PROPAGATION OF *ACER TRUNCATUM*, A NEW INTRODUCTION TO THE SOUTHERN GREAT PLAINS[1]

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Abstract. *Acer truncatum*, a new introduction to the plains, normally hardy only to USDA zone 6 except in its hybrid form with *A. platanoides*, has performed well throughout Kansas (zones 5 and 6). It has survived considerable heat and drought stress, has had no serious pest problems and has been resistant to leaf scorch. Propagation has been successful from seed stratified for 30 days. Softwood cuttings taken in August rooted better than those taken in late May. Best rooting occurred with basal portions treated with 1,000 to 5,000 ppm IBA although over 50% rooted without the use of hormone.

In contemporary landscapes maples that mature at 25 to 30 feet in height are very useful, especially if they are tolerant of a wide range of planting conditions. Often overlooked species include *Acer truncatum* (7), the shantung maple, also called purpleblow maple because of the often reddish-purplish color in its new foliage. Native to northern China, the species was first introduced to the United States in 1881 but has not been in wide cultivation in the nursery trade.

Plants used in this evaluation were obtained from the USDA Plant Introduction Station, Ames, Iowa under the accession number PI-18578. It was originally introduced to the U.S. by F. N. Meyer following a plant exploration trip to the Weitsan mountains near Peking in 1906. Trees were established at Wichita (zone 6) and Colby, Kansas (zone 5), in 1973 as part of a North Central states regional project. The species did not prove to be hardy in any of the North Central states except Kansas, although it reportedly grows as a small shrub at the Morden Research Station, Manitoba, Canada. A hybrid with *A. platanoides* has been hardy at the Minnesota Landscape Arboretum. Plants survived at at both locations, including the northwest test site at Colby where winter temperatures often reach −20°F (−29°C).

Performance has been excellent at Wichita, under very hot, dry conditions and has been resistant to leaf scorch. No pest problems have been observed except an occasional tar spot on leaves of trees at Colby. Results of both seed and cutting propagation are reported here.

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REVIEW OF LITERATURE

Traditionally, seeds of many maples that mature their samaras in the fall need to be stratified 60 to 90 days (13). In recent years many species have also been vegetatively propagated by softwood cuttings, especially *Acer rubrum* cultivars (4,5,10), but also *A. campestre, A. ginnala, A. platanoides,* and others (1,2,3). Seed propagation is often preferred for genetic diversity, but vegetative propagation has advantages where seed is limited and, more importantly, when superior selections are to be clonally propagated. *Acer truncatum* and *Acer truncatum* subsp. *mono* closely resemble *A. cappadocicum,* the coliseum maple, which has proven so well adapted to Oklahoma (12). It, too, has a milky sap like *A. truncatum* and has been propagated by softwood cuttings in June (2).

Fall color of *A. truncatum* is often late and variable, although this has shown to be affected by moisture level. Irrigated trees in California colored significantly better than non-irrigated trees, although fall coloration occurred four to five days later than trees under drought stress (8). Of three original specimens obtained, the parent tree for these investigations has shown superior fall color each year. The tree is planted on a dry, sandy site and receives no appreciable irrigation during summer. The objective of this study was to propagate this tree vegetatively and to evaluate it with other seedlings for superior fall color.

MATERIALS AND METHODS

Two separate experiments were conducted to study both seed and cutting propagation of this species. They are discussed separately below.

Experiment 1: Seed Propagation. Seed from two different, 12-year-old trees were collected in October, 1985, to determine the stratification requirements for best germination. Seed were stored dry at 34°F until February, 1986, then sown in moist peat: sand (50/50 v/v) and stratified at 34°F for 30, 45, or 60 days. Flats of both seed lots were removed at 30, 45, or 60-day intervals and germinated at 65°F. Additional seed flats were also treated with the fungicide benomyl as a drench at the rate of 1 tbsp/gal. of water before placing in the cooler in an attempt to reduce root rot.

Experiment 2: Vegetative Propagation. In a preliminary study softwood cuttings were taken from trunk sprouts off a 10-year-old tree in 1982. Cuttings were sectioned into 6-in. (15 cm) lengths, given a 10-sec. dip in an IBA solution at 0, 1,000, 5,000, and 10,000 ppm. Cuttings were placed in sand under intermittent mist having intervals at 10 sec. mist every 6 min. in an outdoor propagation bed with 55% shade. After rooting, cuttings were potted, overwintered in an unheated polyhouse, and planted in a nursery row the following spring.

During 1986, softwood cuttings were taken at two dates from three-year-old seedlings in a nursery row and treated in a similar manner as above. The first cuttings were taken May 29 and evaluated August 6. The second group of cuttings was stuck August 8 and evaluated September 30. Where possible, basal sprouts were used to obtain juvenile growth but some lower branches were also used to supplement numbers of cuttings needed. Cuttings were sectioned into terminal and basal portions approximately 6-in. (15 cm) in length and given a quick (5-sec.) dip in IBA solution at 0, 1,000, 2,500, and 5,000 ppm. Since we observed injury earlier in 1982 at the 10,000 ppm concentration that treatment was omitted. Three replications of 10 cuttings each were used in May, but due to limited cutting material only two replications were possible in August. Photoperiod was extended to 15 hours on August 27 in a manner similar to that used by Smalley and Dirr (6), and by Waxman (11) to encourage vegetative growth after rooting and better winter survival.

RESULTS

Experiment 1: Seed Propagation. Germination was quite rapid with 96% emerging in seed lot No. 1 after only 30 days stratification, with no increase in emergence after longer stratification periods (Table 1). In fact, upon examination, some radicles were observed emerging after only two weeks of moist-chilling. The reduction of seedling stand after 45 days may have been partially attributed to stem and root rot from being in stratification too long. Mortality of some seedlings was attributed to some cotyledons not being able to break the seed coat if allowed to dry out.

Table 1. Germination and emergence of *Acer truncatum* seed after various stratification periods.[1]

Tree No.	Length of stratification	Percent germination	Percent emergence
1	30	96%	96%
	45	94	86
	60	85	73
2	30	67	46
	45	83	67
	60	61	54

[1]Mean of 3 replications of 20 seed each.

A fungicide drench with benomyl gave only slight improvement in percent germination. After 60 days of stratification, 93% of treated seed germinated compared to 85% of untreated seed (data not shown). It would appear that with the very short stratification requirement, seedlings should be given light and warm temperature after 30 days of cold-moist conditions in order to hasten the development of healthy seedlings. This could also accelerate

growth, which traditionally has been slow the first growing season.

Experiment 2. Vegetative Propagation. In preliminary studies in 1982, 71 and 79% rooting of terminal sections occurred at 1,000 and 5,000 ppm, respectively (Table 2). Decreased rooting occurred at 10,000 ppm due to basal injury to the cuttings.

Table 2. Effect of IBA concentration on the rooting of *Acer truncatum* softwood cuttings.[1]

IBA Conc. (ppm)	Percent rooting
0	43%
1,000	71
5,000	79
10,000	10

[1]Terminal cuttings collected June 8, 1982 from a 10-year-old tree.

During 1986, good results were obtained with terminal and basal portions taken at two different dates although better rooting occurred with cuttings taken in August than May. This agrees with Vertees (9) who reported poor results with cuttings taken in June. Another reason for poor results in mid-summer was due to wind, which affected the mist pattern in the outdoor propagation bed during June and July. Nevertheless, some rooting occurred at all concentrations of IBA. Most rooting occurred on terminal portions treated with 1,000 ppm, and with basal portions dipped in 2,500 ppm IBA (data not shown).

Cuttings taken in early August rooted quite successfully by mid-September. Maximum (75%) rooting of terminal portions occurred at the 1,000 ppm concentration. In contrast, increased rooting occurred on basal portions at concentrations of IBA increased (Table 3). The number of roots per cutting was greatest at 1,000 ppm due to some basal injury to the cuttings at higher concentrations, especially at 5,000 ppm. At the higher levels of IBA, most rooting occurred above the treated area. Although only five roots per cutting developed in the best treatment, roots were vigorous and usually extended several inches into the sand medium (Figure 1).

Table 3. Effect of stem portion and IBA concentration on rooting of *Acer truncatum*.[1]

IBA conc. (ppm)	Stem portion	Percent rooting	No. roots per rooted cutting
0	Terminal	35%	2.5
	Basal	55	4.6
1,000	Terminal	75	5.0
	Basal	60	5.2
2,500	Terminal	50	2.6
	Basal	75	3.9
5,000	Terminal	60	3.8
	Basal	85	4.7

[1]Mean of 2 replications of 10 cuttings.

Although 5,000 ppm IBA increased rooting of basal portions to 85%, higher concentrations were apparently not justified. In a separate group of cuttings, Hormodin No. 2 and No. 3 (3,000 and 8,000 ppm IBA, respectively) were compared. Best results were with Hormodin No. 3, which produced 50% rooting of terminal portions and 60% of basal sections. Half the cuttings were potted in a pine bark:peat:sand medium (2:1:1 v/v) and kept under long days to encourage some vegetative growth before winter. The other half were left in the propagation bed to overwinter before lifting in the spring.

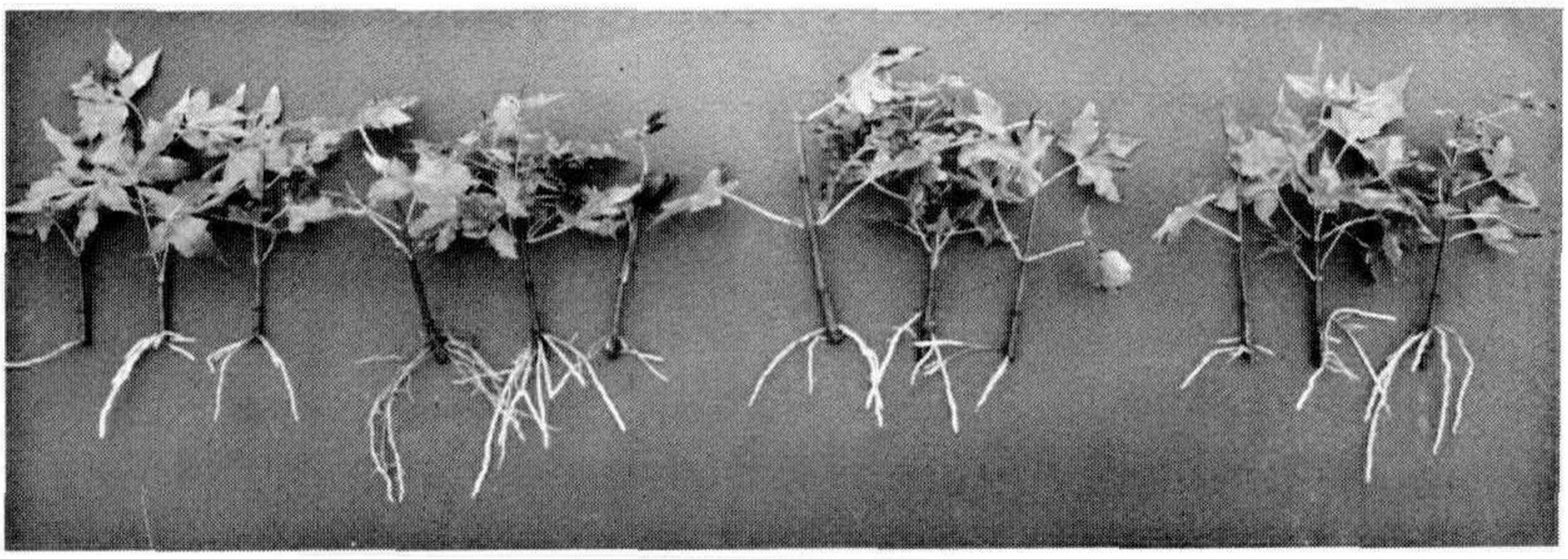

Figure 1. Rooted stem cuttings of *Acer truncatum* taken August 8 and dipped into various IBA solutions. *Left to right*: Control, 1000 ppm, 2,500 ppm, and 5,000 ppm.

DISCUSSION

The shantung or purpleblow maple has shown excellent adaptability to the southern Great Plains and arid sections of the Southwest. Propagation was easily accomplished by both seed and softwood cuttings. A 30-day stratification period is apparently sufficient to break seed dormancy of this Asiatic maple. Extra precautions may be required during seed germination to obtain maximum survival of seedlings compared to other maple species. This may explain to some degree the limited use of this tree in the nursery trade.

Cuttings taken in late summer rooted in seven weeks and produced healthy liners for fall potting or leaving in the propagation bed until spring. Some growth after rooting to restore carbohydrate reserves is important for good winter survival of cuttings taken late in the season.

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