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**МОРФОЛОГИЧЕСКИЕ ОСОБЕННОСТИ
ЛИСТОВОГО АППАРАТА ТОПОЛЯ
БАЛЬЗАМИЧЕСКОГО (POPULUS
BALSAMIFERA L.) В ГОРОДСКИХ ЛЕСАХ
Г. НОВОСИБИРСКА**

**MORPHOLOGICAL FEATURES OF THE
LEAF DEVICE OF POPULUS BALSAMIFERA
L. IN THE URBAN FORESTS OF
NOVOSIBIRSK**

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Использование перспективной культуры тополя
бальзамического в 1950–1970-е получило
широкое распространение не только в городском
озеленении, но и как лесные культуры в
городских лесах. Развитие промышленности и
городской инфраструктуры имело определенное
влияние на насаждения на всех видах городских
объектов озеленения. Биомониторинг состояния
окружающей среды проведен на трех
принципиально различных участках в г.
Новосибирске: на участках городских лесов, в
сквере и на объекте улично-дорожной сети.
Оценка флуктуирующей асимметрии листьев
тополя бальзамического показала, что к
настоящему времени 50–70-летние культуры
тополя бальзамического, выросшие на территории
мегаполиса, характеризуются разной степенью
нарушения или наличия отклонения от
стабильности развития. Их можно расположить
по шкале уменьшения стабильности в следующем
порядке: ландшафтные группы в сквере, лесные
культуры в городских лесах и рядовые посадка на
газонах вдоль улично-дорожной сети

The use of the promising crop of balsam poplar in the
1950s–1970s became widespread not only in urban
landscaping, but also as forest crops in urban forests.
The development of industry and urban infrastructure
has had a certain impact on plantings on all types of
urban landscaping. Biomonitoring of the state of the
environment was carried out at three fundamentally
different sites in Novosibirsk: in areas of urban
forests, in a public garden, and at a road network
facility. An assessment of the fluctuating asymmetry
of balsam poplar leaves showed that, to date, 50–70-
year-old balsam poplar crops grown in the metropolis
are characterized by varying degrees of disturbance
or deviation from developmental stability. They can
be arranged on a scale of decreasing stability in the
following order: landscape groups in the public
garden, urban forest, and ordinary plantings on lawns
along the road network

Ключевые слова: АНТРОПОГЕННАЯ
НАГРУЗКА, ГОРОДСКИЕ ЛЕСА, ЛЕСНЫЕ
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ФЛУКТУИРУЮЩАЯ АСИММЕТРИЯ

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Populus balsamifera L. (balsamic poplar) became widespread in the
landscaping of Siberian cities in the 1950s–1970s after the war. Balsam poplar
was planted both in squares and parks, and on lawn strips along the road

<http://ej.kubagro.ru/2023/06/pdf/19.pdf>

network, and in some cases, forest plantations were formed from it in areas of urban forests.

Despite the location of objects within the urban infrastructure, fundamentally different conditions of growth and technology for caring for green spaces created from balsam poplar led to the formation of plantations with different characteristics. It should be noted that the anthropogenic load and the regulatory framework under which these plantations were created have changed significantly by now. During the creation of plantations, the habitat conditions for urban forests, squares, parks and the road network had similar conditions, but to date, with the development of industry and urban infrastructure, the habitat conditions have acquired significant differences.

In the summer period of 2022, three plots with plantations of balsam poplar were selected on the territory of the city of Novosibirsk, which currently have fundamentally different growing conditions. Technologies for maintaining green spaces throughout their entire life cycle also had significant differences.

Plantings on lawn strips along the six-lane highway Petukhov street, where due to emissions from vehicles and aggressive roadway cleaning technology, two-row plantations of balsam poplar are subjected to the greatest anthropogenic load. The technology of maintaining green spaces is minimized to comply with traffic safety rules and only the undergrowth and lower branches of trees are pruned.

The second site for the study was the square named after. M. I. Kalinin, where green spaces have been maintained since their inception according to the technology.

The third site was forest cultures of balsam poplar in the urban forests of the city of Novosibirsk. Subject to requirements Art. 116 and 122 of the Forest Code of the Russian Federation, the protection regime and the ban on the use of pesticides were observed in these areas. In this area, there was the least technological human intervention in the growth and development of balsam

poplar plantations.

Differences in habitat conditions determined the expediency of environmental monitoring of changing growth rates and condition of trees.

The aim of the work was to determine the level of functional asymmetry of the balsam poplar (*Populus balsamifera L.*) leaf in accordance with the methodology of the Decree of the Russian Ecology Committee dated October 16, 2003.

The material for the study was collected in July 2022 after the leaf growth stopped. At each site, 10 leaves of approximately the same size were selected from short shoots of the lower part of the crown of 20 trees of the same generative age growing on the south side of the trees.

The collected leaves did not show signs of faultiness. Leaves that differed greatly in size or were damaged were discarded. At least 200 leaves were examined for each plot. To assess the magnitude of the fluctuating asymmetry of the balsam poplar leaf blade, a standard set of five morphological features characterizing the stability of leaf formation in ontogenesis was used.

The assessment of fluctuating asymmetry has proven itself in determining the overall level of anthropogenic impact [1]. As a result of measurements of five morphological features of the leaf blade, the degree of deviation of indicators from the norm on a five-point scale was established. At the same time, one point corresponds to a conditional norm, and five points correspond to a critical condition. Table 1 shows data on the fluctuating ability of balsamic poplar leaves based on the results of research in 2022 in Novosibirsk.

Table 1 - Data on the fluctuating ability of balsam poplar leaves

Type of plantations and place of growth	Integral indicator of development stability		Assessment of the level of development stability
	The meaning of fluctuating asymmetry indicators	Development Stability Score	
Ordinary plantings along the road network	0.080	5	High deviation from developmental stability
Landscape groups in the city park	0.047	3	Violation of developmental stability
Forest plantations in urban forests	0.051	4	Deviation from developmental stability

An assessment of the fluctuating asymmetry of balsam poplar leaves showed that row plantations along the road network are characterized by a high deviation from developmental stability, which corresponds to the fifth point of developmental stability. Forest plantations of balsam poplar in urban forests are characterized by the presence of a deviation from the developmental stability or the fourth point of developmental stability. The best indicators were obtained in balsamic poplar plantations in landscape groups in the public garden - the presence of a violation of development stability - three points of development stability.

To date, 50–70-year-old balsam poplar crops grown in the territory of the metropolis are characterized by varying degrees of disturbance or deviation from development stability. They can be arranged on a scale of decreasing stability in the following order: landscape groups in the public garden, forest plantations in urban forests, and row plantings on lawns along the road network. But all of them have a fairly high development stability score - from 3 to 5, which indicates a high anthropogenic impact and characterizes all three green areas of the urban area as polluted, dirty and very dirty, respectively.

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