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STUDY OF PHARMACOTECHNOLOGICAL INDICATORS OF GINGER ROOTS PROCESSING PRODUCTS

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Introduction. The popularity of herbal medicines is currently growing. New ways of processing long–known and used in medical practice types of plant raw materials are needed. Such objects include ginger roots, which are not produced in sufficient quantities in filter packs, which are considered a popular form of release, given the convenience of their use.

However, the main characteristics of ginger roots powders (uniformity of particle size, bulk density, etc.), obtained during their grinding and sieving, are due to the peculiarities of the structure of the outer and inner parts of the ginger roots. The outer parenchymal part of ginger roots is fragile, which is quickly destroyed when crushed, easily flies away with the air flow in pneumatic transport, while it contains a significant amount of glycyrrhizic acid, compared to the inner part of strong, fibrous parts of the root. It is the fibrous parts of ginger roots that prevent dosing of the powder into filter bags in conditions of extemporaneous production. In order to saturate the market with this type of medicinal plant raw materials in a dosage form – filter bags, it is necessary to overcome the negative influence of the histological structure of the roots on the process of their dosage [1].

The aim of the study. Improvement of methods for quality control of ginger roots and products of its processing: grinding of raw materials, powders, cut–pressed granules and their mixtures (compositions).

Research methods. Organoleptic, physico–chemical, pharmacotechnological, instrumental research of ginger roots.

Main results. When dosing at home with the help of a tablespoon of crushed ginger roots, packaged in bundles that are in circulation, additional efforts are required, because during transportation and storage, particles of different structures are separated, fine powder falls to the bottom of the bundle, and lumps form loose lumps.

Therefore, before dosing, the contents of the pack must be mixed to a homogeneous state.

Additional sieving of ginger roots powder and liberation from the fine fraction also does not bring success, since the fibrous roots, freed from the fine fraction of the powder, become light and even more unsuitable for dosing into filter bags. In addition, the fine fraction is necessary both to preserve the quantitative content of glycyrrhizic acid and to preserve the bulk density.

As experience shows, the significant negative impact of the histological structure of ginger roots can be overcome by using cut–pressed granules mixed with large powder to achieve optimal flowability and bulk density.

Since the effectiveness and safety of herbal medicinals planned for production is ensured by the quality of the starting substances [2] obtained from medicinal plant raw materials, close attention should be paid to the process of preparation for compaction. This chapter is devoted to the description of the sequence of processing ginger roots from the production of substances of plant origin to the medicinal product dosed in filter bags.

The final product, according to modern terminology [3], is a herbal medicinal product, consisting of a mixture of ginger roots powder and cut–pressed granules, dosed at 1.5 g in filter bags. The ingredients of the mixture are made using different methods of processing.

To make the ingredients of the new drug, it is necessary to apply several methods of processing ginger roots:

- grinding raw materials and obtaining powders;
- production of cut–pressed granules;
- obtaining a mixture (composition);
- packing the mixture into filter bags.

Pronounced fibrousness of ginger roots is their main feature, which does not allow dosing the powder into filter bags on modern high–performance equipment. The sequence of manufacturing a dosed preparation is proposed taking into account this feature of ginger roots [3].

Coarse powder samples obtained on a Bosch TSM 6A011 W grinding machine (coffee machine). When grinding ginger roots, in addition to coarse powder, which is the target product of grinding, a significant amount of intermediate product – medium–coarse powder formed as a result was obtained mechanical impact of powerful equipment on the outer fragile ginger roots [4]. This powder with a concentrated content of glycyrrhizic acid is practically not suitable for packaging and should be transferred to the waste. Since it is not economically profitable to dispose of a significant amount of valuable natural raw materials, an attempt was made to subject it to additional technological processing – moistening, pressing and transformation into cut–pressed granules [5].

The results of studies of the products obtained during grinding are given in the Table 1.

Table 1

Grinding of coarse powder and medium–coarse powder of ginger roots and their purpose

Coarse powder		Medium–coarse powder	
Particles that do not pass through the sieve 2,0 mm, %	Particles that pass through the sieve c/c 0,18 mm, %	Particles that do not pass through the sieve 0,31 mm, %	Particles that pass through the sieve 0,18 mm, %
5.0	5.0	10.0	90.0
4.7	2.9	5.2	83.7
0.8	4.5	7.3	79.9
3.0	1.8	5.9	82.2
4.8	2.3	9.4	84.3
It is intended for the production of a mixture for packing in filter bags		Designed for the production of cut–pressed granules	

The obtained results (table 1) show that the granularity of the coarse powder contains large particles that do not pass through the sieve 2.0 mm from 0.8 to 5.0 %; of particles passing through through the sieve 0.18 mm, contains from 1.8 % to 5.0 %. This product is a standardized crushed ginger roots.

Medium–coarse powder consisted of 90 % of particles passing through through the sieve 0.18 mm; particles that do not pass through the sieve 0.31 mm contained from 5.2 to 10 %, they are an important element that binds dust–like particles during the pressing of medium–coarse powder and its transformation into cut–pressed granules, and also contribute to the disintegration of granules when brewing with hot water.

The fractional composition affects the bulk density and, as a result, the flowability of the product, a study of the fractional composition of the coarse powder was conducted. The obtained results are presented in the Table 2.

Table 2

Fractional composition of the coarse powder of ginger roots

Particle size, mm	Content of fraction fractions	
	g	%
More 2.0	2.03	4.06
2.0–1.0	30.24	60.48
1.0–0.5	6.07	12.14
0.5–0.25	8.92	17.84
0.25–0.18	2.43	4.86
Less 0.18	0.31	0.62

Table 2 shows that the coarse powder contains about 70 % of particles with a size of 2.0 to 0.5 mm. Medium large particles make up the bulk of the powder for packaging in filter bags; particles of the dusty fraction passing through a 0.18 mm sieve are less than 1 %. This is very important because, when trying to pack coarse powder into filter bags, the excessive content of dust–like particles gives significant deviations in the mass of the filter bag, and also passes into water extraction through the pores of the filter bag and impairs its quality. About 18 % of particles with a size of 0.5 to 0.25

mm. It is this fraction, when packed in a filter bag, that causes the product to delaminate and lump, and uneven dosage. The low flow rates of coarse powder from 0.2 g/sec to 10 g/sec confirm this.

The bulk density of the coarse powder under study varied from 0.22 to 0.25 g/ml (average value 0.24 g/ml); the humidity index varied from 6.02 to 7.27 % (average value 6.7 %).

Based on the actual data, the large powder has a low bulk density, about 0.24 g/ml, and an unsatisfactory degree of flowability, from 0.2 to 10 g/sec.

Conclusions. Thus, 2 types of powders were obtained – coarse powder and medium–coarse powder of ginger roots. Basic physical properties have been established for these powders. For coarse powder: fractional composition, where the content of particles with a size of 2.0 to 1.0 mm should be about 60.0±5.0 %; particles with a size from 1.0 to 0.5 mm should be about 12.0±5.0 %; particles with a size of 0.5 to 0.25 mm should be about 21.0±5.0 %; particles with a size from 0.25 mm to 0.18 mm are about 5 %. Bulk density – 0.24 g/ml; humidity in the range from 6.02 % to 7.19 %. As well as medium–coarse powder, for which the indicator of the content of particles that do not pass through the sieve 0.3 mm is set, about 10±5.0 %; about 90±5.0 % of particles passing through the sieve 0.18 mm; determining the fractional composition, similar to coarse powder, there is no practical significance of its pressing. In addition to the study of the pulverization of the medium–coarse powder, it was established that the content of ash insoluble in a 10 % HCL solution varied from 1.13 to 1.47 %; the content of glycyrrhizic acid reached more than 12 % (spectrophotometry method), which met the pharmacopoeial requirements.

Due to the high content of glycyrrhizic acid in the medium–coarse powder, it is possible to adjust the content of glycyrrhizic acid in the final product by calculation method. However, without prior pressing, medium–coarse powder cannot be used in extemporaneous production.

These powders were used for the production of a new medicinal product: coarse powder as an ingredient of a mixture of coarse powder and cut–pressed granules; medium–coarse powder – as an intermediate product and raw material for obtaining cut–pressed granules.

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THE SCIENTIFIC TALKS OF FEATURES OF CURRENT STATE, ITEMS, PROSPECTS AND DEVELOPMENT PHARMACISTS' PROFESSION AND PHARMACEUTICAL EDUCATIONAL CHALLENGES IN GEORGIA

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