

Title Determination of appropriate MAP films for fresh-cut potato (*Solanum tuberosum*) and green onion (*Allium fistulosum*) by respiration modeling

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Abstract

Low-density polyethylene films with thickness of 30 mm (PE30) and 50 mm (PE50) were evaluated for suitability as modified atmosphere packaging material for fresh-cut potato and green onion (shredded or sliced) stored at 2°C. Potato samples were heat treated (held at 30°C in air for 20 h or 45°C for 2 h), peeled, quartered, and dipped in 2°C water for 2 h. Selection of film thickness and fill weight was based on respiration models that predicted headspace O₂ and CO₂ concentrations; a linear function was used to model potato respiration, while an enzyme kinetic (uncompetitive inhibition) model was used for green onion. Internal validation showed that accuracy (*A*), bias (*B*) and standard errors of prediction (*SEP*) of models for predicting O₂ concentrations were acceptable ($1.02 \leq A \leq 1.05$, $0.99 \leq B \leq 1.00$, $0.84\% \leq SEP \leq 2.12\%$ for potato; $1.02 \leq A \leq 1.06$, $0.98 \leq B \leq 1.00$, $0.59\% \leq SEP \leq 0.94\%$ for green onion); the models were less accurate for predicting CO₂ concentrations for both products. Based on predictions of headspace gas concentrations, package simulations showed that PE30 was suitable for extended storage of both products without resulting in anaerobic conditions, while PE50 was more suited for storage periods of 4 days or less. Packaging trials did not agree consistently with predicted results for potato, possibly due to preharvest variations between batches. Oxygen concentrations in PE packs (30 and 50 mm?) of fresh-cut potato decreased more rapidly than expected; however, measured O₂ concentrations at steady state in PE30 packs were close to the maximum recommended concentration of 3%. Fresh-cut potato in PE30 had a shelf life of 4 days at 2°C, with tissue darkening the main limiting factor; however, off-odor was still acceptable after 6 days. Fresh-cut green onion in PE30 had a shelf life of 9 days at 2°C with acceptable off-odor upon opening.