STUDYING THE QUANTITY OF CARBOHYDRATES IN ITALIKA PALENK GRASS

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Abstract 
Carbohydrates, in particular monosaccharides, are necessary for the normal functioning of the human body. Therefore, it is important to search for plant sources of available carbohydrates such as glucose, fructose, arabinose, etc. Broccoli, Brassica oleracea var. italica has recently received significant attention due to its remarkable nutritional composition and numerous health benefits. Broccoli contains glucose, fructose and sucrose as the main monosaccharides, while the maltose content is negligible. The data obtained confirm the potential of broccoli in the medical field as a source of monosaccharides and water-soluble polysaccharides, which creates the basis for further research on this plant.

How to Cite 

Introduction. Prevention of diseases has always been considered a better strategy than treatment with various methods. Health and nutrition are closely related because our bodies rely on the nutrients, energy and chemical compounds found in food to grow, develop and maintain health. A balanced diet with vegetables plays a key role in maintaining health and reducing the likelihood of many diseases [1,2]. Vegetables are an integral part of a healthy diet and promote good health. Despite the fact that vegetables have great benefits for the body, nutritionists and health experts constantly emphasize the importance of eating fruits and vegetables. Therefore, the inclusion of fresh vegetables and fruits in the diet plays an important role in the prevention of various diseases, which is important for society [3,4].

Broccoli, Brassica oleracea var. italica has recently received significant attention due to its remarkable nutritional composition and numerous health benefits [5].
Broccoli, a member of the cruciferous family, is a significant source of several important nutritional components, including fiber, vitamins (A, C and K), minerals (calcium, potassium and iron) and antioxidants. In addition, this product has been found to contain biologically active substances such as glucosinolates, sulforaphane and indole-3-carbinol, which have been proven to have beneficial effects on the body [6,7,8]. Broccoli is widely recognized in the medical community for its antimicrobial, antioxidant, anticancer, immunomodulatory, antidiabetic, hepatoprotective, cardioprotective, and antiamnestic properties [9,10,11,12].

Most of the broccoli stems and leaves are not used, resulting in environmental pollution. Dietary fiber is a major functional component of green leafy vegetables and has therefore become a popular research topic. Compared to insoluble dietary fiber, soluble dietary fiber has many functional properties. Therefore, we assessed the composition and physicochemical properties of broccoli soluble dietary fiber based on sugar composition, electron microscopy, spectroscopy, and thermal analysis. The results showed that the major monosaccharides of B-SDF include galactose and arabinose, and the major molecular weight is less than 6000 Da (61.37%). B-SDF had a small particle size (average Z-particle size = 42.22 nm) that existed in an amorphous form [13].

Dietary fiber affects all processes in the intestines, which as a result can affect the health of the cardiovascular system. Because many commonly used hydrocolloids are viscous, palatable dietary fibers, they can be used in acceptable food products that offer a wide range of additional health benefits [14].

Carbohydrates are sugars in plants (monosaccharides and oligosaccharides containing 2-3 monosaccharide residues), as well as polysaccharides (starch, cellulose, pectin substances). The products of all agricultural crops contain small amounts of sugar, which is stored in the roots and some parts of vegetable crops, grapes, berries and fruits. In most plants, monosaccharides are predominantly glucose and fructose, while oligosaccharides are in the form of the disaccharide sucrose. Monosaccharides, primarily glucose, are the main source of energy during plant respiration, and its phosphate esters, together with other sugar phosphates, are involved in photosynthesis, the breakdown of complex carbohydrates and other metabolic processes [17].

Since monosaccharides have a significant influence on the bioavailability and overall therapeutic effect of the raw material, the purpose of our research is to study the sugar composition of broccoli herb.

Materials and methods of research. The object of the study was the aerial part of Brassica oleracea collected in the budding phase at the end of November 2022 (supplier "YAKKA-BURGUT" farm, Samarkand region, Jambay region).

The raw materials were dried at room temperature in a well-ventilated area for ten days [15,16] and stored in paper bags.

In the process of testing the method, the analysis conditions were determined: -isocratic elution mode, the composition of the mobile phase is acetonitrile/water in a volume ratio of 82/18 without mixing from two separate containers. The composition of the mobile phase can be varied to achieve complete separation of glucose and fructose peaks. Volumetric elution rate 1.0 ml/min; injection volume 10 µl; column thermostat temperature 35°C; retention times of standards: -fructose –4.9 ± 0.2 min, glucose –5.7 ± 0.2 min, sucrose –10.4 ± 0.2 min, maltose –12.1 ± 0.2 min.

Research results and discussion. The results of determining the carbohydrates composition of broccoli herb (Brassica Oleracea var. Italica Plenck) are presented in Table 1 and Figures 1,2.

As a result of determining the qualitative composition and quantitative content of sugars in the dry raw materials of the grass Brassica oleracea L. var Italika Plenk using HPLC, four monosaccharides were identified, such as fructose, glucose, sucrose and maltose. The content of monosaccharides in dry raw materials of broccoli herb is 1.07%.
Table 1. Carbohydrate content of broccoli grass

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Concentration %</th>
</tr>
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<tbody>
<tr>
<td>Fructose</td>
<td>0.22</td>
</tr>
<tr>
<td>Glucose</td>
<td>0.56</td>
</tr>
<tr>
<td>Sucrose</td>
<td>0.27</td>
</tr>
<tr>
<td>Maltose</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>1.07</strong></td>
</tr>
</tbody>
</table>

**Conclusion.** Thus, as a result of determining the quantitative content of broccoli plant, four carbohydrates such as two monosaccharides (fructose, glucose) and two disaccharides (sucrose, maltose) were determined. The total amount of carbohydrates in the dry raw material of broccoli grass was 1.07%. Based on the returned results, we can recommend broccoli (Brassica oleracea L. var Italica Plenk) plant and food biologically active compounds obtained from it as a dietary product in diseases of the endocrine system, diseases of the gastrointestinal tract, and biologically active. We can continue to study the phytochemical composition in order to develop technology for the composition of additives.
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