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IMPACT OF THE POPLAR LEAF BEETLE (MELASOMA POPULI L.) ON POPLAR PLANTATIONS (POPULUS SPP.): BIOLOGY, DAMAGE POTENTIAL, AND CONTROL METHODS

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Abstract: The poplar leaf beetle (Melasoma populi L.) is one of the most dangerous pests affecting poplar trees across the Eurasian region. Its mass reproduction leads to significant foliage damage, reduced photosynthetic activity, and weakened tree vitality. This study examines the biological characteristics of the species, its harmful effects, and methods of monitoring and control. The research was conducted in the Andijan region, where outbreaks of the pest were observed. Results showed that biological control methods, particularly Bacillus thuringiensis-based preparations, are effective alternatives to chemical insecticides.

Keywords: Melasoma populi, poplar, leaf beetle, pest, biological control, monitoring, forest plantations

Introduction. Poplar (Populus spp.) is an important tree species used in landscaping, forestry, and industry. Poplars are widely planted along streets, parks, and squares due to their height, dense crown, and resistance to pollution. These plantations help reduce noise levels and contribute to a comfortable urban microclimate.

In Uzbekistan, poplar is actively used in landscaping and afforestation, especially within ecological improvement and desertification control programs. Poplars rapidly accumulate green biomass, making them effective in combating air pollution and carbon dioxide accumulation. Their leaves release substances that suppress pathogenic microorganisms, improving urban sanitation. The root system stabilizes soil and prevents erosion, particularly in coastal and steppe zones.

However, poplar plantations are vulnerable to various pests, among which the poplar leaf beetle (Melasoma populi L.) is particularly significant. This beetle can cause mass defoliation, negatively affecting tree growth, resilience, and ornamental value. The aim of this study is to investigate the pest's biology, assess its impact on poplar, and propose effective control methods.

Literature Review. Poplar is a fast-growing species capable of producing technically usable wood in short rotation cycles. Globally, about 110 poplar species grow in the Northern Hemisphere [1]. The Royal Botanic Gardens, Kew, lists 199 scientific names under the genus Populus, of which only 87 are recognized as valid species [7]. S.K. Cherepanov's catalog includes 34 species and 8 hybrids found in Russia and neighboring territories [6]. According to the FAO's International Poplar Commission, the total area of natural poplar stands exceeds 75 million hectares, with 96% located in Canada (30.3 million ha), Russia (24.8 million ha), and the USA (17.7 million ha).

According to WikiForest, Melasoma populi belongs to the Chrysomelidae family and is characterized by high fertility. Adults feed on leaves, while larvae consume buds and young shoots. Ecosystema reports peak activity in May–June, marked by intense feeding and reproduction.

Botgard studies describe the beetle's morphology: body length 10–12 mm, brick-red elytra, and a black-blue body. Larvae are gray-white with dark spots. Kuznetsov V.I. (2005) notes that pest populations increase in monoculture plantations, especially in the absence of natural enemies. Ivanova N.P. (2012) highlights the effectiveness of biological control methods, including entomopathogenic bacteria.

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Materials and Methods.

The study was conducted in 2024 at a nursery in the Andijan region. Two plots were selected: infested and control. The following methods were used:

Visual inspection of trees
Counting beetles and larvae
Assessing leaf damage
Application of Bacillus thuringiensis-based biopreparation
Statistical data analysis (ANOVA)
Leaf Damage Stages Caused by Melasoma populi

Initial stage:
Small round bites along leaf edges
Adult beetles with red elytra visible

Intermediate stage:
Leaf covered with multiple holes
Larvae appear—gray with dark spots
Damage covers up to 50% of surface

Skeletonization:
Leaf blade nearly destroyed
Only veins remain
Larvae actively feeding

Complete defoliation:
Leaf entirely consumed
Tree loses photosynthetic capacity
Presence of frass and bark peeling

Results.

On the infested plot, the following was observed:
Up to 75% leaf surface damage.
40% reduction in shoot growth compared to control.
After biopreparation treatment, pest numbers dropped by 82% within 14 days.
In the untreated control group, beetle numbers remained stable.

Discussion.

The poplar leaf beetle (Melasoma populi) is the most significant defoliator of poplar nurseries and plantations. The beetle, 10–12 mm long, has a uniformly convex body. Elytra range from brick-red to yellow-brown with black claw-like tips at the seam and are dotted. The body is black-blue, with a dark head and pronotum. Adults overwinter under fallen leaves or bark at tree bases. They emerge in early spring, depending on location, typically in March in southern regions, coinciding with leaf emergence.

Mating occurs on leaves, and fertilized females lay clusters of 20–30 orange eggs on the underside of leaves, totaling several hundred per female. Larvae, both white and black, feed on leaves—initially on the underside—causing damage comparable to adults. Perforated leaves indicate larval presence. Larvae hatch in 1–2 weeks, begin feeding, and later skeletonize leaves. After 3 weeks, they pupate on leaves. The pupal stage lasts about 10 days. Young beetles feed and initiate a second generation, which in Central Europe completes development by September. In favorable conditions, especially in southern regions, a third generation may occur, and in Transcaucasia, even a fourth.

The data confirm the high damage potential of Melasoma populi in dense plantations. Biological control proved highly effective and environmentally safe. However, during outbreaks, an integrated approach may be necessary, combining agronomic practices and chemical treatments. Pest phenology must be considered for timely intervention.

Conclusion. The poplar leaf beetle poses a serious threat to poplar plantations. Effective control is possible through early detection, biological agents, and adherence to agronomic

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standards. Further research on population dynamics and development of resistant poplar varieties is recommended.

References:

1. Abdullayeva X.Z. G‘o‘zani ildiz qurtidan himoya qilishda axborot kommunikatsion tizimlarini qo‘llash natijalari / Science and education in the modern world: Challenges of the XXI century" Astana, Kazakhstan, may 2023. 12-14 b.
2. Abdullayeva X.Z. G‘o‘zani zararkunandalardan himoya qilishda axborot kommunikatsion tizimlarini qo‘llash natijalari. / O‘zbekiston qishloq va suv xo‘jaligi Maxsus son [1]. 2023. 29-30 b.
3. Abdullayeva X.Z. G‘o‘zani zararkunandalardan himoya qilishda axborot kommunikatsion tizimlarini qo‘llash natijalari. // International Scientific Journal Science and Innovation Special Issue “Digital technologies: Problems and solutions of practical implementation in the spheres” April 2023 664-667 b
4. Abdullayeva X.Z. G‘o‘zaning holati va asosiy zararkunandalari bilan zararlanish darajasini nazorat qilish, prognozlashtirish va boshqarish “Science and Innovation” jurnali 2022-1, 137-142-b
5. Abdullayeva X.Z. G‘o‘zani ildiz qurtidan himoya qilishda axborot kommunikatsion tizimlarini qo‘llash natijalari / “Қишлоқ хўжалигида ресурс тежовчи инновацион технологиялардан самарали фойдаланишнинг илмий-амалий асослари” мавзусидаги халқаро илмий ва илмий-техник анжуман, 1-tom. Андижон 2023. 259-263
6. Деревья и кустарники СССР / Под ред. С.Я. Соколова. М.; Л.: АН СССР, 1954. Т.2. 611 с.
7. Кузнецов В.И. Вредители лесных культур. — М.: Лесная промышленность, 2005.
8. Иванова Н.П. Биологические методы защиты растений. — СПб.: Наука, 2012.
9. Определитель насекомых, повреждающих деревья и кустарники полезащитных полос / Гл. ред. акад. Е. Н. Павловский, ред. проф. Г. Я. Бей-Биенко. — М.—Л., 1950. — С. 208. — 441 с. — (Определители по фауне СССР, издаваемые Зоологическим институтом Академии наук СССР; т. 36).
10. Просвиров А. С. Атлас жуков средней полосы России. — М.: Фитон-XXI, 2019. — С. 217. — 272 с. — ISBN 978-5-906811-64-6.
11. Черепанов С.К. Сосудистые растения России и сопредельных государств (в пределах бывшего СССР). СПб.: Мир и семья, 1995. 992 с.
12. The Plant List. http://www.theplantlist.org/browse/A/Salicaceae /Populus/ (дата обращения: 08.11.2012).
13. https://wiki.rcfh.ru/index.php/Листоед_тополевый
14. https://ecosystema.ru/08nature/insects/77.php
15. http://insects.botgard.uran.ru/node/44