

Abstract

A study was conducted to evaluate the potential of the passive silicone membrane and diffusion channel systems to preserve the quality and extend the shelf-life of bananas. Cavendish bananas were stored for 42 days at 15 °C under MA conditions using silicone membrane and diffusion channel systems. The respiration rate under MA at 15 °C was estimated as 20% or 60% less, or 20% greater than that measured in regular atmosphere at the same temperature. Three different silicone membrane areas (50.29, 98.56 and 158.43 cm²) and three different diffusion channel lengths (4, 7 and 10 cm) were tested. Results showed that the estimation of a 60% reduction in respiration rate was most accurate. The smallest area of silicone membrane achieved gas levels of 3.5% CO₂/3% O₂ in about 10 days while the shortest diffusion channel achieved 5% CO₂/3% O₂, in 12–16 days. Fruit in these atmospheres remained unripe for 42 days, had harvest-fresh appearance, good colour, minimum mould and excellent marketability compared with controls and fruit stored in different gas compositions. In general, the silicone membrane system was found to be superior; it achieved stability more quickly than the diffusion channel system, maintained more stable gas levels throughout storage and had better physiological and sensory ratings. The diffusion channel system had higher CO₂ levels that may have resulted in peel discoloration in some chambers and may have affected other quality attributes. The silicone membrane system offers an inexpensive and easy to use alternative to the traditional methods used for MA storage of bananas.