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FIREBLIGHT SUSCEPTIBILITY, GROWTH AND OTHER CHARACTERISTICS IN ORNAMENTAL PEARS IN ALABAMA

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Abstract. *Pyrus calleryana* and nine cultivars were evaluated for fireblight susceptibility, flowering, growth habit, fall leaf color, and fruiting in southern conditions. Disease susceptibility to fireblight (*Erwinia amylovora*) was monitored during the spring season. Aristocrat and Autumn Blaze were highly susceptible as indicated by the number of infected shoots per tree and shoot length dieback. Bradford was the least sensitive to fireblight. Bradford was the earliest flowering cultivar, with flowering beginning in late March to early April and Aristocrat was the last cultivar to flower, beginning 10 - 14 days later. Autumn Blaze developed fall leaf color by mid-October while Bradford's leaf color peaked in mid-November. Aristocrat, Autumn Blaze, Bradford, Cleveland Select, Earlyred, and Fauriei developed rounded to pyramidal canopy forms. Capital, Redspire, and Whitehouse developed upright canopy forms.

Release of Bradford pear by the USDA in the early 1960's has led to extensive plantings along streets, highways and urban landscapes in many Mid-Atlantic and Southeastern States. Seasonal contributions of spring flowering, summer shade, and fall leaf color has led to Bradford being ranked among the "Ten Most Recommended Trees" in several states (2). However maturing Bradford trees have exhibited robust growth, causing overcrowded conditions in some landscapes (1). Also, trunk and canopy split of older trees has been reported in several Southeastern States (3). Splitting is often reported as storm damage, but is probably attributed to unnoticed splitting prior to storms, related to acute branch angles. Efforts to improve on the success of Bradford have led to the release of 12 - 15 other selections of *Pyrus calleryana*.

Since 1980, *P. calleryana* and nine orna-

mental pear cultivars were evaluated for growth rate, flower and fall color development, canopy form, and tolerance to fireblight (*Erwinia amylovora*).

All cultivars evaluated were on a site with uniform soil conditions, in a Cecil gravelly sandy clay loam soil with three replications of three trees each. All trees were planted as 1.0- to 2.0-m bare root whips with a spacing of 7.6 m within rows and 9.1 m between rows. A complete randomized block design with 3 replications of 3 trees each was used. Height and caliper (30 cm above the soil line) measurements were taken each fall. During May (1988, 1989, & 1990) fireblight injury was assessed by counting the number of infected shoot tips/tree. Also, 3 infected shoots/tree were chosen at random to measure the length of the fireblight dieback. At this stage of infection, shoots were darkened as if scorched by fire (6). Measurements were taken to the base of the fire dieback, though some fire blight cankers were observed below the dieback in what appeared to be healthy branches. No selective pruning or corrective spray program was taken to alleviate fireblight pressure.

Maintenance in the test plot included an annual spring application (late February) of a complete fertilizer (13N-5P-10.5K) at the rate of 454 g nitrogen per 2.54 cm of caliper. Weeds were controlled using a tank mix of glyphosate at 2.2 kg ai/ha and oryzalin at 4.4 kg ai/ha in April or May. A second application of glyphosate was applied during August if needed for postemergence weed

control. Herbicides were applied as a directed spray around the tree base (1.2 - 1.8 m in diameter). Other than herbicides, no pesticides were applied. Supplemental irrigation was not applied.

Fireblight. Fireblight development is enhanced by warm, moist weather, particularly during flowering. Blight development can occur at temperatures between 65 and 95° F; but the 75-81° F range is most favorable. Rain is critical to the spread and development of fireblight. Warm, cloudy weather following a rain, as often found in the Southeast, promotes bacterial growth and spread. Other environmental factors, such as frost, high winds, and hail, create wounds through which the bacteria can enter the plant (4). Weather conditions in 1988 and 1989 in central Alabama matched the description of weather favorable for disease development. In 1990, flowering occurred about one month earlier than previous years, due to unseasonably warm temperatures and less rainfall during this time than in previous years. Consequently, disease severity was greater in 1988 and 1989 than 1990. Prior to the spring of 1988, the incidence of fireblight infection was insignificant. In 1988, Aristocrat and Redspire had 112 and 40 shoots, respectively, infected with fireblight.

P. calleryana and other cultivars had fewer than 12 infected shoots/tree (Figure 1). The number of infected shoots of Aristocrat (208) and Redspire (70) was higher in 1989. These data concur with a report from Kentucky that Redspire and Aristocrat were more infected with fireblight than Bradford, Capital, Fauriei, and Whitehouse (7). Their data were based on a survey of four sites where more than one cultivar were growing in close proximity.

In 1988, average length of dieback/infected shoot was greatest on Aristocrat (38 cm), Autumn Blaze (43 cm), Earlyred (36 cm), and Redspire (49 cm) (Figure 2). In 1989, Autumn Blaze was severely infected with fireblight (209 infected shoots/tree averaging 199 cm dieback per infected shoot). Autumn Blaze trees died during the winter of 1989-1990, after 2 years of intense infection. Bradford had the least dieback/infected shoot, with the dieback averaging 7, 21, and 13 cm in 1988, 1989, and 1990, respectively.

Flower. Flowers of callery pear cultivars are similar in regard to size and color. Flower clusters are spur borne with 10-13 flowers per cluster. Individual flowers have 5 white to off-white petals. Bradford is the earliest cultivar to bloom. In Alabama, flowering of Bradford peaks during early to mid- March, and generally lasts for about 10 days (Table 1). In contrast, Aristocrat flowering peaks about 10 days after Bradford. Capital, Cleveland Select, and Earlyred have flowering characteristics similar to those of Bradford. Whitehouse peaks after Bradford but not as late as Aristocrat. Whitehouse is very showy as a small tree due to the abundant spur borne flower clusters. Redspire and Fauriei do not have the floriferous characteristics of the other selections.

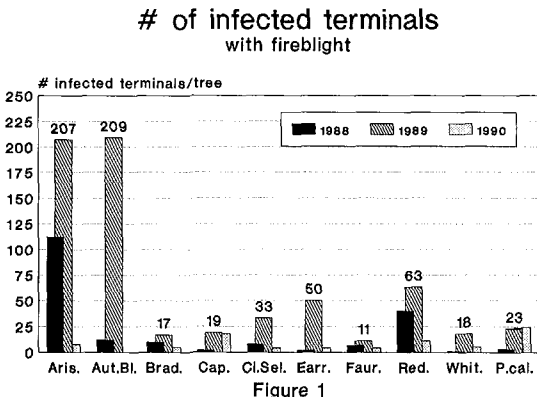


Figure 1

LSD: 1988 - 20.2
1989 - 33.9
1990 - 20.7

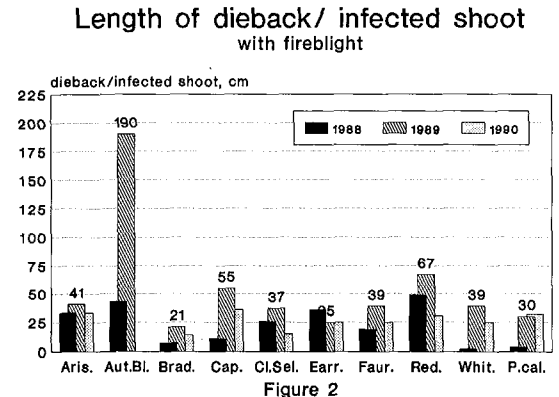


Figure 2

LSD: 1988 - 31.1
1989 - 85.5
1990 - 31.0

These two bloom about the same time and duration as Bradford, but flower somewhat sparsely.

Growth Habit. Cumulative height growth and the average annual growth is presented in Table 1. Cleveland Select, Capital, and Redspire height growth averaged 77, 75, and 75 cm per year, respectively. Greater height growth with these cultivars reflects the upright canopy form. Fauriei has been reported to be dwarf or slow growing, but apparently there was confusion with another species, *P. fauriei*, which is dwarf (3,5,9). In our test, Fauriei averaged 69 cm per year of height growth, which is similar to Aristocrat and Bradford. Autumn Blaze had the least height growth, 56 cm/year, due to the severe infection of fireblight resulting in shoot dieback and eventual plant death.

Many canopy forms (crown shape) are available with ornamental pears (Figure 3). Aristocrat has a broad pyramidal form similar to the species form. Crotch angles are less acute, allowing a more open and potentially stronger growth habit (5). Capital has an upright growth habit with acute angles toward the central leader of the tree. Capital is the most upright form in our test, followed by Whitehouse and Cleveland Select. Redspire has a columnar canopy form, while Fauriei, Autumn Blaze, and Earlyred have a pyramidal canopy

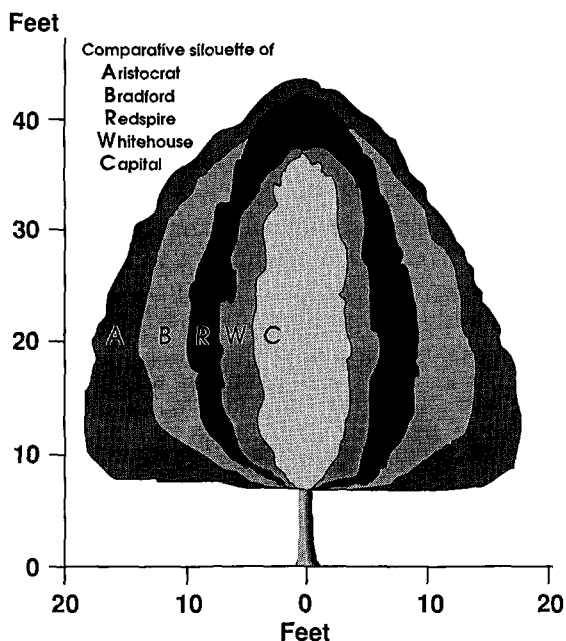


Figure 3

form similar to Bradford.

Fall Leaf Color. Autumn Blaze has fall leaf color of brilliant red occurring in late October, three to four weeks earlier than Bradford. Subsequently, leaf drop from Autumn Blaze was earlier

Table 1. Characteristics of *Pyrus calleryana* cultivars

	Aris- toocrat	Autumn Blaze	Brad- ford.	Cap- ital	Cleveland Select	Early red	Fauriei	Red- spire	White house	<i>PYRUS calleryana</i>
Planted in test	1980	1981	1980	1984	1984	1983	1983	1983	1984	1980
Height growth by 1989, m ²	7.4	-	6.9	5.1	5.2	5.0	5.3	5.8	4.4	7.8
Avg annual height growth, cm	68	56	64	75	77	59	69	75	60	80
Caliper growth by 1989, cm	23	-	22	10	10	11	13	13	8	19
Avg annual caliper growth, cm	2.3	1.4	2.2	1.5	1.6	1.5	1.8	1.8	1.2	2.1
Time of flowering ¹	MN-LM	EM-MM	EM-MM	EM-MM	EM-MM	EM-MM	EM-MM	EM-MM	MN-LM	EM-MM
Duration of flowering, days	7-10	7-10	7-10	7-10	7-10	7-10	7-10	7-10	7-10	7-10
Interesting fall color ²	-	r	r-y-o	y-o	y-o	o	o	y-o	y-o	y-o
Time of fall color ³	-	LO-EN	MN-LN	MN-LN	MN-LN	MN-LN	MN-LN	MN-LN	MN-LN	MN-LN
Fruiting	yes	no	no	no	no	no	no	yes	no	yes
Problems, fireblight	heavy	heavy spines	light	light	light leaf spot ⁴	heavy	light	light	light	light leaf spot

¹Height and caliper measured October 1989; all Autumn Blaze were dead. Existing Autumn Blaze were measured October 1988.

²Time of flowering coded by EM = early March, MMN = mid-March, LM = late March.

³Fall color coded by r=red, y=yellow, o=orange.

⁴Time of fall color coded by LO = late October, EN = early November, MN = mid-November, LN = late November.

⁵ALTERNARIA spp. leaf spot.

in the fall. Other cultivars, with the exception of Aristocrat, developed fall leaf color during mid to late November. Bradford has the most outstanding fall color of this latter group, with leaf colors of reds, yellows, and burgundies. Earlyred was selected by Simpson Nursery Company because of the development of early fall color, but in Alabama, time of color development is similar to that of Bradford. Leaves of Aristocrat turn from green to dark brown in mid-November, and this cultivar has not developed interesting fall color. Whitehouse has had limited development of fall leaf color due to premature leaf drop in late summer from a fungal leafspot.

Fruit. Fruits of Callery pear are small (approximately 10 mm) and undesirable for human consumption, but can provide a source of fruit for birds and other wildlife. Fruit color ranges from russet-green to maize yellow when ripe (8). Aristocrat has a heavier fruit set than the other cultivars, but is not extremely showy. Redspire and *P. calleryana* have a few scattered fruit; fruit have been practically nonexistent on the other cultivars.

Problems. *Alternaria spp.*, a fungal leafspot, has been a problem on Whitehouse and Cleveland Select. Leafspot disease generally appears in late spring and becomes progressively worse as the summer continues. Premature leaf drop has been observed on Whitehouse, reducing fall leaf color. *Alternaria* has not affected Cleveland Select as severely as Whitehouse.

Another problem, associated only with Autumn Blaze, is the occasional spur borne thorn. These thorns are characteristic of the parent species Callery.

Newer pear cultivars appear to be similar to Bradford in many respects, but offer different canopy forms with perhaps stronger branching characteristics. Growth rate of the upright forms

appears to be more vigorous than that of the pyramidal forms that are similar to Bradford. Time of flowering was cultivar related, with Bradford the earliest to bloom and Aristocrat the latest. Fall color was also cultivar related, with Autumn Blaze developing fall leaf color during late October. Other selections developed fall leaf color approximately 3-4 weeks later.

The selection of callery pear for use in southern landscapes should be strongly influenced by fireblight and leafspot tolerance. Fireblight transmitted from native plant species may create risk on cultivated landscapes, therefore the probable success of an ornamental pear cultivar may be determined by fireblight tolerance as the chief criterion.

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