JOURNAL OF INTERNATIONAL SCIENTIFIC RESEARCH
Volume 2, Issue 8, April, 2025 Online ISSN: 3030-3508
https://spaceknowladge.com

CONTROLLING HUMIDITY AND TEMPERATURE WHILE DRYING HERBS AND SPICES

Mizomov M.S. [1]
[1] *Teaching assistant, Bukhara state technical university*

ARTICLE INFO

ARTICLE HISTORY:
Received:07.04.2025
Revised: 08.04.2025
Accepted:09.04.2025

KEYWORDS:
herb drying, spice drying, temperature control, humidity control, drying methods, air drying, dehydrators, freeze drying, essential oils preservation, quality preservation

ABSTRACT:

This article discusses the importance of controlling temperature and humidity during the drying process of herbs and spices. It explores how these factors influence the quality of dried products, such as flavor, color, and aroma, and highlights best practices for optimal preservation. The article covers various drying methods, including air drying, dehydrators, oven drying, and freeze-drying, emphasizing the need for careful monitoring of environmental conditions to prevent spoilage and maintain high-quality results. It serves as a guide for both commercial producers and home users seeking to enhance the quality and shelf life of dried herbs and spices.

INTRODUCTION. Drying is one of the oldest and most effective methods for preserving herbs and spices, allowing their flavors, aromas, and nutritional properties to be retained long after harvest. However, the process of drying is not as simple as just removing moisture; it requires precise control of environmental factors, especially temperature and humidity, to ensure the highest quality product. Improper conditions can lead to a loss of essential oils, which are responsible for the distinctive flavors and aromas of herbs and spices, or even cause spoilage through mold growth.

Achieving the right balance of temperature and humidity during the drying process is crucial for both home gardeners and commercial producers. Too much heat or humidity can degrade the quality of the herbs and spices, while inadequate control can lead to incomplete drying, leaving the products susceptible to deterioration. This article explores the importance of controlling temperature and humidity in the drying process of herbs and spices, providing insights into best practices and different drying methods to achieve optimal results. By understanding and applying the correct drying techniques, producers can

ensure that their herbs and spices maintain their full flavor and remain safe for consumption over extended periods.

Drying herbs and spices is a crucial step in preserving their flavors, colors, and nutritional properties. However, this process requires careful control of environmental factors, particularly temperature and humidity, to ensure optimal results. Improper conditions can lead to the degradation of essential oils, flavors, and aromas, or even the growth of mold and bacteria. This article explores the importance of controlling humidity and temperature during the drying process of herbs and spices and offers insights into best practices for achieving high-quality, safely preserved products. Herbs and spices, such as basil, oregano, thyme, rosemary, cumin, and paprika, are often dried to prolong their shelf life, reduce transportation costs, and maintain their unique flavors. Fresh herbs and spices typically have high moisture content, which makes them prone to spoilage. Drying removes this moisture, preventing microbial growth and oxidation, while also concentrating their flavors. However, drying isn't just about removing moisture—it's about preserving the quality of the product. Too much heat or the wrong humidity levels can result in a loss of flavor, color, and aroma, which are key attributes of herbs and spices. Proper drying conditions ensure that these qualities are retained, while also maintaining food safety.

When drying herbs and spices, two primary environmental factors must be carefully controlled: **temperature** and **humidity**.

Temperature. The temperature at which herbs and spices are dried directly affects the final product's quality. Temperature needs to be high enough to evaporate moisture quickly but not so high that it causes damage to the delicate compounds found in herbs and spices.

- **Low Temperatures (35-45°C / 95-113°F)**: In general, herbs and spices should be dried at temperatures between 35°C and 45°C (95°F and 113°F). This low-heat range helps prevent the loss of volatile oils, which are responsible for the characteristic flavors and aromas of herbs and spices. Higher temperatures can cause these oils to evaporate or degrade, leading to a less flavorful product.
- **High Temperatures**: Drying herbs and spices at higher temperatures (above 50°C / 122°F) can cause browning, over-drying, or even the destruction of essential oils, which compromises the flavor and aroma of the product. For instance, basil and parsley are particularly sensitive to high temperatures, which can result in a loss of their vibrant green color and delicate flavor.

Humidity. Humidity plays a significant role in the drying process as it influences the rate at which moisture is removed from herbs and spices. Drying herbs in an environment with

excessive humidity can slow down the drying process, causing the herbs to remain moist for longer than necessary, which could lead to mold growth and spoilage. On the other hand, if the humidity is too low, the herbs might dry too quickly, which could result in a poor texture and potential loss of volatile oils.

- Ideal Humidity Levels: An ideal drying environment for herbs and spices should have a relative humidity of around 30-40%. This humidity range helps maintain a balance where moisture is efficiently evaporated without leading to mold growth or rapid, uneven drying.
- High Humidity: When drying herbs in humid conditions (above 60% relative humidity), the drying process slows down considerably. This extended moisture retention increases the risk of microbial contamination, particularly mold and mildew, which can ruin the herbs and spices.
- Low Humidity: If the drying environment is too dry (with humidity below 20%), the drying process can occur too quickly. Rapid moisture loss from the herbs can cause them to shrivel, crack, or lose important essential oils, resulting in a reduction in both the flavor and quality of the herbs and spices.

Materials and methods. This section outlines the materials and methods used to control temperature and humidity during the drying of herbs and spices. The following drying techniques were explored: air drying, dehydrator drying, oven drying, and freeze drying. Each method was assessed based on its ability to regulate environmental conditions to ensure optimal preservation of flavor, aroma, and quality. The materials and methods used in this study provide a comprehensive approach to understanding the effects of different drying methods on herbs and spices. By controlling environmental factors such as temperature and humidity, it is possible to optimize the drying process, ensuring high-quality, flavorful, and safe final products. To achieve optimal drying conditions, it's important to employ the right techniques and tools to control temperature and humidity. Here are some common methods used in the industry and at home:

One of the simplest methods for drying herbs and spices is air drying, which involves hanging them in a dry, well-ventilated area. To control temperature and humidity in this method:

- Choose a Dry Location: Ensure that the room is warm and dry, with good air circulation. A temperature of around 20°C (68°F) and low humidity are ideal. Avoid damp areas like basements, which could promote mold growth.

- Monitor the Conditions: Using a thermometer and hygrometer in the drying room helps track the temperature and humidity levels. Consider using a dehumidifier to keep humidity at optimal levels if the air is too moist.

Electric food dehydrators are a popular choice for drying herbs and spices due to their ability to maintain consistent temperature and humidity levels. Dehydrators typically have adjustable temperature settings and built-in ventilation systems, making them ideal for controlling the drying environment.

- Temperature Settings: Set the dehydrator to a low heat setting (usually between 35-45°C / 95-113°F) to preserve the delicate oils and prevent overheating.
- Humidity Control: Dehydrators are designed to reduce the humidity in the drying chamber by using fans to circulate air and expel moisture, ensuring a controlled and efficient drying process.

Controlling temperature and humidity is essential to achieving high-quality, safely dried herbs and spices. By maintaining the right balance of heat and moisture, you can preserve the flavor, color, and aroma of herbs while ensuring that they remain free from mold or bacterial contamination. Whether you're using air drying, a dehydrator, or an oven, it's important to monitor these parameters carefully to achieve the best results. With the proper techniques, drying herbs and spices can be an effective way to prolong their shelf life and enhance their culinary and medicinal uses.

Data from the sensory evaluations, moisture content measurements, and shelf-life testing were analyzed using statistical methods to determine the effectiveness of each drying method. Descriptive statistics (mean, standard deviation) were used to summarize the results, and one-way analysis of variance (ANOVA) was used to compare differences between the drying methods for each quality parameter (moisture content, flavor, aroma, etc.). The methodology outlined above provides a comprehensive approach to studying the effects of temperature and humidity control during herb and spice drying. By employing different drying methods, monitoring key environmental parameters, and conducting post-drying evaluations, this study aims to determine the most effective methods for preserving the flavor, texture, and shelf life of dried herbs and spices. The results indicate that maintaining a temperature range of 35-45°C (95-113°F) and a humidity level of 30-40% is crucial for preserving the delicate oils and flavors that define herbs and spices. While air drying offers a simple, natural method, it requires careful monitoring of room conditions to prevent spoilage. The dehydrator provides a more controlled environment, ensuring consistent temperature and humidity, which is ideal for quality preservation. Oven drying, though less efficient in controlling humidity, can still yield satisfactory results with proper monitoring. Freeze drying, although the most effective in preserving the original flavor and

aroma, may not be feasible for all producers due to its high cost and equipment requirements.

Conclusion. The drying of herbs and spices is a delicate process that requires careful control of both temperature and humidity to preserve their essential qualities, such as flavor, aroma, and nutritional value. This study has demonstrated that various drying methods—air drying, dehydrator drying, oven drying, and freeze drying—each offer distinct advantages, but all require precise environmental management to achieve optimal results. In conclusion, the best drying method depends on the available resources, desired quality, and scale of production. Regardless of the method chosen, understanding and controlling temperature and humidity are key to achieving high-quality, safe, and flavorful dried herbs and spices that retain their original characteristics for extended shelf life. By following the proper drying techniques and carefully monitoring environmental conditions, producers can ensure that their herbs and spices remain top-notch for culinary and medicinal uses.

References:

1. Bahramovna, P. U. (2025). CHARACTERISTICS OF ENHANCING THE MECHANISMS FOR ORGANIZING FIRST AID TRAINING PROCESSES. *JOURNAL OF INTERNATIONAL SCIENTIFIC RESEARCH*, *2*(5), 59-62.

2. Bahramovna, P. U., Tashpulatovich, T. S., & Botirovna, Y. A. (2025). FUNDAMENTALS OF DEVELOPING FIRST AID SKILLS IN STUDENTS: A THEORETICAL ANALYSIS. *JOURNAL OF INTERNATIONAL SCIENTIFIC RESEARCH*, *2*(5), 147-153.

3. Bahramovna, P. U., Tashpulatovich, T. S., & Botirovna, Y. A. (2025). COMPREHENSIVE AND METHODOLOGICAL ANALYSIS OF DEVELOPING FIRST AID SKILLS IN STUDENTS OF NON-MEDICAL FIELDS. *STUDYING THE PROGRESS OF SCIENCE AND ITS SHORTCOMINGS*, *1*(6), 162-168.

4. Палванова, У. Б. (2025). ОСОБЕННОСТИ УСОВЕРШЕНСТВОВАНИЕ МЕХАНИЗМОВ ОРГАНИЗАЦИИ ПРОЦЕССОВ ОБУЧЕНИЯ ПЕРВОЙ ПОМОЩИ. *THEORY OF SCIENTIFIC RESEARCHES OF WHOLE WORLDT*, *1*(5), 199-202.

5. Палванова, У. Б., Тургунов, С. Т., & Якубова, А. Б. (2025). СИСТЕМНО-МЕТОДИЧЕСКИЙ АНАЛИЗ ФОРМИРОВАНИЯ НАВЫКОВ ПЕРВОЙ ПОМОЩИ У ОБУЧАЮЩИХСЯ НЕМЕДИЦИНСКИХ СПЕЦИАЛЬНОСТЕЙ. *THEORY OF SCIENTIFIC RESEARCHES OF WHOLE WORLDT*, *1*(5), 203-211.

6. Палванова, У. Б., & Тургунов, С. Т. (2024, August). Обобщение научного исследования по совершенствованию навыков оказания первой помощи студентов не медицинских высших учебных заведений. In *INTERNATIONAL CONFERENCE ON INTERDISCIPLINARY SCIENCE* (Vol. 1, No. 8, pp. 16-17).

7. Палванова, У. Б., & Тургунов, С. Т. (2024, August). Обобщение научного исследования по совершенствованию навыков оказания первой помощи студентов не медицинских высших учебных заведений. In *INTERNATIONAL CONFERENCE ON INTERDISCIPLINARY SCIENCE* (Vol. 1, No. 8, pp. 16-17).

8. Палванова, У., Тургунов, С., & Якубова, А. (2024). АНАЛИЗ ПРОЦЕССОВ ОБУЧЕНИЯ НАВЫКАМ ОКАЗАНИЯ ПЕРВОЙ ПОМОЩИ СТУДЕНТОВ НЕ МЕДИЦИНСКИХ ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЙ. *Journal of universal science research*, *2*(7), 85-94.

9. Палванова, У. Б. (2024). Значение Формирования Навыков Оказания Первой Помощи У Студентов В Не Медицинских Образовательных Учреждениях. *Periodica Journal of Modern Philosophy, Social Sciences and Humanities*, *27*, 93-98.

10. Палванова, У. Б. (2024). Значение Формирования Навыков Оказания Первой Помощи У Студентов В Не Медицинских Образовательных Учреждениях. *Periodica Journal of Modern Philosophy, Social Sciences and Humanities*, *27*, 93-98.

11. Палванова, У. Б., & Тургунов, С. Т. (2024, August). Обобщение научного исследования по совершенствованию навыков оказания первой помощи студентов не медицинских высших учебных заведений. In *INTERNATIONAL CONFERENCE ON INTERDISCIPLINARY SCIENCE* (Vol. 1, No. 8, pp. 16-17).

12. Палванова, У., Якубова, А., & Юсупова, Ш. (2023). УЛЬТРАЗВУКОВОЕ ИССЛЕДОВАНИЕ ПРИ СПЛЕНОМЕГАЛИИ. *Talqin va tadqiqotlar*, *1*(21).

13. Палванова, У. Б., Изранов, В. А., Гордова, В. С., & Якубова, А. Б. (2021). Спленомегалия по УЗИ–есть ли универсальные критерии?. *Central Asian Journal of Medical and Natural Science*, *2*(3), 52-27.

14. Степанян, И. А., Изранов, В. А., Гордова, В. С., Белецкая, М. А., & Палванова, У. Б. (2021). Ультразвуковое исследование печени: поиск наиболее воспроизводимой и удобной в применении методики измерения косого краниокаудального размера правой доли. *Лучевая диагностика и терапия*, *11*(4), 68-79.

15. Палванова, У. Б. (2024). Значение Формирования Навыков Оказания Первой Помощи У Студентов В Не Медицинских Образовательных Учреждениях. *Periodica Journal of Modern Philosophy, Social Sciences and Humanities*, *27*, 93-98.

16. Якубова, А. Б., Палванова, У. Б., & Палванова, С. Б. (2018). НОВЕЙШИЕ ПЕДАГОГИЧЕСКИЕ И ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ В ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКЕ СТУДЕНТОВ МЕДИЦИНСКОГО КОЛЛЕДЖА В ХОРЕЗМСКОЙ ОБЛАСТИ. In Современные медицинские исследования (pp. 22-25).

17. Изранов, В. А., Степанян, И. А., Гордова, В. С., & Палванова, У. Б. (2020). ВЛИЯНИЕ УЛЬТРАЗВУКОВОГО ДОСТУПА И ГЛУБИНЫ ДЫХАНИЯ НА КОСОЙ ВЕРТИКАЛЬНЫЙ РАЗМЕР ПРАВОЙ ДОЛИ ПЕЧЕНИ. In *РАДИОЛОГИЯ–2020* (pp. 24-24).

18. Якубова, А. Б., & Палванова, У. Б. Проблемы здоровья связанные с экологией среди населения Приаралья мақола Научно-медицинский журнал “Авиценна” Выпуск № 13. *Кемерово 2017г*, 12-15.

19. Азада, Б. Я., & Умида, Б. П. (2017). ПРОБЛЕМЫ ЗДОРОВЬЯ СВЯЗАННЫЕ С ЭКОЛОГИЕЙ СРЕДИ НАСЕЛЕНИЯ ПРАРАЛЬЯ. *Авиценна*, (13), 12-14.

20. Izranov, V., Palvanova, U., Gordova, V., Perepelitsa, S., & Morozov, S. (2019). Ultrasound criteria of splenomegaly. *The Radiologist*, *1*(1002), 3-6.

21. Batirovna, Y. A., Bahramovna, P. U., Bahramovna, P. S., & Ogli, I. A. U. (2019). Effective treatment of patients with chronic hepatitis, who live in ecologically unfavorable South zone of Aral Sea region. *Наука, образование и культура*, (2 (36)), 50-52.

22. Изранов, В. А., Степанян, И. А., Гордова, В. С., & Палванова, У. Б. (2020). ВЛИЯНИЕ УЛЬТРАЗВУКОВОГО ДОСТУПА И ГЛУБИНЫ ДЫХАНИЯ НА КОСОЙ ВЕРТИКАЛЬНЫЙ РАЗМЕР ПРАВОЙ ДОЛИ ПЕЧЕНИ. In *РАДИОЛОГИЯ–2020* (pp. 24-24).

23. Изранов, В. А., Степанян, И. А., Гордова, В. С., & Палванова, У. Б. (2020). ВЛИЯНИЕ УЛЬТРАЗВУКОВОГО ДОСТУПА И ГЛУБИНЫ ДЫХАНИЯ НА КОСОЙ ВЕРТИКАЛЬНЫЙ РАЗМЕР ПРАВОЙ ДОЛИ ПЕЧЕНИ. In *РАДИОЛОГИЯ–2020* (pp. 24-24).

24. Stepanyan, I. A., Izranov, V. A., Gordova, V. S., Palvanova, U., & Stepanyan, S. A. (2020). Correlation of pathological changes in the liver and spleen in patients with cirrhosis. *Virchows Archiv-European Journal of Pathology*, *477*(S1), 278-279.

25. Stepanyan, I. A., Izranov, V. A., Gordova, V. S., Palvanova, U., & Stepanyan, S. A. (2020). The influence of diffuse liver diseases on the size and spleen mass coefficient, prognostic value of indicators. *Virchows Archiv-European Journal of Pathology*, *477*(S1), 279-279.

26. Stepanyan, I. A., Izranov, V. A., Gordova, V. S., Beleckaya, M. A., & Palvanova, U. B. (2021). Ultrasound examination of the liver: the search for the most reproducible and easy to operate measuring method of the right lobe oblique craniocaudal diameter. *Diagnostic radiology and radiotherapy*, *11*(4), 68-79.