

**Title** Storage of pears using dynamic controlled-atmosphere (DCA), a non-chemical method  
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### **Abstract**

Storing of some pear cultivars has usually included a reliance on postharvest chemical treatments, e.g., ethoxyquin or diphenylamine, to control superficial scald. The current trend towards elimination of pre- and post-harvest synthetic chemical treatments in Europe and other markets necessitates a change to reliance on other, preferably non-chemical, methods to achieve scald and quality control. Previous research has demonstrated this can be accomplished with storage at very low O<sub>2</sub> levels. Wide-spread adoption, however, has not taken place due to concerns of anaerobic damage when the pear fruit are held below the lower oxygen limit (LOL) for long periods of time. Dynamic controlled-atmosphere (DCA) storage is able to identify the LOL of pears using chlorophyll fluorescence. It is termed 'Dynamic' CA since it allows the storage manager to customise the O<sub>2</sub> concentration at the beginning of storage and change it during storage, as the LOL changes. DCA is appealing because it: 1) is non-chemical, 2) uses existing CA technology, 3) can be monitored electronically in real-time, 4) extends the storage time of fruit, 5) controls superficial scald and other storage disorders, and 6) can warn the operator of equipment malfunctions, e.g., refrigeration and CA equipment failure. The principle of DCA is based on the discovery that a sudden increase in the fruit's fluorescence occurs at the LOL. If the O<sub>2</sub> concentration is increased, by as little as 0.2% above the LOL, the fruit can be safely stored. This has allowed apples and pears to be stored below 1.0% O<sub>2</sub> and as low as 0.4% O<sub>2</sub>, thereby achieving both longer storage life and superficial scald control in scald-prone fruit. DCA has been used commercially since 2004. In 2010, ca. 300,000 to 400,000 bins of fruit were stored using this technology, mainly in the North American and European apple industries. Its use is increasing at more than 40% per year. It is useful for extending the marketing window of pears and as an alternative to ethoxyquin for controlling superficial scald in pear fruit.