

**CHEMICAL COMPOSITION OF PEAR FRUIT AND
ITS IMPORTANCE FOR HUMAN HEALTH**

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Annotation. This study investigates the chemical composition of pear (*Pyrus communis* L.), particularly the Nashvati cultivar grown in Uzbekistan, with a focus on its macro- and microelement content and their significance for human health. Advanced analytical techniques, specifically inductively coupled plasma optical emission spectrometry (ICP-OES), were employed to determine the quantitative distribution of mineral elements in the fruit. The results revealed that potassium, phosphorus, calcium, and magnesium are present in relatively high concentrations, while trace elements such as iron, zinc, copper, and manganese were also detected in smaller amounts. The high phosphorus content highlights its essential role in bone formation, energy metabolism, and genetic processes.

Keywords. Pear, *Pyrus communis*, Nashvati cultivar, chemical composition, macroelements, microelements, ICP-OES, phosphorus, calcium, magnesium, potassium, human health, nutritional value

Introduction. Among fruit crops cultivated in Uzbekistan, pear (*Pyrus communis* L.) occupies a special place due to its nutritional value, pleasant taste, and richness in biologically active compounds. Pear fruits have long been used not only as food but also in traditional medicine [1]. In particular, the macro- and microelements present in pears play an essential role in maintaining normal physiological functions in the human body. Modern scientific studies indicate that the composition of pears is rich in biologically active substances that regulate metabolic processes in the organism. The chemical composition of pear fruit varies depending on several factors, including cultivar characteristics, climatic conditions, soil composition, and agricultural practices. Pear varieties grown in Uzbekistan, especially the Nashvati cultivar, are characterized by a balanced content of sugars, organic acids, pectins, vitamins, and mineral elements. The main objective of this article is to comprehensively analyze the

chemical composition of pear fruit, determine the quantitative content of its elements, and scientifically evaluate their impact on human health [2].

The primary component of pear fruit is water, followed by carbohydrates, mainly fructose and glucose. The sugar content ranges from approximately 10–13%, which determines the sweet taste of the fruit. The amount of organic acids is relatively low (0.1–0.3%), contributing to its mild acidity. In addition, pears contain pectin substances, which play an important role in improving intestinal function. Regarding mineral composition, pears contain essential elements such as potassium, calcium, magnesium, phosphorus, iron, zinc, and copper. These elements participate in various physiological processes in the human body [3]. Potassium is crucial for regulating heart function, calcium contributes to bone strength, and magnesium supports the nervous system. Modern analytical techniques are essential for determining the chemical composition of pear fruit. In this study, inductively coupled plasma optical emission spectrometry (ICP-OES) was employed, as it allows for the detection of trace amounts of elements with high precision. The Nashvati pear sample was selected, dried, and ground into a fine powder. The sample was then subjected to high-temperature ashing in a muffle furnace. The resulting ash was dissolved in an acidic medium to prepare a solution suitable for analysis. This procedure ensures that all mineral elements are transferred into the solution. Standard solutions were subsequently prepared, and calibration curves were constructed. The analysis was performed using a high-precision spectrometer, and the results were processed using specialized software to determine the quantitative content of each element [4].

The analysis revealed that pear fruit contains a wide range of macro- and microelements. Among them, potassium, phosphorus, calcium, and magnesium were found in the highest concentrations, indicating the high biological value of the fruit. Phosphorus was detected in particularly high amounts, confirming its significant role in metabolic processes. The presence of calcium and magnesium in considerable quantities highlights their importance for bone health and muscle function. Trace elements such as iron, zinc, copper, and manganese were also identified, playing vital roles in blood formation, enzymatic reactions, and immune system function. Additionally, small amounts of elements such as selenium and molybdenum were detected. Phosphorus is one of the most important minerals in the human body. It is a key structural component of bones and teeth, contributing to their strength and integrity. Together with calcium, phosphorus forms the mineral matrix of bone tissue. Moreover, phosphorus plays a crucial role in energy metabolism. It is a component of adenosine triphosphate (ATP), which serves as the primary energy carrier in cells. A deficiency of phosphorus can lead to fatigue, muscle weakness, and general lethargy. Phosphorus is also an essential component of genetic material, including DNA and RNA, and is therefore involved in cell growth and division. Additionally, it contributes

to the proper functioning of the nervous system by facilitating the transmission of nerve impulses. Regular consumption of pear fruit provides numerous health benefits. The potassium content helps regulate heart rhythm and lower blood pressure. Magnesium has a calming effect on the nervous system and helps reduce stress. Calcium and phosphorus contribute to the strengthening of the skeletal system, which is particularly important for children and elderly individuals. Iron plays a role in hemoglobin synthesis and helps prevent anemia. Pectin substances improve intestinal function and assist in detoxifying the body by removing harmful substances. Therefore, pears can be recommended as part of a dietary and therapeutic nutrition plan. The findings of this study are consistent with the results of other researchers. Studies conducted in different countries also indicate that potassium, calcium, magnesium, and phosphorus are the predominant elements in pear fruit. This confirms the universal nutritional value of pears. Furthermore, the high sensitivity and accuracy of the ICP-OES method enable the detection of even trace concentrations of elements, thereby enhancing the reliability of the results [5].

Conclusion. The conducted research demonstrates that the Nashvati pear variety has a high biological value and contains essential macro- and microelements necessary for human health. In particular, phosphorus, calcium, magnesium, and potassium were found to be predominant. The multifunctional role of phosphorus in the human body—including its involvement in bone strength, energy metabolism, genetic processes, and nervous system function—highlights its importance. Regular consumption of pears contributes to improving overall health, strengthening the immune system, and preventing various diseases. Thus, incorporating pears into the daily diet is scientifically justified not only from a nutritional perspective but also for preventive and therapeutic purposes.

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