging to the genus Aphis in the fauna of Uzbekistan was published. This work analyzed 53 species within this morphologically similar and hard-to-distinguish group in detail.
A.G. Davletshina's work on aphids in Bostanlik (Tashkent region) described the species composition, host plants, and distribution of these insects. The fauna, morphology, and biological characteristics of root aphids in Uzbekistan were studied by A.A. Kan [6].
From the 1960s, A.A. Muhammadiev started research on aphids in the Fergana Valley and adjacent areas, marking a new stage in the study of aphids in Uzbekistan. Between 1961 and 1998, nearly ten new species in the genus Ferganaphis Mukh. were discovered and classified [7]. His monograph on the aphids of the Fergana Valley analyzed species harmful to agricultural crops, fruit, and ornamental plants. In collaboration with M.H. Akhmedov, he co-authored a second monograph detailing the species composition, biology, and ecological characteristics of woolly aphids in Central Asia [8].
Between 1972 and 1980, M.H. Akhmedov thoroughly studied the fauna, biology, vertical distribution along climatic zones, and zoogeographical features of dendrophilous aphids in Western Tianshan. His research also focused on the biology, distribution, and damage caused by certain species living on acclimatized trees and shrubs. Further research by Akhmedov and colleagues analyzed the taxonomy, ecology, and faunogenesis of aphids in the arid mountainous regions of Central Asia [2].
From 1992 to 1995, M.M. Yunusov studied the species composition, ecological and geographic distribution of plant aphids in Central Tianshan, with detailed investigations on mountain and forest aphids [12]. Research aimed at reducing aphid damage and managing harmful species in cultivated biocenoses was conducted.
In Uzbekistan, the morphological variability, biology, and ecological features of aphids under conditions of rapid anthropogenic pollution have been studied very little. K.H. Ganiev conducted extensive research from 1997 to 2004 on the morpho-ecological variability of the green apple aphid under anthropogenic pollution [3]. The results are useful for bioindication of environmental pollution and for predicting seasonal development and density of green apple aphids.
Sh.R. Toshmatova, during 2002–2010, studied anthropogenic transformations of aphids in the Ohangaron oasis [11]. This work showed that under strong anthropogenic pressure, the aphid fauna undergoes significant changes dependent on annual seasonal, local ecological conditions, and pollution levels [10].

Results and Analysis

This research collected data on the biology and ecological features of the aphid fauna of plant aphids in the forestry areas of Kokand. The results have practical significance, providing important data for specialists in natural sciences.
The theoretical and practical study has led to certain conclusions and contributed to the expansion of existing evidence.
The research was based on materials collected in 2021–2023 in the Kokand forestry area of the Fergana region, including observations and practical experiments on aphid seasonal development, biology, ecology, reproduction, and control methods.
The study was conducted in orchards, poplar, and elm plantations located in farmer households within the Kokand forestry territory. Seasonal observations were carried out in spring, summer, and autumn — from early spring when eggs hatched until female individuals laid fertilized eggs in autumn. All changes occurring in aphid populations during this period were examined.
Based on observations, the distribution of plant aphids in the Kokand forestry aphid fauna by families showed that the family Anoeciidae was represented by the fewest species, comprising only one species of the genus Anocia, accounting for 0.88% of species diversity.

The family Aphididae held the leading position with the highest number of genera and species—13 genera and 70 species (61.6%).
The family Pemphigidae ranked second in terms of genera and species richness, comprising 6 genera (12%) and 23 species (20.24%).
Representatives of the family Lachnidae included 9 species (7.92%) from the genera Cinara, Eulachnus, Tuberolachnus, Pterochloroides, and Maculolachnus, while the family Chaitophoridae consisted of 12 species (10.56%) from the genera Chaitophorus and Periphyllus.

Conclusion

- The research and observation work thoroughly covered the current state of the topic, materials, and methods.
- Literature analysis discussed the work of foreign and Uzbek aphidologists studying plant aphids.
- Materials for the study were collected based on seasonal observations in farmer households of the Kokand forestry.
- The forestry was established in 1937 on the lands of Kipchak and Fergana forestry divisions, with additional land allocated from state land reserves.
- Although several researchers have studied aphids and compiled literature, the Kokand forestry area of the Fergana region had not been systematically studied.
- This study was based on aphidological material collected during 2021–2024 and practical observations in the Kokand forestry and surrounding areas.
- Aphid samples were collected and analyzed seasonally during spring, summer, and autumn, and partially in winter.
- During collection, aphid distribution, damage to host plants, plant changes, and other factors were studied, with herbarium specimens prepared.
- Seasonal changes in aphid developmental stages and population density were analyzed in relation to temperature and humidity.
- The aphid fauna of the Kokand forestry was investigated by families, revealing their species composition and distribution.

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