



*Full Length Research Paper*

# Comparative analysis of aqueous and alcohol extracts amino acid composition of fruits of jujube (*Ziziphus jujuba mill.*)

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The amino acid composition of water and alcohol extracts of unabi fruits was studied. A comparative analysis of water and alcohol extraction of the fruits of unabi shows that the total amount of amino acids is higher in alcohol extraction (about three times), the pattern of distribution of individual amino acids has much in common. In addition, it should be noted, the hypotensive effect of the fruits of unabi is due, along with the main biologically active substances, to a high content of proline and tyrosine.

**Keywords:** unabi, fruits, amino acids, aqueous, alcoholic, extracts.

## INTRODUCTION

It is known that the introduction of medicinal plants in medical practice also includes a comprehensive study of its nature of the chemical composition, in particular, and amino acid composition. As you know, amino acids are organic compounds whose molecules simultaneously contain carboxyl and amine groups. The combination of the biological activity and the distribution of amino acids in the raw materials of plants and their preparations contribute to an effective action on the body. Amino acids give other biologically active substances an easily digestible form, while at the same time potentiating their pharmacological effect. Amino acids according to the ability of the organism to synthesize from precursors are divided into the following groups: essential (valine, isoleucine, leucine, threonine, methionine, lysine, phenylalanine, tryptophan) and replaceable (glycine, alanine, proline, serine, cysteine, aspartate, asparagine, glutamate, glutamine, tyrosine). The classification of amino acids into replaceable and essential ones is not without flaws. For example, tyrosine is a replaceable amino acid only if there is a sufficient supply of phenylalanine. For patients with phenylketonuria, tyrosine becomes an essential amino acid. Arginine is synthesized in the human body and is considered an

essential amino acid, but due to certain peculiarities of its metabolism, under certain physiological conditions of the body, it can be equated to indispensable. Histidine is also synthesized in the human body, but not always in sufficient quantities, and therefore must be supplied with food [1,2].

It is known, the main source of naturally occurring radioactive substances entering the environment, which are now widely distributed in all the earth's envelopes, is radiation waste. Due to the destructive processes of meteorological, hydrological, geochemical and volcanic nature, occurring continuously, radioactive substances have undergone a wide dispersion. The natural radioactivity of plants and food products due to their absorption of radioactive substances from the environment. In this regard, when evaluating medicinal plant materials, it is necessary to take into account all the factors affecting the ecological purity and safety of use [3].

Jujube has been consumed for thousands of years, which is still gaining influence on our daily life. Recent phytochemical and pharmacological results have revealed that flavonoid, polysaccharide, and triterpenic acid are the main active ingredients within jujube. Based on the literatures, both flavonoid and polysaccharide could account for antioxidant effect of jujube [4]. Moreover,

jujube polysaccharides were also proposed to be main active ingredients contributing to its immune-modulating and hematopoietic functions [5]. Triterpenic acids were considered as active ingredients for the effect on anti-inflammatory and anticancer activities. In addition, betulinic acid and jujube side B could be the active components showing beneficial effects on cardiovascular system [1, 6].

**The purpose of this study** was to study the qualitative and quantitative content of amino acids in the fruits of unabi harvested in the Khorezm region in the period of full maturity.

### Characteristics of the object of study

Unabi—*Ziziphus jujuba* Mill. - Deciduous tree from the family Rhamnaceae. Wild species are represented in Afghanistan, Syria, Azerbaijan, Turkmenistan, Tajikistan, Iran, India, China, Japan, and Pakistan [3]. Cultivated in all regions of our republic. Unabi is a medicinal plant, although it is not included in the State Pharmacopoeia. In folk medicine, it is used as a hypotensive, tonic, diuretic, sedative, choleric and laxative. Currently, it has been shown that many of the pharmacological properties of the plant are due to the number of biologically active substances contained in them, in particular flavonoids, tannins, polysaccharides, etc. [4,5].

### EXPERIMENTAL PART

For analysis, raw materials harvested during 2017-2018 in the Khorezm region were used. Analysis of the amino acid composition was performed by HPLC [6] in aqueous (1:10) and alcoholic extracts (70%) of the raw material.

**Isolation of free amino acids.** The precipitation of proteins and peptides of an aqueous extract was carried out in centrifugal cups. To do this, 1 ml (exact volume) of 20% trichloro-acetic acid (TCA) is added to 1 ml of the test sample. After 10 min, the precipitate is separated by centrifugation at 8000 rpm for 15 minutes. Separating 0.1 ml of the supernatant, lyophilized.

**Phenylthiocarbonyl (FTC) Analysis of Amino Acid Derivatives.** The synthesis of PTK derivatives of free amino acids was performed according to the method of Steven A., Cohen Daviel [6].

The identification of FTC-amino acids is carried out on an Agilent Technologies 1200 chromatograph or a similar 1 equipped with an ultraviolet (UV) detector or a diode array detector (DAD), 75x4.6 mm Discovery IIS C18 columns or a similar column for the analysis of amino acids. Solution A: 0.14 M  $\text{CH}_3\text{COONa}$  + 0.05% GEA with pH 6.4, B:  $\text{CH}_3\text{CN}$  (acetonitrile for HPLC). The flow rate of 1.2 ml / min, the absorption of 269 nm. Gradient % V/min: 1-6%/0-2.5min; 6-30%/2.51-40min; 30-60%/40.1-45min; 60-60%/45.1-50 min; 60-0%/50.1-55 min. The obtained data are shown in Table 1.

**Table 1:** Amino acid composition of water and alcohol extracts of unabi fruit

№	Identified Amino Acids	Содержание аминокислот			
		Water extracts		70% alcohol extract	
		(mg/g)	%,totalaminoacids	(mg/g)	%,totalaminoacids
1.	Aspartic acid	0,124202	0,896562	0,255057	1,24749
2.	Glutamic acid	0,115148	0,831205	0,396622	1,939887
3.	Serine	0,68618	4,953245	0,075971	0,371576
4.	Glycine	0,379376	2,738556	0,767575	3,754227
5.	Asparagin	0,383881	2,771076	0,776606	3,798398
6.	Threonine	1,686869	12,1768	1,244949	6,089074
7.	Alanine	0,382653	2,762211	0,349523	1,709525
8.	Proline	6,483209	46,79956	10,05008	49,15517
9.	Tyrosine	3,338675	24,10049	5,002289	24,46631
10.	Methionine*	0,296119	2,137559	0,548135	2,680941
11.	Isoleucine*	0	0	0,085719	0,419254
12.	Leucine*	0	0	0,241573	1,181539
13.	Tryptophan*	0,272125	1,964356	0,310577	1,519039
14.	Phenylalanine*	0,061024	0,440507	0,104331	0,510285
15.	Lysine HCL *	0,161245	1,16396	0,23661	1,157265
<b>The total amount of amino acids</b>		<b>13,85314</b>		<b>20,44562</b>	
<b>The amount of essential amino acids</b>		<b>5,71</b>	100		100

Note: \* - essential amino acids

## RESULTS

The amino acid composition of the water extraction of unabi fruit is represented by 15 components and is characterized by a high content of threonine, proline, tyrosine, minor content of phenylalanine and glutamic acid, lack of histidine, valine, glutamine, argenine, isoleucine, leucine and cysteine. Alcohol extraction also has a high content of threonine, proline and tyrosine; higher content of methionine, asparagine and glycine, the absence of histidine, valine, glutamine, argenine and cysteine. A comparative analysis of the water and alcohol

extraction of the fruit of the unabi shows that the total amount of amino acids is higher in alcohol extraction (about three times), the pattern of distribution of individual amino acids has much in common. Also, it should be noted that the hypotensive effect of the fruits of unabi is due, along with the main biologically active substances, to a high content of proline, which has a beneficial effect on the heart muscle and reduces high blood pressure, as well as tyrosine, which reduces irritability, fatigue, stress and promotes sleep.

The results of determination of radionuclides in the fruits of unabi are shown in Table 2.

**Table 2:** Results of determination of radionuclides in unabi fruits

Indicators	The rate according to the requirements of SanRaR number 0093-99	Results of the study	Rawmaterialcompliance
Content <sup>137</sup> Cs <sup>90</sup> Sr, Bq/kg	1850	6,9	match

## CONCLUSION

The research results showed that the studied raw materials fully comply with the radiation safety requirements as well as the total amount of amino acids is higher in alcohol extraction.

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