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Bioecological Characteristics and Impact of Pest Insects on Ornamental Plants in the Absheron Region

Abstract

In recent years, alongside native ornamental plants, a wide variety of exotic species introduced from other countries have been planted and continue to be cultivated on the Absheron Peninsula, particularly in Baku city and its surrounding areas. With increased state attention and care, the protection and preservation of these plants have become a priority. However, despite these efforts, ornamental plants widely cultivated in Absheron suffer significant damage from insect pests each year, affecting 45–50% of plantings, and in some cases up to 80%. Research has shown that in the parks, boulevards, alleys, streets, and sports complexes of cities and settlements within the region, a total of 85 insect species belonging to 22 families and 4 orders cause damage to both native and introduced ornamental plants. Among these, 11 species are newly recorded for the natural region of Absheron, and 19 species are reported for the first time in the fauna of Azerbaijan. The bioecological characteristics, distribution, and economic importance of 30 species have been studied, along with the phenology of 10 species and the flight dynamics and natural enemies of 6 species.

Keywords: *Absheron region, bioecological, insect, plant, ornamental, pest*

Introduction

The unique geographical position and climatic conditions of the Absheron region, along with the diversity of its vegetation cover, have created favorable conditions for the formation of a rich entomofauna. Ornamental plants play a key role in the cultural development of the Absheron Peninsula, contributing significantly to urban landscaping, environmental improvement, and the mitigation of pollution in urban ecosystems. However, a wide range of ornamental plants cultivated across Absheron suffer extensive damage from insect pests annually, with infestation levels reaching 45–50%, and in some cases up to 80%. Ineffective and untimely application of chemical control measures has largely failed to reduce the damage caused by these pests. Given this situation, the protection and sustainable cultivation of ornamental plants require a scientifically grounded approach. This includes comprehensive studies on the biodiversity, bioecological characteristics, seasonal dynamics, and natural enemies of insect pests. Developing ecologically sound and integrated pest management strategies based on such studies is one of the most pressing issues in ensuring the long-term health and aesthetic value of ornamental plantings in the region (Balakhanova, 2024).

Research

Based on field research conducted on the Absheron Peninsula, 85 species of insect pests have been identified as harmful to ornamental (decorative) plants. Among them, 30 species have been classified as dominant due to their widespread distribution and significant economic impact.

These species cause considerable damage to both native and introduced ornamental plants, leading to a noticeable decline in their aesthetic appearance, visual appeal, and overall landscape value. Given the severity of the infestation and its detrimental effects, these dominant pest species have been studied in detail. Their **bioecological characteristics**—including life cycles, reproductive biology, feeding behavior, and host plant preferences—have been investigated. For a subset of key species, additional research has focused on their **phenology**, **flight activity patterns**, and **spatial distribution** across urban and peri-urban green spaces (Beibutov, 1965). Moreover, the study has also identified and documented the **natural enemies** of these pests, including parasitoids and predators, which play a crucial role in regulating pest populations in the local ecosystem. By integrating this knowledge, scientifically grounded principles for **integrated pest management (IPM)** and **biological control** strategies have been developed. These approaches aim to reduce reliance on chemical pesticides, enhance ecological balance, and ensure the sustainable protection of ornamental plants in the Absheron region. The findings of this research contribute to the broader understanding of urban entomofauna and provide a foundation for implementing environmentally friendly pest management practices in ornamental horticulture. The following provides detailed information on several key pest species (Valiyeva, Hasanova, 2022).

Trialeurodes vaporariorum **Westw. –** ***Greenhouse Whitefly.*** *Trialeurodes vaporariorum* is a highly damaging pest of ornamental and vegetable crops cultivated under greenhouse conditions in household plots across the Absheron Peninsula. Eight species of whiteflies are currently known in Azerbaijan, among which *T. vaporariorum* is the most widespread and economically significant. The adult (imago) has a pale-yellow body with white wings. The body length of females reaches approximately 1.1 mm, while males measure about 0.9 mm. The legs are initially pale yellowish-grey, but within 8–10 days they darken and become black. The first instar larva (approximately 0.3 mm) has visible legs and antennae. By the third instar, the larvae measure around 0.5 mm, and in the fourth instar, they reach 0.73 mm. During the transition to the nymphal stage, the red eyes become visible in mature larvae. The nymph is greenish-white in color (Porchinsky, 1911). The development of *T. vaporariorum* proceeds through seven distinct stages: egg, four larval instars, nymph, and adult. Females lay their eggs in clusters on the undersides of leaves, with clutch sizes ranging from 30 to 500 eggs. After 8–10 days, the eggs hatch into larvae that feed on plant sap by inserting their mouthparts into the leaf tissue. Larvae continue to feed and develop until they reach the adult stage. After emerging from the pupal stage, adults feed for a short period before mating. Fertilized females then begin to oviposit (Mammadov, 2004). It has been observed that in the absence of mating, unfertilized eggs produce only male offspring. *T. vaporariorum* feeds and reproduces on over 300 plant species, including at least 20 species of ornamental plants. Feeding by whiteflies disrupts the photosynthetic activity of plants, significantly reducing both their productivity and ornamental value. This pest presents a serious threat to horticultural aesthetics and yields, especially in greenhouse environments (Moiseeva, Polyakova, 1970).

Aphis craccivora **Koch –** ***Acacia Aphid*****.** The acacia aphid (*Aphis craccivora* Koch) is a widely distributed pest species in the Absheron Peninsula, particularly affecting ornamental plants in urban and suburban parks, alleys, and residential gardens. This aphid primarily infests species from the *Rosa* genus, the Malvaceae family, and is especially common on *Syringa* (lilac) species. The apterous adult forms are pale green with three dull longitudinal stripes running along the dorsal surface (Meyer, 1933-1936). The head is elongated and covered with a waxy coating. The eggs are small, elongated, and black. The pest overwinters in the form of fertilized eggs, usually deposited in crevices of bark or between buds on host plants. In early spring, nymphs hatch from overwintered eggs and migrate to newly emerging shoots, where they begin feeding on plant sap. By the end of the flowering period, these nymphs complete development and give rise to parthenogenetic females that reproduce viviparously. The first generation generally consists of a low number of individuals, but population

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density increases significantly from the second generation onward. Nymphs often aggregate in large colonies on the undersides of leaves (Rubtsov, 1948). Beginning in June, winged forms from subsequent generations disperse to ornamental plants in household gardens and areas near water sources, where they establish new colonies. As a result, the pest continues to reproduce and develop simultaneously on both woody and herbaceous ornamental plants throughout the entire summer season. In September and October, females lay up to 10 eggs before dying. The resulting nymphs develop into sexual females, which mate with males. After mating and fertilization, these females lay 3–5 overwintering eggs over a period of 10–12 days, often covering them with a waxy substance (Safarova, Ismayilova, 2024). Feeding damage by *A. craccivora* causes leaf curling, significantly reducing the photosynthetic area of the plant. In severe cases, mass abscission of leaves and flowers can occur. Additionally, the aphid secretes a sticky honeydew during feeding, which promotes the growth of saprophytic fungi (sooty mold). This leads to contamination and deterioration of branches and foliage, further reducing the aesthetic and physiological quality of the infested ornamental plants (Ben-Yehuda, Assael, Mendel, 2000).

Chrysomela populi **L.– *Poplar Leaf Beetle***. The poplar leaf beetle (*Chrysomela populi* L.) is a significant defoliator of poplar and willow trees in the Absheron Peninsula. It is commonly found in urban green spaces, including parks, alleys, and household gardens, where it primarily infests various species of *Populus*. The adult beetle measures approximately 10–12 mm in length, with a dark green dorsal surface and elytra that exhibit a reddish hue. Under Absheron's climatic conditions, both larvae and adult beetles feed on the foliage of poplar and willow species, often causing considerable damage (Shapiro, 1960). In certain years, infestations have led to a reduction of 40–50% in leaf cover on affected trees, negatively impacting their aesthetic and physiological condition (Mirzoeva, 2001). Adults emerge from overwintering sites in early April. After a feeding period of 10–15 days, females begin oviposition. Each female lays between 200 and 350 eggs, typically in clusters of 20–60 on the undersides of leaves. Larvae hatch towards the end of April and pass through three instar stages. Larval development lasts approximately 12–14 days. By mid-May, mature larvae pupate in the soil or on sheltered parts of the plant. Adult beetles emerge from the pupae within 4–5 days and begin laying eggs by early June, initiating the second generation (Toth, Schmera, Imrei, 2004). Depending on annual climatic conditions, *C. populi* may produce two or even three generations per growing season in the Absheron region. Due to its multivoltine life cycle and high reproductive potential, *Chrysomela populi* represents a significant threat to ornamental and urban forestry plantings, particularly in areas dominated by poplar species. Effective monitoring of its population dynamics and the implementation of timely management strategies are essential to prevent large-scale defoliation and long-term damage to green infrastructure (Mamedov, 2004).

Conclusions

Comprehensive field and laboratory investigations conducted across various urban and suburban areas of the Absheron Peninsula revealed a total of **85 insect pest species** associated with ornamental plants, belonging to **4 orders and 22 families**. Among these, **30 species were identified as dominant**, exhibiting high population densities and causing significant economic and aesthetic damage to both native and introduced ornamental plant species (Safarova, Jabrailzadeh, n.d.). The presence of natural enemies such as *Encarsia* spp. and *Macrolophus caliginosus* was documented, providing a foundation for future biological control efforts. Another key pest, the **acacia aphid** (*Aphis craccivora*), was widely distributed in city parks, alleys, and household gardens. It caused damage primarily to species in the genera *Rosa*, *Syringa*, and the family Malvaceae. The aphid overwinters in the egg stage and produces multiple parthenogenetic generations during the growing season. By **June**, winged morphs were observed dispersing to new host plants, establishing fresh colonies. Infestations led to **leaf**

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deformation, **reduced photosynthetic area**, and in some cases, **mass leaf and flower drop**. The aphid's production of honeydew facilitated the growth of sooty mold fungi, further diminishing plant health and appearance (Asian, Warchalowski, 2001). Phenological observations and trapping studies enabled the identification of **flight periods** for several major species and allowed for the determination of peak activity periods. Overall, the findings demonstrate that insect pests pose a serious and widespread threat to ornamental plantings across Absheron. The need for region-specific, ecologically sound pest control strategies—based on thorough knowledge of pest biology and ecology—is urgent and essential for sustainable landscape management.

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