Center for Landscape and Urban Horticulture
University of California Cooperative Extension
Los Angeles County/U.C. Riverside

Evaluation of Interspecific Hybrid Pears for Use in Southern California Landscapes

Final Report to the Elvenia J. Slosson Endowment Fund

September 2010

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Introduction and Background

Trees of the pear genus, *Pyrus*, notably cultivars of *P. calleryana* Decne. (callery pear) and the species *P. kawakamii* Hayata. (evergreen pear), have been widely used as medium-sized, deciduous or semi-evergreen, flowering landscape trees in Southern California, but each has serious defects. The *P. calleryana* cultivar, 'Bradford', was introduced by the U.S. Department of Agriculture in 1963 and remains the most widely used of the *P. calleryana* cultivars (Dirr, 1998). 'Bradford' and the popular newer *P. calleryana* cultivars, 'Aristocrat', 'Chanticleer', 'Capital', and 'Whitehouse', have desirable landscape qualities including attractive spring flowering, outstanding fall color, adaptation to varieties of climate and soil conditions, and variable degrees of resistance to fire blight disease (*Irwinia amylovora*). Unfortunately, the *P. calleryana* cultivars suffer from narrow branch angles that often result in severe splitting of the tight, upright branch crotches. Also, newer *P. calleryana* cultivars appear to be less resistant to fire blight than originally thought at the time they were introduced (Coate, 2005). Evergreen pear, *P. kawakamii,* exhibits attractive winter flowering, nearly evergreen foliage but good fall color, adaptation to varieties of climate and soil conditions, and acceptable branch structure, but it is highly susceptible to fire blight and may require considerable training to develop an attractive tree (Dirr, 1998). Thus, although ornamental pears offer many desirable qualities and have a mature size appropriate in scale to urban residential sites, their defects often limit their use as landscape trees.

Fortunately, there is potential for the defects noted above to be overcome through breeding within *Pyrus* because it includes considerable genetic diversity for desirable landscape traits, climatic and soil adaptation, and disease and pest resistance. The *Pyrus* gene pool for fruit breeding is well-documented (Bell et al., 1996), but the potential of *Pyrus* for landscape use had been largely unexplored until recently (Hummel, 2000). *Pyrus* is a member of the Rosaceae family and contains 22 primary species plus at least 6 naturally occurring interspecific hybrids (Hummel, 2000). The genus is believed to have arisen in the mountainous regions of western China and now is indigenous to Europe, temperate Asia, and the mountainous regions of North Africa (Bell et al., 1996). Today pears are the second most important deciduous tree fruit crop in the world, with the major species being *P. communis* L., the common European pear, and *P. pyrifolia* (Burm.) Nak., the Asian or Oriental pear.

In 1990, the Landscape Plant Development Center, Mound, MN (LPDC), a non-profit organization of cooperating academics and wholesale nurseries devoted to developing improved landscape plants, collected open pollinated (OP) seeds from Melvin Westwood's interspecific *Pyrus* hybrids growing at the National Clonal Germplasm Repository in Corvallis, OR (Hummel, 2000). The goal of the breeding program is to produce ornamental pear selections with good stress tolerance and resistance to fire blight. The first controlled crosses of selected *Pyrus* accessions from the Repository were made in 1991 (Hummel et al., 1992; Pellett and Hunt, 1992) and more crosses were made in 1992. *Pyrus* species involved in these crosses and their native geographical distribution are: *P. amygdaliformis* Vill. and *P. elaeagrifolia* Pall. are native to the Mediterranean region; *P. regellii* Rehd. and *P. salicifolia* Pall. are mid-Asian species; *P. betulaefolia* Bunge, *P. calleryana* Decne., *P. dimorphophylla* Mak., *P. fauriei* Schneider, *P. pyrifolia* (Burm.) Nakai, *P. ussuriensis* Maxim. are East Asian species, and *P. nivalis* Jacq. is of European origin (Bell et al., 1996). These species were chosen because they represent a diversity of tree forms, foliage characteristics, and climatic adaptations with the potential for desirable landscape traits to be expressed through breeding.

Seeds from the *Pyrus* crosses made in 1991 and 1992 along with OP seeds were sent to the Washington State University Research Center in Puyallup, WA where a field planting of 503 interspecific *Pyrus* hybrids has been under evaluation for their potential as landscape trees (Hummel 2000, 2003). Several interspecific hybrids have demonstrated wide-angled branch structure, good flowering, attractive fall color, and fire blight resistance (Hummel 2003), plus their parentage may confer adaptation to warm semi-arid climates like those of Southern California. In addition, previous studies in Riverside, CA determined established evergreen pears are adequately watered at 55% to 60% of reference evapotranspiration (ET_0) (Pittenger et al., 2002), which suggests the water needs of ornamental *Pyrus* can be satisfied where landscape water conservation targets are imposed in Southern California.

Because the ornamental pear selections currently used have significant limitations, it is important to evaluate the LPDC's interspecific hybrid pears under Southern California conditions to determine if any

might serve as alternatives to *P. calleryana* cultivars or *P. kawakamii*. Thus, in 2003 a study was initiated with the objectives to determine the performance and horticultural characteristics of six advanced selections from the LPDC's interspecific *Pyrus* evaluation project under the climate and soil conditions typical of inland Southern California, and to compare their performance against the two ornamental pears commonly planted in the region, 'Bradford' (*P. calleryana)* and evergreen pear (*P. kawakamii*).

Materials and Methods

The study site was at the University of California Riverside (UCR) Agricultural Operations facility, Riverside, CA, which is in an inland valley approximately 65 mi. (105 Km) east of Los Angeles at an elevation of about 860 ft. (260 m.). It experiences a semi-arid Mediterranean climate, also described as Sunset zone 18 (Brenzel, 2007). The climate is characterized by hot, dry summers and mild, wet winters. Average summer high/low temperatures are 95°F/62°F (35°C/17°C), while average winter high/low temperatures 68°F/43°F (20°C/6°C). It is common to experience several summer days with high temperatures greater than 100°F (38°C) and a few winter nights with low temperatures slightly below 32°F (0°C). On average, there are enough cumulative winter chilling hours to grow successfully some low-chill varieties of deciduous fruit crops. Annual average rainfall is about 10 in. (254 mm) with nearly all of it occurring during late fall to early spring, especially January through March. The historical average ET_0 is 56 in. (1,420 mm.) per year with the highest evaporative demand of 7.2 in. (183 mm.) in July. Thus, regularly scheduled irrigation is required in spring through fall for urban landscape plantings to perform acceptably. Due to the unique combination of climate and close proximity to the Los Angeles metropolitan area, the Riverside area experiences above average air pollution (smog) composed primarily of ozone and fine particulate matter during the warmer months of the year.

Soil at the evaluation site is a Hanford sandy loam that has physical and chemical properties well suited for tree growth and development. It has neutral to slightly acidic reaction (pH 5.5-7.0), very low salinity (EC <1.0 dS/m.), moderate water-holding capacity with 1.3-1.6 in. (33-41 mm.) of plant-available water per 1 ft. (300 mm.) depth of soil, and moderate bulk density (about 1.7).

In March 2003, three or four dormant bare-root whips each of six unnamed, advanced *Pyrus* interspecific hybrid selections were received at the University of California Riverside, Riverside, CA (UCR) from an Oregon wholesale nursery associated with the LPDC breeding program. The 20 trees were immediately planted in standard plastic #15 (68-L) containers using U.C. Mix #2 media (Baker, 1957) and placed in a nursery yard in the UCR Agricultural Operations facility to grow additionally before transplanting in the field. For comparison, two trees each of *P. kawakamii* and *P. calleryana* 'Bradford' in #15 containers were obtained from a local nursery and included in the study. The parentage, number of individual trees, and identification key for the pear trees included in the study are found in Table 1.

In November 2004, the container-grown trees were transplanted into a plot at the UCR Agricultural Operations facility. Trees were spaced 20 ft. (6.1 m.) within rows by 24 ft. (7.3 m.) between rows. The planting consisted of four rows of six trees in a completely randomized experimental design. Planting holes were prepared in accordance with University of California Cooperative Extension recommendations (Hodel and Pittenger, 2002).

Trees were watered thoroughly after planting and were kept well watered throughout the study. Irrigation was applied with mini-sprinkler irrigation emitters placed near the base of each tree that wetted and area about 4 ft. (1.2 m) in diameter. Irrigations were scheduled to rewet the soil 2 to 3 ft. (0.6 to 0.9 m.) deep every 3 to 7 days from spring through fall and as needed to keep soil moist in winter.

Minimal pruning was applied to trees. Dormant pruning was conducted the first three years of the study in which the bottom lateral branches were kept temporarily on the trunk but severely headed, and serious structural problems with permanent main scaffold limbs were addressed. The bottom temporary lateral branches were removed after the third year.

Trees were fertilized annually as follows:

- 0.2 lb. (90 g) nitrogen per tree when foliar growth began in years 2005, 2006, 2007;

- 1.0 lb. (400 g) nitrogen per tree, one-half applied when foliar growth began in spring and one-half in July, in years 2008 and 2009.

Several types of data were recorded in order to effectively describe and evaluate the performance of the trees. The height (estimated with a telescoping measuring pole), trunk caliper 6 in. (15 cm.) above the soil, and crown width of each tree were measured annually to document growth and tree size. Trees were also rated periodically for the following horticultural characteristics:

- Overall tree visual quality on a 1 to 5 scale where 1 = undesirable appearance, poor vigor, very thin canopy; 3 = acceptable appearance, moderate vigor, full canopy; 5 = outstanding appearance, superior specimen, moderate or greater vigor and full canopy.
- Spring-summer foliage quality on a 0 to 4 scale where 0 = no foliage or dead; 1 = leaves very small and off-color (e.g. chlorotic, marginal scorch, blotchy coloration, etc.); 2 = leaves small or off-color, 3 = acceptable appearance, leaf size and color are normal; and, 4 = leaf size is normal and color and appearance are very attractive.
- Fall foliage quality on a 0 = 4 scale where 0 = no fall color (essentially green); 1 = poor color development and/or drab color; 2 = color developed but not intense and not uniform through canopy; 3 = acceptable fall color developed but either not intense or not uniform through canopy; and, 4 = outstanding color developed intensely and uniformly through canopy.
- Fall foliage color or color range observed.
- Winter/spring flowering on a 0 to 4 scale where 0 = no flowers, 1 = few flowers, not showy (<25% of shoots with flowers); 2 = light to moderate flowering, (25% to <50% of shoots flowering), 3 = moderately heavy flowering, showy (50% to 75% of shoots with flowers); and, 4 = extensive flowering, very showy (>75% of shoots with flowers); bloom period was noted.
- Fruit number estimated on a 0 to 4 scale where 0 = no fruit; 1 = very few, <10 fruit /tree (sparsely covered with fruit), not messy; few, 2 = 10-25 fruit/tree, noticeable but not messy; 3 = moderate number and could be messy, 25-50 fruit/tree; 4 = large number, messy, 50-75 fruit/tree; and, 5 = >75 fruit/tree (densely covered with fruit), very messy.
- Fruit size noted as very small (size of a blueberry), small (size of a cherry), medium (size of a prune plum), and large (size of small apple).
- Spring-summer foliage color or color range.
- Incidence of fire blight on a 0 to 4 scale where 0 = no evidence of disease, 3 = 50% of shoots are infested, and 4 = nearly whole tree is infested or tree is dead.

Results and Discussion

Across all characteristics evaluated, none of the interspecific hybrid selections were equal to the best overall tree in the study, *P. kawakamii*, and only selections 137, 156, and 326 came close to equaling 'Bradford' pear (Table 2). However, unlike 'Bradford', all of the interspecific hybrids and *P. kawakamii* exhibited wide branching angles. All trees of selection 134 and two of 154 were killed by fire blight, so their high susceptibility to this disease makes them unacceptable for landscape use. 'Bradford' also expressed a high degree of susceptibility to fire blight, while *P. kawakamii* had relatively minor fire blight problems.

All the hybrids but selection 158 provided at least acceptable visual tree quality and were equal with 'Bradford' and *P. kawakamii* for this character (Table 2). Only selections 154 and 158 had unacceptable summer foliage (Table 2 and Figure 4). Interesting silver-green foliage was expressed by selections 137, 156, and 158. Of the best performing pear hybrids, only selection 326 expressed consistent acceptable fall foliage color, and it was on par with 'Bradford' and evergreen pear. Unfortunately, selection 326 also produced significant quantities of fruit that would be too messy in many urban settings.

Selections 137 and 326 along with *P. kawakamii* and 'Bradford' developed the largest trees in terms of height and trunk caliper, (Figures 2 and 3). 'Bradford' was the most vigorous grower in the study. Selections

154, 156, and 158 expressed low vigor as shown in their small crown width plus low height and caliper growth (Table 2, Figs. 2 and 3). In addition, growth data for *P. kawakamii* indicate it slowed in height growth but maintained overall vigor as shown by its continued increase in trunk caliper and favorable appearance ratings. These data also underscore that *P. kawakamii* often needs significant pruning early in its development in order to keep it from growing shrub-like without a leader or well-defined scaffold branches.

With the exception of selection 326, the interspecific hybrids appeared to have difficulty in breaking winter dormancy and were commonly observed to have uneven bud break within trees in most years of the study. One entire tree of selection 158 failed to break dormancy in 2009. Also, most hybrid selections expressed inconsistent or only moderate flowering. Selection 137 had the best flower rating among the acceptable hybrid selections, although its flowers were small, while *P. kawakamii* showed the best flowering in the study (Fig. 5). Selection 326 showed moderate flowering but, unlike other pears, its flowers emerged simultaneously with the new foliage, which reduced the appearance of the flowers.

The overall performance of the interspecific hybrid selections was disappointing, particularly concerning their poor fall foliage color and flowering. The lack of vigor, inconsistent bud break, and poor flowering responses demonstrated by many of the interspecific hybrids suggests the affected trees did not experience sufficient winter chilling. 'Bradford' and *P. kawakamii* did not express these problems. Table 3 provides the cumulative chilling units, average monthly maximum/minimum temperatures, and rainfall data for winter months during the years of the study. The chilling requirements of the pear selections in this study have not been reported, but the values in Table 3 appear to be insufficient for most of the hybrid selections in some years.

In summary, none of the interspecific hybrid pear selections were equal overall to *P. kawakamii*, but three selections were nearly equal to 'Bradford' in overall performance. These selections have potential as small to medium-sized landscape trees and warrant further evaluation in Southern California and other areas of the state that receive greater hours of winter chilling than Riverside. They are:

- 137 – primary concerns are inconsistent fall color and minor fruit mess.
- 156 – primary concerns are mediocre fall color, minor fruit mess, and small stature.
- 326 – primary concerns are its bushy form and significant quantities of messy fruit.

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Table 1. Parentage, number of individual trees evaluated, and identification key for six interspecific hybrid pear (*Pyrus*) selections and two commonly grown ornamental pear species evaluated from November 2004 through December 2009 at the University of California Riverside, Riverside, CA.

Parentage	No. of Trees	Identification Key
P. amygdaliformis X *P. calleryana* 'Chanticleer'	3	134
P. calleryana 'Chanticleer' X *P. eleagrifolia*	4	137
P. amygdaliformis X *P. dimorphophylla*	3	154
P. (*calleryana* X *fauriei*) X *P. elaeagrifolia*	3	156
P. elaeagrifolia X *P. ussuriensis*	3	158
P. [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP	4	326
P. calleryana 'Bradford' (Bradford pear)	2	B
P. kawakamii (evergreen pear)	2	K

Table 2. Horticultural characteristics of six interspecific hybrid pear (*Pyrus*) selections and two commonly grown ornamental pear species from November 2004 through December 2009 at the University of California Riverside, Riverside, CA.

Species[z]	Form	Crown Width (m)	Tree Quality[y]	Foliage Quality[x] Summer	Foliage Quality[x] Fall	Foliage Color[w] Summer	Foliage Color[w] Fall	Flower Rating[v] (bloom period)	Fruit[u] Size	Fruit[u] Quantity	Fire Blight[t]	Comments
134	Irregular to oval	—	3.4	3.1	3.3	G,BG,LG, DG,W	G,R,O,O/R, O/Y,W	4.5 (mid-Mar. - mid-Apr.)	S	1	4	All trees died by end of 2007 due to fire blight; good flowering; poor potential due to fire blight susceptibility.
137	oval to pyramid	2.0	3.7	3.4	2.8	SG,LG,G, DG,BG	SG,G,Y,O, O/R,U/G,W	3.3 (mid-Mar. - late Apr.)	S	1-2	1	Good form, dense; large numbers of small flowers most years; inconsistent fall color, minor fruit mess some years.
154	oval	2.1	3.5	2.7	3.4	BG,LG,G, DG,W	G, M,U,R, RR,Y,O,W	2.5 (mid-Mar. - mid-Apr.)	VS-S	1-2	4	2 of 3 trees died by mid-2007 due to fire blight; usually good fall color; poor potential due to fire blight.
156	compact oval	1.6	3.1	3.4	2.6	SG,LG,G	SG,G,RG, O,R,Y,YG	3.0 (Mar. - mid-Apr.)	S	2	1	Good form; compact, slow-growing, small tree; consistent flowering; minor fruit problem; poor/mediocre fall color.
158	oval to pyramid	1.0	2.2	2.6	2.4	LG,SG,G, BG,DG,	G,R,O,Y,W Y/G,W	2.5 (Mar. & Apr.)	M	1-5	1	Lost vigor after 2007, 1 tree did not break dormancy in 2009; flowering inconsistent, fruit can be a problem.
326	round, broad, weeping	2.8	3.3	3.6	3.0	DG,BG,G, W	G,DG,Y,O, R,RR,M,W	2.5 (early Mar. - mid-Apr.)	S	4	1	Bushy, dense, needs training; messy fruit hold on tree to late fall; flowers emerge after foliage emerges; non-uniform flowering; good foliage.
P. calleryana 'Bradford'	fastigiate	2.6	3.3	3.5	3.1	G,BG,DG, M,U	G,G/O,O, Y,Y/R,RR, O/R,U,W	3.0 (Mar. - mid-Apr.)	--	0	4	One tree with severe fire blight; good to excellent flowering & fall color; poor angle of branch attachment; most vigorous tree in study.
P. kawakamii	broad, irregular	3.9	3.1	3.3	3.2	BG,G,DG, Y/G	G,O,R,Y, Y/O,W/R	3.5 (late Jan. thru Feb.)	--	0	2	Consistent attractive flowering and fall color; requires training; aphid feeding in summer; fire blight disfigure shoots in some years.

[z]Species ID: 134 = *P. amygdaliformis* X *P. calleryana* 'Chanticleer'; 137 = *P. calleryana* 'Chanticleer' X *P. eleagrifolia*]; 154 = *P. amygdaliformis* X *P. dimorphophylla*; 156 = *P.* (*calleryana* X *fauriei*) X *P. elaeagrifolia;* 158 = *P. elaeagrifolia* X *P. ussuriensis*; 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; B = *Pyrus calleryana* 'Bradford'; K = *P. kawakamii*.

[y] Overall Visual Tree Quality Rating (mean): 1 = undesirable appearance, 3 = acceptable appearance, 5 = outstanding appearance.

[x]Summer Foliage Quality Rating (mean): 0 = no foliage/dead, 3 = acceptable appearance, leaf size and color are average, 4 = leaf size is normal and appearance is very attractive; Fall Foliage Quality Rating (mean): 0 = no fall color (green), 3 = acceptable fall color but either not intense or not uniform within canopy, 4 = outstanding color developed intensely and uniformly within canopy.

[w]Foliage Color: BG=bright green, DG=dark green, G=green, LG=light green, M=maroon, O=orange, R=red, RR=deep red, SG=silver-green, U=burgundy, W=brown, Y=yellow.

[v]Flower Rating: 0 = no flowers and 4 = extensive flowering, very showy (>75% of shoots with flowers).

[u]Fruit Size: VS=very small (blueberry), S= small (cherry), M=medium (prune plum), L= large (small apple); Fruit Number: 0 = no fruit to 5 = >75 fruit/tree (densely covered), very messy.

[t]Fire Blight Rating: 0 = no disease symptoms, 2 = 10%-50% of shoots affected, 4 = tree completely infested or dead.

Table 3. Cumulative chilling hours, cumulative chilling units, reference evapotranspiration (ET_0), and temperature data from November through February for years 2004-2009 at the University of California Riverside.

Mo.-Yr.	Cumulative Chilling Hours Below 45° F[z]	Cumulative Chilling Units (Utah Model)[z]	Total ETo[y] (in.)	Total Precipitation[y] (in.)	Average Maximum Air Temp.[y] (°F)	Average Minimum Air Temp.[y] (°F)
Nov-04	66	-87.5	2.44	0.78	66.2	44.0
Dec-04	149	130.5	2.30	2.09	66.2	43.6
Jan-05	235	271.0	2.02	5.37	64.7	45.8
Feb-05	240	402.5	2.21	5.32	63.9	47.0
Nov-05	20	-421.5	2.84	0.0	74.5	49.8
Dec-05	60	-299.0	2.15	0.32	67.6	45.5
Jan-06	140	-152.0	2.92	0.26	66.5	44.2
Feb-06	218	-94.0	3.35	1.64	71.1	44.3
Nov-06	17	-956.0	3.14	0.03	75.5	50.3
Dec-06	134	-807.5	2.94	0.46	67.6	42.4
Jan-07	286	-582.0	3.28	0.45	63.9	40.8
Feb-07	357	-446.0	2.91	0.25	67.6	44.0
Nov-07	4	-956.5	2.81	0.0	73.7	49.9
Dec-07	166	-619.5	2.24	0.0	62.4	41.1
Jan-08	282	-296.0	1.69	2.77	61.9	42.1
Feb-08	348	-106.5	2.31	0.67	66.6	43.5
Nov-08	0	-1308.5	3.14	0.02	77.1	52.6
Dec-08	133	-1016.5	1.89	0.06	63.0	42.1
Jan-09	187	-1052.0	3.32	0.07	70.5	47.1
Feb-09	278	-841.0	2.41	2.96	64.5	43.8
Nov-09	6	-1056	3.18	0.12	75.3	48.2
Dec-09	110	-784.5	2.08	1.78	63.1	43.5
			Historic Average[y,x]			
Nov	-	-	2.94	-	72.1	44.8
Dec	-	-	2.56	-	66.4	40.6
Jan	-	-	2.49	-	65.8	41.2
Feb	-	-	2.91	-	68.2	42.8

[z]Source: Weather Services. Fruit and Nut Research and Information Center, University of California Cooperative Extension. http://fruitsandnuts.ucdavis.edu/. Viewed June 16, 2010.

[y]Source: California Irrigation Management Information System (CIMIS) Station #44. Office of Water Use Efficiency, California Department of Water Resources. http://wwwcimis.water.ca.gov/cimis/welcome.jsp. Viewed June 16, 2010.

[x]Source of avg. max. and min. temperature data: World Climate. www.worldclimate.com. Viewed September 27, 2010.

Figure 1. Typical wide branching angles expressed by six interspecific hybrid pear (*Pyrus*) selections evaluated for their potential as landscape trees from November 2004 through December 2009 at the University of California Riverside, Riverside, CA.

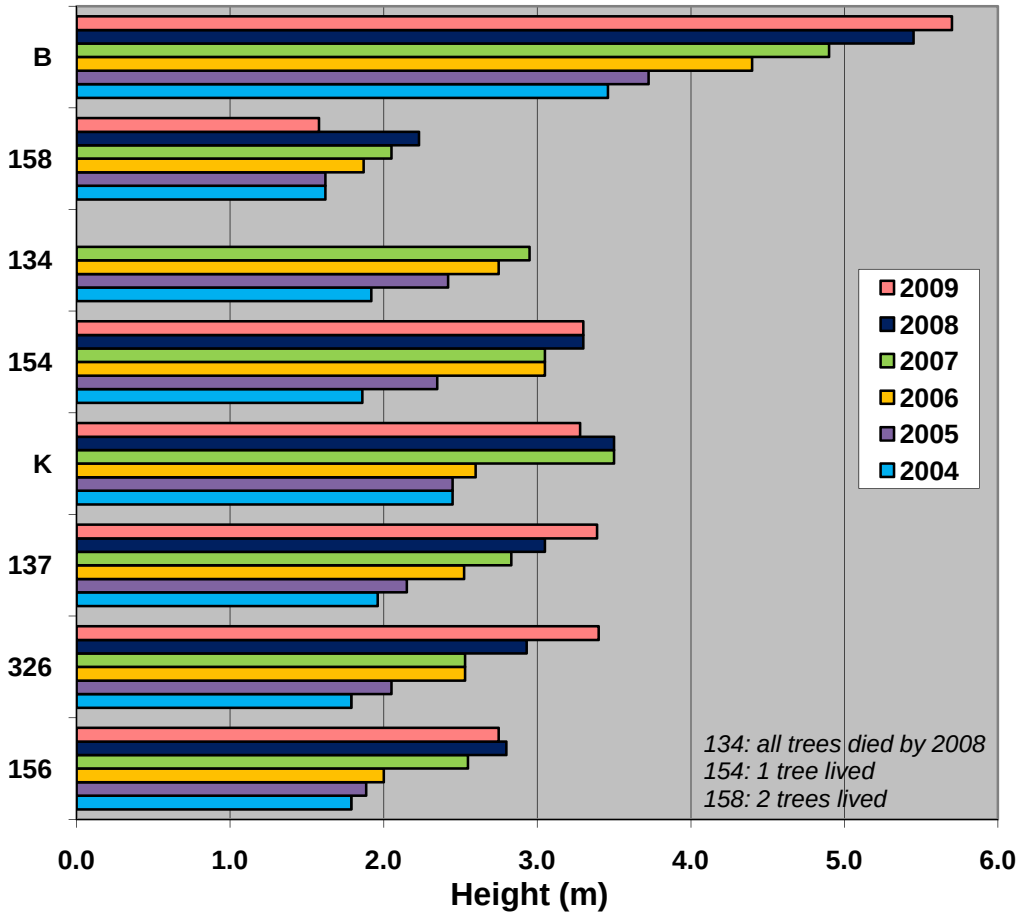

Figure 2. Mean over all height of six interspecific hybrid pear (*Pyrus*) selections and two commonly grown ornamental pear species from November 2004 (date of planting) through December 2009 at the University of California Riverside, Riverside, CA.

Key to Y Axis: B = *P. calleryana* 'Bradford'; K = *P. kawakamii*; 154 = *P. amygdaliformis* X *P. dimorphophylla*; 156 = *P.* (*calleryana* X *fauriei*) X *P. elaeagrifolia;* 158 = *P. elaeagrifolia* X *P. ussuriensis*; 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; 134 = *P. amygdaliformis* X *P. calleryana* 'Chanticleer'; 137 = *P. calleryana* 'Chanticleer' X *P. eleagrifolia.*

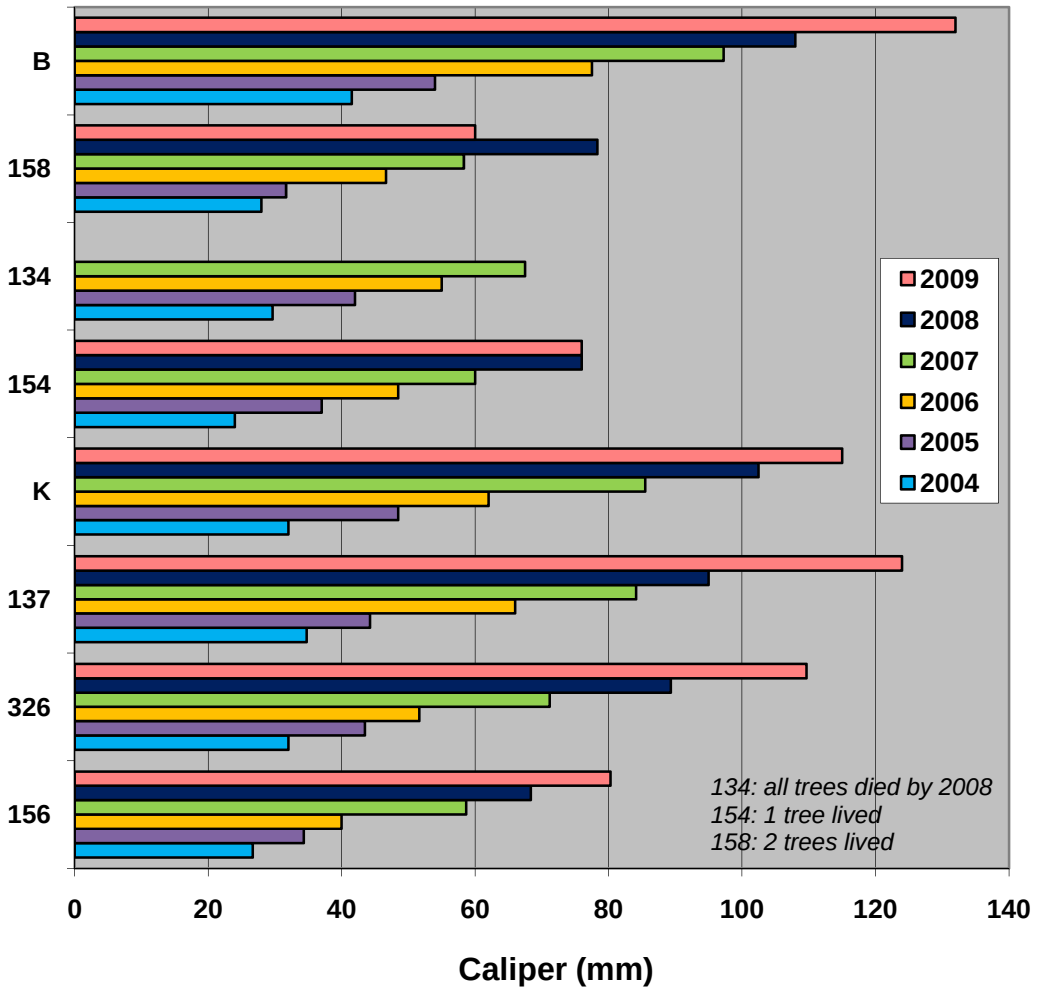

Figure 3. Mean trunk caliper at 6 in. (15 cm.) above soil of six interspecific hybrid pear (*Pyrus*) selections and two commonly grown ornamental pear species from November 2004 (date of planting) through December 2009 at the University of California Riverside, Riverside, CA.
Key to Y Axis: B = *P. calleryana* 'Bradford'; K = *P. kawakamii*; 154 = *P. amygdaliformis* X *P. dimorphophylla*; 156 = *P.* (*calleryana* X *fauriei*) X *P. elaeagrifolia;* 158 = *P. elaeagrifolia* X *P. ussuriensis*; 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; 134 = *P. amygdaliformis* X *P. calleryana* 'Chanticleer'; 137 = *P. calleryana* 'Chanticleer' X *P. eleagrifolia*.

P. calleryana 'Bradford'

#154

P. kawakamii

#156

#137

#158

#326

Figure 4. Typical summer appearance of *Pyrus calleryana* 'Bradford', *P. kawakamii*, and five interspecific hybrid pear (*Pyrus*) selections five years after planting from #15 (68-L) containers at the University of California Riverside, Riverside, CA. Key: 154 = *P. amygdaliformis* X *P. dimorphophylla*; 156 = *P.* (*calleryana* X *fauriei*) X *P. elaeagrifolia;* 158 = *P. elaeagrifolia* X *P. ussuriensis*; 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; 134 = *P. amygdaliformis* X *P. calleryana* 'Chanticleer'; 137 = *P. calleryana* 'Chanticleer' X *P. eleagrifolia*.

#326

#326 close-up
(note flowers with foliage)

#156 close-up

Pyrus kawakamii

P. kawakamii close-up

#156

#137 (just beginning to flower)

#137 close-up (note small flower size)

Figure 5. Flowering appearance of *Pyrus kawakamii*, and two interspecific hybrid pear (*Pyrus*) selections with the best flower quality at the University of California Riverside, Riverside, CA. Key: 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; 156 = *P.* (*calleryana* X *fauriei*) X *P. elaeagrifolia;* 326 = *P.* [*amygdaliformis* X (*ussuriensis* X *calleryana*)] OP; 137 = *P. calleryana* 'Chanticleer' X *P. eleagrifolia*.

Copies of this report are available on the World Wide Web at:

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