

### 13. Impact of Lyophilization on the Chemical Composition and Metabolic Activity of Plant Extracts

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**Introduction.** One of the effective methods for preserving the quality and shelf life of plant extracts is the lyophilization technology, where the solvent is removed at low temperatures under vacuum by sublimation [1].

**Materials and Methods.** A search and thorough analysis of foreign scientific works were conducted regarding the advantages and disadvantages of lyophilization technology, and its influence on the composition of secondary metabolites in plant extracts and raw materials.

**Results.** Lyophilization technology is widely used for concentrating plant extracts and raw materials, preserving their organoleptic properties, and extending their shelf life in pharmaceutical, food, and chemical industries. Among the disadvantages of this technology, high equipment costs, and energy and labor resources consumption can be mentioned. It has also been found that lyophilization may affect the composition of secondary metabolites, potentially reducing the amount of volatile compounds susceptible to sublimation or decreasing the metabolic activity of components, making the study of such effects particularly relevant in the pharmaceutical and food industries [1].

In a study of the efficiency of lyophilization of fresh root and wheat root extract, it was found that lyophilization changed the metabolic structure of fresh root samples. In general, 7% of all wheat metabolites identified in non-lyophilized samples were no longer observed in dried samples, and up to 43% of other metabolites exhibited modified metabolic activity. In water and alcohol extracts of wheat root, less than 5% of metabolites were completely lost as a result of lyophilization [2].

Comparison of different drying methods (lyophilization and drying in oven) and different extractants (water and 50% ethanol) for extracts of *Arthrocnemum macrostachyum* shoots showed that oven drying post-extraction led to a loss of up to 27% of metabolites in comparison to lyophilization of aqueous extracts. Conversely, only 3% of metabolites were lost in 50% ethanol extracts during oven drying. Drying extracts in the oven proved to be as efficient as lyophilization in conserving metabolites in extracts only when 50% ethanol was utilized as the extraction solvent [1].

**Conclusion.** Thus, research on the impact of lyophilization on the composition of metabolites and their biological activity remains relevant, as well as the selection of the extractant depending on the chemical nature of biologically active substances.

#### References:

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