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CHEMICAL COMPOSITION AND NUTRITIONAL VALUE GRAPE LEAVES

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Annotation. Increased consumption of processed products using grape leaves. Processing and storage of grape leaves, development of recipes and technologies for the production of cabbage rolls from grape leaves using minced rice and meat. The physicochemical parameters and nutritional value of grape leaves have been determined, which still does not have an assortment and a specific processing technology. The analysis of the results showed that a significant proportion of carbohydrates in grape leaves is 8.33% of the dry matter mass. The mass fraction of proteins is 18% of the dry matter mass. A high index of the mass fraction of lipids is found in grape leaves and is 7,95% of the dry matter mass. The amount of cellulose in grape leaves is 30%.

Key words: grape leaves, butanol-1-pyridine-water, signetovaya salt, Nessler's reagent, chloroform, methanol, diethyl ether, cabbage rolls, solids, proteins, fats.

Introduction

Today, world population growth, environmental degradation, including climate change, lack of drinking water and droughts, pose serious challenges to humankind, such as the constant search for progress, the rapid development of science and technology and the urgency of such problems, and remains a necessity. In order to ensure the well-being of the population of the republic, many state programs have been adopted and scientific research and practical work on their implementation is regularly carried out, as a result, the well-being of the people is improved. A high-tech tool for deep processing of agricultural products, the production of semi-finished and finished food products and their design in accordance with modern requirements [1].

Grape leaves are a spice, flavoring and aromatic additive used in the preparation of canned products, as well as hot second courses from vegetables and meat. For culinary purposes, young grape leaves, harvested during the flowering period of the vine, are best suited. The most favorable time for collecting such leaves is considered to be the flowering period of the vine. The delicate juicy leaf collected during this period has a pleasant sour taste.

100 g of grape leaves contains about 93 kcal of energy. The chemical composition of grape leaves includes proteins, fats, carbohydrates, ash, fiber, vitamins (A, B9, C, E, K, PP), minerals (iron, potassium, calcium, magnesium, manganese, copper, phosphorus) and phytonutrients (beta-carotene).

Leafy greens are used in popular dishes such as stuffed cabbage rolls mixed with rice. Before using in the

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preparation of stuffed cabbage, grape leaves are subjected to heat treatment in order to achieve the elasticity of the latter. Fresh grape leaves are used exclusively for the manufacture of canned products in the form of cabbage rolls. Products are sterilized.

The largest number of dishes with grape leaves are prepared in Greece, Armenia, Moldova, Turkey and Asian countries. Different names (dolma, tolma, dosmades) mean the same dishes - minced rice and meat, wrapped in grape leaves.

Grape leaves are best combined with meat (lamb), rice, nuts, cucumbers, tomatoes, bell peppers.

When choosing grape leaves, it should be borne in mind that only those that were collected during the flowering period of the vine differ in the best taste. In addition, it is necessary to pay attention to the absence of any defects on their surface, including dark or yellowish spots.

Objects and research methods

Research objects. Grape leaves, their content of dry matter, total mass fraction of carbohydrates, fraction of fiber, mass fraction of proteins, total mass fraction of lipids in relation to dry matter, physicochemical parameters and nutritional value of a grape leaf, are experimentally determined by conventional methods. The amount of dry matter was determined by the express method using a hand-held refractometer.

Determination of the carbohydrate complex and fiber. The initial sample is spread evenly in a thin layer on glass or on a sheet of thick paper and pinches of the material are taken from different places into a glass jar. The middle sample is the material for taking an analytical sample. The average sample should be thoroughly ground in a porcelain mortar and mixed [10-15].

Isolation of alcohol-soluble sugars in the leaves. The crushed leaves are extracted with boiling 820C alcohol twice for 1 hour, at a module of 1:20. After extraction, pieces of leaves are separated by filtration and dried. The alcoholic extracts are evaporated and analyzed by outgoing paper chromatography (PC) on Filtrak-FN-11 paper, in the butanol-1-pyridine-water system (6: 4: 3). Chromatography time - 18 hours. The paper is dried and sprayed with anilig-acid phthalate developers - they reveal hexose and pentose with this substance, 5% urea - ketosugar (fructose, sucrose). Then the strips of paper are again dried and heated in an oven for 3-4 minutes at 1100C, thereby revealing the presence of glucose, fructose and sucrose [15].

The dried residue of the raw material is extracted with 5% KOH (1:20) with continuous stirring at room temperature for 4 hours. Then the extract is separated by filtration, neutralized with concentrated acetic acid, dialyzed, evaporated to 50 ml and precipitated with alcohol (250 ml). The formed precipitate is separated by centrifugation (5000 rpm, 10 min). Dry with alcohol.

Allocation of fiber. 10 g of raw material is boiled with 75 ml of a mixture of acids (80% acetic acid - 200, concentrated acid HNO3 - 10 ml) for 30 min, the solution is filtered, the filter cake is washed with water until neutral and dried [8-9].

Determination of protein content in leaves was determined by a standard method. The work used a coffee grinder, analytical balance, filter paper, conical funnel, FEK, sodium hydroxide, Signet salt, Nessler's reagent, distilled water, hydrogen peroxide, concentrated sulfuric acid [2-4].

The study of protein substances was carried out by various methods. The results were different depending on the method used. However, all methods of studying proteins are reduced to the following. To isolate proteins, biological material was crushed until the cell walls were destroyed, obtaining a homogenate, and then proteins were extracted [5].

To determine the protein content in the isolated fractions, an aliquot of 5-10 ml was taken into a heat-resistant flask. Concentrated sulfuric acid H2SO4 (ρ = 1.84 g / cm3) is poured into heat-resistant

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flasks, to a selected sample or to an aliquot of the fraction taken. The flasks are placed in a sand bath, setting the temperature equal to 4000C. At the same time, it is necessary not to allow violent boiling. Distilled water is carefully poured into cooled flasks along the walls and quantitatively transferred to a volumetric flask with a capacity of 50 ml. After cooling, the volume in the flasks is brought up to the mark and thoroughly mixed. From a volumetric flask, after mineralization, to determine the protein content by nitrogen, an aliquot was taken, depending on the expected protein content.

At a high nitrogen content in the samples, dilution was carried out. Distilled water is added to the selected aliquot to half its volume. Then the solution is neutralized. Added 1 ml of Nessler's reagent. The solutions in the flasks are brought to the mark with water and mixed thoroughly. In this case, the solutions should be completely transparent. 15 minutes after painting, the solutions were colorimetric on a KFK-3 electrophotocolorimeter [1,6,7].

Determination of fatty acid content. Total lipids (OL) from air-dried leaves of two grape varieties were extracted by extraction with a mixture of chloroform and methanol (2: 1 v/v) according to the Folch method.

The extracts were washed with a 0.05% aqueous solution of CaCl2 to remove non-lipid components. After complete extraction of the extract, the receiving flask with the extract was disconnected, and chloroform was distilled off on a rotary evaporator of the R1001LN brand, manufactured in Germany [8, 14].

The residual solvent was removed by drying the extract in a drying oven at a temperature of 600C to constant weight. The yield of total lipids was,% of the mass of air-dried leaves:

Drying was considered complete if the difference between the last two weighings is 0.002-0.004 g.

The content in dry leaves of grapes in% (X) was calculated by the formula:

$$X = \frac{(P_1 - P_2).100}{P},$$

where, P1 is the weight of the flask with the extract, g, P2 is the weight of the empty flask, g, P is the weight of dry crushed leaves, g.

Results: No. 1 - "Muscat Black" - 3.7%
No. 2 - "Kizil khurmoni" - 3.2%

Total lipids were separated into separate groups by silica gel column chromatography. In this case, neutral lipids were eluted with chloroform, glycolipids - with acetone and phospholipids - with methanol, their content was, respectively: No. 1: 1.2%, 1.36% and 0.64%; No. 2: 1.8%, 1.55%, 0.35% by weight of the extract.

To determine the composition of fatty acids, each group of lipids was hydrolyzed with a 10% methanol solution of KOH in a sample: solution ratio of 1:10, while boiling in a water bath for 1 hour. The soaps obtained were decomposed with a 50% aqueous solution of H2SO4.

Fatty acids were extracted three times with diethyl ether. Then the ether extracts were washed with distilled water until neutral, dried over sodium sulfate, then the ether was distilled off. Fatty acids were methylated with diazomethane.

The obtained methyl esters were purified in a thin layer of silica gel in a system of hexane: diethyl ether 4: 1 solvents, the ME zone was developed in J2 vapors, and the methyl esters were desorbed from silica gel with chloroform

After removal of chloroform, ME was dissolved in hexane and analyzed on an Agilent Technologies 6890 N instrument with a flame ionization detector using a capillary column 30 m long with an inner diameter of 0.32 mm with a deposited HP-5 phase at temperatures from 150 to 270°C. The carrier gas is helium.

Results and its discussion

Determination of the carbohydrate complex and fiber, protein content, fatty acid content in dry grape leaves was carried out in the laboratories of the Institute of Chemistry of Plant Substances

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of the Academy of Sciences of the Republic of Uzbekistan and entered in tables 1-3.

Raw materials	Alcohol soluble sugars	Carbohydrate complex (water-soluble polysaccharides, pectin substances, hemicelluloses),%	Cellulose (fiber),%
Black Muscat	Glucose, fructose, sucrose	7	33
Dogwood persimmon	-	8,33	30

Table 1. Determination of carbohydrate complex and fiber

To clarify the percentage of active ingredient in plants, there are standard methods of quantitative analysis. However, an important condition for the analysis of plants is the correct removal of the average sample.

Sample	Hinge weight, g	Aliquot	400, нм	Protein, %	Average value,%
Dogwood persimmon					
Experience1	0,4883	0,2	0,245	18,4	18,2
Experience 2	0,4254	0,2	0,200	18,0	
Early muscat					
Experience 1	0,4707	0,2	0,277	21,4	21,1
Experience 2	0,4553	0,2	0,272	20,8	

Table 1. Total Protein Analysis Results

Fatty acid	NL		GL		FL	
	№1	№2	№1	№2	№1	№2
Capric 10:0	0,30	0,25	0,14	0,26	Сл.	0,16
Lauric 12:0	1,58	1,64	0,37	1,03	0,71	0,60
Myristic 14:0	1,47	1,87	0,93	1,50	0,76	1,02
Pentadecane 15:0	Сл.	0,29	0,25	0,28	Сл.	0,25
Palmitic 16:0	32,83	32,62	43,80	43,82	56,72	61,56
Palmitotic 16:1	1,22	1,13	0,45	0,51	4,58	7,17
Margarine 17:0	Сл.	0,31	0,29	0,35	0,37	0,46
Stearic 18:0	5,27	5,20	5,27	5,69	7,25	7,95
Oleic+linolenic 18:1 18:3	29,48	28,46	32,50	29,67	12,87	9,19
Linoleic 18:2	14,24	13,78	9,98	8,41	11,43	6,67
Arachinic 20:0	1,53	2,17	1,04	1,41	1,24	1,33
Eicosenic 20:1	0,48	-	0,43	0,44	-	-
Behenic 22:0	3,62	4,07	1,91	2,54	2,80	2,70
Lignoceric 24:0	5,33	5,67	1,89	2,92	1,27	0,94
Hexacosane 26:0	2,65	2,54	0,75	1,17	-	-
Saturated sum FA	54,58	56,63	56,64	60,97	71,12	76,97
The sum of unsaturated FA	45,42	43,37	43,36	39,03	28,88	23,03

Table 3. Composition of neutral fatty acids (NL), glyco (GL) – and phospho (PL) - lipids GLC,% by weight

The fatty acid composition of grape leaves, including neutral, glyco- and phospholipids, are of a unique nature, is therapeutic and prophylactic for the human body.

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