

MODIFIED ATMOSPHERE PACKAGING FOR PEARS

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During the 2000-2001 storage season, a series of trials were conducted at the Southern Oregon Research and Extension Center to evaluate the effects of storing pears in LifeSpan[®] modified atmosphere packaging (MAP) bags. LifeSpan[®] bags are reportedly used commonly for export of Bartlett pears from Australia, where the bags are manufactured. They have also begun to be used by some packinghouses in the Pacific Northwest.

We evaluated the performance of five pear varieties (Starkrimson, Bartlett, Comice, Bosc, and Anjou) in LifeSpan[®] bags as compared to storage in regular air and in controlled atmosphere (CA) at 2% oxygen, <1% CO₂. All storage took place at approximately 31 °F. We also compared different methods of sealing the bags: folding over of the bag neck only, or 1, 2, 3, or 4 twists of the bag neck followed by taping. Finally, the effects of temporary warming to 45 °F and to 39 °F on the atmosphere inside of the bags were measured.

Oxygen levels within the bags reached a minimum, and CO₂ levels reached a maximum, within 3 to 7 days of bag closure. Generally, oxygen levels then rose slightly, and CO₂ levels declined slightly, then both gases sustained around levels characteristic of the pear variety. The lowest oxygen levels were observed with Starkrimson and Bartlett. Bosc was intermediate, and the highest levels were observed with Comice and Anjou (Figure 1). Carbon dioxide levels were also highest in boxes with Starkrimson and Bartlett, and lowest in Bosc, Comice, and Anjou (Figure 2).

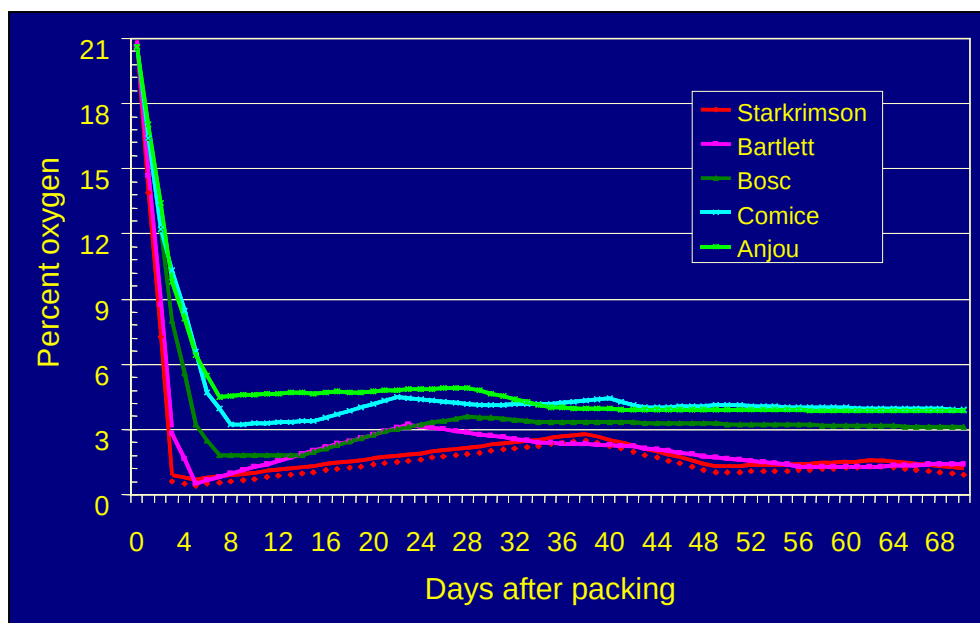


Figure 1. Oxygen levels within LifeSpan bags packed with different pear varieties.

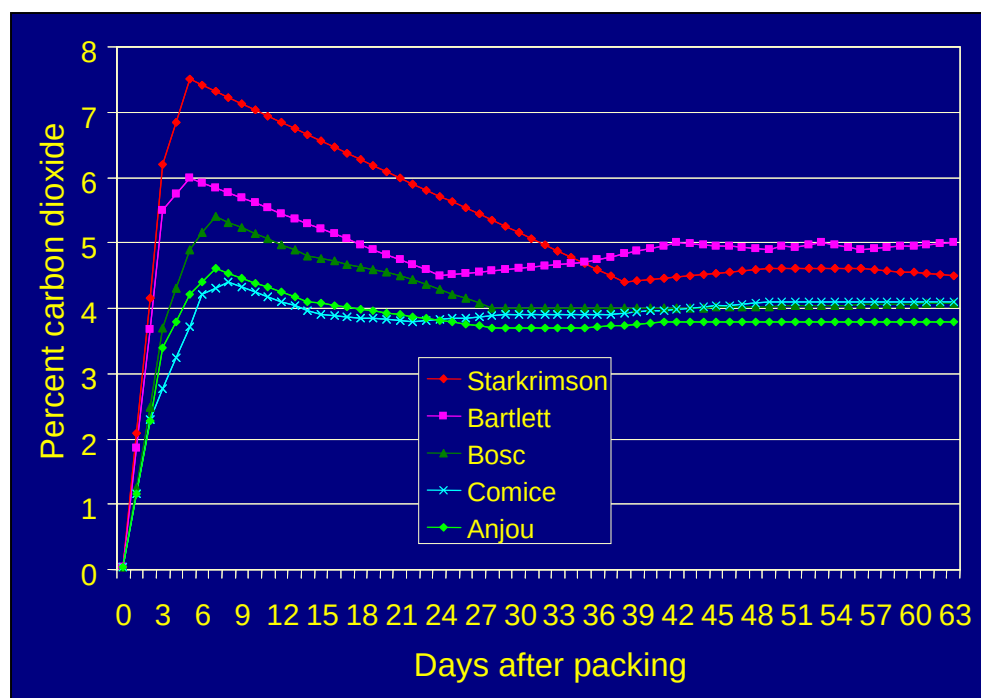


Figure 2. Carbon dioxide levels within LifeSpan bags packed with different pear varieties.

Starkrimson pears were evaluated after 2 months and nearly 3 months storage, Bartletts after 3 and 4 months, Comice after 4 and 5 months, Bosc after 5 and 6 months, and Anjou after 6 and 7 months (7 month Anjou data not available as of this writing). In general, the external appearance of fruit of all cultivars was maintained in LifeSpan bags similarly to CA (see photos). Internally, all cultivars stored in regular air showed core browning (core breakdown, senescence) when evaluated at the latest date (Table 1). This condition was not observed in fruit stored in CA or in LifeSpan bags. However, injury associated with the combination of low oxygen and high carbon dioxide was observed in later evaluations of Starkrimson and Bosc, both evaluations of Bartlett, and the early evaluation of Anjou. This injury was not observed in Comice or in first evaluations of Bosc and Starkrimson.



Bartlett

7 Nov



7 Dec

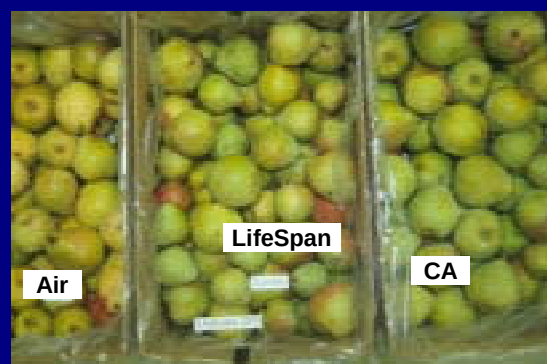


Comice

10 Jan

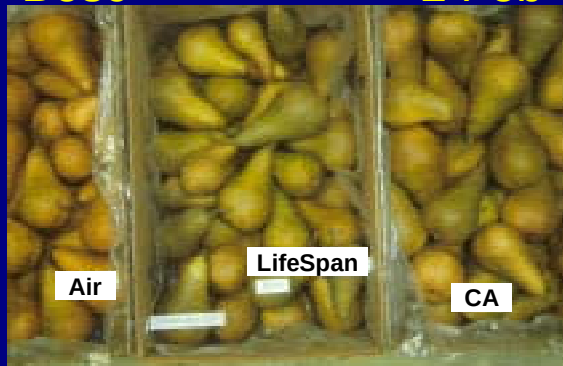


2 Feb



Bosc

2 Feb



1 Mar

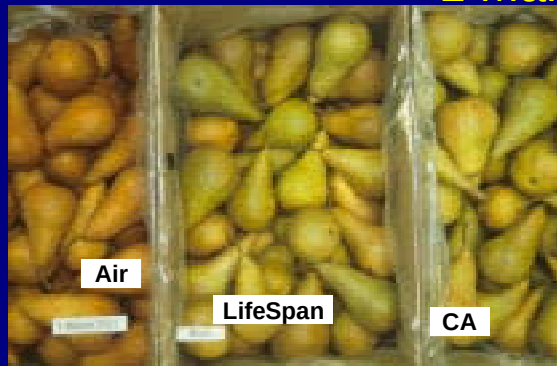
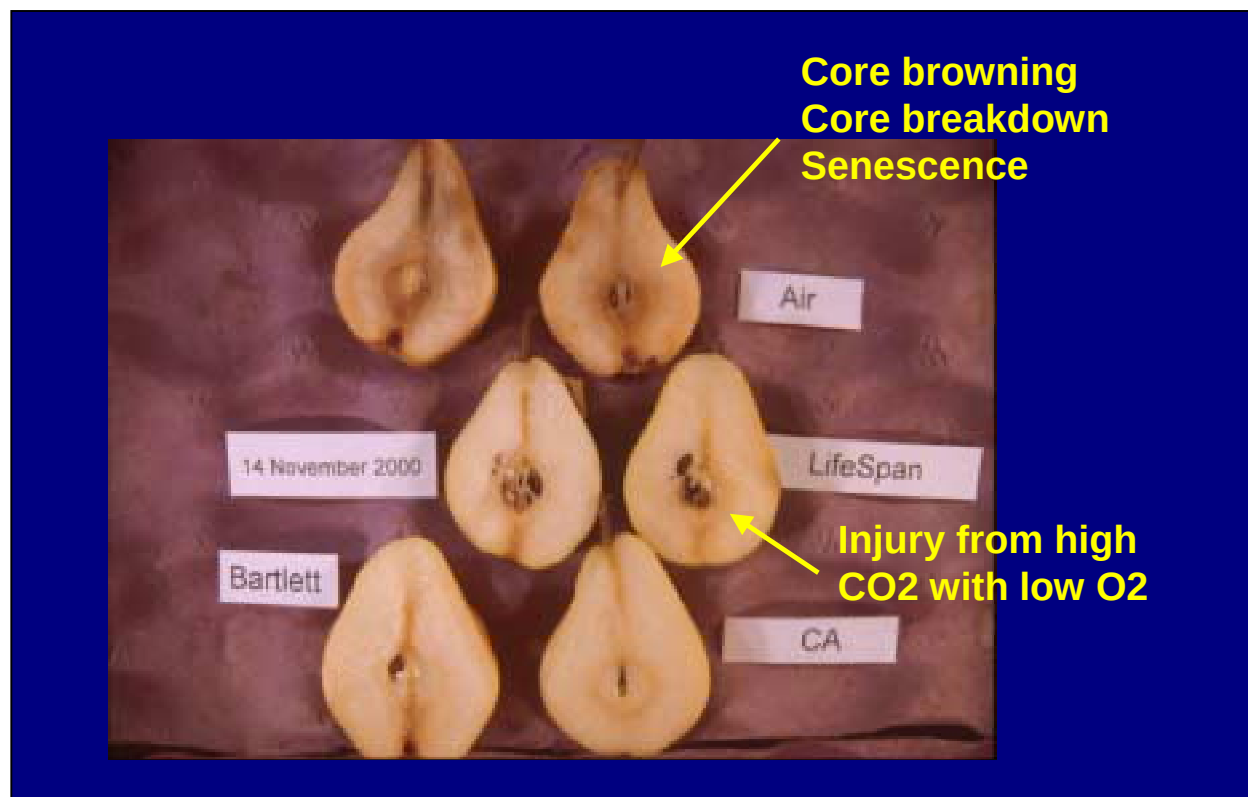




Table 1. Incidence of internal injury in pear varieties stored in regular air, CA (2% oxygen, <1% carbon dioxide) and LifeSpan MAP bags.

	Core breakdown (%)			CO ₂ injury (%)		
	Air	CA	LifeSpan	Air	CA	LifeSpan
<i>Starkrimson</i>						
3 Oct	0	0	0	0	0	0
29 Oct	100	0	0	0	0	16
<i>Bartlett</i>						
14 Nov	100	0	0	0	0	23
13 Dec	100	0	0	0	0	15
<i>Comice</i>						
16 Jan	39	0	0	0	0	0
7 Feb	52	0	0	0	0	0
<i>Bosc</i>						
8 Feb	0	0	0	0	0	0
5 Mar	12	0	0	0	0	7
<i>Anjou</i>						
6 Mar	0	0	0	0	0	13



The method of sealing LifeSpan bags strongly affected the oxygen levels within the bags with Bartlett pears, but affected CO₂ levels only slightly. Folding over the bag tops, without twisting or taping the bag neck, resulted in oxygen levels of approximately 10 to 13%. A single twist of the bag neck, followed by taping, brought oxygen levels to 6 to 7%. Two twists with taping resulted in oxygen of 4 to 5%, and three or four twists resulted in 3 to 4% oxygen.

When pears were moved from 31 °F storage into rooms at 39 °F or 45 °F for one week, the oxygen level within the bags decreased and the CO₂ increased. When the boxes were returned to 31 °F, gas levels returned to those measured prior to the temperature change. This emphasizes the importance of maintaining cold temperatures throughout the storage and transport of pears in MAP bags.

In summary, there is potential in the use of LifeSpan or other MAP bags to maintain pear quality it storage similar to that achieved with CA storage, but without the investment in CA structures and equipment. However, there is also potential for injury to fruit if oxygen levels are low and carbon dioxide levels are high. It is expected that the manufacturer will modify the bags to reduce the risk of injury developing.