



Research Paper

Effects of Packaging and Application of Oily Covers on Shelf Life of Cucumber and Bell Pepper Fruits

Leila Aslani^{1*}, Behfar Modares², Ali-Akbar Ramin³

¹Ph.D. Student, Department of Horticulture Science, Faculty of Agriculture, Isfahan University of Technology, Isfahan, Iran

²Ms.C. Department of Horticulture Science, Faculty of Agriculture, Isfahan University of Technology, Isfahan, Iran

³Professor, Department of Horticulture Science, Faculty of Agriculture, Isfahan University of Technology, Isfahan, Iran

*Corresponding author: Leila Aslani, Email: Leilaaslani40@gmail.com

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Extended Abstract

Introduction Fresh vegetables such as cucumber and bell pepper are highly perishable, with their quality rapidly declining due to factors like water loss, respiration, and exposure to pathogens. Packaging and coating treatments have been explored as effective methods for extending the shelf life of these perishable products. Polyethylene packaging and various oil-based coatings, such as wax, olive oil, castor oil, and almond oil, are known to influence key postharvest characteristics, including marketability, weight loss, texture, acidity, and overall freshness. This study investigates the combined effects of polyethylene packaging and oil-based coatings on the shelf life and quality of cucumber and bell pepper fruits stored at 20°C for one week.

Methods A factorial experiment was conducted in a completely randomized design with three replications. The treatments included polyethylene packaging, no packaging (control), and five oil coatings: oily wax, olive oil, castor oil, almond oil, and no coating (control). Cucumber and bell pepper fruits were stored under ambient conditions (20°C) for seven days. Key quality attributes such as marketability, weight loss percentage, total soluble solids (TSS), titratable acidity (TA), pH, and fruit firmness were measured. Marketability was scored on a scale of 0 to 4, with scores converted to percentages. Weight loss was calculated by comparing the initial and final weights of the fruits. TSS was measured using a

refractometer, TA was assessed by titration with sodium hydroxide, pH was measured using a pH meter, and fruit firmness was determined using a mechanical penetrometer.

Results and Discussion The results revealed that polyethylene packaging significantly preserved the marketability, soluble solids, firmness, and reduced weight loss in both cucumber and bell pepper fruits. This packaging also maintained the organic acids and acidity of cucumber fruits. The packaging altered the atmospheric conditions around the fruits, which in turn reduced respiration rates, ethylene production, and transpiration, ultimately extending the quality retention of the produce. Among the oil coatings, oily wax was the most effective, improving all measured attributes, including marketability, soluble solids content, weight loss percentage, firmness, pH, and organic acids content in both cucumber and bell pepper fruits. Oil coatings like olive oil, castor oil, and almond oil also had positive effects, though to a lesser extent. A significant interaction between packaging and oil coatings was observed in terms of weight loss percentage and firmness in cucumber and bell pepper fruits, as well as organic acids content in bell pepper fruits. The application of polyethylene packaging resulted in a modified atmosphere around the produce, slowing down metabolic processes like respiration and ethylene production, which are key contributors to fruit ripening and spoilage. This aligns with previous studies demonstrating that packaging can significantly extend shelf life by reducing these processes. The reduced weight loss observed in the packaged fruits can be attributed to the preservation of moisture through the barrier properties of polyethylene, which reduces transpiration. The oil-based coatings, particularly the oily wax, were effective in slowing down respiration and transpiration by forming a protective layer that reduces water loss and prevents surface damage. This is consistent with prior research indicating that wax coatings improve the firmness and marketability of fruits by retaining moisture and reducing enzymatic activity related to senescence. The significant interaction between packaging and oil coatings on certain quality parameters (weight loss, firmness, and organic acids) suggests that the combination of packaging and coatings offers enhanced preservation over individual treatments. In particular, the combination of polyethylene packaging with almond oil and oily wax was most effective in maintaining firmness and reducing weight loss in cucumbers and bell peppers. These findings are consistent with studies on other fruits, which showed that the application of oil coatings in combination with modified atmosphere packaging can offer synergistic benefits for extending shelf life.

Conclusion This study demonstrates that polyethylene packaging combined with oil-based coatings, especially oily wax, significantly improves the shelf life and quality of cucumber and bell pepper fruits. The packaging helps to maintain the internal atmosphere, reduce respiration and ethylene production, and prevent moisture loss. Oil-based coatings, particularly oily wax, enhance these effects by further reducing transpiration and preserving fruit texture and acidity. Therefore, using a combination of polyethylene packaging and oil-based coatings can be recommended as an effective strategy for extending the shelf life of cucumber and bell pepper, providing a natural method for improving postharvest quality without the use of synthetic preservatives.

Keywords: Transpiration, Firmness, Weight loss, Quality, Wax

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