In order to study the differences between the wood samples for each temporary sample plot, the average NIR spectra were calculated. Before this, they were preliminary processed. The processing included calculating the second-order derivative according to the Savitzky–Golay method (using 7 smoothening points).

It should be noted that the curves are very similar. However, a more thorough study of some characteristic spectral bands indicates that visible differences at each sampling site are still observed, i.e. spectra from each temporary sample plot have their specific chemical composition. However, due to the overlap between the bands in the NIR spectra, it seems difficult to conclude on those chemical compounds that are responsible for these differences.

Considering the different chemical composition of wood at each temporary sample plot, all the spectra we obtained were analyzed using the Principal Component Analysis. As a result, the spectra were found to form three separate groups (TSP No. 1–3, TSP No. 4–6 and TSP No. 7–9), which do not overlap each other. Note that for Vitebsk and Brest regions there is also a separation of each TSP within the group. At the same time, the recorded spectra for Minsk region form one partially overlapping sphere. In this case, this fact can be explained by the fact that the for-est stands on the studied TSP grow under similar soil and environmental conditions.

Thus, the obtained results showed that plantations of Scots pine from different areas can be successfully differentiated using the PCA method, however, in order to successfully separate samples within the same area, in some cases, additional studies and/or other methods of correction of dissemination and processing of spectrometric data may be required.

In general, based on the study conducted, it can be concluded that the NIR spectroscopy method is suitable for determining the place of growth of plant objects and therefore can be recommended for tracking the origin of wood and detecting facts of illegal logging.

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BETULA PENDULA ROTH POLLEN AS A BIOINDICATOR OF THE POLLUTION DEGREE IN URBAN AREAS

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The presented research estimates the possibility of using birch pollen as a biological indicator of the condi-tion of the urbanized territory. Minsk was considered as an example. The studies conducted have shown high sensi-tivity of pollen grains to growth conditions.

Keywords: pollen, Betula pendula Roth, bioindicator, pollution, urban areas.

Assessing the quality of an urban environment full of a variety of pollution sources is of great practical importance. The use of physical, physicochemical, chemical methods with their high accuracy cannot create a complete picture of the ecological situation since under the conditions of the anthropogenic load of the biota experiences the complex effect of all components of the environment. That is why biological methods of controlling the changes in the environment nowadays have an indisputable advantage.

This research discusses the possibility of timely monitoring of the degree of pollution in the city of Minsk using the pollen of Betula pendula Roth., a widespread species in the flora of the urbanized territories of the Republic of Belarus.

The working hypothesis was based on the assumption that under conditions of environmental disadvantage, plants will produce a greater number of teratomorphic and/or sterile pollen grains. Moreover, the more stressful the environmental situation is, the higher the percentage of abnormal pollen will be and vice versa [1].

Male inflorescences of birch were collected in the period corresponding to the beginning of flowering in the following technogenic zones of Minsk: Minsk Automobile Plant (1), Minsk Tractor Works (2), Minsk Motor Plant (3), Minsk Thermal Power Station No. 2 (4), Minsk Thermal Power Station No. 3 (5) and Minsk Thermal Power

Sta-tion No. 4 (6). As a conditionally clean control sample, soil samples were taken from the State Nature Protection Institution Berezinsky Biosphere Reserve (7). All samples were fixed in 70% ethanol. They were examined according to the method of assessing pollen fertility by the acetocarmine method. The resulting preparations were studied using a light microscope at a magnification of 400x. Fertile pollen was considered to be pink-coloured, with a well-structured cytoplasm containing a nucleus with generative and vegetative cells. Sterile and teratomorphic pollen was considered to be unpainted, shrunken, empty, and with other visible damage. A micro preparation was made from the pollen of each sample and at least 2500 pollen grains were scanned [2].

The data obtained indicate the existence of a significant difference between the amount of normally devel-oped fertile pollen in the control sample and different areas of the city of Minsk, characterized by different anthro-pogenic stress. The differences between the pollen test samples and the control samples are statistically significant.

The ratio of abnormal and normally developed pollen in the studied samples significantly differs from the control sample. The number of fertile pollen in the control sample is 94,81 %, while from 44,81 % to 94,81 % in samples with anthropogenic load, which indicates that the quality of pollen directly depends on the level of contamination of the habitat of the indicator species. The largest number of defective and sterile pollen was found in sample No. 6 (44,81 %) taken in the region of TPS-4. Here, the maximum number of detected anomalies is observed – 8. This sample contains both very small and hypertrophied pollen grains, grains without content, with a destroyed and lumpy cytoplasm, with more than three pores.

Thus, since all pollen sampling sites are located close to large industrial enterprises or thermal power stations, which daily release into the atmosphere a large number of various substances including heavy metals. These substances are the main polluting factor, and the different quality of pollen grains in samples may reflect the degree of intensity of the impact of this factor.

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COMPARATIVE ANALYSIS OF THE ANATOMOMETRIC INDICATORS OF SCOTS PINE NEEDLES IN DIFFERENT TYPES OF FORESTS

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The studies conducted have shown high sensitivity of pollen grains to growth conditions. Comparative analysis of the anatomometric indicators of Scots pine needles in different types of forests.

Keywords: needles, Scots pine, types of forests, environmental factors.

Scots pine needles are the organ that is the most sensitive to environmental factors. Knowledge of the laws governing the occurrence of various variations of its anatomical structure as a result of external influences, their differentiation, the transition from a qualitative description to a quantitative expression will make it possible to nar-row the group affiliation and identify plants.

The objective of this research was to conduct a comparative analysis of the biometric indicators of pine needles, depending on the type of forest. At the end of the growing season, 20 model trees were selected from 8 sample plots in the plantations of mossy (1), sorrel (2), ledum (3) and sphagnum (4) forest, located in the territory of the Brest forestry enterprise. Samples of needles of the 1st and 2nd year of life were taken from the model trees from the first-order branches in the middle part of the crown around the entire circumference. The age of the trees ranged from 10 to 15 years. In laboratory conditions the length (A) of each needle was measured to an accuracy of 0.01 cm, the width (B) and thickness (C) were measured on transverse sections in the field of view of the Leica mi-croscope at the magnification of 10X in the middle part of the needles, the number of resin channels (D) was count-ed, and the stomata were (E) measured and counted at the magnification of 40X. Based on the experimental studies conducted, it was found that, according to the dimensional indicators of the needles (length, width, thickness, area), the pine trees are arranged in the following order: mossy, sorrel, ledum, sphagnum, i.e. in case of worse nutrition and water supply, the values of these indicators decrease ac-