Physical Properties of Jujube Slices by Hot Air and Infrared Drying

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Abstract
Dried Chinese jujube slices are mainly consumed as snacks or soaked for tea drink. The requirements in physical properties and hydration characteristics of the dried jujube slices are related to the applications. Jujube slices with different thicknesses (3, 5 and 7 mm) were dried in single layer with hot air (HA) and infrared (IR) at different temperatures (60, 70 and 80°C). The drying characteristics, crispiness, rehydration ratio and total soluble solid (TSS) content were investigated. The results showed that both drying method and drying temperature had significant influence (p<0.05) on the drying time and crispiness. The drying rate under IR drying was higher than HA drying at the same drying temperature, and the corresponding drying time was shorter. The rehydration ratio was mainly affected by the thickness. The TSS content of IR dried products was higher and the color of rehydrated solution was more attractive. The results indicated that IR dried slices are better for tea drinks and HA dried jujube slices are more suitable for crispy snacks.

Background
• China produces over 7 million tons of jujube annually (89% of world production), and over 90% of the jujubes are dried for consumption.
• Dried jujube slices with 5% moisture content (MC) are usually produced by HA drying from semi-dried jujubes (25%–28% MC), and the drying process is time consuming.
• The physical properties and hydration characteristics of jujube slices are important and may be affected by drying methods.

Objectives
• Investigate the influence of operating conditions and system parameters on the drying characteristics of jujube slices.
• Study the physical properties of jujube slices dried by IR and HA heating.
• Determine the appropriate drying methods for jujube slices with respect to the product applications.

Materials and Methods

Results and Discussions

Rehydration ratio
Drying temperature did not significantly affect the rehydration ratio of jujube slices. The rehydration ratio was higher for thinner slices.

TSS content
TSS content of the hydrated solution increased with IR temperature, but was not affected by HA temperature.
Reduced slice thickness resulted in higher TSS content in hydrated solution.

Color difference
Higher drying temperature led to higher ΔE value of hydrated solution.
The ΔE value of the hydrated solution was higher for thinner slices.

Crispness value
The crispness value of dried jujube slices increased with drying temperature, and the products dried by HA drying was crispier than that by IR drying.

Conclusion
The results indicated that HA drying produced crispier jujube slices, but the color and TSS content of hydrated solution were better for IR dried jujube slices. Higher drying temperature and thinner slices resulted in better product quality. This study provided important information for the selection of appropriate drying methods of jujube slices for different applications.

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