CALLERY PEAR CULTIVARS TESTED AS STREET TREES: INITIAL RESULTS[1]

by Henry D. Gerhold and Heather L. McElroy

Abstract. Eight callery pear cultivars were planted, two each in ten communities, for evaluation as street trees. They were measured annually during the first three years by cooperators in the Municipal Tree Restoration Program, using standardized methods. Under sometimes stressful site conditions, all the cultivars but one grew well and remained healthy. Two-year height growth of five cultivars varied from 1.0 to 3.4 feet, representing a 7 to 30 percent increase. Diameter growth ranged from 0.4 to 1.0 inches, i.e. average increases of 18 to 68 percent in two years. The health of foliage, branches, and trunks was good to excellent after the first growing season, during which there were occasional signs of transplant shock. The one exception was the Whitehouse cultivar, which grew little in height and exhibited greater foliage injury than the others. Aristocrat, Cleveland Select, and Redspire received the highest overall rating; Autumn Blaze, Cleveland Pride, and Valiant also appear promising, based on more limited data. Bradford is growing well, and has not yet shown signs of breakage which is known to occur when trees become more mature.

Callery pear (*Pyrus calleryana*) cultivars represent one of several species being tested as street trees in the Municipal Tree Restoration Program. Besides obtaining better information for selecting trees well suited to various urban sites, the program encourages municipalities to improve their tree programs. Support is provided by utility companies through the Pennsylvania Electric Energy Research Council, and by state forestry agencies in Pennsylvania and Maryland. Initial results of crabapple (Malus) performance tests were reported previously (3).

Methods

Cultivars and planting sites were chosen in each of ten communities in Pennsylvania according to site characteristics, aesthetics, and community preferences. Foresters in the Pennsylvania Bureau of Forestry and utility foresters assisted community representatives with these decisions, and provided technical advice on planting and tree care. The two cultivars selected for each community (a third one was added in Tioga) were planted alternately within each of 4 to 8 plots typically containing 4 to 16 trees each. All plots were required to be under primary electric distribution lines, and in many places deteriorating old trees that conflicted with wires were removed prior to planting. Trees were purchased from various nurseries and planted during 1988 to 1993. Both cultivars in any test came together from the same nursery and were ordered with the same caliper, either 1.75 or 2 inches. Heights ranged from 9 to 16 feet. The eight callery pear cultivars that have been planted so far are Aristocrat, Autumn Blaze, Bradford, Cleveland Pride, Cleveland Select, Redspire, Whitehouse, and Valiant.

During the first three years trees were measured and evaluated annually by Bureau of Forestry cooperators, seven people in all, using standardized methods. Data were collected typically in September on height and diameter; health of foliage, branches, and trunk; maintenance needs; and overall quality of the individual cultivars. Causes of damage such as disease, insects, drought, and mechanical damage were recorded and also any other noteworthy observations on tree characteristics.

An analysis of variance was conducted on each type of quantitative data to determine significant differences between the two (or three) cultivars in each community. Each location in every year was treated as a separate experiment with plots providing replication. These results, together with written comments of cooperators, were used to characterize the performance of cultivars.

[1] Funds for purchasing trees were donated by Pennsylvania Electric Company and the Metropolitan Edison Company. Foresters of the Pennsylvania Bureau of Forestry assisted with community liaison and measurements.

Results

Most of the cultivars are growing quite well, with growth rates varying more among locations than among cultivars (Table 1). Significant differences found between the cultivars at any location are due largely to the difference in size at the time of planting. During the first growing season growth was quite small, as it usually is, so growth rates are reported for the second plus third years after transplanting.

Height growth of five of the cultivars which had been measured for three years ranged from 1.0 to 3.4 feet in two years, which represented increases of 7 to 30 percent (Table 1). Whitehouse was an exception, as it grew 2 percent at one location and had some dieback at the other; the cultivars to which it was compared grew 22 percent and 7 percent, respectively.

The trees seemed to put more energy into diameter growth than height growth. The 0.4 to 1.0 inch two-year growth in diameter (excluding Redspire trees at Warren which had low branching that caused inconsistent measurements) represented 18 percent to 68 percent increases (Table 1). Diameter growth was not closely correlated with height growth.

The foliage of all cultivars except Whitehouse was very healthy (Table 1), though some of them had lower ratings in the first growing season most likely due to transplant shock. Most values after the first year were above 3.9 on the five-point scale, indicating that trees retained more than 85 percent healthy foliage even at the end of the season. Injuries to leaves were attributed to drought

Table 1. Growth, health, and overall ratings of callery pear cultivars.

Cultivar	Location, date planted	No. of years measured	2-year height growth	2-year diameter growth	Average foliage health[z]	Average branch health[z]	Overall rating[y]
Aristocrat	Union City, 5--90	3	30	66	3.9*	4.6	6.8
	Warren, 4-89	3	21	26	5.0	5.0	8.8
	Waterford, 4-91	2	-	-	3.7*	4.7	6.6
Autumn Blaze	Titusville, 4-88	3	9	28	4.5*	4.2	7.7
Bradford	Saegertown, 4-89	3	7	49	4.5***	4.7	7.8
	Tioga, 4-89	3	13	57	3.8*	4.3**	-
Cleveland Pride	Mt. Holly Springs, 5-93	1	-	-	4.7*	4.8	8.8
Cleveland Select	Franklin, 4-89	3	22	32	4.6***	4.8***	7.9
	Mt. Holly Springs, 5-93	1	-	-	5.0*	4.9	9.0
	Red Lion, 5-91	1	-	-	3.7	4.3	6.4
	Tioga, 4-89	3	11	25	3.9*	4.6**	7.8
	Union City, 5-90	3	27	42	4.1*	4.5	7.2
	Waterford, 4-91	2	-	-	3.9*	4.8	6.4
Redspire	Sounthmont, 9-92	2	-	-	4.0**	4.6*	8.4
	Tioga, 4-89	3	11	50	3.9*	4.2**	8.0
	Titusville, 4-88	3	11	18	4.2*	4.3	7.8
	Warren, 4-89	3	15	-2	4.6	4.5	8.5
Whitehouse	Franklin, 4-89	3	2	27	3.2***	3.7***	5.6
	Saegertown, 4-89	3	-3	32	3.5***	4.5	6.6
Valiant	Southmont, 9-92	2	-	-	3.5**	4.5*	8.4

* Asterisks represent significant differences in one *, two **, or three *** years, from the other cultivar(s) at the same location in the same year.

z Health was estimated according to the percentage of foliage or branches that were injured or damaged: 5 = less than 5%, 4 = 5-20%, 3 = 25-40%, 2 = 45-60%, and 1 = 65-100%.

y Overall ratings were based on all characteristics related to adaptation, appearance, and health: 9 = ideal for the site, 7 or 8 = better than average with one or more faults, 5 or 6 = reasonably good with faults in balance with favorable qualities, 3 or 4 = inferior to an average variety, with faults that outweigh its merits but not severe enough to eliminate it from use.

stress, late frost, aphids, unidentified leaf-feeding insects, a disease that causes brown leaf spots, and possibly fireblight. None of these has been severe enough to warrant concern, except for Whitehouse which had low ratings every year.

The health of branches and trunks has been very good, especially in the second and third years. The most prevalent injuries were mechanical ones caused during shipping and planting, or later by lawnmowers. A few cases of fireblight were suspected at Franklin, Warren, and Waterford, but the pathogen (*Erwinia amylovora*) was not positively identified and damage has not been serious.

When all characteristics of cultivars were considered, most quality ratings were very high (Table 1). The most notable exception was Whitehouse, which was rated somewhat lower than the comparison cultivars at two locations. The ratings of Autumn Blaze and Bradford fell off somewhat during the three years, but evaluations of each were available only from one location.

Conclusions

The cultivars that had the strongest initial evidence of good health and growth on sometimes stressful urban sites were Aristocrat, Cleveland Select (identical to Chanticleer), and Redspire. Autumn Blaze in one municipality and Bradford in two also performed well, but Bradford is known from experience to suffer from breakage when trees become larger (2). The limited data on Cleveland Pride and Valiant so far are promising. Whitehouse, although inferior to the other cultivars in growth and health, still performed well enough that it may be considered for urban sites where a narrow tree is needed.

Two concerns about callery pears should receive special attention in subsequent years. They could attain heights that reach utility wires, so growth rates should be projected to predict when interference may occur. Secondly, fireblight could become serious, or it may not. In Alabama when warm, moist weather prevailed, severe damage was caused by fireblight to Aristocrat and Autumn Blaze, and moderate damage to Redspire (1). If symptoms reappear in Pennsylvania, branches should be sampled for diagnosis of the pathogen.

When opportunities arise for additional performance tests of callery pears, they will be concentrated on extending the geographic range and increasing the number of locations of underrepresented cultivars.

Literature Cited

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Résumé. Huit cultivars différents de poirier Callery étaient plantés, à raison de deux de chaque cultivar au sein de dix municipalités, pour les évaluer comme arbre de rue. Les arbres étaient mesurés annuellement, suivant des méthodes de mesurage standardisées, durant les trois premières années par des personnes associées au *Municipal Tree Restoration Program* (Programme municipal de restauration des arbres). À moins de se retrouver occasionnellement sous des conditions difficiles de site, tous les cultivars, à l'exception d'un seul, se comportaient bien et demeuraient en santé. La croissance totale en hauteur en deux ans variait de 1.0 à 3.4 pieds (0.3 à 1.03 m environ) pour cinq des cultivars, ce qui représentait de 7 à 30 pourcent d'accroissement. La croissance en diamètre se chiffrait entre 0.4 et 1.0 pouce (1.0 à 2.5 cm environ), c'est-à-dire une augmentation moyenne de 18 à 68 pourcent en deux ans. Les cultivars Aristocrat, Cleveland Select et Redspire reçurent la note générale la plus élevée; Les cultivars Autumn Blaze, Cleveland Pride et Valiant apparurent eux aussi prometteurs.

Zusammenfassung. Acht chinesische Wildbirnen-kultivare wurden zur Wertermittlung als Strassenbäume gepflanzt, jeweils zwei in zehn Gemeinden. Sie wurden während der ersten drei Jahre jährlich durch die Mitarbeiter des städtischen Baumrestaurierungsprogramms vermessen. Dabei wurden standartisierte Methoden verwandt. Unter manchmal stressvollen Standortbedingungen gediehen alle Kultivare bis auf eine gut, und sie blieben gesund. Das zweijährige Höhenwachstum von fünf Kultivaren variierte zwischen 1.0 bis 3.4 Fuß (0.3 - 1.2 m), was einen Zuwachs von 7 bis 30% representiert. Der Zuwachs im Durchmesser rangierte zwischen 0.4 bis 1.0 inches (1.0 - 2.5 cm), d.h. ein durchschnittlicher Zuwachs von 18 bis 68% in zwei Jahren. Aristocrat, Cleveland Select und Redspire erreichten insgesamt die höchsten Werte; Autumn Blaze, Cleveland Pride und Valiant erschienen ebenfalls vielversprechend.