

Title Precooling characteristics and parameters optimization of mango fruit
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Abstract

Harvested mango fruit (*Mangifera indica*, L. cv. Tainong) have short postharvest life at ambient temperature. Mangoes should be precooled immediately after harvest and placed at low temperature to minimize quality losses. However, mangoes are susceptible to chilling injury (CI) if exposed to temperatures below 13 degrees C. The study of precooling parameters is important to design a cooling process without inducing CI. Green mature mangoes were cooled with water at 0, 4, 8 or 12 degrees C until the central temperature reached to 13 degrees C. Meanwhile, the surface and central temperatures of mango were measured with two thermocouples. Then all samples were stored at 13 degrees C with 90-95%RH. After 2 weeks all the mangoes were brought out of the cold storage and held at ambient temperature to observe the possible CI and quality changes. In this work, we obtained the temperature-time and cooling rate-time curves. Cooling parameters such as cooling coefficient, half-cooling and seven-eights cooling times were calculated according to the curves. Results showed that precooling times were decreased with the cooling temperature decreasing. Precooling time was 42.4 min at 12 degrees C, but only 12.9 min at 0 degrees C. Furthermore, no visual symptoms of CI were observed under all treatments. Precooled mangoes kept a high standard of quality by conserving high total soluble solids (SSC) and flesh firmness and maintaining green skin color. Precooling at 0, 4, 8 and 12 degrees C resulted in 14.3%, 3.3%, 5.9%, 3.2% higher SSC and 20.6%, 14.3%, 10.9%, 6.9% higher firmness than uncooled. These results indicate the principle of the mango precooling process and suggest that 0 degrees C is optimum for mango precooling. Our findings may provide an effective and useful method for maintaining the quality of mango.