STUDY OF EXTRACTION CONDITIONS OF *LAGOCHILUS INEBRIANS BGE* PLANT

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Annotation: *This article provides information on obtaining the dry substance of the plant Lagochilus inebrians Bge by extracting it in water and studying its optimal conditions.*

Key words: *lagochilus inebrians, water, extract, substance, inebrin, tablet, lagochyline diterpenoid.*

INTRODUCTION

The species Lagochilus has long been known for its healing properties, i.e. as a hemostatic agent, and it is one of the most popular, effective hemostatic medicinal plants of the East. Decoctions and tinctures based on the Lagochilus plant have been used in practice to stop various bleedings. The pharmacology of Lagochilus plant species was studied at the pharmacology departments of the Kuban, Samarkand, Andijan medical universities. Of these, aqueous and alcoholic decoctions of Lagochilus inebrians have been identified as having physiologically active properties such as sedative, hypotensive, sedative, anti-shock, anti-radiation and anti-allergic (anti-allergic) in addition to hemostatic properties[1-2].

The Lagochilus inebrians plant grows in the Nurota district of the Navoi region of Uzbekistan and in the village of Navandak, Mirdosh Langar, Akmal Ikromov collective farm of the Khatirchi district, on the banks of the river and in the rocky areas. It is also found in Bukhara and Kashkadarya regions. It was grown in the village of Darmana in the former Frunze state farm of Shymkent province. It grows wild in the villages of Ko'shrabot, Gujumsoy, Bozorjoy, Jush, Samarkand region.

THEORETICAL PART

Lagochilus inebrians is a perennial herb growing to 20-60 cm tall. the stem is branched, ascending, woody at the base, four-sided, covered with hard glandular hairs. The leaf is simple, cut into three to five parts, oppositely located on the stem and branches. The flowers are pink, arranged in the form of semicircles on the stems and branches. The fruit is 4 nuts and blooms in June-September. Harvest time for Lagochilus inebrians is July-August. Lagochilus inebrians Bge plant and its flower and seeds are shown in Fig. 1.[3-4]

Fig. 1. Lagochilus inebrians Bge plant and its flower.

The chemical composition of Lagochilus inebrians plant contains vitamin K1, 0.6-1.97% lagoxilin, 0.67% flavonoid glycosides, 44-77 mg% ascorbic acid, 6-7% organic acids, 5-10 mg% carotene, 9.66 - 12.42% tar, 2.58-2.78% additives and other substances, as well as calcium and iron salts. Lagochilus inebrians leaves contain lagoxilin, 0.03% essential oil, 11-14% flavoring agents, organic acids, 7-10 mg% carotene and 77-100 mg% vitamin C. [3-4].

Preparations obtained from plants include: tincture, decoction, tincture, extract, extract-concentrate, tablets and hakazos. Extracts are biologically active substances extracted from plant raw materials using water, alcohol, ether or other separators, and the separator is partially, sometimes completely evaporated. Extracts are divided into liquid, thick and dry. The most commonly used of these is the dry extract. Dry extracts are a concentrated extract obtained from medicinal plant raw materials and are dispersible powders containing up to 5% moisture. The production of dry extracts consists of technological steps such as separation, removal of foreign substances, evaporation or drying, grinding, sieving, evaluation and packaging. [5-7].

DISCUSSION OF RESULTS

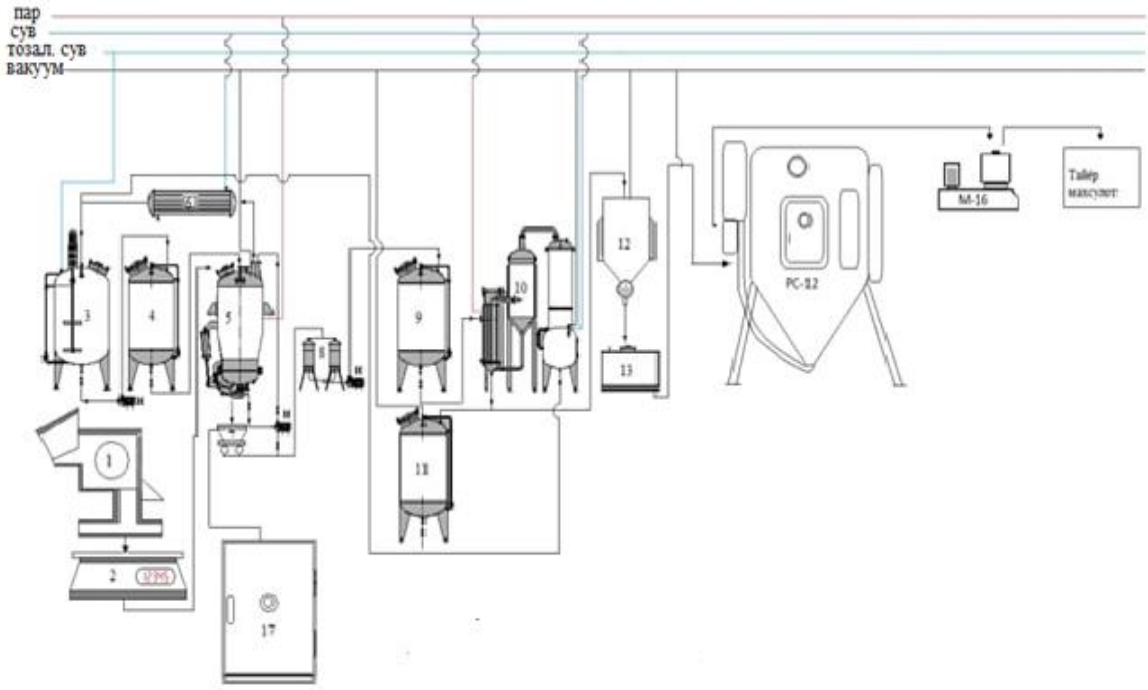
Preparation of inebrine dry extract substance based on the plant Lagochilus inebrians Bge was studied by the maceration method. For this purpose, at the pilot production enterprise of the Institute of Chemistry of Plant Substances of the UzR FA, a device was assembled that allows extraction methods to be carried out in extractors with a capacity of 1100 l, and the experiments were carried out as follows. [5-10].

100.0 kg of the plant Lagochilus inebrians Bge, crushed to a size of 4-6 mm, was placed in the extraction device and 1000.0 l (hydromodule 1:4) of water was poured, then water vapor was sent to the "steam jacket" of the extractor and heated to a temperature of 60^{0}C. The extract was withdrawn from the lower part of the extractor by means of a specially installed pump, and then drained from the upper part of the extractor by rain. The circulation rate of the extract was 100 l/h. The process was carried out until the equilibrium of mass transfer in the phases was established. For this, the yield of extractives was analyzed every half hour. At the end of the extraction process, the extract (500, l) was poured and 500,0 l of water was added and the extraction process was carried out under the same conditions as the first one. The extraction was carried out three times in this way, and the technological process and

apparatus scheme for extracting the dry extract of Lagochilus inebrians Bge plant was developed. The plant Lagochilus inebrians Bge was crushed in a mill (1) in size 4-6 mm, weighed on a scale (2), placed in an extractor (5) in the amount of 100 kg, 1000 l of purified cold water was added from the measuring device (3, 4) and boiled for 20 hours. In this method, the raw material was extracted 2 times. The resulting 1500 l extract was filtered on a notch filter (8) and collected in a vessel (9) and condensed in a vacuum evaporator (10) until 75 l, that is, 15% of the dry residue, and cooled (12). Then (13) was poured into a vessel and spray-dried in an Anhydro No. 2 (Denmark) device. It was dried in a spray dryer with hot air inlet at 170°C, outlet at 80°C, air pressure 0.2 MPa for 50 minutes (RS-12). The dry extract substance (M-16) with a content of not less than 16-17% of the obtained product was crushed and packaged as a finished product. The technological process and equipment scheme for extracting dry extract from the plant was developed (Scheme 1).

Scheme 1

Technological scheme of the process of obtaining "Inebrin" substance



(1-mill, 2-scale, 3,4- (purified water at 60°C) tank, 5,6,7-extractor, refrigerator, cart for shrew, 8-filter, 9-tank for filtered extract, 10-vacuum evaporator equipment, 11-container for extracted solvent, 12- (for cooling) separation funnel, 13-container, PC-12 spray dryer, M-16 grinder, 17- drying cabinet, CO2 - extractor.

At present, vacuum, microwave and other various drying equipment are widely used in the drying of extracts obtained from the plant Lagochilus inebrians Bge [89; internet resource]. But the extracts obtained by these methods do not meet the requirements in terms of color, moisture and other indicators. It should be noted that this dry extract is a product in the form of briquettes. Currently, there is a high demand in the world for dry extracts obtained from the plant Lagochilus inebrians Bge, which have a moisture content not higher than 8-11% and are powdery. ("Lagochilus inebrians Bge plant extract" FS 42 Uz-2535-2018

Therefore, our research was focused on determining the optimal conditions for drying the extract obtained from the Lagochilus inebrians Bge plant in a spray drying device, which allows obtaining a dry extract that meets these requirements.

We carried out our studies on drying our extracted extracts in the "ZPG 150" (PRC) spray drying device, which allows drying 200 l of solution per hour in the GMP scientific and technological center launched under the Institute of Chemistry of Plant Substances. Factors affecting the process were selected and their influence on the drying process was selected, taking into account that the solution being dried in the ZPG 150 dryer is fed through a drum with the ability to rotate at different speeds.

In the extract spray dryer, the extract sprayed through a drum is dried using heated air. The temperature of the air entering the device and leaving the device while keeping moisture in it is of great importance in obtaining the dried extract of standard moisture. For this reason, the influence of heated air at the inlet and outlet of the device, which is one of the main factors affecting its yield and quality, was studied.

Experiments were carried out in order to fulfill the task as follows: 100.0 l of extracts taken for the experiment were dried at different temperatures in the ZPG 150 drying device, and the obtained dry extracts were analyzed (Table 1).

Table 1

Effect of air temperature entering and leaving the dryer on yield and quality of dry extract

Air temperature, °C		Moisture percentage in dry extract, %	Yield of dry extract, kg
input	output		
150	70	8,1-8,5	Does not meet the condition of FS
160	75	6,0-6,8	Does not meet the condition of FS
165	85	4,2- 4,8	11,2
170	90	3,0-3,6	Does not meet the condition of FS
175	95	2,1-2,8	Does not meet the condition of FS

During research, it was observed that the moisture content of the extract was high when the air temperature was 150°C at the inlet and 70°C at the outlet. This indicates that the degree of formation of the solution at this temperature is low. The low yield of the finished product is explained by the fact that the extract is partially stuck at the bottom of the drying chamber of the device. Even when the air temperature is 160°C at the inlet and 75°C at the outlet, the moisture content of the extract is high. Therefore, the temperature of the heating air in the spray drying unit of the aqueous extract obtained from the plant Lagochilus inebrians Bge was set to 170±5°C at the inlet and 80-90±5°C at the outlet.

To study the effect of extract concentration on the drying process, the prepared extract was divided into five equal parts. Then, each part of the extracts was concentrated to different concentrations. The concentrates were dried in a spray dryer at a temperature of 170±5 ^{0}C at the inlet and 80±5^{0}C at the outlet and analyzed (table 2).

Table 2

Effect of extract concentration fed to spray dryer on yield and quality of dry extract

The percentage of dry substances in the solution, %	The percentage of moisture in the dry extract, %	The yield of the dry extract, kg	The color of the dry extract
5	8,6	9,4	Yellow
10	4,8	11,2	Yellow
15	**4,2**	**11,1**	**orange**
20	2,4	10,4	Does not meet the condition of FS
25	1,7	9,6	Does not meet the condition of FS

From the experimental results presented in table 2, it can be seen that with the increase in the concentration of the solution, the percentage of moisture in the dry extract obtained during the drying process decreases, but the color of the product does not meet the requirements of the normative technical document. At the same time, when the percentage of dry matter in the extract was 5%, it was observed that the extract was partially covered at the bottom of the drying chamber of the device, and when it exceeded 20%, the finished product mixed with air increased, so the yield of the dry extract decreased compared to other concentrations, that is, the loss increased. Therefore, it was concluded that the percentage of extractives in the extract should be 15±2% when drying the aqueous extract obtained from the plant Lagochilus inebrians Bge in a spray dryer. [5-10].

SUMMARY

1. The temperature of the heating air in the spray drying unit of the aqueous extract obtained from the plant Lagochilus inebrians Bge was set to 170±5^{0}C at the inlet and 80-90±5^{0}C at the outlet.

2. It was concluded that the percentage of extractives in the extract should be 15±2% when drying the aqueous extract obtained from the plant Lagochilus inebrians Bge in a spray dryer. Optimal conditions for drying the extract from Lagochilus inebrians Bge plant in a spray dryer were determined.

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