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Research Article

Monitoring the amount of carbohydrates in wheat grains grown in Denov, Uzun and Sariosyo districts of Uzbekistan under negative atmospheric conditions

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Abstract

This article presents monitoring analyzes of the amount of carbohydrates in wheat grains grown in negative atmospheric conditions in Denov, Uzun and Sariosyo districts of Surkhandarya region, which are considered to be the territory close to the state unitary enterprise "Tajikistan Aluminum Company".

The conducted studies showed that the poisoning of the atmosphere with toxic wastes caused a decrease in the productivity of grain crops, and a decrease in their biochemical, biological and nutritional values.

Keywords: Wheat grains, amount of carbohydrates, sucrose, glucose, maltose, fructose, "Tajikistan Aluminum Company", negative atmosphere.

Introduction

Providing population with quality and safe food products is one of the most urgent issues of today. Among the products, bread and bakery products are leading in terms of consumption, and their quality is directly determined by the composition of wheat grains. The volume of total reserves in the world is primarily occupied by grain reserves as food products. Wheat is one of the most important staple food crops among cereals. Environmental conditions of the external environment (soil fertility, atmosphere, location of the region, type of grain crops) are of great importance in determining the quality potential of grain crops.

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Wheat grains contain a lot of useful substances, vitamins, proteins, macro and microelements, and their quality indicators are determined by the amount of this content. However, many environmental factors have a negative effect on grains, causing their biological value to decrease. The most important of them are: plant nutrition, soil composition, negative atmospheric conditions and others. Also, toxic elements, mycotoxins, benzapyrene, pesticides, radionuclides, harmful compounds, and pests are factors that reduce the quality of grains [1, 2].

As mentioned in many literatures, the most important factor for the successful development of a plant is the suitable climate and ecological environment [3]. Assessment of biological nutritional value of grains, their biochemical composition are important factors. Various changes in the ecological environment directly reduce the productivity of grain crops and negatively affect quality indicators [4-6].

The amount of proteins and carbohydrates in grains is the basis of human and farm animal nutrition [7], and more than half of the nutritional needs are met by grains. Therefore, their biochemical composition is one of the most important features for evaluating their value. The amount of carbohydrates and the amino acid composition of proteins are decisive for the biological and nutritional value of any product [8].

Therefore, the study and evaluation of biological, biochemical, ecological and genetic characteristics of grain crops and grain products is not only an urgent issue of the present day, but also a national economic effective task [9].

Research methods.

Determination of the amount of carbohydrates in grains was carried out using the method of liquid chromatography. Fructose standard, imp. Glucose standard, imp. Sucrose standard, imp. Maltose monohydrate standard, imp. Acetonitrile for HPLC "Sigma-aldrich", USA.

Procedure for liquid chromatography equipment - Buffers: A-acetonitrile, B-water. It is carried out in the isocratic mode in the ratio of 82/18 volume. In this case, the buffers are prepared not in separate containers, but in one container in the following ratio, and the flow rate is realized through one channel. This process is carried out in order to separate the peaks of glucose and fructose. The flow rate is 1 ml/min, and the amount delivered to the injector is 10 µl. The temperature of the column thermostat is 35°C.

Obtained results and their analysis.

In scientific studies, the amount of carbohydrates in wheat grains grown in Denov, Uzun, Sariosyo districts of Surkhandarya region were monitored. The reason is that these areas are considered ecologically unhealthy and are among the areas that have been poisoned for

several years by the wastes released by the state unitary enterprise "Tajikistan Aluminum Company". Contamination of the atmosphere and soil composition in the regions with various biochemical elements has a direct harmful effect on the fauna and flora of the region. As mentioned in many scientific literatures [10, 11] harmful effects in the ecological environment reduce the productivity and nutritional value of cereal crops.

In preliminary studies, we monitored the biochemical composition of wheat plant grains grown in Denov district of Surkhandarya region. Among the carbohydrates in the studied samples: the amount of fructose was 2.4 mg/ml (24%), glucose was 0.93 mg/ml (9%), sucrose was 2.07 mg/ml (20%) and was maltose 4.77 (47%) mg/ml. Statistical numbers showed that the total amount of carbohydrates (sucrose, glucose, maltose and fructose) in wheat grains grown in this area was 10.18 mg/ml (Figure 1).

Carbohydrate Type	Content (mg/ml)	Percentage (%)
Fructose	2.40	24%
Glucose	0.93	9%
Sucrose	2.07	20%
Maltose	4.77	47%
Total	**10.18**	**100%**

Table1: carbohydrate composition in wheat grains from the studied area

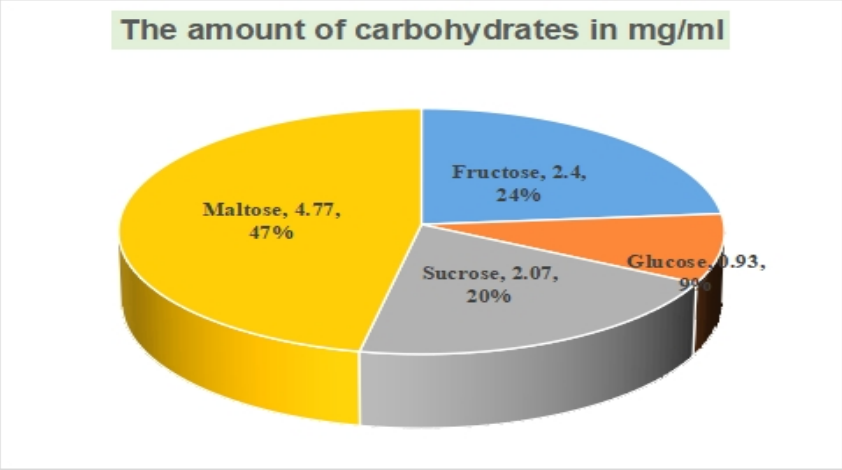

Figure 1. The amount of carbohydrates in the wheat plant grown in Denov district of Surkhandarya region as part of environmental impact of the wastes of "Tajikistan Aluminum Company" state unitary enterprise.

Note: The amount of carbohydrates in wheat is expressed in mg/ml.

According to research results, it can be seen that glucose, one of the carbohydrates tested, is very low in these samples. This is an important indicating factor in the biological nutritional value of grains.

Similar results were observed in samples of wheat grains grown in Uzun district. Among the carbohydrates in the samples of wheat grains grown in this district, fructose was 2.8 mg/ml (27%), glucose was 3.3 mg/ml (31%), sucrose was 1.4 mg/ml (13%) and maltose was 3.10 (19%) mg/ml. The amount of total carbohydrates was 10.72 mg/ml (Figure 2). These obtained results are highlighted by the fact that the amount of carbohydrates in the wheat plant grown in Uzun district is relatively different from the amount of carbohydrates in wheat grown in Denov district. Because, in the conducted research, we can see that the amount of glucose in the wheat grown in Uzun region was increased, but the amount of sucrose and maltose carbohydrates was decreased.

The following table presents the carbohydrate composition in wheat grain samples grown in the Uzun district. These results show a relatively different carbohydrate profile compared to those from the Denov district, with higher glucose content and reduced sucrose and maltose levels.

Carbohydrate Type	Amount (mg/ml)	Percentage (%)
Fructose	2.8	27%
Glucose	3.3	31%
Sucrose	1.4	13%
Maltose	3.1	29%
Total	10.72	100%

Table2: Carbohydrate Composition in Wheat Grains - Uzun District

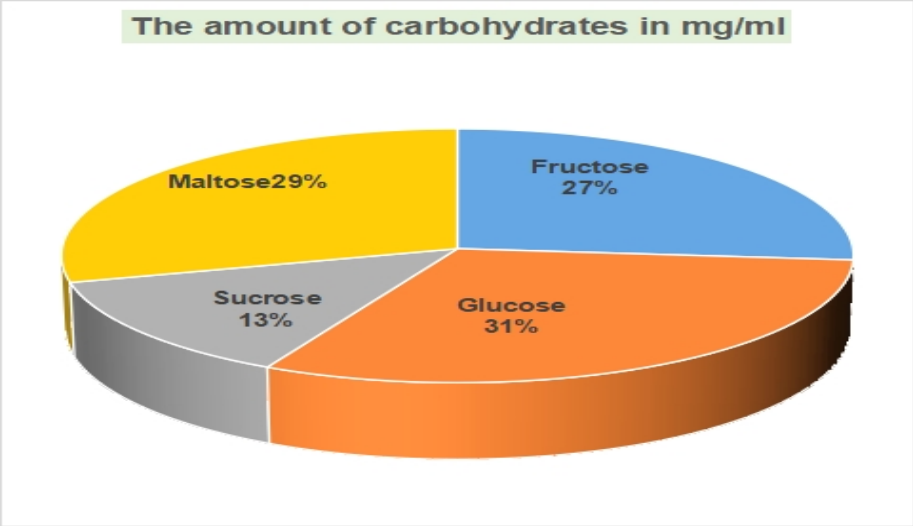

Figure 2. The amount of carbohydrates in wheat plant grown in Uzun district of Surkhandarya region as part of environmental impact of wastes of "Tajikistan Aluminum Company" state unitary enterprise.

Note: The amount of carbohydrates in wheat is expressed in mg/ml.

The experiments were carried out with the study of the amount of carbohydrates in wheat grain samples grown in the Sariosyo district (Figure 3).

In the conducted experiments, it was found that the quantitative content of carbohydrates in the wheat samples grown in Sariosyo district differs sharply from that of Denov and Uzun districts. The fructose content of these samples was 5.33 mg/ml (27%), glucose was 4.74 mg/ml (31%), sucrose was 0.74 mg/ml (13%) and maltose was 3.24 (19%) mg/ml.

Carbohydrate Type	Content (mg/ml)	Percentage (%)
Fructose	5.33	27%
Glucose	4.74	31%
Sucrose	0.74	13%
Maltose	3.24	19%
Total	**14.05**	**100%**

Table3: amount of carbohydrates in wheat grain samples grown in the Sariosyo district

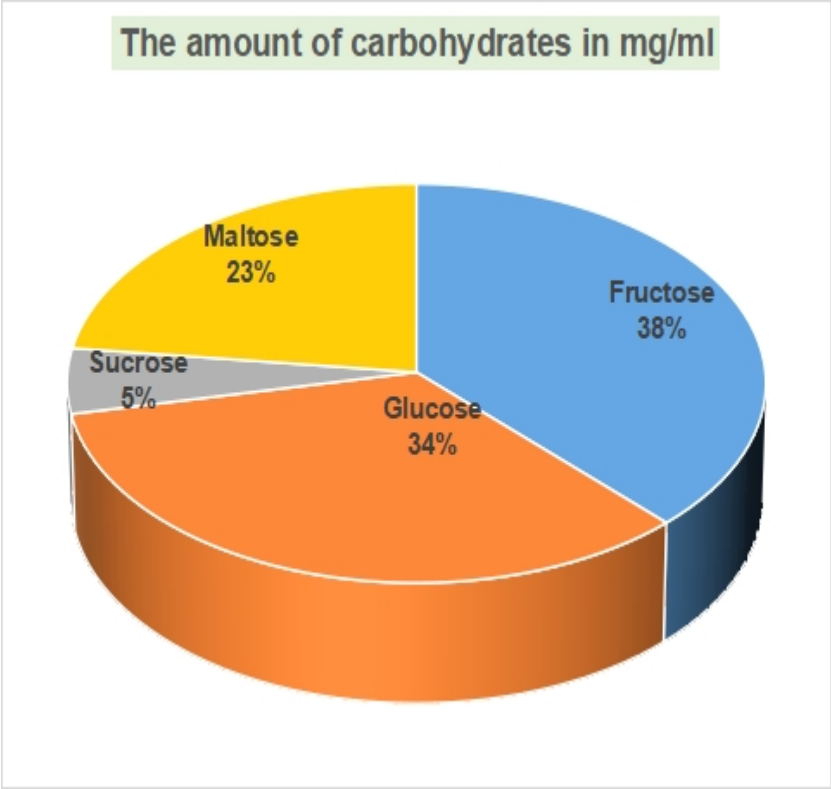

Figure 3. The amount of carbohydrates in wheat plant grown in Sariosyo district of Surkhandarya region as part of environmental impact of wastes of "Tajikistan Aluminum Company" state unitary enterprise.

Note: The amount of carbohydrates in wheat is expressed in mg/ml.

The amount of total carbohydrates in wheat samples grown in Sariosyo district was 14.06 mg/ml (Figure 3).

The total amount of carbohydrates in these obtained results means that their amount in Denov and Uzun districts are significantly less than Sariosyo district. It was found that the amount of monosaccharides in grain samples taken from Denov district is 3.5 to 5.0 times less than the other two districts. But it was observed that the content of disaccharides was high. These are the facts that clearly show that there are changes in the functions of the enzymes contained in the grain after ripening.

Wheat samples grown in Denov district of the province had the highest maltose content, and the lowest glucose content. However, it was shown that the fructose content of wheat grain samples grown in Sariosyo district is somewhat higher, and the ecological environment of Sariosyo district is more stable compared to the ecological conditions of Denov and Uzun districts. However, it is worth noting that these opinions are expressed only in relation to the comparative assessment of the environmental conditions of Denov, Uzun and Sariosyo districts of Surkhandarya region.

In conclusion, we can say that the disturbance of the ecological balance of the environment, the pollution of the atmosphere, the poisoning of the soil under the influence of various toxicants are factors leading to a decrease in the productivity of grain yields. Therefore, it is desirable to keep the area of plants grown as food, especially grain crops, in clean ecological conditions.

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Conflict of interest: None to declare.

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