



FAUNAL DIVERSITY AND ECOLOGICAL CHARACTERISTICS OF DENDROPHAGOUS BEETLES (COLEOPTERA) IN THE FERGANA REGION AND THEIR IMPACT ON FOREST ECOSYSTEMS

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ABSTRACT

The study examines the diversity, distribution, and ecological role of dendrophagous beetles (wood-feeding insects) in the Fergana region of Uzbekistan. A total of over 30 species from the families Scolytidae, Cerambycidae, Buprestidae, Scarabaeidae, and Curculionidae (order Coleoptera) were recorded. These beetles exhibit both beneficial and harmful ecological functions—participating in the decomposition of dead wood and nutrient cycling, while also causing significant damage to forestry and horticulture. The arid continental climate, extensive orchards, and irrigated plantations of Fergana Valley create favorable conditions for their reproduction. The study highlights the need for integrated pest management (IPM) strategies to mitigate the economic losses caused by these insects.

Introduction

Dendrophagous beetles are a diverse group of xylophagous insects that feed on the woody tissues of living or dead plants. Their ecological role is dual: while they contribute to wood decomposition and nutrient recycling, they can also become serious pests, damaging forests and agricultural plantations. The **Fergana region**, located in the eastern part of Uzbekistan, represents a unique biogeographical zone with a variety of habitats—ranging from irrigated orchards and agricultural fields to foothill forests and semi-arid shrublands.

The region's **climatic conditions**—hot summers, mild winters, and uneven precipitation—are highly favorable for the development of numerous wood-boring insects. Despite their economic importance, dendrophagous beetles of Fergana have been insufficiently studied compared to those of Tashkent and Samarkand regions. This study aims to investigate the **faunal composition, ecological distribution, and economic impact** of dendrophagous beetles in Fergana, and to propose effective control measures.

Materials and Methods

The research was carried out during the 2022–2024 vegetation seasons in selected areas of the **Fergana, Margilan, and Rishtan districts**. Sampling was conducted in both **natural forest patches** and **cultivated orchards** (apple, apricot, mulberry, and walnut). Insect specimens were collected using:

- **Visual examination** of bark and trunk surfaces for larval galleries and exit holes;

- **Bait traps** and **pheromone traps** for bark beetles (*Scolytidae*);
- **Manual collection** and **light traps** for longhorn beetles (*Cerambycidae*).

Collected specimens were preserved in ethanol and identified according to the morphological keys of *Browne (1972)*, *Danilevsky (2019)*, and *Lobl & Smetana (2008)*. Environmental data, including air temperature, humidity, and vegetation type, were recorded to correlate beetle abundance with ecological conditions.

Results

The analysis identified **32 species** of dendrophagous beetles belonging to 5 families within *Coleoptera*:

- **Scolytidae**: *Scolytus scolytus*, *S. mali*, *Ips typographus*, *Carpoborus perrisi*, *Xyleborus dispar*
- **Cerambycidae**: *Aeolesthes sarta*, *Trichoferus campestris*, *Saperda populnea*, *Clytus arietis*
- **Buprestidae**: *Capnodis miliaris*, *C. tenebricosa*, *Melanophila picta*
- **Scarabaeidae**: *Polyphylla adspersa*, *Melolontha afflicta*
- **Curculionidae**: *Polydrosus obliquatus*, *Rhynchites auratus*

The **most abundant and economically harmful** species were *Scolytus scolytus*, *Aeolesthes sarta*, and *Capnodis miliaris*. *S. scolytus* was observed primarily on elm (*Ulmus pumila*) plantations near irrigation canals, while *Aeolesthes sarta* infested apricot and mulberry trees in orchards. *Capnodis miliaris* larvae damaged the root collar and lower trunk zone of young fruit trees, leading to wilting and mortality.

Population peaks occurred in **late spring (May–June)** and **mid-summer (July)**, coinciding with high average temperatures (25–32 °C) and low precipitation levels. Statistical analysis confirmed a positive correlation between beetle activity and air temperature ($r = 0.81$, $p < 0.05$).

Discussion

The results indicate that Fergana's **arid climate** and **intensive horticultural practices** favor the proliferation of dendrophagous beetles. The widespread use of irrigation and monoculture orchards creates stable microhabitats with weakened trees—ideal for bark and longhorn beetle colonization.

The predominance of *Scolytidae* species, particularly *Scolytus scolytus* and *Ips typographus*, poses a threat to both natural and ornamental stands of elm and poplar. Their galleries disrupt nutrient flow and often facilitate the invasion of pathogenic fungi, such as *Ophiostoma ulmi*, known to cause “Dutch elm disease.”

The presence of *Aeolesthes sarta* (Asian longhorn beetle) in fruit orchards reflects the spread of xerophilous Cerambycidae species adapted to semi-arid conditions. Similar patterns have been documented in Kazakhstan and Turkmenistan, indicating regional dispersal trends associated with climate warming.

Conclusion

The study confirms the rich faunal diversity of dendrophagous beetles in the Fergana region, representing over 30 recorded species. Their ecological and economic importance necessitates ongoing monitoring and management. Key recommendations include:

1. **Systematic pest monitoring** using pheromone traps and visual surveys;

2. **Sanitary cutting** and destruction of infested trees to limit population spread;
3. **Promotion of biological control** through entomopathogenic fungi (*Beauveria bassiana*, *Metarhizium anisopliae*);
4. **Public awareness programs** for farmers and forestry workers on pest identification and control.

Sustainable management of dendrophagous beetles is essential for preserving the ecological balance and economic productivity of Uzbekistan's Fergana Valley.

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