



ANALYSIS OF PHYSICAL AND BIOLOGICAL PROPERTIES OF SPICES  
AND HERBS

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**Abstract.** *Biologically active substances (BAS) accumulate in various parts of plants (buds, leaves, stems, flowers, fruits, roots or bark) and during certain periods of their development. The amount of biologically active substances in different phases of the plant's growing season does not remain constant, and sometimes fluctuates even during the day. In this regard, only those parts of plants that contain the largest amount of biologically active substances are usually harvested. Thus, the time and place of accumulation of biologically active substances in the plant actually determine the period of procurement of medicinal plant raw materials. Spices and herbs, integral components of culinary traditions and ancient healing practices, are renowned for their captivating flavors, aromas, and diverse bioactivities. While their sensory attributes have tantalized palates for millennia, a deeper understanding of their physical and biological properties is essential for unraveling their full potential in food, pharmaceutical, and cosmetic applications. This article embarks on a journey into the fascinating realm of spice and herb properties, exploring their interconnectedness and significance in various domains [1].*

**Key words:** *biologically active substances, herb properties, drying time, processing, final compounds of product.*

**Introduction.** Most types of medicinal plant raw materials are used in medicine in dried form. Only certain species are processed in a fresh state immediately after collection. Drying ensures the preservation of biologically active substances of medicinal plant materials. From the point of view of thermodynamics, drying is the process of interaction between wet material (medicinal raw materials) and a coolant (heated air); from a technological point of view, it is the process of removing liquid (dehydration) from the medicinal material. The collected medicinal raw materials contain, as a rule, 70-90%, and dried - 10-15 (20)% moisture. The optimal drying regime should be based on experimental data on the effect of drying and its specific methods on the content of certain groups of biologically active substances. In some cases, drying is preceded by drying of the collected raw materials, i.e. keeping raw materials at normal temperature under a canopy. Sometimes the drying procedure helps to increase the content of active substances or accelerates the process of subsequent dehydration. The duration of the drying process and the productivity





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of drying installations are influenced by the morphological characteristics of the raw material, its initial humidity, the total surface of the material being dried, as well as humidity, temperature and the speed of the coolant. The physical properties of spices and herbs, encompassing characteristics like size, shape, color, density, and water activity, profoundly influence their handling, processing, shelf life, and sensory attributes [2].

The biological properties of spices and herbs, encompassing their bioactive compounds, antioxidant capacities, and antimicrobial effects, underpin their traditional use in medicine and their increasing incorporation into functional foods and nutraceuticals. Many spices and herbs exhibit broad-spectrum antimicrobial activity against bacteria, fungi, and viruses, making them valuable natural preservatives and potential therapeutic agents. Key antimicrobial compounds include:

The physical and biological properties of spices and herbs are intricately intertwined, influencing each other and ultimately determining their overall quality and functionality.

**Comprehensive Profiling:** Developing comprehensive databases that catalog the physical, chemical, and biological properties of a wide array of spices and herbs.

**Bioactivity-Guided Fractionation:** Identifying and isolating specific bioactive compounds responsible for desired therapeutic effects. For drying materials that require high humidity of the drying agent and low temperatures, devices are used that ensure recirculation (return) of part of the exhaust air into the dryer, as well as dryers with intermediate heating of air between individual stages (or zones) and simultaneous recirculation his. When drying difficult-to-dry material or to improve its flowability, recirculation of part of the dried product is used, returning it to the inlet of the dryer and mixing with the original material. The mechanism of the convective drying process can be represented as follows. When a wet body is introduced into a heated gas, heat is transferred to the surface of the material, caused by the temperature difference between them, heating it and evaporating the moisture. At the same time, the partial pressure near the surface of the body increases, which leads to the transfer of moisture vapor into the environment. As a result of the evaporation of moisture from the surface and the removal of the resulting vapor, a gradient of moisture concentration in the material arises, which is the driving force for its internal movement from the deep layers to the evaporation surface [3].

**Synergistic Effects:** Investigating the potential synergistic effects of combining different spices and herbs to enhance their bioactivities.

**Sustainable Production:** Exploring sustainable farming practices and processing technologies to preserve the quality and bioactive potential of spices and herbs. The improvement of fragrant plants has numerous likenesses with the development of green species inside the open field and, in this way, a conventionally genuinely advancement system, which gives for planting, visit advancement care and one or more harvests in the midst of the advancement cycle of the alter inside the era season. The plants are accumulated inside the green field, in grow [4]. When the parts create, but for a few and unprecedented cases, they are a thing that contain variable rates of vegetation water and,





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hence, cannot be protected and transported, but in a brief run. Gathering can be done by hand or by machine. Temperature Control: Drying racks and screens can be placed in warm, dry environments, such as attics or greenhouses, to promote faster drying. However, careful monitoring is essential to avoid excessive heat exposure.

Conclusion. The world of spices and herbs extends far beyond their culinary uses. Their intricate physical and biological properties, intricately intertwined, hold immense potential for applications in food preservation, medicine, cosmetics, and beyond. As we delve deeper into this captivating realm, embracing the complexity of nature's gifts will pave the way for innovative and sustainable solutions to enhance human health and well-being.

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