

Title           Quality characteristics of dehydrated onion produced with infrared radiation technology  
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### **Abstract**

Onions are normally dehydrated by using conventional forced hot air drying, which requires long drying time and has low energy efficiency and product quality. It is necessary to investigate new dehydration technologies with high-energy efficiency and product quality for such applications. An infrared radiation technology with appropriate wavelengths of radiant energy to directly target water has been studied for drying onions due to its potential as an alternative dehydration technology. The objectives of this research were to investigate the quality characteristics of dehydrated onions under various operational and design parameters of an infrared dryer and its energy efficiency. A flameless catalytic gas-fired (FCG) infrared dryer and dehydrator onion containing high solid content (25%) were used in the study. The quality characteristics of dehydrated onions, including color, pungency, and microbiological reduction were measured under various conditions. Pungency of the dried samples was determined using a chemical assay of pyruvic acid. The drying rate and energy efficiency of the infrared dryer were also studied. Control samples were produced with an electrically heated forced air drier. The results showed that the onions dried with the infrared dryer had higher whiteness index and pungency than the onions dried with the conventional method as long as the product temperature was less than 65 °C. Additionally, the infrared dried onion showed a 5 log reduction of microorganisms from a fresh sample whereas the conventionally dried sample was reduced only 3 logs. The required drying time was significantly less than that in the current commercial practice. These findings suggest that use of the flameless catalytic infrared drier could greatly reduce drying time and improve the product quality and safety.