

## **BIOINDICATION OF THE CONDITION OF THE COUNTRYSIDE WITH THE HELP OF THE TEST “FLUCTUATED LEAF ASYMMETRY”**

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The assessment of the quality of the environment in the area of the village of Staroe Selo by the fluctuating asymmetry of the birch leaf plate makes it possible to determine the quality of the state of the environment by applying a method that does not require large financial costs [3]. It is also worth noting the speed of obtaining materials for research, the simplicity of calculating the value of the stability indicator for the development of the object under study, according to which the assessment of the state of the environment is carried out. The choice of silver birch (*Bétula péndula*) as a bioindicator is due to the fact that it is characterized by high ecological plasticity, intensive growth and durability, and also has high dust and gas trapping properties. In addition, this research work clearly reflects the fact that the state of the environment directly depends on the level of anthropogenic pressure on it [2].

The purpose of the work is to assess the quality of the environment in terms of fluctuating asymmetry of drooping birch leaves in the area of the village of Staroe Selo.

**Material and methods.** The collection of material and the calculation of the fluctuating asymmetry index were carried out according to the method of V. Zakharov [1]. Five measurements were taken from each leaf on both sides of the leaf: the width of the half of the leaf, the length of the second vein from the base of the leaf of the second order, the distance between the bases of the first and second veins of the second order, the distance between the ends of these veins, the angle between the main vein and the second from the base of the leaf with a vein of the second order. Indicators 1-4 are determined using a ruler, and 5 – using a protractor. The research was carried out at the school site, near the intersection of highways and in the forest near the village of Staroe Selo, Vitebsk region. 10 leaves were collected from each tree. In total, 15 trees were examined, 150 leaves were collected, and 750 measurements were made. Statistical data processing was carried out using the "Analysis Package" in the program "Microsoft Office Excel".

**Findings and their discussion.** In addition to determining the level of fluctuating asymmetry, a correlation analysis was carried out in order to study the relationship between the right and left sides of the leaf according to five features. All values of the correlation coefficient turned out to be positive (table). This means that following the increase in the indicators on one side of the sheet, the indicators on the other side of the sheet also increased. As a result, the following results were obtained: in the school district, the first sign has a value of 0.82, the second – 0.95, the third – 0.66, the fourth – 0.59, the fifth – 0.56; near the intersection, the following correlation indicators are observed: for the first sign – 0.89, for the second – 0.96, for the third – 0.39, for the fourth – 0.65 and for the fifth – 0.63; in the forest, the first characteristic is characterized by a value of 0.75, for the second 0.91, for the third – 0.65, for the fourth and fifth 0.45 and 0.66, respectively.

Table – Correlation coefficients of sheet plate parameters

Explored points	Investigated signs				
	1	2	3	4	5
School district	0,82	0,95	0,66	0,59	0,56
Near the intersection	0,89	0,96	0,39	0,65	0,63
Forest	0,75	0,91	0,65	0,45	0,66

So the degree of relationship between the right and left sides of the leaf in the school area ranges from significant to very high; near the intersection and in the forest – from moderate to very high.

Turning to the results of calculating the fluctuating asymmetry, we observe the following: in the school area, the value of FA is 0.04, near the intersection of roads – 0.049, in the forest – 0.038. Thus, we see that the highest value of fluctuating asymmetry is observed near the intersection, where the state of the medium is characterized as polluted and corresponds to 3 points on the scale for assessing fluctuating asymmetry deviations.

Now, based on the foregoing, we can assess the state of the environment in the area of the village of Staroe Selo. Having found the arithmetic mean of the fluctuating asymmetry of silver birch leaves in three places of the study, we see that the average value is  $0.042 \pm 0.002$ . Turning to the scale for assessing deviations in terms of the value of the fluctuating asymmetry, we can say that this value lies in the range of 0.040 – 0.044 (2 points). This indicates that the village of Staroe Selo is characterized by a weak influence of unfavorable factors.

**Conclusion.** The degree of correlation between the right and left sides of the drooping birch leaf varies from moderate to very high (0.39-0.96). Statistically unconfirmed differences in the fluctuating asymmetry index were established, which tends to decrease at the study points: forest (0.038) – school site (0.04) – road intersection (0.049). The average index of fluctuating asymmetry of the drooping birch leaf in the study area was  $0.042 \pm 0.002$ , which indicates favorable conditions and a weak influence of anthropogenic load.

1. Zakharov, V. Environmental health: assessment methodology / V. Zakharov, A. Baranov, V. Borisov. – M.: Center for Environmental Policy of Russia, 2000. – 68 p.

2. Kulagin, A. Woody plants and biological conservation of industrial pollutants / A. Kulagin. – M.: Science, 2005. – 190 p.

3. Litvenkova, I. Fluctuating asymmetry as an indicator of population development stability / I. Litvenkova // Fundamental and applied problems of stress: mat. II Intern. scientific-practical. conf. Vitebsk, April 21, 2011. – Vitebsk, 2011. – P. 192–194. URL: <https://rep.vsu.by/handle/123456789/14383> (accessed 10.10.2022).

## “GREEN” STUDENT AUDIENCE

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Keywords: “green” economy, “green” office, save, resources, planet, society.

There are more than 8 billion people living on the planet Earth. We use nature for our own purposes, because of what it suffers. Population and consumption are growing, and little attention is paid to environmental protection. This leads to an increase in production,