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The Quantity of Free Amino Acids in the Agricultural Crops Cultivated in the Northern Areas of Surkhandarya Region and Impact of Fluorides on them

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Abstract: ***The scientific and technical progress in the world and in part, in our republic requires intensive application of all kinds of natural resources. As a result, countries are facing sharp decline in the reserves of natural resources, environmental degradation, and other problems.***

Keywords: Quantity, Surkhandarya region, agricultural, crops, fluorides

1. Introduction

Today, as a result of the production activity of the state unitary enterprise "Tajik Aluminum Company" (TALKO SUE) deteriorates the ecological situation in the vast area, seriously damaging the environment and human health. Particularly, negative ecological situation can be observed in the worsening of the natural environment of Sariosiyo, Uzun and Denau districts of Surkhandarya region (Figure 1).

2. Result and Discussion

Fluorine technical wastes 25-30 km wide against windflaw produced by the TALKO SUE contaminate air, water, soil through various natural phenomena.

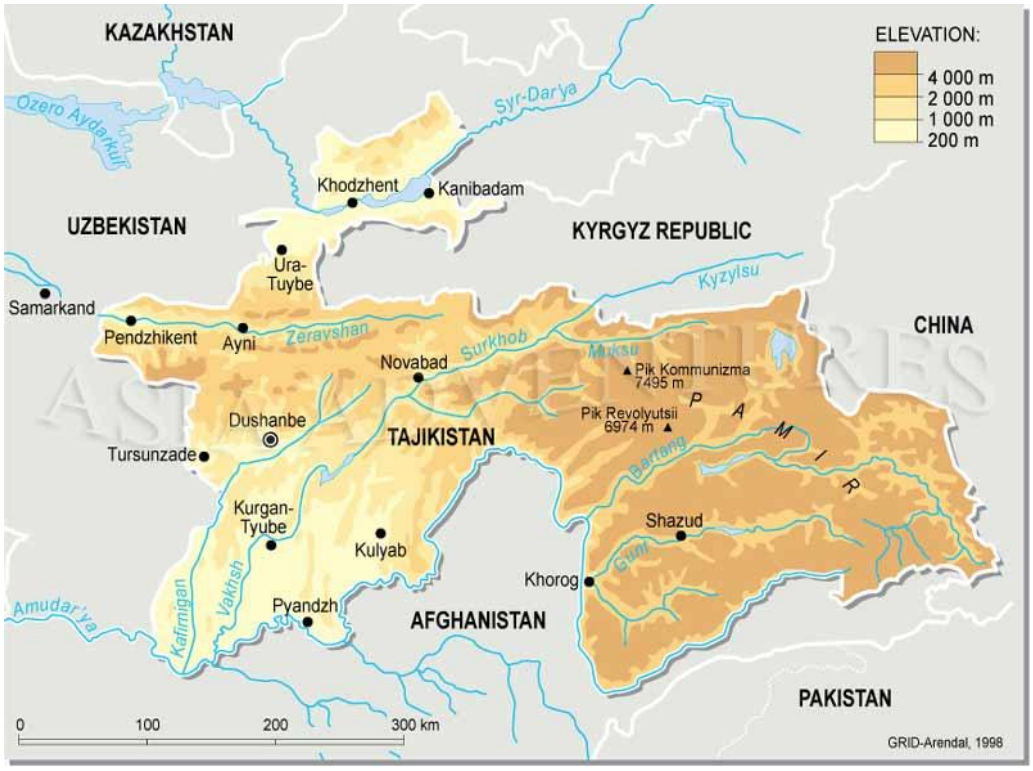
It was discovered that in the distance of one kilometer away from surface water resources, its fluorine content is equal to 31.5 mg / l, 3 km away is 13 mpg / l; when the distance is at the range from 3 to 30 km, the results were 1,1-4,7 mg / l. Near the source of the waste. The indicators of fluoride content in the soil are about 1000 mkg / l., in the distance of 5-6 km - 500 mkg / g and in the distance of 24-26 km - 320-340 mkg / g, while in control options they are equal to 100-200 mkg / g.

Fluorine compounds react with different elements in the environment and form other chemical compounds. It is also important to note that sodium fluoride is strongly toxic to hydrogen fluoride, which may be especially harmful to the vital activities of living organisms.

First of all, the enterprises producing aluminum, steel, glass, enamel, ceramics, phosphate fertilizers, ferrous metals, as well as enterprises of thermal power plants pollutes the environment (fluorine compounds) with gaseous hydrogen fluoride.

Within the framework of the project, anomalies were observed in the amount of free amino acids contained in the leaves of harvested crops in Sariosiyo District of Surkhandarya Province (Dashnabad District) near Denau town, Oltinsoy District (Babur residential area) and Jarkurgan District (Surkhandarya Region) (Figure 1 and Figure *2*) located in the influence zone of the TALKO SUE.

The purpose of this study is to determine the amount of free amino acids contained in the leaves of Horticultural Crops like apricot (Armeniasa vulgarus lam), vine (Vitis vinifera L), cherry (Carasus avium L) .



(a)

(b)

Figure 1: Survey area: a) general map b) magnified view of territory within the scope of object impact

Even at the minimum levels of pollution at the impact zone of the enterprize, plants have been exposed to a sharp deterioration of mineral and protein exchange. This leads to the decline in productivity and poor quality of fruits. It has been proven during the lab tests that certain biostimulants involved in the regulation of mineral and protein metabolism in plant seeds can reduce their damage by their chemical compounds (Figure 2)

Figure 2: Apricot (a) and cherry (b) trees leaf samples damaged by the fluorine compunds Dashnobot residential area in Sariosiyo District (April -May, 2016.)

During the ecogeobotanic expeditions carried out within the impact zone of the TALCO SUE, the influence of environmental factors on the apricot, vine, cherry plant spcies in the region has been observed. As a result of the observations which covered the last months of the spring season including April and May, there were strong lesions of young cells in the tree foliage in existing plant species.

To understand the role of amino acids in the biosynthesis process in plant cells, as well as the importance of a biochemical response to an adverse environmental situation, specimens of herbal vegetative organs were collected from different plant species including apricot, pistachio, cherry planted in this area to identify the amount of free amino acids contained in the plant leaf cultivated within the impact zone of the TALCO SUE (*Table 1*).

The combination of free amino acids with phenyl carbamate (FTC) was carried out on the basis of the analysis of high performance liquid chromatography (HLPC) in Laboratory of Peptide & Protein Chemistry at the Institute of Bioorganic Chemistry under the Academy of Sciences of the Republic of Uzbekistan.

Proteins and peptides in the aqueous extract of the samples were dissolved. 1 ml of 20% trichloroacetic acid was added to the 1 ml of the supernatant. After 10 min, it was centrifuged for 15 minutes with the rotation rate at 8000 rpm. 0.1 ml of residual liquid was dried over in a liofil dryer. Phenyl carbamate (FTC) synthesis of free amino acids was performed by the Steven Cohen method. The FTC amino acid identification was carried out on Agilent Technologies 1200 chromatography at 75x4.6 mm Discovery HS C18 column. The following compounds were used: 0,14M CH_3COONa + 0,05% triethanolamine pH 6,4 and CH_3CN. Flow rate is 1.2 ml per minute, absorption is 269 nm. Gradient% B / min: 1-6% /0-2.5 min; 6-30 %/2.51-40 min; 30-60 %/40,1-45 min; 60-60%/45,1-50 min; 60-0 %/50,1-55 min (Table 1).

Table 1: A number of fruit trees in different regions of Surkhandarya region containing free amino acids(mg / g).

Amino acids	grape leaves *Vitis vinifera* (Sariosiyo district)	cherry leaf *Carasus avium* (Sariosiyo district)	Apricot leaf *Armeniaca vulgarus Lam* (Sariosiyo district)	grape leaves *Vitis vinifera* (Jarkurgan district)	cherry leaf *Carasus avium* (Jarkurgan district))	Apricot leaf *Armeniaca vulgarus Lam* (Jarkurgan district))
Aspartic acid	0,13671	0,037037	0,118464	0,118464	0,14488	0,22658
Glutamic acid	1,025493	0,05551	0,141036	0,078536	0,115543	0,258224
Serine	0,922173	0,534998	1,028634	0,171072	0,386686	0,397699
Glycine	1,949144	4,822243	1,093869	0,4173	8,153992	3,042776
Asparagin	1,948243	4,809117	1,095679	0,418566	8,149573	3,037274
Glutamine	1,134928	0,485645	0,425359	1,462201	1,438756	1,051196
Cysteine	0,645597	0,808901	0,513089	0	0,560209	0,730366
Threonine	0,396291	0,275738	0,319076	0,132256	0,154996	0,099357
Arginine	0,578837	0,847826	0,694866	0,288109	1,41802	0,127816
Alanine	0,493056	0,999592	1,001838	0,456495	1,516748	0,467729
Proline	0,849781	0,815428	2,781074	11,52467	3,115553	1,179888
Tyrosine	0,710997	0,570759	0,326087	1,055413	0,583546	0,14578
Valin	2,133144	0,549897	0,672958	0,255171	1,257239	0,158997
Methionine	0,269611	0,416254	0,059717	0,204974	0,328622	0,304947
Isoleucine	1,379401	0,165918	0,9	0,115356	0,128839	0,082397
Leucine	0,426875	0,200756	0,8381	0,208851	0,259579	0,248786
Histidine	0,776347	0,358314	0	0,514052	0,288056	0,173302
Tryptophan	0,745697	0,745688	1,3544006	1,935608	1,627003	0,264688
Phenylalanine	0,575901	0,119949	0,808518	0,541318	0,322534	0,087914
Lysine HCI	0,071811	0,016315	0,069938	0,023536	0,127574	0,063252
Total	**17,17104**	**17,63678**	**14,43049**	**19,92195**	**30,07795**	**12,14897**

According to the latest observations, the spread of fluorine-bearing chemicals leads to the decline in the yield of plants and the increase in the number of dried trees within the 20-30 km of impact zone. The main symptoms of the lesion are chlorosis and necrosis in plant leaf cells. In addition, fluorine compounds reduce the intensity of decomposition of phytoncides in plants and reduce the resistance of affected trees against xylophage. The most dangerous is the accumulation of fluorine compounds in the nutrient or the absorption of fluorine compounds due to gaseous sediment. The abundance of fluoride in plants can be sreiously harmful to the animals consuming it, and the ruminant animals. In addition, studies have shown that harmful emissions from enterprises lead to the growth and development of plants of the same type, while reducing the natural composition of the flora.

The above information shows that fluoride emissions have negative affect both to the growth, development, and degradation of plants, and to the exploitation of agricultural and natural herbs, which adversely affects the animal and human body and leads to metabolic disease and the spread of various diseases.

References

[1] Azenova A.Kh. Changes in crtain physiological and biochemical parameters in test plants under the impact of harmful emissions from the Tajik Aluminum Plant: Abstract of dissertation of the PhD in Biological Sciences. -Tashkent. 2004 – P- 21
[2] Alikhanov B.B. On the state of the environment and the use of natural resources in the Republic of Uzbekistan in 2002-2004. National Report, 2006.
[3] Boynazarov B., Mamatkulov K., Norbaev N. Effects of organic wastes on plants. Ecological report.- Tashkent.1999 - № 5-6, – P.17-19.
[4] Boynazarov B., Narbaev Z. Mutation of impedance in crop seeds growing in areas with radioactive contamination. The use of chemical technology in solving environmental problems of industrial enterprises. Karshi. 2004. -P.131-134.
[5] Norbaev Z. The permeability of plant tissue under the influence of ionizing radiation and atmospheric pollution. International scientific - practical conference dedicated to the 75th anniversary of Academician A.I.Imomaliev « Agrarian education in the system of personnel training. Science and production integration» 07.12.2006. -P.336-338
[6] Norbaev Sh.Sh., Imomov B., Norbaev Z. The combined effect of low doses of ionizing radiation and atmospheric pollution on the content of endogenous substances in plants. International Scientific Practical Conference. Agrarian science: achievements and prospects. Tashkent. May 1-2 2002. -pp.121-122.