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IMPROVEMENT OF METHODS FOR ISOLATING FLAVONOIDS FROM THE RAW MATERIAL OF LAGOCHILUS INEBRIANS

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Abstract Lagochilus inebrians Bge. is a valuable medicinal plant belonging to the family Lamiaceae. This plant is widely distributed in Central Asia and has long been used in traditional medicine due to its hemostatic, sedative, anti-inflammatory and biologically active properties. The pharmacological effects of Lagochilus inebrians are mainly associated with the presence of various secondary metabolites, including diterpenoids, phenolic compounds, tannins, essential oils, alkaloids and flavonoids.

Flavonoids are one of the most important groups of natural phenolic compounds found in plants. They are known for their antioxidant, anti-inflammatory, antimicrobial, capillary-strengthening and hepatoprotective properties. Therefore, the isolation and study of flavonoids from medicinal plants is an important task in phytochemistry and pharmaceutical science. The improvement of extraction and purification methods makes it possible to obtain flavonoid-rich fractions with higher yield and purity.

The present thesis is devoted to the improvement of methods for isolating flavonoids from the raw material of Lagochilus inebrians. The research focuses on selecting effective extraction conditions, choosing suitable solvents, optimizing the extraction time and temperature, and applying chromatographic methods for the purification of flavonoid compounds. The improvement of these methods is important for the rational use of plant raw materials and for obtaining biologically active substances that may be used in the development of phytopreparations.

Keywords: Lagochilus inebrians, flavonoids, extraction, isolation, medicinal plants, phytochemistry, chromatography, biologically active substances.

Introduction Medicinal plants are an important natural source of biologically active compounds. Many plant-derived substances are widely used in medicine, pharmacy, cosmetology and biotechnology. Among these substances, flavonoids occupy a special place because of their diverse chemical structure and broad spectrum of biological activity.

Lagochilus inebrians Bge. is one of the promising medicinal plants of Central Asia. It has been studied as a source of biologically active compounds and is known for its therapeutic potential. The plant contains different classes of secondary metabolites, which determine its pharmacological importance. In particular, flavonoids found in *Lagochilus inebrians* may contribute to its antioxidant and anti-inflammatory activity.

Flavonoids are polyphenolic compounds that are widely distributed in higher plants. They usually occur in the form of glycosides or aglycones. Their extraction from plant raw materials depends on many factors, including the nature of the solvent, particle size of the raw material, extraction temperature, extraction duration, ratio of raw material to solvent and purification method. Therefore, the improvement of flavonoid isolation methods is necessary to increase the efficiency of the technological process.

Traditional extraction methods often require large amounts of solvent and long extraction times. In addition, they may not always provide high yield or sufficient purity of the obtained flavonoid fractions. For this reason, modern phytochemical research pays special attention to optimization of extraction conditions and the use of effective chromatographic purification methods.

Aim of the Study. The main aim of this research is to improve the methods for isolating flavonoids from the raw material of *Lagochilus inebrians* and to determine optimal conditions for obtaining flavonoid-rich extracts.

Objectives of the Study

To achieve this aim, the following objectives were defined:

1. To study the chemical composition of *Lagochilus inebrians* raw material based on literature data.
2. To select suitable solvents for the extraction of flavonoids.
3. To compare different extraction conditions and determine the most effective method.
4. To obtain flavonoid-containing fractions from the plant raw material.
5. To purify the obtained fractions using chromatographic methods.
6. To evaluate the qualitative characteristics of isolated flavonoid compounds.
7. To propose an improved method for the isolation of flavonoids from *Lagochilus inebrians*.

Materials and Methods. The object of the study was the aerial part of *Lagochilus inebrians* Bge. The plant raw material was collected, dried under natural conditions away from direct sunlight, and then ground to obtain a uniform powder. Proper preparation of the raw material is important because the degree of grinding affects the extraction efficiency of biologically active compounds.

For the isolation of flavonoids, several solvent systems may be used. Ethanol, methanol, water-ethanol mixtures and other polar solvents are commonly applied for extracting flavonoid compounds. Since flavonoids are phenolic substances, they are better extracted by polar and moderately polar solvents.

In the experimental process, the plant raw material can be extracted with 70% ethanol, 80% ethanol or methanol-water mixtures. The extraction may be carried out by maceration, heating under reflux or ultrasonic extraction. Among these methods, ultrasonic extraction is considered more efficient because it reduces extraction time and increases the release of biologically active substances from plant cells.

After extraction, the obtained solution is filtered and concentrated under reduced pressure. The concentrated extract is then treated to remove accompanying substances such as chlorophylls, fats and resins. For this purpose, liquid-liquid extraction with solvents of different polarity may be used. For example, non-polar impurities can be removed with petroleum ether or chloroform, while flavonoid compounds remain in the polar fraction.

The purification of flavonoids can be carried out using column chromatography, thin-layer chromatography or high-performance liquid chromatography. These methods allow the separation of individual components from complex plant extracts. Thin-layer chromatography can be used for preliminary identification of flavonoids by comparing the Rf values of spots and observing their color reactions with specific reagents.

Qualitative reactions are also important for detecting flavonoids. The presence of flavonoids may be confirmed by the Shinoda reaction, reaction with aluminum chloride, ferric chloride and alkaline solutions. For example, aluminum chloride forms colored complexes with flavonoids, which can be used for both qualitative and quantitative analysis.

Results and Discussion The analysis of literature data shows that *Lagochilus inebrians* contains a wide range of biologically active substances, including flavonoid compounds. These compounds are important because they may participate in the pharmacological activity of the plant. The improvement of flavonoid isolation methods is therefore necessary for obtaining more concentrated and purified fractions.

The selection of solvent plays a key role in flavonoid extraction. Water alone may not be sufficiently effective for extracting all flavonoid forms, while absolute alcohol may extract fewer glycosidic flavonoids. Therefore, aqueous ethanol is considered one of the most suitable solvents for flavonoid extraction. A 70% ethanol solution may provide good extraction efficiency because it dissolves both glycosidic and moderately polar flavonoid compounds.

The extraction temperature also influences the yield of flavonoids. Moderate heating can accelerate the extraction process, but very high temperatures may lead to degradation of thermolabile compounds. Therefore, the optimal extraction temperature should be selected carefully. In many cases, extraction at 50–60°C is considered suitable for preserving flavonoid compounds while improving their release from plant material.

The extraction time is another important factor. Very short extraction time may result in incomplete extraction, while excessively long extraction may increase the amount of accompanying substances in the extract. Therefore, optimization of extraction duration allows researchers to obtain flavonoid-rich extracts with fewer impurities.

The use of ultrasonic extraction may significantly improve the isolation process. Ultrasound waves destroy plant cell walls and facilitate the transfer of flavonoids into the solvent. As a result, the extraction time can be reduced and the yield of flavonoids can be increased. This method is also considered more economical because it requires less solvent and energy compared with traditional long-term maceration.

Chromatographic purification is necessary to obtain flavonoid fractions with higher purity. Column chromatography allows the separation of flavonoids according to their polarity and adsorption properties. Thin-layer chromatography provides a simple and rapid method for monitoring the separation process. High-performance liquid chromatography can be used for more accurate identification and quantification of individual flavonoid compounds.

The improved method for isolating flavonoids from Lagochilus inebrians may include the following stages: drying and grinding of plant raw material, extraction with 70% ethanol, concentration of the extract, removal of non-polar impurities, purification of the flavonoid fraction by chromatography, and qualitative identification of the obtained compounds.

Such an approach makes it possible to increase the efficiency of flavonoid isolation, reduce the loss of biologically active substances and obtain a cleaner flavonoid-containing fraction. This is important for further pharmacological studies and for the development of medicinal preparations based on *Lagochilus inebrians.*

Scientific Novelty The scientific novelty of this research lies in the optimization of technological conditions for isolating flavonoids from Lagochilus inebrians raw material. The study proposes improved extraction parameters, including the use of suitable aqueous alcohol solvents, optimal extraction temperature and time, and chromatographic purification methods. This approach may provide higher yield and better quality of flavonoid fractions compared with traditional extraction methods.

Practical Significance The practical significance of this study is related to the possibility of using the improved method for obtaining flavonoid-rich extracts from *Lagochilus inebrians*. The results may be useful in phytochemical research, pharmaceutical analysis and the development of plant-based medicinal products. The proposed method may also contribute to the rational use of local medicinal plant resources.

Conclusion. In conclusion, Lagochilus inebrians Bge. is a promising medicinal plant containing various biologically active compounds, including flavonoids. Flavonoids are important natural substances with antioxidant, anti-inflammatory and other pharmacological properties. Therefore, their isolation from plant raw material is of great scientific and practical importance.

The improvement of flavonoid isolation methods depends on the correct selection of extraction solvent, extraction time, temperature, raw material particle size and purification method. Aqueous ethanol, especially 70% ethanol, can be considered an effective solvent for extracting flavonoid compounds from *Lagochilus inebrians*. The use of ultrasonic extraction and chromatographic purification may further increase the yield and purity of the obtained flavonoid fractions.

Thus, the improved method for isolating flavonoids from *Lagochilus inebrians* raw material can provide better extraction efficiency and create a basis for further chemical, pharmacological and pharmaceutical studies. Future research should focus on the isolation of individual flavonoid compounds, determination of their chemical structures and evaluation of their biological activity.

References

1. Harborne J.B. *Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis*. London: Chapman and Hall, 1998.
2. Trease G.E., Evans W.C. *Pharmacognosy*. London: Saunders, 2009.
3. Bruneton J. *Pharmacognosy, Phytochemistry, Medicinal Plants*. Paris: Lavoisier, 1999.

4. Hostettmann K., Marston A. *Chemistry and Pharmacology of Natural Products*. Cambridge University Press, 1995.
5. Scientific studies on the chemical composition and biological activity of *Lagochilus inebrians* Bge.
6. Literature data on extraction and chromatographic isolation of flavonoids from medicinal plants.