

FOUR-YEAR EVALUATION OF FIVE CULTIVARS OF *PYRUS CALLERYANA*

by John E. Kuser¹, Gary Robinson², and Nicholas Polanin³

Abstract. In November 1995, five cultivars of Callery pear (*Pyrus calleryana*: 'Aristocrat', 'Capital', 'Chanticleer', 'Redspire', and 'Whitehouse') were planted within parking-lot traffic islands at Livingston College, a Piscataway campus of Rutgers, The State University of New Jersey, U.S. During the next four years, the trees were observed each spring from bud break to flowering, and again each fall. Measurements of growth patterns as well as observational attributes of the cultivars were recorded. 'Aristocrat' flushed growth a few days earlier than the others, occasionally suffering frost damage to flowers. Its vertical growth was slower when compared to the other cultivars, with a wider branch angle, a distinctly lower, broader crown, and a deep purple-red fall color in contrast to the orange-reds of the other cultivars. 'Aristocrat' was the only cultivar in the study to display branch angle attachments necessary for storm resistance and growth success. 'Chanticleer' grew the fastest of the five and had the narrowest branch angles. 'Redspire' was intermediate in growth, somewhat open, with fairly narrow branch angles. 'Capital' and 'Whitehouse' were comparatively dense and heavy blooming; it was difficult to distinguish between them.

Key Words. Callery pear; *Pyrus calleryana*; 'Aristocrat'; 'Capital'; 'Chanticleer'; 'Redspire'; 'Whitehouse'; cultivar attributes and selection; branch angle.

There are so many cultivars of popular urban tree species that it is difficult for shade tree commissioners, urban foresters, and landscape architects to decide which to plant. Before undertaking this project, the authors often had such problems while on shade tree commissions or department of public works forestry departments in their respective communities. A once highly desirable street tree noted for its seasonal interest and tolerance of poor urban sites, Callery pear 'Bradford' (*Pyrus calleryana* 'Bradford'), has shown susceptibility to storm damage and branch failure, incompatibility, and severe splitting due to tight crotch formations and poor branch attachment (Dirr 1990). Unfortunately, this cultivar's failures have resulted in the branding of all Callery pears as poor choices in urban and suburban streetscaping. Because of this situation, a five-cultivar test of Callery pear was

planted as a living demonstration site that urban foresters could visit and assess in order to assist their decision-making process. The comparative performance of these trees after four growing seasons is reported here.

METHODS AND MATERIALS

On November 24, 1995, Rutgers University personnel planted *Pyrus calleryana* 'Aristocrat' (six trees), 'Capital' (eight trees), 'Chanticleer' (eight trees), 'Redspire' (eight trees), and 'Whitehouse' (eight trees) at the Yellow parking lot, Livingston campus, in Piscataway, New Jersey, U.S. This project was funded through a Small Business Association grant. Due to limited resources, industry experiences, and historical data, 'Bradford' was not included in the study. All trees were 3.75 to 4.375 cm (1.5 to 1.75 in.) caliper and 270 cm \pm 30 cm (9 ft \pm 1 ft) in height. The site is a macadam lot with two center rows of planting islands running east to west. Islands in the north row measure 1,020 cm long by 360 cm wide (34 by 12 ft), and those in the south row measure 1,020 cm long by 180 cm wide (34 by 6 ft). The soil, although cut-and-fill, appeared to be native red-clay, having all the attributes of many of the urbanized soils of the northeast. Two trees were planted in each island (in some cases fewer, if another tree was present). Three islands contained 'Aristocrat', two 'Capital', two 'Chanticleer', two 'Whitehouse', and two 'Redspire'. All survived and grew, although not exceptionally well because this lot is a difficult site with red-clay soil, wet in spring and brick-hard by mid-summer. The natural vegetation surrounding the lot is dominated by pin oak (*Quercus palustris*) and red cedar (*Juniperus virginiana*).

RESULTS

The site was visited and data were taken on the Callery pears at times of spring bloom, March 25 through April 15; and fall color, November 1 through December 1, beginning in spring 1997 (Table 1).

1997 Spring

- 'Whitehouse' flowers are apple-blossom colored just as they open; other cultivars open white.

1997 Fall

- 'Aristocrat' fall foliage color is a distinctive deep purple-red; others are orange-red blends.
- 'Capital' has a fruit crop of 1.25 cm (0.5 in.) pears; others not fruiting.

1998 Spring

- 'Aristocrat' flowers frost-killed. All other cultivars flowering satisfactorily.
- 'Whitehouse' and 'Capital' densest and most floriferous.

1998 Fall

- 'Aristocrat' fall color is a deep purple-red; others are orange-red. Wide crown spread.
- 'Chanticleer' has narrow crown; others intermediate.

1999 Spring

- 'Aristocrat' flowers partly hidden by leaves.
- 'Capital' and 'Whitehouse' dense and floriferous.
- 'Chanticleer' and 'Redspire' becoming taller and not as heavy blooming.

1999 Fall

- 'Aristocrat' deep purple-red; others orange-red. Height and diameter of each tree (Table 2) were measured, omitting one traffic-damaged 'Aristocrat'.

2000 Spring

- 'Aristocrat' buds showed color on March 28, with some flower buds open on March 31, but no others.
- 'Capital' and 'Whitehouse' buds showed apple-blossom pink on April 4, 'Chanticleer' and 'Redspire' showed white. Branch angle attachments were measured (Table 2).
- 'Aristocrat' leaves had expanded and partially hidden the flowers; leaves of the other trees were still small. 'Capital' and 'Whitehouse' had the densest blooms and, without the planting design, it was impossible to distinguish these two cultivars.

DISCUSSION

Based upon these findings, the five cultivars of *Pyrus calleryana* at this site can be rated as follows:

- 'Aristocrat': Low, wide, and slow growth rate; useful where room for crown is vertically restricted, as with overhead utility lines, but may require a wider tree lawn or greater setback for best performance. This cultivar's wide branch angles may mean less future development of V-crotches that could break in storms (Smiley et al. 2000). Distinctive deep purple-red fall color. Not as spectacular in bloom as other cultivars because of its earlier bud break, susceptibility to frost injury, and rapid leaf expansion.
- 'Chanticleer': Tall, narrow, fast growing; useful where room for crown is laterally restricted.
- 'Redspire': Vigorous clone; intermediate growth rate; not as bushy as 'Bradford' or as floriferous as 'Whitehouse' and 'Capital'.
- 'Whitehouse' and 'Capital': Nearly the same; compact, with intermediate crown shape and dazzling flower display in spring. Flowers open apple-blossom pink and turn white as they age; good orange-red fall color.

Table 1. Callery pear cultivars: seasonal comparison.*

Cultivar	No. trees	Blossom color	Fall color
Aristocrat	5	white	deep purple-red
Capital	8	white	orange-red
Chanticleer	6	white	orange-red
Redspire	7	white	orange-red
Whitehouse	8	apple-blossom	orange-red

*Performance comparisons made from spring 1997 through spring 2000.

Table 2. Callery pear cultivars: 4-year growth pattern comparison.*

Cultivar	No. trees	Mean height (cm.)	Mean caliper (cm.)	Branch angle range
Aristocrat	5	354 (11.8 ft)	6.15 (2.46 in.)	70–80°
Capital	8	408 (13.6 ft)	6.35 (2.54 in.)	30–40°
Chanticleer	6	519 (17.3 ft)	8.15 (3.26 in.)	15–30°
Redspire	7	462 (15.4 ft)	5.65 (2.26 in.)	20–40°
Whitehouse	8	432 (14.4 ft)	6.125 (2.45 in.)	30–45°

*Parking-lot median strip location, planted November 1995, Livingston College, Rutgers University, Piscataway, NJ.

In comparing these results with those reported by Gerhold and McElroy (1994), we experienced no problems during this study with 'Whitehouse'. Previously reported in their study, 'Whitehouse' was rated lower than the other cultivars in performance, height and diameter growth, and foliage health. However, our results indicate both this cultivar and the very similar 'Capital' would be ideal choices for planting on most New Jersey sites. Perhaps the difference in performance of 'Whitehouse' between these studies is due to New Jersey's proximity to the Atlantic coast. All trees gained considerably in height during four growing seasons, but there were wide differences among cultivars. 'Chanticleer' averaged 60 cm (2 ft) a year, 'Whitehouse' more than 30 cm (1 ft), while 'Aristocrat' gained only 15 cm (6 in) annually. This slower vertical growth may well make 'Aristocrat' the cultivar of choice for planting *Pyrus calleryana* in proximity to utility distribution wires.

The trees in this test have not yet grown large enough to judge whether they are less susceptible to storm breakage than 'Bradford'. The demonstration site, however, is a large parking lot prone to high wind conditions. The site will be revisited in future years to access storm breakage, branch failure, and disease susceptibility (Fare et al. 1991). Nevertheless, branch angle attachment should give some indi-

cation of future resistance or failure. For example, a row of 'Redspire' planted more than 20 years ago in Princeton, New Jersey, are now 900 to 1,505 cm (30 to 35 ft) in height, 22.5 to 32.5 cm (9 to 13 in.) dbh, and narrower in habit than 'Bradford'. In March 2000, two of the seven trees showed previous heavy breakage at the type of V-crotch sites as described by Smiley et al. (2000). The branch angle ranges measured within this study confirm that 'Aristocrat' appears to have the most desirable branch attachments and growth characteristics for storm resistance and growth success (Hensley et al. 1991). *Pyrus calleryana* 'Aristocrat' is the only cultivar in this study with the potential to survive the known poor growth pattern characteristics of Callery pear, becoming a compatible planting choice for many sites within urban and community forestry management plans.

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Figure 1. *Pyrus calleryana* 'Aristocrat', 'Whitehouse', and 'Chanticleer' (L to R) at Yellow Parking Lot, Livingston College, New Brunswick, New Jersey, April 7, 2000.

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Résumé. En novembre 1995, cinq cultivars de poirier de Callery ou *Pyrus calleryana* ('Aristocrat', 'Capital', 'Chanticleer', 'Redspire' et 'Whitehouse') ont été plantés à l'intérieur de stationnements au Collège Livingston, soit le campus Piscataway de Rutgers, l'Université de l'état du New Jersey. Au cours de quatre années suivantes, les arbres ont été observés chaque printemps depuis l'ouverture des bourgeons jusqu'à la floraison ainsi qu'à chaque automne. Des mesures sur les différentes croissances tout comme des observations sur les caractéristiques des cultivars ont été notés. 'Aristocrat' a démarré sa croissance quelques jours plus tôt que les autres cultivars, mais il a souffert occasionnellement de dommages par le gel au niveau de ses fleurs. La croissance verticale était plus lente comparativement aux autres cultivars, avec en plus un angle d'attache des branches plus ouvert, une cime plus large et plus basse ainsi qu'une couleur automnale rouge pourpre profonde qui contrastait avec celle plus rouge orangée des autres cultivars. 'Aristocrat' était le seul cultivar dans cette étude à avoir un angle d'attache des branches suffisant pour résister aux tempêtes et connaître un succès au niveau de sa croissance. 'Chanticleer' poussait le plus vite parmi les cinq

et avait l'angle d'attache le plus étroit au niveau de ses branches. 'Redspire' avait une croissance intermédiaire, quelque peu ouverte, avec des angles d'attaches plutôt fermés au niveau de ses branches. 'Capital' et 'Whitehouse' étaient en comparaison denses et très florifères; une distinction entre ces deux cultivars fut difficile à faire.

Zusammenfassung. Auf dem Piscataway Campus des Livingston College der staatl. Universität von New Jersey wurden auf Parkplatzinseln im November 1995 fünf Kultivare von *Pyrus calleryana* (Aristocrat, Capital, Chanticleer, Redspire und Whitehouse) gepflanzt. Während der nächsten 4 Jahre wurden die Bäume vom Knospentreiben und Blühbeginn und Herbst beobachtet. Die Messungen der Wachstumskriterien und der zu beobachteten Attribute wurden aufgezeichnet. Aristocrat trieb ein paar Tage früher aus als die anderen und litt gelegentlich unter Frostschäden an den Blüten. Das vertikale Wachstum war langsamer im Vergleich zu den anderen Kultivaren mit offenerem Astwinkel, deutlich kleinerer Krone und einer tiefen Purpurfärbung im Herbst im Gegensatz zum Orangerot der anderen Kultivare. Aristocrat war der einzige Kultivar in der Studie mit Attachments im Astungswinkel, die der Sturmresistenz und dem Wachstumserfolg dienen. Chanticleer wuchs von allen fünf am schnellsten und hatte den kleinsten Astungswinkel. Redspire war von mittlerem Wachstum, etwas offenkronig mit etwas engen Astungswinkeln. Capital und Whitehouse waren vergleichsweise dicht mit vielen Blüten, es war schwierig, zwischen ihnen zu unterscheiden.

Resumen. En Noviembre de 1995 cinco cultivares de pera Callery, *Pyrus calleryana* ('Aristocrat', 'Capital', 'Chanticleer', 'Redspire' y 'Whitehouse') fueron plantados dentro de islas en lotes de parqueo de Livingston College, un campus Rutgers de Piscataway, la Universidad Estatal de New Jersey. Durante los siguientes cuatro años, los árboles fueron observados cada primavera en el rompimiento de las yemas de floración y de nuevo cada otoño. Se registraron mediciones de los patrones de crecimiento como también los atributos de los cultivares. Los brotes de 'Aristocrat' surgieron unos pocos días antes que los otros, sufriendo ocasionalmente daño por heladas en las flores. El crecimiento vertical fue más lento comparado con los otros cultivares, con un ángulo amplio de ramificación, copa conspicua y color rojo púrpura en contraste con los rojos anaranjados de los otros cultivares. 'Aristocrat' fue el único cultivar que desplegó un ángulo de unión necesario para resistir las tormentas y lograr un crecimiento exitoso. 'Chanticleer' creció más rápido que los demás y tuvo los ángulos más estrechos. 'Redspire' alcanzó un crecimiento intermedio, algo abierto, con ángulos estrechos. 'Capital' y 'Whitehouse' fueron comparativamente densos y con floración también densa; fue difícil distinguir entre ellos.