

**INTENSIFIED ULTRASOUND-ASSISTED METHOD OF POLYPHENOLS
EXTRACTION FROM ACORUS CALAMUS LEAVES**

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Introduction. Phytotherapeutic treatment of most diseases has been known to mankind since ancient times. In folk medicine, there are many recipes that our ancestors used to treat, prevent or alleviate the symptoms of various pathologies.

Modern therapy is mainly based on synthetic drugs. Fast and strong action makes them attractive to consumers, however, in the case of long-term use, they're dangerous to public health. That's why many modern studies are aimed to develop new drugs based on medicinal plant raw materials. The main argument in favor of the use of phytopreparations is their safety and complex effect on the human body, which provides high efficiency with minimal risk of side effects.

Sweet flag (latin *Acorus calamus* L.) is a world-famous medicinal plant (MP) with valuable therapeutic properties.

In Ayurvedic medicine, sweet flag was widely used to strengthen the body. It was also popular among Native Americans and was considered a plant with significant healing effects. Later, their experience was adopted by immigrants from Europe.

Today in the modern scientific literature numerous researches on pharmacological activity of calamus and extracts from it are described. Has been found that this plant provide anti-exudative and hepatoprotective effect, esures activity towards the hepatobiliary system through improvement of bile-secretory and bile-forming function of the liver. Antioxidant and anticytolytic properties, which are confirmed through a significant decrease in the activity of AST, ALT and g-HHTTP, were also observed. The prophylactic antiulcer effect of calamus leaves extract is proven, It has also been described that dealcoholized *Acorus* leaves extract had dose-dependent thymoleptic activity.

Purpose of the research. To determine the intensified method of extraction of phenolic compounds from *Acorus calamus* leaves and optimal conditions for the process.

Materials and methods. In order to develop the optimal intensified method of extraction samples were prepared in different conditions of raw materials-extractant ratio, temperature, time and multiplicity. The process of extraction was conducted using ultrasound with frequency 35 kHz. As a raw materials, spectrophotometrically pre-standardized *Acorus calamus* leaves were used. Polysorbate 80 was tested as a surfactant. As the criteria of extraction efficiency were indicators of total amount of flavonoids determined using methods described in State Pharmacopoeia of Ukraine. The amount of flavonoids was determined spectrophotometrically on a certified device Specord 200 (Analytik Jena, Germany).

Obtained results. According to our research results it was found that ultrasonic action and addition of surfactant significantly improves the efficiency of the extraction process. The optimal conditions for the process were determined. Experimentally proved that the rational raw material-extractant ratio is 1:15. Reducing the liquid phase to 1:10 leads to a significant decrease in extractives yield, while the ratio of 1:20 was associated with a little increase in the yield of biologically active substances (BAS) but caused significant increment of extractant volume, which reduced the concentration of BAS in the extract and made this ratio economically impractical.

According to the obtained results of determination of optimal extraction time and temperature, the most complete depletion of raw materials was achieved in 45 minutes of extraction at 70 °C. It was shown that increase in temperature greatly affected the extraction process. Under the influence

of this factor there was a better rupture of cellular structures of the plant, which together with the increase in kinetic rate energy of molecules and a decrease in the viscosity of the extractant accelerated the diffusion process. Further increase in temperature didn't lead to a significant increase in the amount of extractives.

At the next stage of the study, the optimal extraction multiplicity was determined: 3-fold change of the extractant. Spectrophotometric study showed that there was a small concentration of flavonoids in the 4th portion, while the analysis of the 5th portion didn't reveal the content of polyphenolic compounds at all. That's, the transition of flavonoids from raw materials to the extractant was almost completed on the 3rd portion of the extractant.

To determine the rational amount of surfactant, extraction was performed in above-defined conditions with different concentrations of polysorbate-80 in the extractant. Results of the study indicate that the surfactant addition improved yield of BAS from calamus leaves. The estimated rational concentration of polysorbate-80 was 0.1 % compared to the volume of extractant as further increase of its amount didn't contribute to the extraction efficiency.

Conclusions. As a result of the study, the intensified extraction method for *Acorus calamus* leaves – re-maceration with ultrasound – was established. The conducted researches allowed to develop the method of extraction, expedient in the conditions of the modern pharmaceutical industry.

SELECTION OF EXTRACTANT OF CHAMOMILE LIQUID EXTRACT BASED ON LOCAL PLANT RAW MATERIALS

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Introduction. Every year, among the population and doctors, interest in the use of medicinal plants is growing. And this is natural. In modern medicine, plant preparations have taken first place among other medicines. Every third medicinal product is prepared on the basis of herbal raw materials. Chamomile flowers are used in medical practice as an anti-inflammatory and antispasmodic agent.

The creation of medicinal products by extraction from plant materials (especially of local origin) is beneficial from the point of view of the economy and rationality of the use of raw materials, since in this case the maximum yield of biologically active substances is ensured. The most common type of total phytopreparations produced by domestic pharmaceutical enterprises are tinctures and liquid extracts.

Chamomile is one of the most popular medicinal plants found in temperate latitudes. Chamomile has long been used as an anti-inflammatory, hemostatic agent, as well as in the treatment of various diseases.

The most pronounced medicinal properties are of chamomile pharmacy. Chamomile flowers contain essential oil (at least 0.3%), which includes chamazulene, prochamazulene, other terpenes and sesquiterpenes, as well as flavonoids, coumarins, polysaccharides, mineral salts (12%), carotene, ascorbic acid, sitosterol, choline, organic acids. They have an antispasmodic, analgesic, anti-inflammatory, antiseptic, diaphoretic, choleric, sedative effect, reduce allergic reactions, increase the secretory activity of the digestive glands. The benefits of chamomile are not limited to medicine.