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**ANALYSIS OF THE AUTHENTICITY INDICATORS OF THE LEAVES OF NUPHAR LUTEA AND ASSESSMENT OF THE PROSPECTS FOR USING THE INDICATOR OF THE POPULATION PRESENCE OF NUPHAR LUTEA TO DETERMINE THE ECOLOGICAL WELL-BEING OF THE RESERVOIR**

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**Abstract.**

Despite the fact that the IUCN Red List defines Nuphar lutea as the "least concern species", in the Russian Federation the populations of Nuphar lutea are decreasing in different regions. For example, in the Red Book of the Krasnodar Territory, the plant is defined as "vulnerable". A significant decrease in the population presence of Nuphar lutea can be avoided by using the above-water (floating) leaves of the plant as medicinal raw materials instead of its rhizomes. According to the studies of recent years, extracts of the leaves of Nuphar lutea also have a good pharmacological potential for use.

**Purpose.**

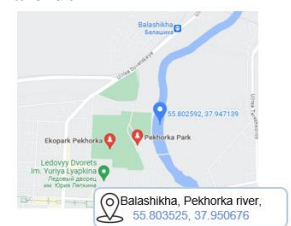
To assess the validity of the use of Nuphar lutea leaves as a new medicinal raw material and to analyze the authenticity indicators of dried above-water Nuphar lutea leaves.

**Objectives.**

- 01 Search for scientific literature on the subject of research on this type of raw materials.
- 02 Study of positive aspects of the use of new medicinal raw materials
- 03 Analysis of dried raw materials by authenticity indicators.
- 04 Analysis dried raw materials according to additional methods.

**Materials and methods.**

- Search and analysis of scientific literature and regulatory documentation
- Collecting and drying of the floating leaves of Nuphar lutea
- Assessment of external signs of raw materials, microscopy of leaf from its surface, conducting qualitative reactions to different groups of BAS
- Microcrystalline analysis for alkaloids



**Pharmacological properties of Nuphar lutea leaf extract.**



The extract of the aquatic plant Nuphar lutea L. showed the most significant inhibition of NF-κB. Activity is concentrated **mainly in the leaves and rhizome of the plant.**

**Leaves or rhizomes? The importance of preserving rhizomes.**

When harvesting rhizomes, stocks recover **very slowly**



The main method of reproduction of Nuphar lutea is **vegetative** (by rhizomes)

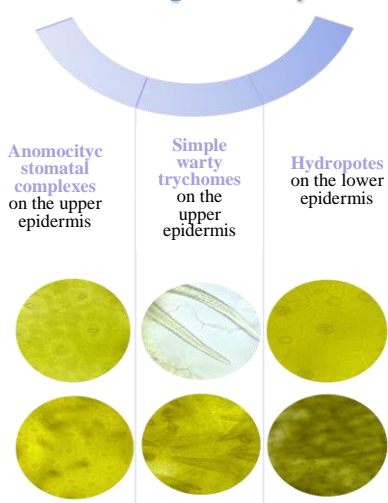
The system of rhizomes and roots provides zoobenthos with food and substrate **even outside the growing season**

**Macroscopic analysis.**

Diagnostic feature	Characteristic of the feature
Structure of the leaf	Simple
Shape of the leaf	Ovoid-oval
Nature of the leaf base	Heart-shaped
Nature of the leaf apex	Rounded
Nature of the leaf edge	Entire
The presence of a petiole, its shape	Present, triangular
Leaf venation	Pinnate
Colour of the leaf	Above: yellowish-green, below: dark green
Pubescence of the leaf and petiole	Absent
Size of the leaf	Length: 14-22 cm, width: 10-14 cm
Smell	Specific
Taste	Not defined



**Microscopic analysis.**



**Qualitative analysis on BAS.**

Group of BAS	Reagents	Phenolic extract (C <sub>12</sub> H <sub>10</sub> O <sub>2</sub> )	Chloroform-ammonia extract (CH <sub>2</sub> Cl <sub>2</sub> /NH <sub>3</sub> ·CH <sub>3</sub> CO <sub>2</sub> )
Phenols	2 ml of hydrochloric acid and 2 ml. alk. added to 2 ml of filtrate	red solution (dark green at the bottom of the tube)	red solution (dark green at the bottom of the tube)
Tannins	0.5 ml of ammonia, then 0.05 ml of sodium 1% is added to 2 ml of filtrate	(greenish black coloring)	(greenish black coloring)
Saponins	1 ml of filtrate is placed in a test tube and shaken hard	-	(abundant, persistent foam)

**Qualitative analysis for alkaloids.**

Reagents	Phenolic extract (C <sub>12</sub> H <sub>10</sub> O <sub>2</sub> )	Chloroform-ammonia extract (CH <sub>2</sub> Cl <sub>2</sub> /NH <sub>3</sub> ·CH <sub>3</sub> CO <sub>2</sub> )
Phosphomolybdic acid	hard to distinguish result (only turbidity)	(sediment in the color of the reagent)
Phosphotungstic acid	hard to distinguish result (only turbidity)	(sediment in the color of the reagent)
Reagent of Dragendorff	rapidly disappearing turbidity (color of the filtrate)	rapidly disappearing turbidity (color of the filtrate)
Picric acid	(orange-brown of the filtrate)	(rapidly disappearing turbidity of the filtrate)
Reagent of Lugol	(yellow turbidity of the filtrate)	-

**Microcrystalline analysis for alkaloids.**



**Results.**

Due to the harvesting of rhizomes, the plant population can be decreased. To avoid this, we can use floating leaves of Nuphar lutea. Qualitative reactions proved the presence of alkaloids, tannins, saponins and flavonoids in the extracts of the leaves. In microcrystalline reactions with some alkaloidal reagents crystals in the form of jagged or simple crosses of different sizes could be observed.

**Conclusions.**

Medicinal raw materials in the form of above-water leaves of Nuphar lutea can become a more environmentally friendly replacement for the rhizomes of this plant with the preservation of qualitative groups of biologically active substances.

**Microcrystalline analysis for alkaloids.**

