

The Study of the Amino Acid Composition of *Helianthus tuberosus* Flowers

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Abstract

In the article, the determination of the amino acid composition of *Helianthus tuberosus* flowers by gas chromatography on a Carlo-Erba-4200 instrument is given. As a result, 20 amino acids were determined, which are: glutamine, aspartate, alanine, proline, arginine, leucine, serine, isoleucine, tyrosine, lysine, glycine, etc.

Keywords: biological active substances, amino acids, Jerusalem artichoke, gas chromatography method.

INTRODUCTION

Biologically active substances – are those substances, which have an influence on the biological processes in the body of humans and animals. They can be products of primary (vitamins, fats, carbohydrates, proteins) and secondary biosynthesis (alkaloids, glycosides, and tanning agents). The plants always contain a complex of biologically active substances, but only one or some of them have therapeutic and prophylactic action. They are called active substances and are used in the manufacture of drugs.

The plants also contain so-called concomitant substances. This is the conventional name for the products of primary and secondary synthesis in plants (menthol, papaverine, tannin). Some concomitant substances positively affect the human body, since they complement the action of the main active substance. For example, vitamins, minerals, flavonoids increase the absorption of active substances, enhance the beneficial effect or weaken the harmful effect of potent compounds [1].

Currently, it causes great interest to isolate biological active substances from plants. Complex-colored plants like *Helianthus tuberosus* belong to such plants.

MATERIALS AND METHODS

The aim of the work is to determine the amino acid flower of *Helianthus tuberosus* plants.

The object of the study is the flowers of the plants of the variety "Interest" of the Almaty region and the Tashkent region, selected in late September-mid October 2015-2016.

To determine the amino acid composition by the method of gas-liquid chromatography on a device of the brand "Carlo-Erba-4200" (Italy-USA) [2], the results of the amino acid composition are given in Table 1.

RESULTS AND DISCUSSION

According to the table found in the content of more glutamate, aspartate, alanine, proline from plants collected in Tashkent region – 2194 mg / 100g, 1820mg / 100g, 1675mg / 100g, 1295mg / 100g, and in Almaty region – 2015mg / 100g, 2015mg / 100g, 1550mg / 100g, and 1248mg / 100g.

Amino acids are organic compounds that are a building material for proteins and muscle tissues. In the human body, amino acids perform many important functions. Glutamate is very common in nature, for humans it is an indispensable amino acid, that is, it can be synthesized in sufficient quantities. Its concentration in the blood is 500-900 $\mu\text{mol} / \text{l}$, which is higher than the concentration of any other amino acid.

In the body, aspartate and glutamate are used by all cells to synthesize purine and pyrimidine bases. Amide derivatives of these amino acids are transport forms of ammonia from tissues to the kidneys and liver. Additionally, glutamic acid is a composition

of glutathione - substances that perform two different functions – transfer of amino acids through the membrane and a key link in the antioxidant system of the cell.

Alanine regulates the level of sugar in the blood, participating in the processes of gluconeogenesis (glucose synthesis), the metabolism of sugar and organic acids, and also promotes the accumulation of glycogen by the liver and muscles. It is used as an energy source for the brain cells and participates in the production of immunoglobulins and antibodies.

Proline is the main component of collagen, strengthens the tendons and ligaments, and promotes the good functioning of the joints, in the presence of vitamin C helps to heal wounds and injuries [3].

The results are shown in Figures 1-3 and Table 1.

Table 1 – The amino acid composition of flowers of *Helianthus tuberosus* plants.

Name of amino acids	Almaty region (mg/100g)	Tashkent region (mg/100g)
Alanine	1550	1675
Glycines	502	544
Leusine	813	883
Isoleucine	546	548
Valine	408	450
Glutamate	2015	2194
Threonine	442	448
Proline	1248	1295
Methionine	220	298
Serine	910	978
Aspartate	1754	1820
Sisteyn	102	121
Hydroxy-proline	6	7
Phenylalanine	625	652
Thyrosinum	596	685
Histidinum	480	503
Ornitine	6	7
Arginine	612	638
Lysine	440	462
Tryptophan	225	244

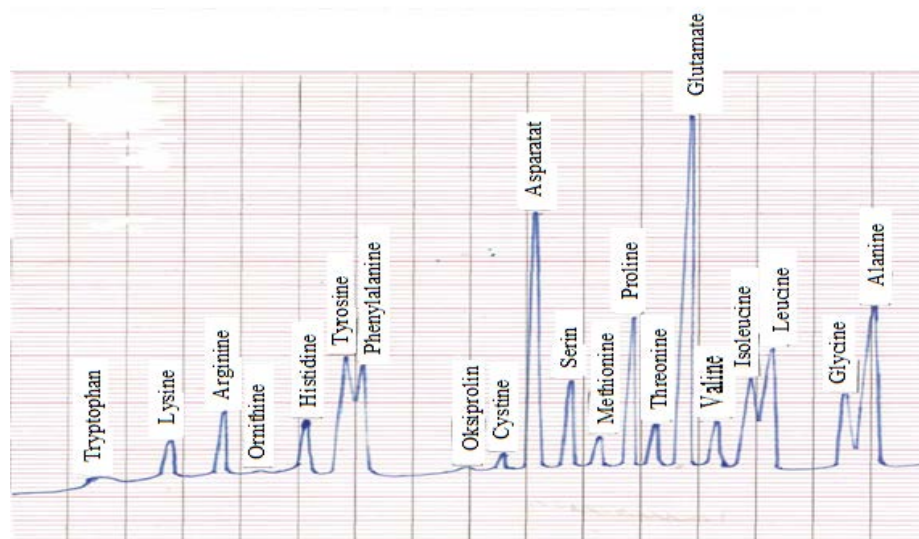


Figure 1 – The chromatogram of amino acids composition of *Helianthus tuberosus* blooms (mg / 100 g)

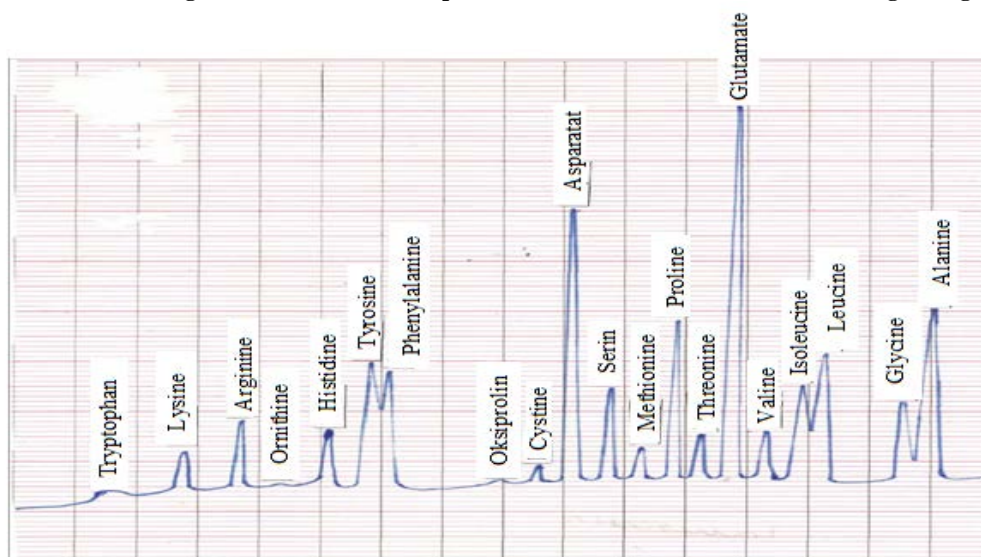


Figure 2 – The chromatogram of amino acids composition of *Helianthus tuberosus* blooms (mg / 100 g)

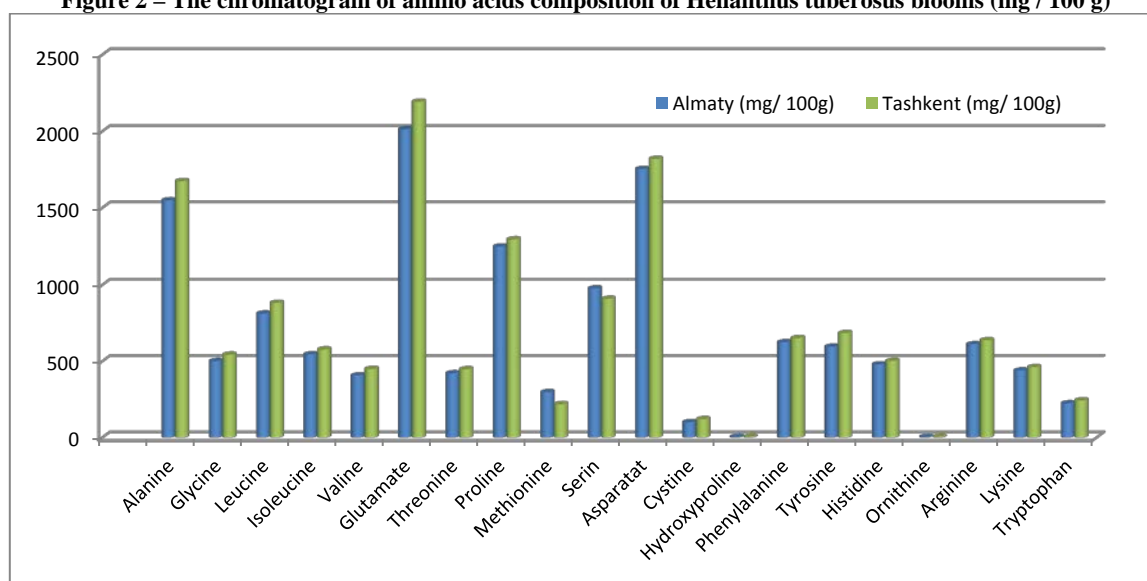


Figure 3 – The amount of amino acids composition of *Helianthus tuberosus* blooms

CONCLUSIONS

1. The amino acid composition of the flowers of *Helianthus tuberosus* plants has been determined by the methods of gas-liquid chromatography of the brand "Carlo-Erba-4200" (Italy-USA). The result of the study revealed a large amount of glutamate, aspartate, alanine, proline, in the Tashkent region – 2194 mg / 100g, 1820mg / 100g, 1675mg / 100g, 1295mg / 100g, and in the Almaty region – 2015m / 100g, 2015mg / 100g, 1550mg / 100g, 1248mg / 100g.

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