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Development of burdock leaves dense extract obtaining technology

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Abstract
Optimum conditions of extraction have been selected and a technology for producing a thick extract from the leaves of burdock has been developed. The optimum parameters are: extraction with 40% ethyl alcohol in a ratio of raw material – the extractant as 1:7. The yield under the predetermined conditions is more than 25%, the quantitative content of flavonoids – 1.50%. In the future, it is advisable to standardize the resulting extract, which will create the preconditions for expanding the range of sources of raw materials for herbal remedies with anti-inflammatory action.

Keywords: Burdock, thick extract, extractant, flavonoids, extraction conditions

1. Introduction
According to the World Health Organization (WHO) currently in medical practice are used more than 17 thousands of drugs, among which about 40% are herbal remedies. The trend towards an increase in the range of herbal remedies in the range of pharmacies is maintained recently. Therefore, the development of new herbal remedies is one of the main areas of pharmaceutical production. Thus, according to the literature [5] of 1335 names of new active substances introduced to the pharmaceutical market from 1981 to 2010 the share of herbal remedies is about 65%.

Growth of herbal remedies production rate promotes and guides pharmaceutical research to the search for new raw sources of biologically active substances, that at the moment is one of the most promising and important directions. However, in recent years increasingly large scale gets a tendency to reduce stocks of medicinal herbs. This can lead to the fact that pharmaceutical companies are experiencing an acute shortage of raw material for the manufacture of substances, and the development of new herbal remedies can become impossible. As the optimal solution to this problem can proposed approaches to complex use of all kinds of raw materials of already known plants that will preserve plant resources. The choice of plant source of herbal remedies must meet certain requirements, namely: plants must have sufficient and quickly renewable raw stocks, have complex chemical composition and some application experience in folk or officinal medicine. Special attention deserve cultures with sufficient and rapidly renewable raw material reserves.

Attract the attention the plants of family Asteraceae (the Compositae) which species diversity in the world is large (in nature, there are about 350 species), and the resource base is sufficient [2, 5].

The major resource stocks has Burdock (Arctium lappa L.) – biennial herb of the family Asteraceae. In medicine, burdock roots are used as a diuretic, anti-inflammatory agent. In folk medicine the first year leaves are widely used as an anti-inflammatory, anticancer, diuretic, diaphoretic and choleretic agent, as well as in diabetes, tachycardia, externally – as wound healing, regenerative means. Experimentally proved is their antibacterial activity [1].

In scientific medicine to date leaves haven't found application, and in the procurement of burdock roots aboveground part is almost never used. According to the literature, burdock leaves contain carbohydrate derivatives (up to 22% of mono- and di-saccharides), 3, 4-8, 0% tannins, rubber. They also contain derivatives of phenol carbonic acids (caffeic, chlorogenic, isochlororogenic) and 5,7-18,0% flavonoids, coumarins, vitamins, amino acids, saponins, inulin (up to 45%), trace elements [3, 4].

The aim of the work was to develop a technology for the production of thick extract from the leaves of burdock and substantiate the optimum extraction conditions.

2. Materials and Methods

Burdock leaves have been harvested during the 2015-2016.The harvesting was conducted from June to August, which is caused by the maximum accumulation of active substances in the raw during this period. As the main BAS group phenolic compounds have been chosen (flavonoids) that according to literature [6] dominate in the raw of burdock leaves and provide pharmacological activity [7].

To obtain the thick extract we have been selecting optimal conditions for the extraction of raw materials, namely, the choice of extractant, the ratio of raw material/extractant optimal time and extraction ratio. The selection has been made by experimentation, considering the yield of substance and the amount of active ingredients in it.

When studying the process of biologically active substances extraction from medicinal plants used several methods, one of which is the method of filtration extraction.

To determine the optimal extracting conditions the extract was obtained using 70% ethanol. Each of the extracts collected fractionally in DER increments 1:1. For each sample was conducted quantitative determination and calculated main indicators of process dynamics.

The process of extraction was carried out in laboratory filtration extractor. In extractor loaded 150 g of grinded burdock leaves. In measuring tank poured 40% ethyl alcohol and started the process of infusion - 1 hour. Then started the extraction process, setting the rate approximately as 3-4 ml/min. Samples of extract were collected separately with DER step 1:1. The extraction process was carried out to obtain a total extract of DER 1:10. For each extract sample was determined dry residue and established basic physical and chemical properties.

Quantitative determination of flavonoids in extracts obtained by portions with DER step 1:1 carried out using spectrophotometry methods.

To quantify flavonoids in the extract used the following technique: 0, 1 g of burdock leaves extract (accurate sample) quantitatively dissolved in 25 ml of 50% ethanol. 1 ml of resulting solution placed in 25 ml volumetric flask, added1 ml of 1% aluminium chloride solution in 95% ethanol and brought the volume of the solution with 95% ethanol to mark. After 40 min the optical density of the solution was measured spectrophotometrically at a wavelength of 415 nm in a cuvette with a layer thickness of 10 mm. As a reference solution the solution was used consisting of 1 ml of the dissolved extract, 1 drop of diluted acetic acid and taken with 95% ethanol up to the mark in the volumetric flask of 25 ml.

In parallel, the absorbance of a solution containing 1ml of 0.005% solution of the rutin standard sample, which was prepared the same way as test solutions.

The content of sum of flavonoids in terms of rutin, as percentage (X) was calculated using the formula:

$$X = \frac{A \times m_0 \times 25 \times 100 \times 1}{A_0 \times m \times 1 \times (100 - W)}$$

Where A - the absorbance of the test solution, nm;
A_0 - optical density of rutin standard sample, nm;
m - Weight of thick extract sample, g;
m_0 - rutin weight, g;
W - Loss in weight on drying the extract, %.

3. Results and Discussion

Data of the experiment on selection of optimum extraction conditions are shown in Tables 1-3.

According to the experimental data the optimum extractant is 40% ethyl alcohol as at extraction with this exactly extractant the maximum yield of thick extract with sufficient flavonoid content is observed (Table 1).

Table 1: Selection of the optimal extractant in the extraction of the burdock leaves

Number	Extractant	Yield,%	Flavonoid content,%
1	Purified water	37,13	0,86±0,02
2	20% ethyl alcohol	22,98	1,10±0,01
3	40% ethyl alcohol	27,90	1,65±0,01
4	60% ethyl alcohol	20,16	1,37±0,01

The extraction has been carried out at the drug-extractant ratio – 1:10, with water-ethanol solutions, extraction last 12 hours at room temperature, with water – for 4 hours at 90 °C. The drug-extractant ratio as 1:6-1:7 is optimum, since at its reduction reduces the yield of ready product and flavonoids content (Table 2, Fig. 1), and its increasing is inexpedient, because extractant expenses cannot be justified by minor increasing in ready product yield and quantitative content of flavonoids.

Table 2: Determining the ratio of raw material / extractant in the extraction of the burdock leaves with 40% ethyl alcohol

Number	Raw Material / extractant ratio	Yield,%
1	1:1	6,00
2	1:2	11,25
3	1:3	15,89
4	1:4	19,66
5	1:5	22,31
6	1: 6	23.83
7	1:7	25.02
8	1: 8	26.02
9	1:9	26,97
10	1:10	27,90

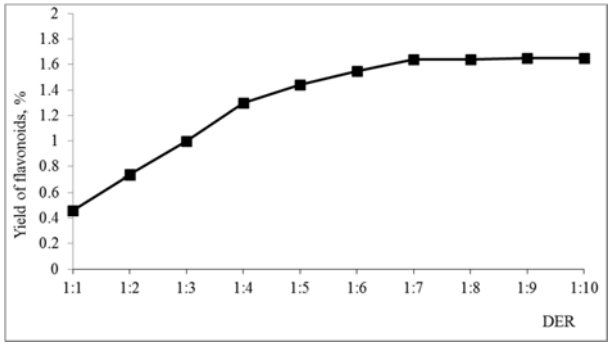

Fig 1: Yield of flavonoids depending on DER

Analysis of data in Table 3 demonstrates that an effective extraction time interval is 12 hours. Reducing this time does not allow exhaustively extracting phenolic compounds from the raw material. The increase – does not provide the growth of the finished product yield and the active ingredients content and is uneconomical.

Table 3: Determination of the optimal burdock leaves extraction time with 40% ethyl alcohol at a ratio of feed / extractant as 1:7

Number	infusion time, h	Yield,%	Flavonoids content,%
1	6	16,14	1,22±0,02
2	12	20,22	1,46±0,01
3	24	25,02	1,64±0,02

Thus, the following technology of burdock leaves dense extract obtaining has been recommended: the raw is grinded, infused for 24 hours and extracted with 40% ethyl alcohol by filtration extraction method to obtain 1:7 extraction, the resulting extract is filtered, condensed under vacuum and dried to dense. Yield of the product under given conditions is at least 25.0%, quantitative flavonoid content – not less than 1.50%.The resulting thick extract is a sticky viscous mass of dark brown color with a pleasant smell. Solubility indicators are given in Table 4.

Table 4: The solubility of thick burdock leaves extract

Purified water	96% ethyl alcohol	40% ethyl alcohol	Chloroform	Hexane	Diethyl ether
Readily soluble (1:1)	Poorly soluble (1:300)	Readily soluble (1:1)	Poorly soluble (1:100)	Practically insoluble (Greater than 1: 10,000)	Poorly soluble (1:200)

4. Conclusions

Optimum conditions of extraction have been selected and a technology for producing a thick extract from the leaves of burdock has been developed, which is as follows: the raw is grinded, infused for 24 hours and extracted with 40% ethyl alcohol by filtration extraction method to obtain 1:7 extraction, the resulting extract is filtered, condensed under vacuum and dried to dense. Yield of the product under given conditions is at least 25.0%, quantitative flavonoid content - not less than 1.50%. In the future, it is advisable to standardize the resulting extract, which will create the preconditions for expanding the range of sources of raw materials for herbal remedies with anti-inflammatory action.

5. References

1. Attalla Farag El-Kott, Mashael Mohammed Bin-Meferij. Use of *Arctium lappa* Extract Against Acetaminophen-Induced Hepatotoxicity in Rats. Current Therapeutic Research, 2015; 77:73-78.
2. Duke JA. Handbook of phytochemical constituents of GRAS herbs and other economic plants. Boca Raton, FL: CRC Press, 1992. http://www.ars-grin.gov/duke.
3. Gagnier JJ, van Tulder MW, Bermanet B. Herbal medicine for low back pain: a Cochrane review. Spine. 2007; 32(1):P. 82-92.
4. Jinlian Zhaoa, Dimitrios Evangelopoulosb, Sanjib Bhaktab, Alexander I. Graya, Véronique Seidela. Antitubercular activity of *Arctium lappa* and *Tussilago farfara* extracts and constituents. Journal of Ethnopharmacology, 2014; 155(1):796-800.
5. Newman DJ, Cragg GM. Natural products as sources of new drugs over the 30 years from 1981 to 2010. J Nat. Prod., 2012; 3(75):311-335.
6. Nurgun Erdemoglua, Nilufer N Turanb, Esra Küpeli Akkola, Bilge Senera, Nurettin Abacıoglub. Estimation of anti-inflammatory, antinociceptive and antioxidant activities on *Arctium minus* (Hill) Bernh. ssp. Minus. Journal of Ethnopharmacology. 2009; 121(2):318-323.
7. Juliane Carlottoa, Lauro M, de Souzaa c, Cristiane H. Baggiob, Maria Fernanda de P. Wernerb, Daniele Maria-Ferreirab, Guilherme L. Sassakia, Marcello Iacominia, Thales R. Cipriania. Polysaccharides from *Arctium lappa* L.: Chemical structure and biological activity. International Journal of Biological Macromolecules. 2016; 91:954-960.