

Heat transfer and external quality attributes of 'Regal seedless' table grapes inside multi layered packaging during postharvest cooling and storage

M.E.K. Ngcobo, M.A. Delele, U.L. Opara, G.D. Thiart, C.J. Meyer

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Abstract

Postharvest packaging of table grapes is characterized by multi-layer packaging comprising of the carton box, the inner liner film, the individual bunch carry-bag and the SO₂ sheet. This multi-layered packaging is required to allow sufficient airflow to efficiently cool packed grapes in order to preserve quality. Total pressure drop and cooling rates of different table grape packaging systems were measured and the percentage contributions of each package component and the fruit bulk were determined. Also, the effects of different carton liners on the cooling rate and external quality attributes of table grapes were investigated. Fruit quality attributes measured included stem dehydration and browning, SO₂ injury and decay. On average the liner films contributed significantly higher to total pressure drop (61.04±15.91%) than other components of the package combinations. Compared with the cooling of bulk grape bunches, the presence of the bunch carry bag increased the half and seven-eighth cooling time by 61.1 and 97.3%, respectively. The addition of plastic liners over the bunch carry bag increased the half and seven-eighth cooling time by 168.9 and 185.2%, respectively. Non-perforated liners maintained relative humidity (RH) close to 100% during cold storage and during a 7-day shelf-life period which resulted in delaying the loss of stem quality but significantly ($P \leq 0.05$) while increasing the incidence of SO₂ injury and berry drop during storage compared with perforated liners.