

# EVALUATION OF WOODY ORNAMENTALS FOR KANSAS<sup>1</sup>

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Evaluations of new, different, and superior plants are meaningful to nurserymen, arborists, landscape architects and designers, and to consumers. This project attempts to identify and evaluate worthy landscape plants for use in Kansas. Specific problems in plant selection for Kansas vary widely because of large differences in climate, soils, and urbanization. A special need for increased selections of shade trees for western Kansas has been expressed by the nursery industry. New, different, and superior cultivars or woody species also are needed in the more populous eastern and central regions.

## MATERIALS AND METHODS

Planting sites are on Kansas Agricultural Experiment Station fields in Manhattan, Hays, Colby, Tribune, Garden City, and Wichita. Each spring since 1984, five species or cultivars (Table 1) have been planted at each site in a randomized block design (five replications per site). Height and diameter (at 30.5 cm) of new and existing plantings are measured at the same time. All plantings are subjectively rated for foliage quality and overall quality during the summer. Survival also is recorded in late summer.

After the initial planting, care of the plants, except fertilization, is the responsibility of personnel located at each site. Each plant was fertilized with 75 g of a low nitrogen, complete fertilizer during the spring of the first season after planting and annually in subsequent years.

## RESULTS AND DISCUSSION

**1984 Planting.** Survival varied with species and site (Table 2). Some sites (especially Colby, Tribune, and Garden City) were quite dry, and plants have suffered. Although differences in survival, growth, and quality were partly due to environmental factors, some were obviously due to variations in care. Survival, growth, and quality were better at sites where periodic irrigation was provided and weeds were controlled.

The only plant established during 1984 that survived at all sites

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**Table 1.** Species planted to date.

Botanical name	Common name
1984	
<i>Crataegus crus-galli</i> var. <i>inermis</i>	Thornless cockspur hawthorn
<i>Fraxinus excelsior</i> 'Kimberly'	'Kimberly' European ash
<i>Pistacia chinensis</i>	Chinese pistachio
<i>Pyrus calleryana</i> 'Aristocrat'	'Aristocrat' Callery pear
<i>Quercus shumardii</i>	Shumard oak
1985	
<i>Acer platanoides</i> 'Greenlace'	'Greenlace' Norway maple
<i>A. rubrum</i>	red maple
<i>Cercocarpus montanus</i>	mountain mahogany
<i>Phellodendron amurense</i>	Amur corktree
<i>Q. acutissima</i>	sawtooth oak
1986	
<i>A. saccharum</i>	sugar maple (Caddo selection)
<i>A. saccharum</i> 'Legacy'	'Legacy' sugar maple
<i>Celtis laevigata</i> 'All Seasons'	'All Seasons' sugar hackberry
<i>Evodia hupehensis</i>	Hupeh evodia
<i>Q. imbricaria</i>	shingle oak
1987	
<i>A. rubrum</i> × <i>A. saccharinum</i> 'Autumn Blaze'	'Autumn Blaze' maple
<i>A. truncatum</i>	purpleblow maple
<i>F. americana</i> 'Champaign County'	'Champaign County' white ash
<i>Pinus strobiformis</i> [ <i>P. (flexilis</i> var. <i>reflexia</i> )]	southwestern white pine
<i>Q. robur</i> 'Westminster Globe'	'Westminster Globe' English oak
1988	
<i>Corylus colurna</i>	Turkish filbert
<i>F. mandshurica</i> 'Mancana'	'Mancana' Manchurian ash
<i>Platanus</i> × <i>acerifolia</i> 'Bloodgood'	'Bloodgood' London planetree
<i>Q. frainetto</i> 'Schmidt'	'Schmidt' Hungarian oak
<i>Sapindus drummondii</i>	western soapberry

two years after planting was thornless cockspur hawthorn (Table 2). This plant seemed to be reasonably well adapted to all sites, although it was chlorotic at Garden City, where only one plant survived. Chlorosis was not a problem at the other locations. 'Kimberly' European ash had problems at all sites. The original planting did not leaf out well for unknown reasons. Additionally, several of these plants were killed during the 1985 winter in Manhattan; some deer damage also occurred. Borer damage to 'Kimberly' ash in Wichita resulted in eventual tree mortality. All plants had died by mid-summer 1988 at Manhattan because of borer attack.

Some of the problems associated with Shumard oak and 'Aristocrat' pear were due to oversized and poor-quality stock from

the nursery. Both plants did reasonably well at sites where the original planting survived, except at Garden City. There 'Aristocrat' pear was quite chlorotic; the soil pH was 8.3. The majority of the Chinese pistache did not survive, except at Garden City and Wichita.

Average height growth of the 1984 species for each site is presented in Table 2. Data were analyzed as a repeated-measures

**Table 2.** Survival, average height, and diameter growth per year, and summer and overall quality ratings (1–5) for trees planted at 6 locations in Kansas in 1984.

Location	Survival (%)			Average growth (%/year)		Quality ratings (1987)	
	1984	1986	1987	Height	Diameter	Summer	Overall
thornless cockspur hawthorn							
Manhattan	80	80	80	8.3 ab <sup>2</sup>	26.4	5.0	5.0
Hays	100	100	100	6.7 ab	20.2	3.8	4.5
Colby	100	100	100	3.4 a	22.6	4.4	4.4
Tribune	80	80	80	6.4 ab	25.5	4.3	4.5
Garden City	20	20	0	—	—	—	—
Wichita	100	100	100	9.5 b	22.4	5.0	5.0
'Kimberly' European ash							
Manhattan	100	40	40	24.0	47.0	5.0	4.0
Hays	20	0	0	—	—	—	—
Colby	0	0	0	—	—	—	—
Tribune	20	20	20	14.8	42.8	5.0	5.0
Garden City	0	0	0	—	—	—	—
Wichita	100	40	40	24.1	30.8	5.0	1.8
Shumard oak							
Manhattan	80	80	80	11.9	35.5 b	4.9	4.3
Hays	60	40	40	0.8	15.6 a	3.5	3.8
Colby	0	0	0	—	—	—	—
Tribune	40	40	40	3.6	8.8 a	3.5	3.3
Garden City	20	20	20	4.3	9.0 a	2.5	3.0
Wichita	40	40	40	16.3	23.1 ab	5.0	3.5
'Aristocrat' callery pear							
Manhattan	60	40	40	26.0 c	39.9 b	5.0	5.0
Hays	60	60	60	13.3 b	27.7 b	5.0	5.0
Colby	0	0	0	—	—	—	—
Tribune	20	20	0	—	—	—	—
Garden City	40	40	40	1.0 a	12.13 a	1.3	1.3
Wichita	100	100	100	22.3 c	35.9 b	5.0	4.8
Chinese pistache							
Manhattan	0	0	0	—	—	—	—
Hays	80	20	20	14.8 a	45.5	5.0	5.0
Colby	100	0	0	—	—	—	—
Tribune	20	0	0	—	—	—	—
Garden City	100	80	80	12.1 a	27.6	4.2	3.8
Wichita	100	100	100	26.0 a	37.9	5.0	4.6

<sup>2</sup>Within species and columns, mean separation by Tukey's HSD (.05). Means not followed by a letter did not have significant F ratios (p = .05).



ANOVA. Only plants surviving through 1988 were considered, and missing data were ignored.

Height growth was generally greater at sites with a more moderate environment (Manhattan and Wichita). Stem diameter growth also followed this trend (Table 2).

Foliage and overall quality of the plants during 1987 is presented in Table 2. The appearance and quality of 'Aristocrat' pear was excellent at Manhattan, Hays, and Wichita. The quality of Shumard oak and Chinese pistache was good where they survived.

From the results collected thus far, we can conclude that thornless cockspur hawthorn is a desirable plant for consideration in most Kansas landscapes. It would be appropriate for use as a single specimen, in groups or masses, and as a screen. The flower and fruit displays are good, and we have seen only minimal incidence of rust on the foliage. This cultivar will likely be somewhat shorter at maturity than the species. The only problem we have encountered is some, but not extensive, suckering from the base. This can be handled easily by periodic pruning.

'Kimberly' European ash grew well but was subject to winter injury and borers. It would be a questionable plant for widespread planting.

Shumard oak is similar in habit to pin and scarlet oak but does not exhibit the iron chlorosis problem that plagues pin oak. From its performance in these trials, we would conditionally recommend this plant as a possible alternative to pin oak.

'Aristocrat' flowering pear grew well in Manhattan, Wichita, and Hays. It suffered greatly in Garden City, where chlorosis was a severe problem. We did not find the clustering of major branches, a problem with 'Bradford' pear, on the 'Aristocrat' pear trees in our trials.

Chinese pistache was reliably hardy only at the more southerly sites (Wichita and Garden City). In these areas, however, it certainly deserves wider consideration and planting as a specimen, street, or small ornamental tree. It was tolerant of alkaline soil conditions (pH 8.3).

**1985 Planting.** Survival of the 1985 planting was somewhat better than that of the 1984 study (data not shown). Sawtooth oak survived reasonably well at all sites. 'Greenlace' Norway maple survived poorly at all locations except Wichita; this may have been related to the quality of nursery stock received. Mountain mahogany survived better at drier sites than in Manhattan or Wichita. The only plant with any substantial loss during the 1986 winter was Amur corktree. Some of the losses can undoubtedly be correlated with environmental conditions and supplemental care.

**1986 Planting.** Survival was again variable. Both sugar maple selections and shingle oak established well at all locations. Performance of 'All Seasons' sugar hackberry was disappointing, because the plant failed to break dormancy in several locations.

Shingle oak established well except at Colby. Evodia did well, but some loss was experienced during late summer, 1986, or during the 1986–87 winter.

'Legacy' sugar maple had not grown notably at any location, whereas the 'Caddo' selection had grown at all sites. The most dramatic growth was by Evodia.

**1987 and 1988 Plantings.** The 1987 and 1988 evaluations showed that Amur cork did not perform well at most locations. Sawtooth oak did well at all locations except Garden City, where it suffered from chlorosis. Red maple performed better than expected at locations where it survived. Foliage quality of the 'Greenlace' Norway maple scorched at the more westerly locations.

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## A CRISIS IN CULTIVAR NOMENCLATURE

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The ability of our nursery industry to function smoothly and fairly is dependent upon, among others, the use of correct and consistent names to our plants. The rules of nomenclature for cultivated plants have for many years controlled, rather successfully, the proper use of cultivar names. This resulted in a system that assured relatively uniform names throughout the industry, avoided most improper cultivar names, and gave everyone an opportunity to sell cultivars under their correct names. The only exception to this situation concerned the sale of patented cultivars where royalty agreements protected patent owners against unauthorized propagation and sale of their plants. Trademarking, a relatively new practice, however, threatens the availability of horticultural cultivars beyond the constraints of the plant patent law.

In order to understand more fully how the practice of trademarking has affected our industry several examples are given below. It should be understood, however, that there are no clear solutions to the problems and that the examples are meant to illustrate the problems and not to condemn, necessarily, those individuals and organizations which follow these practices. Our