

The effects of different drying methods on the quality of persimmons

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Outline

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Abstract

Persimmons (*Diospyros kaki*) are a nutrient-rich fruit, containing high concentrations of carotenoids and ascorbic acid, which provide various health benefits. However, persimmons are prone to spoilage and difficult to transport and store. Therefore, finding appropriate drying processing techniques is crucial. According to the first two papers, three main drying methods were used to dry persimmon slices: hot air drying (HAD), combined hot-air-microwave drying (CHAMD), and freeze drying (FD). Compared to the other two methods, the FD method can retain a higher content of nutrients, such as β -carotene, ascorbic acid, and total phenol content, but it requires longer time and higher costs. In contrast, the high temperatures used in HAD can reduce the drying time but also lead to significant nutrient loss (like ascorbic acid, titratable acidity, and arbutin) and may cause the cell structure to shrink or even change shape, thereby affecting its rehydration ability. With advancements in technology, researchers have found that combining two or more drying methods can yield better results. The CHAMD can produce colors, structures, and textures similar to FD while not requiring large amounts of energy and cost. The optimal CHAMD conditions identified in this report are a slice thickness of 1 mm, a temperature of 70°C, an initial hot air drying airspeed of 1.0 m/s, and a subsequent microwave drying power density of 10.7 W/g. In summary, using a combined drying method or adjusting the temperature during the hot air drying process can help the samples achieve nutrient content similar to that of freeze drying. Furthermore, carotenoids are not significantly affected by HAD. However, it can lead to the degradation of cell walls and membranes, exposing them to conditions that reduce their antioxidant activity.

探討不同方法乾燥對柿子品質的影響

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大綱

一、前言

二、三種不同乾燥製程對柿片特性的影響：熱風乾燥、熱風微波合併乾燥、真空冷凍乾燥技術比較研究

三、不同乾燥條件和方法對柿片乾燥動力學和生物活性物質保留的影響

四、脫水柿子中的類胡蘿蔔素：抗氧化活性、結構和光致發光

五、結論

摘要

柿子 (*Diospyros kaki*) 是一種富含營養素的水果，含有高濃度的類胡蘿蔔素和抗壞血酸，這些成分提供了多種健康益處。然而，柿子易腐爛，且運輸和儲存困難。故尋找合適的乾燥加工技術至關重要。根據前兩篇文獻，主要使用三種乾燥方法：熱風乾燥 (hot air drying, HAD)、組合熱風微波乾燥 (combined hot-air-microwave drying, CHAMD) 和冷凍乾燥 (freeze drying, FD) 對柿片進行乾燥。FD 法和另外兩種方法相比，可以保留較高含量的營養成分，如 β -胡蘿蔔素、抗壞血酸和總酚含量，但它需要較長的時間和較高的花費。相比之下，HAD 所使用的高溫，雖然可以減少乾燥過程的時間，卻同時會導致營養素的大量損失 (抗壞血酸、可滴定酸和熊果苷等)，且可能造成細胞結構縮小甚至變形，進而影響其復水能力。隨著科技進步，研究人員發現，結合兩種或多種乾燥方法可以產生更好的結果，將 HAD 和微波乾燥兩者合併的乾燥方法能產生和 FD 法相似的顏色、結構和質地，且不需要消耗大量能源及成本。本次報告中找到的最佳 CHAMD 條件為樣品切片厚度 1mm、70°C、熱風乾燥風速 1.0m/s 和微波乾燥功率密度 10.7W/g。總之，使用合併式乾燥方法或在熱風乾燥過程中調整溫度這兩種方式，可以幫樣品獲得與冷凍乾燥後相似的營養成分，而且 HAD 並不會顯著影響類胡蘿蔔素的含量，但會造成細胞壁和細胞膜的降解，並使它暴露於降低其抗氧化活性的環境條件下。

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