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ANALYSIS RESULTS ON QUANTITATIVE DETERMINATION OF LIGHT VOLATILE COMPONENTS, ASH AND PROTEIN CONTENT IN FERULA TADSHIRORUM RESIN

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Annotation: The article presents the determination of the content of volatile components, ash and protein in Ferula tadshikorum resin. Analysis of the resin of plant Ferula tadshikorum showed that the average composition of plant is 9.76 % protein, protein nitrogen 1.56 %, volatile component 24.32 % and ash 3.53 %. These results indicate a high therapeutic, nutritional potential.

Key words: Ferula tadshikorum, resin, protein, ash, volatile components.

Abstract: Ferula tadshikorum is a perennial herbaceous plant, a species of the genus Ferula of the Umbrella family (Apiaceae). A valuable medicinal, forage and price forming plant, a good honey plant. Nowadays, Ferula tadshikorum is widely used in the pharmaceutical industry and in folk medicine. Ferula is used to treat malignant neoplasms, stomach cancer, breast cancer and leukemia [1]. In modern scientific medicine, it is known that the gum resin of the smelly ferula has an anti-inflammatory and analgesic effect [2]. In folk medicine, ferula roots - tubers are used for medicinal purposes in dry and fresh form, tincture on vodka and decoctions on water. Ferula is used for dyspepsia, diabetes mellitus, neuroses, rheumatism, bronchial asthma, as an anti-inflammatory for pneumonia, anticonvulsant, choleretic, pulmonary tuberculosis, liver diseases, kidneys, syphilis, cerebral atherosclerosis, loss of strength, with decreased sexual feeling, treats the entire gastrointestinal tract well [3]. Endemic to Southern Tajikistan, Ferula tadshikorum is the dominant and subdominant of various types of phytocenoses of large-grass semi-savannas. The total area of ferul in Southern

Tajikistan is 175 thousand hectares [4]. The botanical description, ecology, and fields of use are similar to those of the Smelly Ferula. The species is included in the Red Book of the Republic of Tajikistan. Medicinal raw materials are both underground (the milky juice of the roots hardened in the air) and the aboveground parts of the plant. The chemical composition of the hardened milky juice of the roots is represented by resin (9.35-65.15%), gum (12- 48%) and essential oil (5.8-20%). Ferulic acid, asarezinotanol, assarezinol and their ferulic derivatives: farnesiferol C and umbelliferon are isolated from the resin. The essential oil consists mainly of organic sulfides – up to 65%: hexenyl sulfide, hexenyl disulfide, and second-butylpropenyl disulfide. The essential oil also contains pinene and p-oxycoumarin. The roots contain up to 9% resin, from which 0.4% essential oil is obtained.

Fig.1. Ferula tadshikorum Determination of volatile components

Materials and reagents. The analysis was carried out by the recommended method [10] in double repetition. Analytical scales, drying cabinet, desiccator are used in the work.

Conducting an analysis. After careful mixing, the crushed object (resin) was scattered in a thin layer on a board and samples were taken from different places. The selected samples were transferred to pre-dried and weighed buckets and covered with lids, weighed on analytical scales. The samples were dried in a drying cabinet at 100-105 ° C for 3 hours. After the specified time, the hanging buckets were quickly removed from the cabinet, covered with lids and placed in the desiccator for 10-15

minutes. The cooled and weighted buckets were placed back in the drying cabinet for 30 minutes, then removed, cooled and weighed. This was repeated until a constant weight was reached.

A constant weight was considered achieved when the difference between the weighings did not exceed 0.001 g. The resin moisture content in % (X) was calculated using the formula: $X = \frac{(P_1 - P_2).100}{P}$,

there are, P_1 -is the weight of the sample before drying, g; P_2- is the weight of the sample after drying, g; P - sample attachment, g. The average of two parallel definitions was taken as the final result. The discrepancy between the parallel definitions did not exceed 0.3%.

Determination of ash content.

Materials and reagents. The analysis was carried out by the recommended method [11] in two-fold repetition. Analytical scales, a muffle furnace, and a desiccator are used in the work. Ash content was determined by burning the sample in a muffle furnace at a temperature of 600-800 ° C, for 2-3 hours, until the presence of organic substances in the ash in the form of black particles disappeared. The ash content was determined by the difference between the mass of the crucible before and after calcination in the muffle, expressed as a percentage of the initial weight, according to the formula:

Z = M1 - M 2* 100 / H

there are, M_1-is the mass of the crucible with a suspension before drying, g; M_2- is the mass of the crucible with a suspension after drying, g; H- is the weight of the suspension, g.

Determination of total protein.

To determine the total protein content, samples of crushed samples were taken into heat-resistant conical flasks in an amount of 0.3 - 0.4 g. with an accuracy of 0.001 g. 5 ml of concentrated sulfuric acid (H_2SO_4, ρ=1.84 g/cm^3) was added to the selected

sample. The flasks were placed on a sand bath or a temperature-controlled plate, setting the temperature equal to 400 °C and brought to a boil. Heating was continued until the solution in the flask was completely discolored (2-3 hours). After that, the flask was left on the tile for 15-20 minutes, and then cooled. 10 ml of distilled water was carefully poured into the cooled flask along the walls and quantitatively transferred to a measuring flask with a capacity of 50 cm3, bringing the volume in the flask to the mark, and thoroughly mixed. After mineralization, to determine the protein content by nitrogen, aliquots of 90.3 ml were taken into a measuring flask with a capacity of 50 cm^3), up to half the volume of distilled water was added, then the solution was neutralized with a 10% NaOH solution to an alkaline reaction and then 1 ml of Nessler reagent. The solution in the flask was brought to the mark with water and thoroughly mixed. In this case, the solution should be completely transparent [12,13]. After 15 minutes, the solution was colorimetrated at a wavelength of λ= 400 nm on a V-5000 Metash spectrophotometer. The calculation of the protein content in the test sample was carried out according to the formula:

$$C = \frac{V*100*6,25*C_1}{H*A*1000},$$

there are, C- is the protein content, % ; H-is a sample for protein determination, g; V-is the volume after decomposition of the sample, ml; A-is the volume of the aliquot part taken for colorimetry; C_1 -is the mass fraction of nitrogen content in the aliquot part, found according to the calibration schedule, mg; 1000-is the conversion factor, in mg; 100- is the conversion factor, in %; 6.25 – conversion protein coefficient for plants.

Discussion.

Table 1. The results of the determination of volatile components

The name of the sample	The weight of the dish, g	The weight of the dish with the initial sample, g	**Sample, г**	**The results of weighing after drying, g**	**Dry matter, %**
Resin Ferula tadshikorum	25,816	26,260	0,444	26,152	24,32

Table 2 Results of ash content determination

The name of the sample	The weight of the dish, g	The weight of the dish with the initial sample, g	Sample, g	Weighing results after combustion, g	Ash weight, g
Resin Ferula tadshikorum	16,526	17,600	1,074	16,564	3,53

Table 3 The result of the total protein analysis

The name of the sample	Sample, g	Aliquot, мл	Wavelength λ= 400 нм	Protein, %
Resin Ferula tadshikorum	0,480	0,3	0,250	9,76

Table 4 Final results

The name of the sample	Volatile components, %	Ash content%	Total protein nitrogen, %	Protein%	Protein per absolutely dry substance, %,
Resin Ferula tadshikorum	24,32	3,53	1,56	9,76	12,89

Conclusion.

To sum up, the analysis of Ferula tadshikorum resin showed that the average protein composition is 9.76%, protein nitrogen is 1.56%, volatile components are 24.32% and ash is 3.53%. These results indicate a high therapeutic and nutritional potential.

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