

Influence of postharvest cooling on product quality

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Abstract

The quality attributes of raw agricultural commodities are influenced significantly by handling and storage during the time periods shortly after harvest. One of the key product parameters with impact on quality is temperature. In order to control many of the reactions with negative impact on product quality, the product temperature must be reduced from ambient to storage temperature as rapidly as possible. The purpose of this paper is to review the factors influencing the postharvest cooling of raw agricultural products, as well as the influence of temperature on reactions with impact on product quality. The time to cool a product is influenced by several parameters and properties related to the product and the environment surrounding the product. Thermo-physical properties (density, specific heat, thermal conductivity) of the product are part of the input to estimating the cooling time, but these properties do not vary significantly from one product to another. A parameter with more impact on cooling time is the surface heat transfer coefficient. The magnitude of the coefficient is dependent on the velocity of the cooling medium over the product surface. A third parameter is the size and shape of the product or the container holding the product during the cooling process. The final parameter with significant influence on the cooling time is the temperature of the cooling medium. This paper includes illustrations to demonstrate the relative impact of each parameter on time to cool different agricultural products. The influence of key parameters, such as the type and temperature of cooling medium, are illustrated. In addition, the importance of product or container dimensions is discussed. Specific product examples and conditions are used to demonstrate the potential negative impacts of long cooling times on product quality attributes. The importance of rapid cooling to ensure maximum quality retention is emphasized.