

‘Bell’ Pear

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‘Bell’ (*Pyrus communis* L.) is an early-season pear variety that combines fire blight resistance with exceptional flavor and high productivity. Fire blight, caused by the bacterial pathogen *Erwinia amylovora*, is a devastating disease for pear growers in the mid-Atlantic region and other pear production areas prone to hot and humid climates. ‘Bell’ has exhibited strong resistance to natural infection by *Erwinia* compared with the susceptible, industry-standard ‘Bartlett’. ‘Bell’ also exhibits a “balanced” sugar and acidity content that is desirable and preferred by pear consumers. The US Department of Agriculture and Pennsylvania State University released ‘Bell’ in 2022 as a fresh-market pear for commercial, direct-to-market, and home production.

Origin

‘Bell’ was a seedling selected from a cross of ‘Lucious’ and US65003–023 made in 1983 by R.L. Bell (Fig. 1). The original seedling was designated as US84909–391 and from a progeny grown at the US Department of Agriculture (USDA) Agriculture Research Service (ARS) Appalachian Fruit Research Station (AFRS) in Kearneysville, WV, USA. The original seedling tree was propagated as four biological replicate trees grown on ‘Bartlett’ seedling rootstock at AFRS for further evaluation during the 2006–21 seasons. Additional replicate trees were propagated and placed into a cooperative trial in 2011–20 at Pennsylvania State University (PSU) Fruit Research and Extension Center (FREC) in Biglerville, PA, USA. In Pennsylvania, replicate ‘Bell’ trees were grown on OH×F 87 rootstocks in Bi-Axis (907 trees/acre)

and Tall-Spindle (518 trees/acre) training systems, in a trial with other USDA selections and pear varieties of commercial importance. The trees grown in the Bi-Axis system had five replicate trees per variety, whereas the trees in the Tall-Spindle had nine replicate trees per variety. The training systems were planted in a complete block design with one replicate tree per variety in each block. Based on performance information gained at both trial sites, ‘Bell’ was jointly selected by USDA-ARS-AFRS and Pennsylvania State University researchers.

Description

‘Bell’ are vigorous trees with semiglossy leaves with fruit ovate to ovate-pyriform in shape (Fig. 2). Fruit shape is convex toward the middle with an intermediate length (Thibault and Watkins 1983). The peel of the fruit is yellow with a red blush developing on the sun-exposed side. The flesh is buttery and melting in texture and can be harvested tree-ripe or ripened in cold storage. The flesh has little to no grit. Harvest date is similar to ‘Bartlett’, with harvest usually occurring in the third week of August in the mid-Atlantic region.

Tree Performance

At the trial site in Pennsylvania, ‘Bell’ performance was evaluated against USDA releases ‘Blake’s Pride’ (Bell et al. 1999), ‘Potomac’ (Bell et al. 1996), ‘Shenandoah’ (Bell and van de Zwet 2008), and ‘Sunrise’ (Bell and van de Zwet 2011), along with commercial varieties ‘Bartlett’, ‘Harrow Delight’ (Quamme and Spearman 1983), ‘Harrow Sweet’ (Hunter et al. 1992), and ‘Anjou’. From the third through the seventh leaf in the Bi-Axis training system (907 trees/acre), varieties trunk cross-sectional area (TCSA) was recorded (Table 1). ‘Bell’ pear’s yearly average TCSA was the second or third highest documented among the nine varieties tested in the two training systems. ‘Bell’ TCSA was

similar to ‘Anjou’ and ‘Potomac’ (Table 1), suggesting that ‘Bell’ is a vigorous scion variety when grafted on OH×F 87.

In addition to growth characteristics, production measurements were also taken in the Pennsylvania trial between the first through the seventh leaf in Bi-Axis and Tall-Spindle training systems (Tables 2 and 3). In the Bi-Axis, ‘Bell’ produced the fourth highest total of fruit with similar yearly production to ‘Bartlett’, ‘Harrow Sweet’, and ‘Shenandoah’ (Table 2). In the lower density system (Tall-Spindle), ‘Bell’ ranked second in the number of fruits produced only trailing ‘Harrow Sweet’ (Table 2). However, when comparing total yield, ‘Bell’ ranked fourth in both training systems (Table 3). ‘Bell’ pear’s yield was very similar to ‘Bartlett’; however, production between the two varieties varied interseasonally. We also extrapolated the yield during the 2016 season, the first season in which all varieties reached full-scale production, for yield per acre. ‘Bell’ is anticipated to produce 303.5 bushels/acre (749.96 bushels/hectare) when planted in a Bi-Axis system at 907 trees/acre (2,241 trees/hectare) and 244.44 bushels/acre (604.02 bushels/hectare) when planted in a Tall-Spindle system of 518 trees/acre (1200 trees/hectare). The projected yields are similar to ‘Shenandoah’ in the Bi-Axis system and between ‘Shenandoah’ and ‘Sunrise’ in the Tall-Spindle (Table 3). In both systems, ‘Bartlett’ would produce more than ‘Bell’.

Disease Resistance

‘Bell’ was also evaluated for natural infection of fire blight [*Erwinia amylovora* (Burrill)] at the AFRS between 2006 and 2012 and compared with ‘Bartlett’ (susceptible) and ‘Potomac’ (resistant) (Bell et al. 1996; Oitto et al. 1970; van der Zwet et al. 1970; Winslow et al. 1920). Across the six years of observation, ‘Bell’ exhibited little to no natural infection and had an average rating of 9.5 (10 = no infection) compared with 4.2 for ‘Bartlett’ and 7.9 for ‘Potomac’, using the USDA Fire Blight Rating Scale (Fig. 3) (van der Zwet et al. 1970). The source of fire blight resistance can be attributed to both sides of ‘Bell’s’ parentage, as ‘Luscious’ and ‘Seckel’ are fire blight resistant varieties (Fig. 1). Additionally, observations at AFRS and FREC suggests ‘Bell’ is susceptible to *Fabraea* leaf spot [*Diplocarpon mespili* (Sorauer) B.Sutton], also known as leaf blight and black spot, that can result in defoliation and blemishes on fruit peels.

Fruit Quality

In the Pennsylvania trial, ‘Bell’ exhibited a fruit length of 80.43 to 118.45 mm, a diameter of 105.95 to 157.13 mm, and a weight of 117.87 to 122.48 g (Table 4). Generally, fruit grown in the Tall-Spindle training system was larger than in the Bi-Axis system. In the

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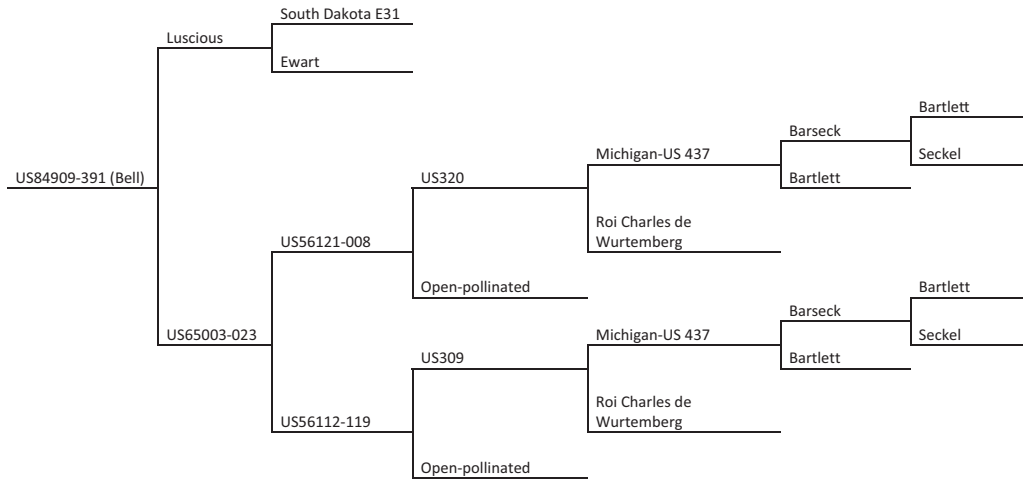


Fig. 1. Pedigree of US84909–391 ('Bell') pear.

Table 1. Average trunk cross sectional area (TCSA) of pear varieties grown in a Bi-Axis (907 trees/acre) training system grafted to OH×F 87, Pennsylvania State University Fruit Research and Extension Center, Biglerville, PA, 2016–20.

| Variety | Avg TCSA (cm ²) | | | | |
|------------------|-----------------------------|-----------|----------|------------|-----------|
| | 2016 | 2017 | 2018 | 2019 | 2020 |
| Anjou | 55.73 c | 70.56 c | 76.20 b | 95.54 cd | 102.00 bc |
| Bartlett | 37.42 abc | 49.66 abc | 57.63 ab | 67.84 abc | 70.51 ab |
| Blake's Pride | 20.30 a | 28.03 a | 31.45 a | 43.78 a | 49.52 a |
| Harrow Delight | 47.81 bc | 60.06 bc | 63.45 ab | 80.28 bcd | 88.53 bc |
| Harrow Sweet | 41.87 abc | 55.05 abc | 60.43 ab | 76.45 abcd | 77.86 abc |
| Potomac | 50.54 c | 68.82 c | 80.13 b | 107.34 d | 114.12 c |
| Shenandoah | 50.41 c | 65.20 c | 71.65 b | 85.06 cd | 90.66 bc |
| Sunrise | 24.09 ab | 32.93 ab | 35.92 a | 46.11 ab | 49.15 a |
| US84909–391/Bell | 54.68 c | 67.25 c | 75.72 b | 89.13 cd | 96.82 bc |

Different letters in the column among pear cultivars denote significant differences obtained by one-way analysis of variance and Tukey honest significant difference test at $P < 0.05$. $n = 5$ trees/variety.

Table 2. Fruit production (count) of pear varieties in two high-density training systems grafted to OH×F 87, Pennsylvania State University Fruit Research and Extension Center, Biglerville, PA, 2016–20.

| Variety | Avg fruit produced (count/yr) | | | | | | | Total fruit produced (count) | Total fruit produced rank |
|---|-------------------------------|----------|----------|-----------|-------------------|--------------------|-----------|------------------------------|---------------------------|
| | 2013 | 2014 | 2015 | 2016 | 2017 ⁱ | 2018 ⁱⁱ | 2020 | | |
| Bi-Axis training (907 trees/acre, $n = 5$ trees/variety) | | | | | | | | | |
| Anjou | — | 0.2 a | 15.60 a | 27.75 a | 25.80 a | 4.00 a | 16.25 a | 281 | 9 |
| Bartlett | 6.4 ab | 15.60 ab | 35.40 a | 103.20 b | 45.60 ab | 41.00 b | 73.80 bc | 1605 | 2 |
| Blake's Pride | — | 1.00 a | 22.00 a | 40.60 ab | 20.25 a | 7.50 a | 59.20 abc | 725 | 5 |
| Harrow Delight | 1.25 a | — | 14.75 a | 19.33 a | 42.50 ab | 2.50 a | 48.25 ab | 495 | 6 |
| Harrow Sweet | 15.75 b | 31.00 b | 99.50 b | 91.50 ab | 135.50 c | 85.00 c | 106.75 c | 2260 | 1 |
| Potomac | — | 0.20 a | 1.50 a | 25.80 a | 19.40 a | 3.00 a | 11.80 a | 295 | 8 |
| Shenandoah | 0.20 a | 31.40 b | 54.20 ab | 49.75 ab | 69.00 b | 19.00 ab | 89.50 bc | 1407 | 3 |
| Sunrise | 0.25 a | 1.20 a | 3.50 a | 33.40 ab | 27.40 a | 2.33 a | 15.00 a | 400 | 7 |
| US84909–391/Bell | 0.25 a | 0.25 a | 98.50 b | 69.25 ab | 81.75 b | 17.25 ab | 56.50 abc | 1294 | 4 |
| Tall-Spindle training (518 trees/acre; $n = 9$ trees/variety) | | | | | | | | | |
| Anjou | — | — | 19.40 a | 47.30 abc | — | 10.00 | — | 677 | 7 |
| Bartlett | 11.44 b | 15.22 b | 39.50 a | 140.20 de | 57.00 | 91.00 | — | 2185 | 4 |
| Blake's Pride | — | 0.10 a | 24.40 a | 57.00 abc | 1.00 | 11.00 | — | 827 | 6 |
| Harrow Delight | 0.33 a | — | 12.56 a | 40.56 ab | 17.00 | 7.00 | — | 505 | 8 |
| Harrow Sweet | 16.10 b | 40.90 c | 122.40 b | 172.70 e | 221.00 | 97.00 | — | 3839 | 1 |
| Potomac | — | 0.22 a | 2.50 a | 18.44 a | 89.00 | 2.00 | — | 264 | 9 |
| Shenandoah | 4.10 a | 39.30 c | 91.20 b | 86.20 bc | 69.00 | 37.00 | — | 2314 | 3 |
| Sunrise | 0.10 a | 3.60 a | 14.67 a | 74.20 abc | 57.00 | 23.00 | — | 947 | 5 |
| US84909–391/Bell | 0.11 a | 4.89 a | 125.44 b | 103.44 cd | 187.00 | 46.00 | — | 2338 | 2 |

ⁱ Replicates decreased to $n = 2$, and thus were removed from ANOVA.

ⁱⁱ Tall-Spindle was reduced to $n = 1$ replicate tree per variety, thus ANOVA could not be applied.

Different letters in the column among pear cultivars denote significant differences obtained by one-way analysis of variance (ANOVA) and Tukey honest significant difference test at $P < 0.05$.

Table 3. Fruit yield of pear varieties in two high-density training systems grafted to OH×F 87, Pennsylvania State University Fruit Research and Extension Center, Biglerville, PA, 2016–20.

| Variety | Avg fruit yield (kg) | | | | | | Total yield (kg) | Total yield rank | 2016 Projected bushels/acre |
|---|----------------------|-----------|----------|-------------------|-------------------|--------------------|------------------|------------------|-----------------------------|
| | 2014 | 2015 | 2016 | 2017 ⁱ | 2018 ⁱ | 2020 ⁱⁱ | | | |
| Bi-Axis training (907 trees/acre, <i>n</i> = 5 trees/variety) | | | | | | | | | |
| Anjou | — | 4.03 ab | 4.60 a | 5.01 a | 0.98 ab | 2.85 a | 76.92 | 6 | 158.45 ab |
| Bartlett | 2.14 a | 7.35 abc | 12.90 a | 8.89 ab | 5.55 c | 10.23 bc | 233.44 | 3 | 444.78 b |
| Blake's Pride | 0.8 a | 3.72 a | 6.03 a | 3.63 a | 1.05 ab | 7.52 ab | 105.87 | 5 | 207.93 ab |
| Harrow Delight | — | 2.64 a | 1.96 a | 5.88 a | 0.36 a | 5.21 ab | 62.24 | 7 | 67.50 a |
| Harrow Sweet | 2.79 a | 15.35 c | 10.11 a | 15.16 b | 9.90 d | 9.44 abc | 250.99 | 2 | 348.70 ab |
| Potomac | 0.32 a | 0.28 ab | 4.22 a | 4.73 a | 0.71 ab | 2.43 a | 59.23 | 8 | 145.67 ab |
| Shenandoah | 6.23 a | 14.15 bc | 9.24 a | 13.58 b | 4.07 bc | 16.82 c | 290.32 | 1 | 318.49 ab |
| Sunrise | 0.68 a | 0.69 ab | 3.9 a | 4.63 a | 0.31 a | 2.50 a | 58.12 | 9 | 134.39 ab |
| US84909–391/Bell | — | 13.16 abc | 8.80 a | 10.40 ab | 1.92 ab | 6.18 ab | 161.82 | 4 | 303.50 ab |
| Tall-Spindle training (518 tees/acre, <i>n</i> = 9 trees/variety) | | | | | | | | | |
| Anjou | — | 4.88 ab | 7.62 a | — | 2.01 | — | 127.00 | 5 | 150.17 ab |
| Bartlett | 1.56 a | 8.18 b | 18.33 c | 12.95 | 11.99 | — | 305.66 | 3 | 361.23 cd |
| Blake's Pride | 0.02 a | 5.03 ab | 7.08 ab | 0.26 | 1.31 | — | 122.82 | 6 | 148.22 ab |
| Harrow Delight | — | 2.28 ab | 4.48 a | 3.07 | 0.95 | — | 63.92 | 8 | 86.27 a |
| Harrow Sweet | 3.76 b | 19.70 cd | 19.86 c | 31.06 | 13.34 | — | 477.68 | 2 | 391.38 d |
| Potomac | 0.03 a | 0.12 a | 2.90 a | 23.13 | 0.51 | — | 51.13 | 9 | 52.49 a |
| Shenandoah | 7.58 c | 25.61 d | 16.88 c | 18.01 | 10.65 | — | 529.29 | 1 | 332.66 cd |
| Sunrise | 0.42 a | 1.43 a | 7.57 ab | 9.29 | 3.33 | — | 106.72 | 7 | 165.66 ab |
| US84909–391/Bell | 0.43 a | 16.64 c | 12.41 bc | 23.88 | 5.39 | — | 294.59 | 4 | 244.44 bc |

ⁱ Replicates decreased to *n* = 2, and thus were removed from ANOVA.

ⁱⁱ Tall-Spindle was reduced to *n* = 1 replicate tree per variety, thus ANOVA could not be applied.

Different letters in the column among pear cultivars denote significant differences obtained by one-way analysis of variance (ANOVA) and Tukey honest significant difference test at *P* < 0.05.

Bi-Axis system, ‘Bell’ exhibited a similar size to ‘Shenandoah’ but was significantly lower in weight, whereas in the Tall-Spindle system, ‘Bell’ was more similar to ‘Bartlett’ but again was significantly lower in weight. In 2021 at the West Virginia trial, ‘Bell’ exhibited an average length of 74.6 cm, a diameter of 18.40 mm, and a weight of 125.54 g (Table 5). The two trials demonstrated consistency in fruit size regardless of the rootstock used or training system. In the West Virginia trial, ‘Bell’ was larger than ‘Seckel’ but smaller than store-bought ‘Bartlett’ (Table 5). ‘Bell’ was closest in size to ‘Forelle’ in terms of its potential market class.

In the PA trial, soluble solids concentrations (SSC) measurements were taken during 2015 in both training systems. ‘Bell’ exhibited a similar SSC to ‘Anjou’ in both systems (Table 4). Between the two training systems, ‘Bell’ SSC was higher in the lower-density Tall-Spindle system. In the West Virginia trial, fruit quality traits SSC, pH, and

titratable acidity (TA) were measured on harvested fruit during the 2021 harvest season (Table 5). The SSC of ‘Bell’ was recorded as an average of 14.7, the third highest measured and similar to ‘Gem’ but lower than store-bought ‘Forelle’. Compared with the two major commercial varieties ‘Anjou’ and ‘Bartlett’, ‘Bell’ was significantly higher. In a comparison of acidity traits, ‘Bell’ had a similar pH to many other varieties, but TA was the third highest measured. Only ‘Shenandoah’ and

‘Starkrimson’ were found to have higher TA than ‘Bell’ (Table 5).

In 2018, ‘Bell’ underwent consumer evaluation and compared with ‘Bartlett’ and ‘Gem’, two varieties of similar harvest periods (i.e., summer pears) (Bell et al. 2014). ‘Bell’ performed the highest in flavor intensity, flavor balance, and juiciness compared with ‘Bartlett’ and ‘Gem’ (Table 6). However, ‘Gem’ exhibited a more desirable visual appearance and texture compared with ‘Bell’. Overall,

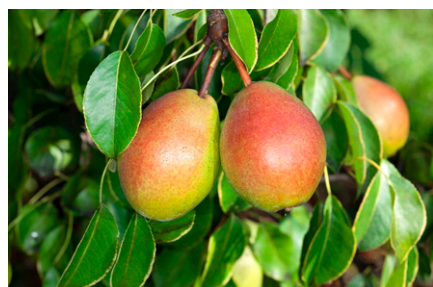


Fig. 2. Photo of US84909–391 (‘Bell’) pear fruit. Photo credit Agriculture Research Service, US Department of Agriculture, Peggy Greb.

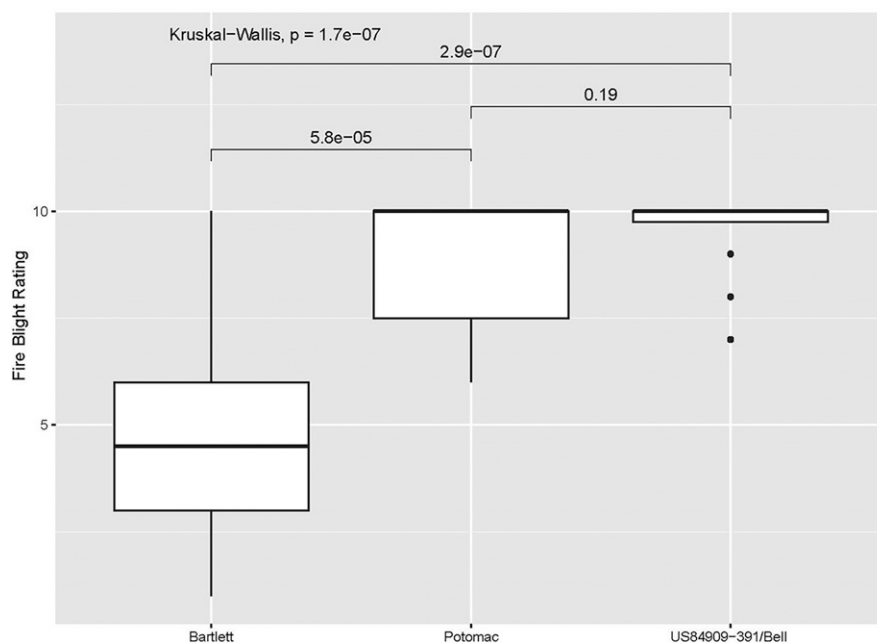


Fig. 3. Fire blight ratings for ‘Bartlett’, ‘Bell’, and ‘Potomac’ pear trees (*n* = 24 trees/variety) from 2006 to 2012 in West Virginia.

Table 4. Average fruit size and quality of pear varieties in two high-density training systems.

| Variety | Length (mm) | Diam (mm) | Wt (g) | SSC (°Brix) |
|---|-------------|------------|------------|-------------|
| Bi-Axis training (907 trees/acre, n = 5 trees/variety) | | | | |
| Anjou | 104.12 ab | 118.50 ab | 203.64 c | 13.78 ab |
| Bartlett | 91.5 ab | 109.14 ab | 155.06 b | 12.76 a |
| Blake's Pride | 77.28 ab | 95.53 ab | 151.30 b | 13.74 ab |
| Harrow Delight | 72.20 ab | 95.38 ab | 136.99 ab | — |
| Harrow Sweet | 92.28 ab | 106.26 ab | 112.93 a | 15.70 c |
| Potomac | 9.70 a | 11.07 a | 212.65 c | 15.10 abc |
| Shenandoah | 108.75 b | 146.16 b | 208.03 c | 14.48 bc |
| Sunrise | 25.90 ab | 42.03 ab | 154.25 b | 14.60 abc |
| US84909–391/Bell | 118.45 b | 157.13 b | 122.48 ab | 13.85 abc |
| Tall-Spindle training (518 trees/acre, n = 9 trees/variety) | | | | |
| Anjou | 116.79 abc | 132.55 b | 206.16 de | 14.62 c |
| Bartlett | 92.43 abc | 111.095 ab | 155.99 bc | 12.95 a |
| Blake's Pride | 110.97 bc | 138.83 b | 173.22 cd | 13.38 ab |
| Harrow Delight | 73.24 abc | 96.83 ab | 146.91 abc | — |
| Harrow Sweet | 92.50 abc | 110.97 ab | 125.76 ab | 15.91 d |
| Potomac | 15.60 a | 19.30 a | 181.13 cd | 16.40 cd |
| Shenandoah | 108.95 c | 149.21 b | 225.03 e | 14.21 bc |
| Sunrise | 46.87 ab | 64.30 a | 125.5 ab | 14.60 bcd |
| US84909–391/Bell | 80.43 abc | 105.95 ab | 117.87 a | 15.20 cd |

Different letters in the column among pear cultivars denote significant differences obtained by one-way analysis of variance (ANOVA) and Tukey honest significant difference test at $P < 0.05$. SSC = soluble solids concentrations. Averages were obtained from 10 fruit from each replicate tree.

Table 5. Average pear fruit size and quality measurements from 2021 from fruit grown at WV or purchased from local grocery stores.

| Variety | Avg (n = 5 fruit) | | | | | |
|----------------------------|-------------------|-----------|-----------|-------------|---------|---------------------|
| | Length (mm) | Diam (mm) | Wt (g) | SSC (°Brix) | pH | TA (g/L malic acid) |
| Anjou (Green) ¹ | 87.42 cde | 23.49 d | 230.18 c | 12.97 c | 3.89 ab | 3.22 cd |
| Bartlett ¹ | 92.38 de | 22.81 cd | 220.34 c | 12.57 bc | 3.91 ab | 3.22 cd |
| Blake's Pride | 78.24 bcd | 19.89 abc | 140.12 ab | 10.67 a | 4.39 ab | 2.11 ab |
| Bosc ¹ | 103.28 e | 22.35 cd | 213.98 c | 12.73 c | 3.99 ab | 1.69 a |
| Dawn | 79.90 cd | 17.65 a | 114.98 ab | 11.53 ab | 4.18 ab | 1.64 a |
| Forelle ¹ | 71.56 abc | 18.47 ab | 120.5 ab | 15.80 f | 4.27 ab | 1.61 a |
| Gem | 72.16 abc | 22.04 cd | 138.52 ab | 14.20 de | 4.28 ab | 3.20 cd |
| Harrow Delight | 82.58 cd | 17.90 a | 118.16 ab | 10.77 a | 4.18 ab | 2.86 bc |
| Honeysweet | 62.92 ab | 17.49 a | 90.40 a | 14.23 de | 4.47 b | 1.76 a |
| Potomac | 79.88 cd | 21.40 bcd | 179.16 bc | 12.90 c | 4.07 ab | 2.82 bc |
| Seckel ¹ | 60.12 a | 17.12 a | 84.80 a | 16.10 f | 4.42 b | 1.92 a |
| Shenandoah | 93.38 de | 21.56 cd | 183.98 bc | 11.50 ab | 3.78 ab | 4.86 e |
| Starkrimson ¹ | 101.44 e | 23.12 d | 245.98 c | 13.43 cd | 3.71 a | 3.80 d |
| Sunrise | 74.66 abc | 18.27 a | 118.34 ab | 11.47 ab | 4.39 ab | 2.02 ab |
| US849090–391/Bell | 74.60 abc | 18.40 ab | 125.54 ab | 14.67 e | 3.94 ab | 3.78 d |
| Rank | | | | | | |
| Anjou (Green) ¹ | 5 | 1 | 2 | 7 | 13 | 5 |
| Bartlett ¹ | 4 | 3 | 3 | 10 | 12 | 4 |
| Blake's Pride | 9 | 8 | 7 | 15 | 3 | 9 |
| Bosc ¹ | 1 | 4 | 4 | 9 | 10 | 13 |
| Dawn | 7 | 13 | 13 | 11 | 8 | 14 |
| Forelle ¹ | 13 | 9 | 10 | 2 | 6 | 15 |
| Gem | 12 | 5 | 8 | 5 | 5 | 6 |
| Harrow Delight | 6 | 12 | 12 | 14 | 7 | 7 |
| Honeysweet | 14 | 14 | 14 | 4 | 1 | 12 |
| Potomac | 8 | 7 | 6 | 8 | 9 | 8 |
| Seckel ¹ | 15 | 15 | 15 | 1 | 2 | 11 |
| Shenandoah | 3 | 6 | 5 | 12 | 14 | 1 |
| Starkrimson ¹ | 2 | 2 | 1 | 6 | 15 | 2 |
| Sunrise | 10 | 11 | 11 | 13 | 4 | 10 |
| US849090–391/Bell | 11 | 10 | 9 | 3 | 11 | 3 |

¹ Store-bought fruit.

Different letters in the column among pear cultivars denote significant differences obtained by one-way analysis of variance (ANOVA) and Tukey honest significant difference test at $P < 0.05$. SSC = soluble solids concentrations; TA = titratable acidity.

Table 6. Consumer evaluation of 'Bartlett', 'Gem', and 'Bell' pear varieties.

| Variety | Visual ¹ | Texture ¹ | Flavor intensity ¹ | Flavor balance ¹ | Juiciness ¹ |
|-------------------|---------------------|----------------------|-------------------------------|-----------------------------|------------------------|
| Bartlett | 7.1 | 6.3 | 5.6 | 5.7 | 5.4 |
| Gem | 8.1 | 6.7 | 6.4 | 6.6 | 6.2 |
| US 84909–391/Bell | 7.4 | 6.6 | 7.3 | 7.2 | 7.4 |

¹ Average.

Likert Scale: 1 = dislike extremely, 9 = like extremely.

consumers responded favorably to the qualities of 'Bell', which can be attributed to its higher sugar content and acidity compared with 'Bartlett' and 'Gem' (Table 5).

Availability

Scion and budwood are currently limited and not available from the Appalachian Fruit Research Station or Pennsylvania State University. Nurseries, researchers, and germplasm repositories should send requests to Christopher Gottschalk to discuss the availability of virus-uncertified grafting material. 'Bell' will be made available to researchers once an accession is established at the US Department of Agriculture National Clonal Germplasm Repository in Corvallis, OR.

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