

Title Modified atmosphere packaging of green-shelled common beans (*Phaseolus vulgaris* L.)
Author Nalini Pandya and Carol Harper
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Abstract

The objective of this research was to develop a modified atmosphere packaging (MAP) system for green-shelled common beans (*Phaseolus vulgaris* L., cv. *Morales*), which are locally grown in Puerto Rico, in order to increase their shelf-life. The green-shelled common beans were packed in 3 different gas mixtures, (1) 4% O₂, 10% CO₂, and 86% N₂ (MAP I), (2) 2% O₂, 5% CO₂, and 93% N₂ (MAP II) and (3) 21% O₂, 0.03% CO₂, and 78% N₂ control (AIR) using Cryovac PD-961EZ plastic bags and stored at 5°C for 26.5 days. Quality analysis were done on each treatment after every 4 days on three replicates and a temperature abuse of 2 days at 20°C was simulated on each day of analysis and they were also analyzed for quality changes. Quality analyses included evaluations of physiological changes, color, water activity, pH, titratable acidity and texture of the beans. The green-shelled common beans stored in AIR, maintained their overall quality at 5°C for 10 days, while beans in MAP I were able to maintain their fresh-like quality up to 18 days at 5°C. Both AIR and MAP I maintained the color, texture, titratable acidity and pH and remained free of off-odors during their shelf-life. The tenderness of the beans increased in both treatments, without any stickiness or off-odor, which could be beneficial in terms of less cooking time required to cook the beans. Furthermore, a computer program was developed to predict time evolutions of concentrations of O₂, CO₂ and N₂ inside the flexible package. This program is not limited to beans and can be used for any other food materials. The present study provides some crucial information for the Puerto Rican food industry, as green-shelled beans are a legume preferred by local consumers.