

**Title** Effect of packaging and storage conditions on quality of shelled walnuts  
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**Citation** Food Control, Volume 20, Issue 8, August 2009, Pages 743-751  
**Keywords** Walnuts; Packaging; Shelf life; Quality

### Abstract

The present study investigated the effect of packaging and storage conditions on quality of raw shelled walnuts. Walnut kernels were packaged in: (a) low density polyethylene (LDPE), 55  $\mu\text{m}$  in thickness in air, (b) polyethylene terephthalate||polyethylene (PET||PE), 70  $\mu\text{m}$  in thickness under  $\text{N}_2$ , and (c) PET-SiO<sub>x</sub>||PE pouches, 62  $\mu\text{m}$  in thickness under  $\text{N}_2$ . Samples were stored either under fluorescent light or in the dark at 4 or 20 °C for a period of 12 months. Quality parameters monitored were peroxide value (PV), hexanal, 2-thiobarbituric acid (TBA), odor, and taste of product. PV ranged between 0.3 for fresh walnut kernels and 31.4 meq O<sub>2</sub>/kg oil for walnuts packaged in PE pouches exposed to light after 12 months of storage. Respective values for hexanal were <28.5  $\mu\text{g}/\text{kg}$  and 36.0 mg/kg and for TBA ca. 0.2 and 11 mg MDA/kg. Values for odor ranged between 0.2 for fresh walnut kernels and 5.7 for walnut kernels packaged in PE exposed to light after 12 months of storage at 20 °C. Respective values for taste were 0.7 and 6.8. Taste proved to be a more sensitive attribute than odor. Based on shelf life (taste) values and PV data it is proposed that the upper limit value for PV is close to 10.0 meq O<sub>2</sub>/kg walnut oil. Respective limit values for hexanal are 1–2 mg hexanal/kg walnut and for TBA is 1–2 mg malondialdehyde/kg walnut. Walnuts retained acceptable quality for ca. 2 months in PE-air, 4–5 months in PET||PE-N<sub>2</sub> and at least 12 months in PET-SiO<sub>x</sub>||PE-N<sub>2</sub> pouches at 20 °C, with samples stored in the dark retaining slightly higher quality than those exposed to light. The effect of parameters investigated followed the sequence: temperature > degree of O<sub>2</sub> barrier > lighting conditions.