

# Maturity and Storage Performance of 'Bartlett' and 'Sensation Red Bartlett' Pears

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**Abstract.** A study was conducted to determine whether or not the practice of harvesting 'Sensation Red Bartlett' (SRB) pear (*Pyrus communis* L.) fruit later than 'Bartlett' fruit results in a higher risk of core breakdown development in SRB fruit. Over a range of harvest dates in 2 years of study, incidence of core breakdown in SRB fruit was lower than in 'Bartlett' fruit from the same orchard. The disorder increased in both cultivars with longer storage periods, but was usually less in SRB than in 'Bartlett'. Core breakdown in both cultivars was more severe in the second year of the study, when lower summer temperatures prevailed. SRB maintained higher fruit firmness on the tree than did 'Bartlett'. Accordingly, harvesting SRB later than 'Bartlett' appears to be an acceptable practice.

'Sensation Red Bartlett' (SRB) is the most widely grown red-skinned pear cultivar in the United States (Sugar and Lombard, 1987). In addition to having red pigmentation in the fruit, leaves, and shoots, SRB trees grow more slowly, and its fruit is generally smaller than that of 'Bartlett' (Sugar and Lombard, 1987). The range of firmness values recommended as indicators of harvest maturity in southern Oregon are 85 to 98N for both cultivars (Lombard, 1987; Sugar and Lombard, 1987). To obtain larger SR13 fruit, many pear producers in the Pacific Northwest begin harvesting 'Bartlett' at the low end of the maturity range and harvest SRB after 'Bartlett' has concluded. This study was undertaken to determine whether the practice of harvesting SRB later than 'Bartlett' results in a higher risk of core breakdown (CB), a storage disorder, for SRB.

'Bartlett' pears are stored in air for up to 80 days (Mitchell, 1990; Westwood, 1993), ending in early to mid-November in the Rogue River Valley. CB is associated with late harvest or overstorage of pears (Fidler et al., 1973; Hartman, 1925). For this reason, CB was chosen as an indicator of incorrect harvest timing in this study. The disorder causes brown to black discoloration of the seed cavity and may extend into surrounding portions of the flesh (Chen, 1990).

## Materials and Methods

In a commercial orchard of mixed 'Bartlett' and SRB pear trees in the Rogue River Valley near Medford, Ore., five replicate trees of each

cultivar were randomly chosen for study. The 15- to 16-year-old trees were grafted on *P. communis* seedling rootstock. At six weekly intervals in 1988 and 1989, 40 fruit were harvested from each replicate tree of each cultivar. Harvest dates commenced with the onset of commercial harvest of these cultivars

in the southern Oregon growing district and ended after commercial harvest had concluded. Ten fruit were used for fruit firmness determination (U.S. pressure tester with 7-mm tip), and soluble solids concentration (SSC) was determined with a hand-held refractometer (Atago, Japan). The remaining 30 fruit from each tree were stored in air at 0C in polyethylene-lined fiberboard boxes. Ten fruit per replication were removed from storage monthly from mid-October through mid-December. The fruit were allowed to ripen 5 to 7 days in air at 20C, then sliced in half longitudinally and visually examined for presence of CB.

## Results

In both years, fruit of SRB were firmer than those of 'Bartlett' at each harvest date, except for the first two harvests in 1988 and the second harvest in 1989 (Fig. 1). Fruit firmness in both cultivars was lower in 1989 than in 1988, perhaps in response to relatively low late-summer temperatures in the Rogue River Valley. The mean for July 1988 was 24.1C, while it was 21.2C in 1989. Relatively cool seasons have been associated with earlier ripening of 'Bartlett' pears (Wang et al., 1971).

Fruit SSC was similar in the two cultivars during the 2 years of study. In 1988, SSC ranged from 12.1 to 13.1 in SRB over the six weekly harvest dates and from 12.2 to 13.8 in 'Bartlett'. In 1989, values ranged from 11.2 to 13.1 in SRB and from 11.8 to 13.0 in 'Bartlett'.

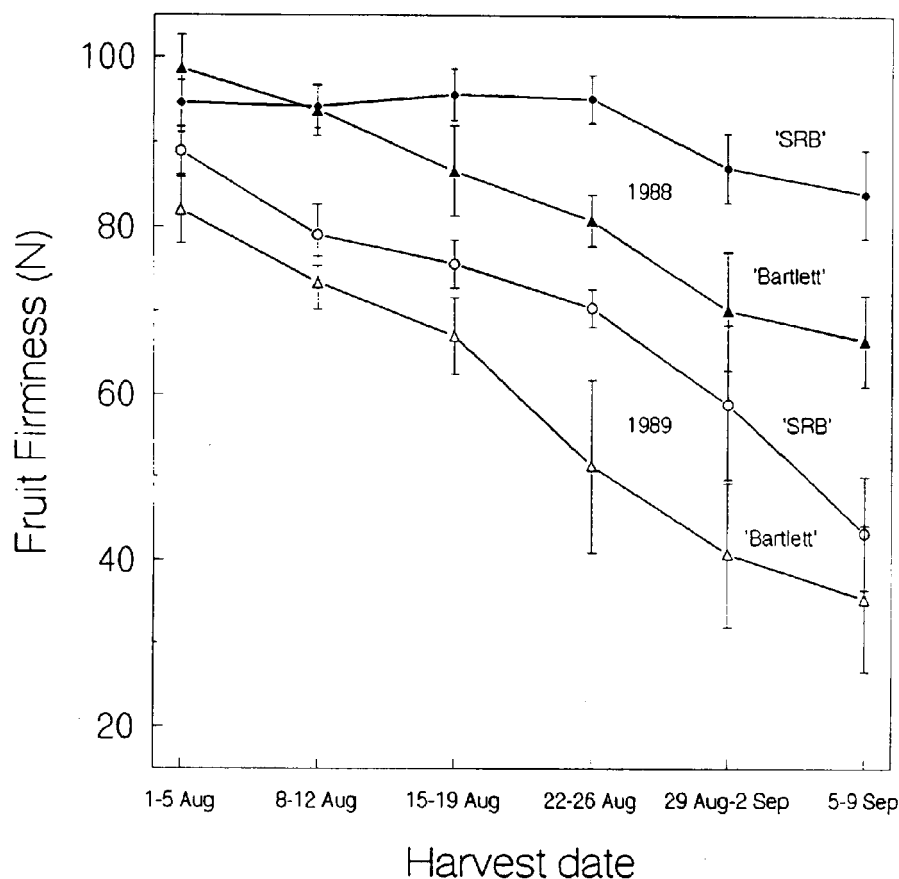


Fig. 1. Fruit firmness in 'Sensation Red Bartlett' (SRB) and 'Bartlett' pears at sequential harvest dates in 1988 and 1989, respectively, in an orchard near Medford, Ore. Bars indicate SE.

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Table 1. Incidence of core breakdown in 'Bartlett' (Bart) and 'Sensation Red Bartlett' (SRB) pears harvested at six dates and stored at OC until the middle of October, November, or December.

Harvest date	Percent fruit with core breakdown <sup>2</sup>					
	October		November		December	
	Bart	SRB	Bart	SRB	Bart	SRB
<i>1988</i>						
5 Aug.	0.0	0.0	32.0	0.0	24.0	12.0
12 Aug.	0.0	0.0	32.0	0.0	24.0	12.0
19 Aug.	0.0	0.0	44.0	8.0	---	---
26 Aug.	4.0	0.0	8.0	4.0	12.0	0.0
2 Sept.	18.0	0.0	12.0	0.0	48.0	4.0
9 Sept.	14.6	0.0	28.0	4.0	44.0	12.0
<i>1989</i>						
1 Aug.	10.0	10.0	100	52.0	100	92.0
8 Aug.	0.0	0.0	70.0	10.0	80.0	94.0
15 Aug.	16.0	0.0	45.0	4.0	50.0	68.0
22 Aug.	54.0	2.0	38.0	14.0	50.0	50.0
29 Aug.	66.0	14.0	98.0	37.0	74.0	30.0
5 Sept.	100	80.0	100	100	100	100
<i>P values</i>						
Cultivar (C)	<0.0001					
Year (Y)	<0.0001					
Harvest date (H)	<0.0001					
Storage time (S)	<0.0001					
C × Y	0.1972					
C × H	0.0263					
Y × H	<0.0001					
C × S	0.0001					
Y × S	<0.0001					
H × S	<0.0001					
C × Y × H	0.1437					
C × Y × S	0.0056					
C × H × S	0.0004					
Y × H × S	<0.0001					
C × Y × H × S	0.3157					

<sup>2</sup>Values represent means of five replications of 10 fruit for each harvest date and each storage time. Analysis of variance was performed on transformed data (arc sin square root).

The incidence of CB in both cultivars was higher in 1989 than in 1988 (Table 1). Magness (1957) found 'Bartlett' pear fruit from cooler growing districts of California more prone to core browning than fruit from the hotter districts of the state. Advanced maturity could also account for higher incidence of CB in 1989, given that firmness values were lower for all harvest dates relative to 1988. Fruit of this maturity are only suitable for short-term storage.

For nearly all removal dates in both years, incidence of CB was lower in SRB than in 'Bartlett'. In many cases, the incidence of CB was higher in the early and late-harvested fruit of both cultivars than in fruit harvested between the two periods. Fruit from early har-

vests were also stored longer than fruit from later harvests. For example, fruit harvested on 1 Aug. 1989 and evaluated on 18 Oct. had been in storage for 79 days, near the maximum expected storage time. Fruit harvested 2 weeks later were stored only 65 days. Hartman (1925) found that CB in 'Bartlett' pears was associated with late harvest but not with early harvest. However, the length of time that fruit were stored before evaluation for CB was not reported. Several reports indicate that 'Bartlett' pears harvested when immature are more prone to CB than those harvested when mature (Overholser and Latimer, 1924; Stubenrauch and Ramsey, 1914), particularly when stored at 0 to -1°C (Magness, 1920).

Our results indicate that 'Bartlett' and SRB

pears differ in the time when they reach maturity. Harvesting SRB after 'Bartlett' is not likely to adversely affect storage quality of SRB unless harvest is delayed until the fruit are already soft (<70 N). Based on the trends observed during this study (Fig. 1), loss of fruit firmness in SRB was ≈2 weeks behind that of 'Bartlett'. Accordingly, an appropriate general guideline would be that harvest of SRB commence within 2 weeks after the start of 'Bartlett' harvest.

#### Literature Cited

- Chen, P.M. 1990. Core breakdown, p. 89. In: A.L. Jones and H.S. Aldwinkle (eds.). Compendium of apple and pear diseases. APS Press, St. Paul, Minn.
- Fidler, J. C., B.G. Wilkinson, K.L. Edney, and R.O. Sharples. 1973. The biology of apple and pear storage. Cmwth. Bur. Hort. Plant Crops, East Mailing, Kent. Res. Rev. 3.
- Hartman, H. 1925. The control of core breakdown in pears. Oregon State Univ. Agr. Expt. Bul. 216.
- Lombard, P.B. 1987. Principal green and new pear varieties for USA, p. 45-67. In: M.J. Willett (ed.). Pear production in the Pacific Northwest: Proceedings of the 1986 Pacific Northwest tree fruit shortcourse. Washington State Univ., Pullman.
- Magness, J.R. 1920. Investigations in the ripening and storage of Bartlett pears. J. Agr. Res. 19:473-500.
- Magness, J.R. 1957. Pear growing in the Pacific coast states. U.S. Dept. Agr. Farmers' Bul. 1739.
- Mitchell, F.G. 1990. Postharvest biology and technology of European pears. Proc. California Pear Course. Univ. of California, Davis. 4: 1-13.
- Overholser, E.L. and L.P. Latimer. 1924. The cold storage of pears. Univ. of California Expt. Sta. Bul. 377.
- Stubenrauch, A.V. and H.J. Ramsey. 1914. Bartlett pear precooking and storage investigations in the Rogue River Valley. U.S. Dept. Agr., Bur. Plant Ind. Circ. 114: 19-24.
- Sugar, D. and P.B. Lombard. 1987. Characteristics and production of red pears in the Pacific Northwest, p. 2241. In: M.J. Willett (ed.). Pear production in the Pacific Northwest: Proceedings of the 1986 Pacific Northwest tree fruit shortcourse. Washington State Univ., Pullman.
- Wang, C. Y., W.M. Mellenthin, and E. Hansen. 1971. Effect of temperature on development of premature ripening in Bartlett pears. J. Amer. Soc. Hort. Sci. 96:122-125.
- Westwood, M.N. 1993. Temperate zone pomology. 3rd ed. Timber Press, Portland, Ore.