

Title Storage characteristics and relationships between microbial growth parameters and shelf life of MAP sliced onions

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Abstract

Microbial proliferation and sensory quality aspects of sliced onions were tested at different temperatures (-2 , 4 and 10 °C) and atmospheric conditions (with or without 40% $\text{CO}_2 + 59\%$ $\text{N}_2 + 1\%$ O_2). The relationships among microorganism growth parameters (the initial cell number (N_0), the maximum cell number (N_{max}), the maximum specific growth rate (μ_{max}) and lag-phase (λ) and the microbial or sensory shelf life were determined. The microorganism growth parameters were obtained by fitting the modified Gompertz equation to the microbial counts. The results showed that color intensity (yellowness), sensory scores and microbial counts increased, and firmness decreased during storage. The total plate counts (TPC) provided the best indication of the spoilage organism growth capacity under tested temperatures and atmospheric conditions. The microbial shelf lives of the tested onions in 40% $\text{CO}_2 + 59\%$ $\text{N}_2 + 1\%$ O_2 , or at -2 , 4 and 10 °C, were 12.5, 9.5, 7, 12, 9 and 6 days, respectively, and their sensory shelf lives were 12, 8, 5, 10.5, 7 and 5 days, respectively. The lag time (λ) of the TPC, coliforms, pseudomonads and yeasts correlated well with the microbial and sensory shelf life results. The correlations between microbial and sensory shelf life, and the μ_{max} of TPC, lactic acid bacteria (LAB) and coliforms were between $(-0.61$ and $-0.85)$. The initial microbial counts (N_0) of the five microorganisms showed a slight correlation, and the maximum microbial counts (N_{max}) of this group showed no obvious correlation with onion shelf life, apart from the LAB and yeasts.