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ACER RUBRUM CULTIVARS FOR THE SOUTH[1]

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Abstract. Nine budded *Acer rubrum* cultivars were evaluated from 1980-1988 for fall color, growth rate and bud union incompatibility. Fall foliar coloration was consistent with 'Autumn Flame', 'Tilford', 'Gerling', and 'Bowhall', but not with 'Red Sunset'. With the exception of 'Red Sunset', bud union incompatibility has occurred with all cultivars, especially 'Bowhall', 'Scarlet Sentinel', and 'Schlesingeri'. Annual height growth of these cultivars averaged 50-69 cm, with the exception of 'Autumn Flame' which averaged 40-45 cm a year. 'Armstrong', a fastigiate form, grew 60-65 cm annually. Two seedling selections, from south Alabama and Tennessee, were compared with the cultivars. Height and caliper growth of the seedlings were similar to most cultivars.

Increased emphasis on tree plantings in cities and residential districts has accelerated the selection and introduction of species and cultivars new to the ornamental industry. With these new species and cultivars, limited tree evaluations have been performed by arboreta, cities, and universities (1, 5). As a result, trees are often selected for use in landscapes before adequate information is available especially on their regional adaptability. For example, many trees are selected for use because of their fall color potential, but often these tree selections do not provide good fall color under climatic conditions in the southeastern United States. High temperatures, high humidity and different daylengths from where they were developed may suppress good fall color in trees that have excellent fall color elsewhere. Lack of adequate information has led to the use of trees poorly suited to southern landscapes, resulting in high maintenance and removal costs. As a result of these problems, research was initiated to provide information about the growth characteristics and adaptability of selected shade and ornamental trees for the South. One group of trees in this study is cultivars and seedlings of *Acer rubrum,* red maple, which are generally identified with excellent fall color.

Materials and Methods

Initial red maple plantings were made in December 1980 at the Piedmont Substation in Camp Hill, Ala., with 1.0- to 1.2-meter bareroot whips planted in a Cecil gravelly sandy loam soil. Trees were planted 7.6 m within rows and 9.1 m between rows. Cultivars evaluated were: 'Armstrong', 'Bowhall', 'Scarlet Sentinel', 'Tilford', 'Schlesingeri', 'Gerling', 'Red Sunset' and 'Autumn Flame'. A complete randomized block design with 3 replications of 3 trees each was used. Supplemental irrigation was not applied.

Evaluation criteria were height and caliper (measured 30 cm above soil line) measurements and fall color observations (time of color development, color and number of trees with color) taken annually.

One spray application of endosulfan was made in 1985 for control of twig borer. A complete fertilizer (13N-5 P-10.5K) was applied in early spring each year at 454 g nitrogen per 2.5 cm of caliper. Soil tests were taken annually and in 1986, 4400 kg/ha of agricultural lime were applied. Weed control consisted of 2 applications per year of glyphosate or paraquat for postemergence weed control, and a spring application of oryzalin at 4.4 kg/ha for pre-emergence weed control. Herbicides were applied as a directed spray around the tree base (1.2 - 1.8 m in diameter). Selective pruning occurred predominately during the dormant season. Basal suckers were removed as needed.

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Results and Discussion

Fall color varied among cultivars in our study (Table 1). Consistent fall color occurred on 4 cultivars: 'Autumn Flame', 'Bowhall', 'Gerling', and 'Tilford'.

In other parts of the United States, 'Autumn Flame' is reported to be the first red maple to develop color, but in our test, fall color development began about the same time as 'Tilford', 'Bowhall', and 'Armstrong' in mid-October to early November. 'Autumn Flame' develops fall coloration more rapidly over the entire tree than the other cultivars, thus appearing to have earlier fall color. Consistent fall color development (100%) has occurred in each of the past 4 years with 'Autumn Flame' (Table 1). This cultivar has had the most outstanding fall color of all the red maples in the test (Fig. 1). Growth (Table 2) of 'Autumn Flame' has been similar to that reported elsewhere (1). 'Autumn Flame' has smaller leaves than most red maple cultivars and a round or oval canopy shape. 'Autumn Flame' is slow growing, averaging about 41.0 cm of height growth annually.

Consistent color has occurred with 'Tilford' since 1985 with 83-100% of the trees exhibiting

Table 1. Fall coloration of 7 cultivars and 2 red maple seedlings.

	Year			
	1985	*1986*	*1987*	*1988*
Autumn Flame				
Flower time	26 Oct-15 Nov	15 Oct-12 Nov	12 Oct-30 Oct	20 Oct-7 Nov
Color	O-R	O-R	O-R	O-R
Trees colored (%)	100	100	100	100
Tilford				
Flower time	19 Oct-15 Nov	17 Oct-19 Nov	19 Oct-9 Nov	17 Oct-11 Nov
Color	O-R	O	O	O-R
Trees colored (%)	100	100	83	100
Scarlet Sentinel				
Flower time	1 Nov-19 Nov	20 Oct-19 Nov	30 Oct-8 Nov	24 Oct-14 Nov
Color	O-R	Y	Y	O
Trees colored (%)	100	75	25	75
Red Sunset				
Flower time	24 Oct-25 Nov	30 Oct-19 Nov	None	24 Oct-17 Nov
Color	R	R	O	R
Trees colored (%)	70	100	0	67
Gerling				
Flower time	21 Oct-15 Nov	19 Oct-17 Nov	1 Nov-21 Nov	30 Oct-19 Nov
Color	Y-R	Y-R	Y-R	Y-R
Trees colored (%)	100	100	100	100
Bowhall				
Flower time	9 Oct-15 Nov	15 Oct-6 Nov	16 Oct-3 Nov	23 Oct-9 Nov
Color	R-O	R-O	R-O	R-O
Trees colored (%)	75	100	75	100
Armstrong				
Flower time	23 Oct-15 Nov	10 Oct-17 Nov	19 Oct-3 Nov	21 Oct-9 Nov
Color	Y	Y	Y/O	Y/R
Trees colored (%)	100	50	50	50
Mobile Seedling				
Flower time	17 Oct-30 Nov	15 Oct-1 Nov	6 Nov-18 Nov	27 Oct-12 Nov
Color	Y	Y	Y	Y
Trees colored (%)	67	56	11	33
Tenn. Seedling				
Flower time	12 Oct-17 Nov	19 Oct-12 Nov	17 Oct-19 Nov	19 Oct-9 Nov
Color	Y	Y	Y	Y
Trees colored (%)	67	56	33	44

R = Red, Y = Yellow, O = Orange
Dates reflect when initial fall coloration began. Ending date indicates no further coloration.



Figure 1. Fall color of 'Tilford' (upper left), 'Bowhall' (upper right), 'Autumn Flame' (lower left), and 'Gerling' (lower right).

fall color. While previous reports have not indicated good fall coloration, in this study 'Tilford' has had a remarkable orange and red coloration in late October. It has a round to globe canopy form and is fast growing (56.5 cm height growth annually). Summer leaf color is not as dark green as 'Armstrong' or 'Red Sunset' (data not shown).

Although the textbook canopy form attributed to 'Bowhall' is pyramidal (1,4), the trees in this eight-year study tended to be upright oval in form. Poor survival has occurred as 5 of 9 trees have died from bud union incompatibility. The remaining trees have shown excellent fall leaf color with hues of yellow, red and orange in October and early November. Summer leaf color is dark green. This moderate growing cultivar (55 cm/year) provides little shade because of its upright shape.

'Gerling' red maple has had consistent fall color with all of the trees developing color during the past 4 years. In the midwest red fall color is reported (1); however, in our study color has ranged from yellow to red. Trees are averaging 54.7 cm/annually; its form is broadly pyramidal (2) and is densely branched. Only one tree of the 9 planted died due to bud union incompatibility.

'Red Sunset' is one of the most widely planted red maples in the Southeast. It was one of the highest rated trees in the Ohio Shade Tree Evaluation (1) and reported to be one of the best red maple cultivars in the South (2). In our study, fall color has been average with leaves turning yellow and red in November and color development has been inconsistent. In 1987, it was the only cultivar that did not have color development. Color development in 1985-88, excluding 1987, ranged from 67% to 100% of the trees developing color. With some of the trees only the outer leaves developed fall color, resulting in poor overall fall coloration. In a planned community development in Birmingham, Alabama only about half of a planting of 60 'Red Sunset' have developed fall color. This observation concurs with our data. With the exception of fall color, the other attributes of 'Red Sunset' are equal to or better than other cultivars tested. In the summer, leaves are dark green. Tree form is oval to upright and grows at a rate similar to most other cultivars; providing an excellent shading affect. No bud union incompatibility has occurred with 'Red Sunset'.

Acer rubrum 'Armstrong' has a fastigiate growth habit as reported elsewhere (4), and is averaging about 64 cm of growth annually. Leaves of this cultivar are generally five lobed (3). Previous reports have indicated poor fall color on this particular cultivar (1). Our results concur with the earlier report in that from 1986-1988, only 50% of the trees have had fall color. Fall colors have ranged from yellow in 1986 to yellow and red hues in 1988. Two of the 9 trees died from bud union incompatibility. Dirr (2) reported that 'Armstrong' often shows incompatibility problems.

'Scarlet Sentinel' has an upright-oval growth form and is averaging about 61 cm of growth annually. Fall leaf color is mostly yellow and red hues. Fall coloration has been inconsistent, ranging from 100% in 1985 to 25% in 1987. Leaf

Table 2. Height and caliper growth of *Acer rubrum* cultivars.

Selections	Height (cm) Oct 1985	Height (cm) Oct 1987	Avg. annual height growth[z] (cm)	Caliper (cm) Oct 1985	Caliper (cm) Oct 1987	Avg. annual caliper growth[z] (cm)	Bud union[x] incompatibility
Armstrong	396a[y]	516 a	63.7	7.2 ab	9.9 ab	1.4	2
Autumn Flame	273 b	361 c	41.0	6.1 ab	9.0 ab	1.3	1
Bowhall	311 ab	410 bc	55.0	5.6 b	7.7 b	1.1	5
Gerling	367 ab	472 ab	54.7	7.2 ab	9.8 ab	1.4	1
Red Sunset	334 a	412 bc	49.5	7.0 ab	9.6 ab	1.4	0
Scarlet Sentinel	332 ab	474 ab	60.7	6.3 ab	9.6 ab	1.4	4
Schlesingeri	128 cde	472 ab	57.3	6.9 ab	10.0 ab	1.4	4
Tilford	358 ab	483 ab	56.5	6.1 ab	8.9 ab	1.3	2
Mobile Seedling	328 ab	410 bc	51.8	6.6 ab	8.9 ab	1.3	0
Tenn. Seedling	385 a	459 abc	51.3	7.7 a	10.6 a	1.5	0

[z]Average annual height and caliper growth from 1980-1988.
[y]Means within columns separated by Duncan's multiple range test, 5% level.
[x]Nine trees each were planted initially.

coloration in the summer is a subdued green; the lightest green among all red maples evaluated. Only 4 trees of 'Scarlet Sentinel' remain alive as 4 of the 9 trees have died from bud union incompatibility. The remaining tree died from winter injury in 1986.

'Schlesingeri' red maple is one of the oldest cultivars on the market today. It has a round to oval canopy form and its leaves are five-lobed. Fall leaf color is considered average, with mostly yellow to reddish colors which peaks in November. It has had poor survival in our test with only 2 trees surviving and is not included in Table 1. Four of 9 trees died from bud union incompatibility. Three other trees died from winter injury.

Bud union incompatibility occurred with most of the red maple cultivars, resulting in the death of several trees during the first 3 years of the test. Bud union incompatibility was noted by a gradual decline of shoot vigor followed by death of the tree top with dead leaves persisting and resprouting below the bud union. 'Bowhall', 'Schlesingeri' and 'Scarlet Sentinel' have had 5, 4, and 4 trees, respectively, die from incompatibility. 'Red Sunset' was the only cultivar that had no trees to die from bud union incompatibility. One tree each of 'Autumn Flame' and 'Gerling' and 2 trees each of 'Armstrong' and 'Tilford' have died.

In summary, consistent fall coloration occurred in the South with 'Autumn Flame', 'Tilford', 'Gerling' and 'Bowhall'. 'Red Sunset' had fall coloration of about 60% averaged over 4 years. Bud union incompatibility was a problem with 'Bowhall', 'Scarlet Sentinel' and 'Schlesingeri' red maple.

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Abstract

KIEPER, A. 1988. **Does money grow on trees? (part II).** Grounds Maintenance 23(11):36, 38, 77.

The first part of this two-part series explained tree valuation methods. Part II walks you through some case examples, gives you tips on claiming casualty losses and explains income tax deduction criteria, civil damage criteria and some precedence-setting cases. There are three avenues for claiming plant material casualty losses—insurance coverage, income tax deductions and civil damage claims. Whatever avenue your plant casualty loss dictates, either by circumstances or amount, make sure the evaluation is professionally backed, thoroughly documented, concisely prepared, up to date, understandable and legally defensible. When contested, many legitimate claims are either not awarded or diminished in award value because the claimant could not properly defend the case.