Title Package atmosphere affects postharvest biology and quality of fresh-cut cilantro leaves.

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**Abstract**

Experiments were conducted to develop a modified atmosphere packaging system for fresh-cut cilantro (*Coriandrum sativum*) leaves, and to determine the effect of package film oxygen transmission rate (OTR) on package atmosphere and the consequence on quality and microbiology of the product. Package film OTR significantly ($P<0.001$) influenced the package atmospheres and the resultant postharvest physiology and quality of fresh-cut cilantro leaves under the tested package configuration (bag size 19x22 cm, product fill weight 85 g/bag) and storage condition (0 deg C). Oxygen and carbon dioxide levels of the packages prepared with 3500 ml day-1 m-2 OTR films equilibrated at 1.5-2.3 kPa and 3.6-4.1 kPa, respectively, on day 3 and maintained this level throughout the storage. The gas compositions of the packages with 6200 ml day-1 m-2 OTR films showed a similar trend, except they equilibrated at a higher $O_2$ (3.6-5.6 kPa) and lower $CO_2$ (2.7-3.3 kPa) level. Fresh-cut cilantro leaves in both packages exhibited the highest tissue integrity as evidenced by the lowest tissue electrolyte leakage, with high overall visual quality scores (like moderately to like very much) at the end of 14 days storage. However, atmospheres in 1700 ml day-1 m-2 OTR film packages displayed a rapid depletion of $O_2$ and accumulation of $CO_2$, with essentially no $O_2$ (approx equal to 0.02 kPa) and high $CO_2$ (7.7-9.0 kPa) levels inside the packages from day 6 until the end of storage. A rapid increase in tissue electrolyte leakage was observed in cilantro leaves in these packages starting on day 6, increasing 6-fold at the end of the storage period. Products in these packages developed a strong off-odour, accompanied by a rapid loss of typical aroma and overall visual quality, with an unacceptable quality rating at the end of storage (dislike slightly). Samples packaged in perforated bags (without modified atmosphere) lost moisture over time, and small numbers of wilted leaves were seen. There was a slow but significant ($P<0.001$) increase inaerobic organisms over time with no significant ($P>0.05$) difference among treatments. There was an increase in anaerobic microorganisms on cilantro leaves packaged in 1700 ml day-1 m-2 OTR film, although only approx equal to 0.5 log cfu/g difference was observed among the treatments and over time.