

We found that the field germination of cornel seeds from preliminarily fermented fruits amounted to $78.25 \pm 4.5\%$ (table). The control sowing of seeds from unfermented fruits showed a germination rate of $4.1 \pm 0.02\%$, which is 14 times lower than in the experimental crops. This figure is alarming and requires further checks.

Table

Germination of seeds of male dogwood

Seed germination, %	
Control	Experience
$4,1 \pm 0,02,$	$78,25 \pm 4,5$

In April 2018, we conducted biometric studies of one-year male dogwood seedlings. Measured (total plant length, shoot length, length of the main root, the number of vegetative buds was counted).

We found that the total length of an annual plant was 22.33 ± 0.59 cm, the length of the shoot was 10.29 ± 0.35 cm, the length of the main root was 12.04 ± 0.35 cm, the number of vegetative buds – 2.99 ± 0.09 cm.

Since there are few control plants, we do not present biometric data, because the indicators are not statistically reliable because of a small sample.

Conclusion. Thus, studies have shown that fermentation of male cornel fruit is a promising method of scaffolding, since a significant difference in seed germination is shown, which made it possible to obtain a sufficiently large number of plants.

Seeds of male dogwood feel good, grow, develop under the conditions of the Vitebsk Botanical Garden of the Voronezh State University named after P.M. Masherova.

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**COMPARISON OF CATALASE ACTIVITY IN TISSUES
OF THE PULMONARY FRESHWATER MOLUSKES
THAT HAVE INHABITED IN NATURAL RESERVOIRS**

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Currently, it is relevant to assess the status of aquatic ecosystems, due to an increase in the level of anthropogenic pressure. The widespread use of natural water bodies in industry and agriculture, the development of domestic water

supply, the impact of pollutants of various origins cause a variety of factors of anthropogenic pressure on water bodies. The main threat to the life of hydrobionts is pollution of water bodies with waste and heavy metals. The vital activity of biological organisms is influenced by the antioxidant defense system, which is involved in the neutralization of reactive oxygen species produced in cells under the influence of oxidative stress, whose mechanisms are associated with free radical oxidation. Excessive free radicals increase lipid peroxidation, resulting in oxidative transformations of polyunsaturated fatty acid phospholipids, neutral fats and cholesterol, which are the main components of cell membranes [1].

Today, the use of pulmonary freshwater mollusks as test organisms for assessing the state of the environment is relevant. Shellfish make up an important component of benthos. Being a bioindicator, mollusks have the following advantages among macrozoobenthos: a variety of taxonomic composition, ease of collection and a sedentary lifestyle [2].

The purpose of the study is to assess the activity of catalase of pulmonary freshwater mollusks of natural reservoirs of the Republic of Belarus, taking into account seasonality, habitat and type of oxygen transport.

Material and methods. The experiments were performed on 252 freshwater pulmonary mollusks divided into two groups: 126 individuals of *Lymnaea stagnalis* (common pond) and 126 individuals of *Planorbarius corneus* (horn coil). Mollusks were collected spring (April-May), summer (June-July) and autumn (September-October) from reservoirs of four districts of the Vitebsk region and three districts of the Gomel region (table 1). Each research subgroup contained 9 mollusks.

Table 1 – Places for the selection of mollusks

Shellfish collection area	Collection place	Pond name
Vitebsk district	Vitebsk	r. Vitba
Dubrovensky district	v. Lyady	l. Afanasyevskoe
Ushachsky district	v. Dubrovka	l. Dubrovskoe
Shumilinsky district	a/g Bashni	l. Budovest
Gomel district	Gomel	l. Lubenskoe
Mozyr district	v. Krasnaya Gorka	r. Pripyat
Rogachev district	Rogachev	r. Drut

Catalase activity was determined by the amount of undecomposed H₂O₂ determined by reaction with ammonium molybdate [3].

Mathematical processing of the results was carried out using parametric and non-parametric statistics using the statistical software package Microsoft Excel 2010, STATISTICA 6.0.

Findings and their discussion. The state of the environment has an impact on the growth, development and livelihoods of living organisms. Especially the environment affects hydrobionts, since toxicants and xenobiotics easily

accumulate in the water. According to the metabolism of mollusks, it is possible to judge the state of the aquatic ecosystem, to predict the degree of anthropogenic influence, the role of biotic and abiotic factors.

According to the results of the study, it was found that the indicators change not only under the influence of the environment, but also cyclically depending on the season of the year. This distribution of the values of the studied parameters, apparently, is due to the fact that the spring period is associated with a sharp rise in temperature during the daytime and lower during the night (instability of the temperature regime), insufficient food supply at the beginning of the season, and the release of anabiosis of hydrobionts.

Table 2 – Catalase activity ($\mu\text{mol} / \text{min} / \text{g}$) in hepatopancreas *Lymnaea stagnalis*($M\pm m$)

Shellfish collection area	Season of the year		
	Spring (n=9)	Summer (n=9)	Autumn (n=9)
Vitebsk district	3,13±0,05 ¹	2,56±0,07	2,85±0,09 ¹
Dubrovensky district	3,03 ± 0,12	2,81±0,05	2,94 ± 0,08
Ushachsky district	3,20±0,29	2,87±0,16	3,06±0,40
Shumilinsky district	3,13±0,30	2,59±0,23	2,94±0,10
Gomel district	3,12±0,08	2,99±0,07	3,06±0,12
Mozyr district	4,57±0,12	3,62±0,08	4,19±0,11
Rogachev district	5,28 ± 0,19 ¹	3,35±0,04	4,28 ± 0,12 ¹

Note – ¹p <0,05 compared with the summer period of collecting mollusks; ²p <0,05 compared with the autumn period of collecting mollusks

Compared with the spring and autumn collection periods in the hepatopancreas of *Lymnaea stagnalis*, the activity of catalase was reduced in the summer period in all the studied areas (table 2). Compared with the summer collection period, catalase activity increased 1,2 times in the Vitebsk and Shumilino regions, 1,3 times in the Mozyr district and 1.6 times in the Rogachev district in the spring collection period.

Table 3 – Catalase activity ($\mu\text{mol} / \text{min} / \text{g}$) in hepatopancreas *Planorbarius corneus* ($M\pm m$)

Shellfish collection area	Season of the year		
	Spring (n=9)	Summer (n=9)	Autumn (n=9)
Vitebsk district	2,80±0,05	2,17±0,07	2,66±0,11
Dubrovensky district	3,04 ± 0,09	2,38±0,04	2,76 ± 0,08
Ushachsky district	2,89 ± 0,09	2,66±0,05	2,79 ± 0,08
Shumilinsky district	2,71 ± 0,04	2,47±0,08	2,60 ± 0,10
Gomel district	3,16±0,06	2,83±0,11	3,02 ± 0,07
Mozyr district	4,58 ± 0,15 ¹	1,10±0,05	2,34 ± 0,09 ¹
Rogachev district	4,52 ± 0,14 ¹	1,12±0,06	2,86 ± 0,17

Note – ¹p <0,05 compared with the summer period of collecting mollusks; ²p <0,05 compared with the autumn period of collecting mollusks

Compared to the summer collection period, catalase activity increased 1.3 times in the Vitebsk and Dubrovno districts, 4,2 times in the Mozyr and Rogachev districts in the spring collection period (table 3).

There were no statistically significant differences in catalase activity in mollusks depending on the type of oxygen transport in all the studied regions of the Vitebsk and Gomel regions.

According to the data obtained, the activity of catalase in the metapopaneas of mollusks has been established that mollusks from the Vitebsk region are lower on average by 1,5 times compared to the Gomel region (Mozyr and Rogachev districts).

Conclusion. In the course of the work, it was established that the indicators of AOS of the tissues of pulmonary mollusks change under the influence of the environment and depend on the season of the year and the background radiation background. The content in water of various pollutants (metal ions, organic substances, etc.) negatively affects the work of enzymes. All the results described in the summer period were an order of magnitude smaller than the spring indicators. This suggests an increased work of AOS of pulmonary mollusks at the time of their release from anabiosis. Depending on the oxygen carrier, no regular changes in catalase activity were recorded.

The difference in the activity of indicators of the enzyme system of mollusks of the Gomel and Vitebsk regions lies in different temperature conditions. Gomel is characterized by a warmer climate, which means that hydrobionts in this area previously come out of hibernation, as a result of which their response to environmental conditions will differ from the reaction of hydrobionts from the Vitebsk region. The increased background radiation indicates that the FLOOR will be higher in the territory of the Gomel region. As a result, the enzymatic AOS itself does not cope with this level of oxidative stress.

The results of the study can be used for biomonitoring and bio-diagnostics of the state of freshwater bodies, in assessing the degree of anthropogenic impact on the environment.

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