

Species/cultivar	Method of propagation	Comments
	stem is cut internodally at the appropriate length).	reduce the risk of fungal infection. Consider removing flower buds of liners in early spring to encourage vegetative growth. Rooting period can be extended by taking cuttings in April from stock plants sited in a greenhouse—flower buds should be removed.

DOVE TREE (*DAVIDIA INVOLUCRATA* VAR. *VILMORINIANA*) AND ITS PROPAGATION BY SEEDS

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Davidia, one of the most unusual trees growing in the Arnold Arboretum, Jamaica Plain, Massachusetts, was introduced to horticulture from China. Abbe Armand David, a French missionary, discovered it while botanizing in the mountains west of Szechuan, China, and sent specimens to Paris, France, where it was described and named after him. Credit for its introduction to horticulture, however, goes to Pere Farges, another missionary who in 1897 sent 37 nuts to the Vilmorin Arboretum at Les Barres in France. From this shipment one seedling germinated in 1899. Two cuttings and one layer were propagated from it. The cuttings were provided to botanical institutions in Europe; the rooted layer was sent to the Arnold Arboretum in 1904 and there it still grows. This particular strain was determined to be different enough from the species to warrant a varietal name and therefore became *Davidia involucrata* var. *vilmoriniana*.

In Rehder's *Manual of Cultivated Trees and Shrubs*, *Davidia involucrata* is listed as being hardy in Zone 6 (−5° to +5°F) while the variety *vilmoriniana* is rated as being hardy in Zone 5 (−10° to −5°F). During the winter of 1933–34 *D. involucrata* var. *vilmoriniana* was killed to the ground at the Arnold Arboretum, but sprouted from the roots and is now a tree with six trunks. It should be noted that the winter of 1933–34 had some of the lowest temperatures ever recorded in the northeastern United States. On rare occasions the

partly dehardened flower buds have been destroyed by late frosts.

Flowers and Fruits. Both the flowers and fruits of *Davidia* present some highly unusual characteristics. In the area of Boston, Massachusetts, flowers appear during May. They are bunched in a rounded head about $\frac{3}{4}$ in. in diameter. The impressive feature is the two very large white bracts that subtend the flowers. These are unequal in size with the lower being much the larger. When one looks at the serrated margins and their vein patterns it becomes obvious that the bracts are modified leaves.

The fruits are about $1\frac{1}{2}$ in. long and elliptical in shape. Each contains an extremely hard stone in which seeds (sometimes only one, but more frequently two to five, and rarely more) are arranged around a central axis. The stones are so hard that I have had to clamp them in a vise and cut their walls with a hacksaw to count the numbers of seeds.

Germination of the Seeds. For many years the germination behavior of *Davidia* seeds was unknown and propagators planted them out-of-doors as soon as possible with the thought that seasonal changes would prepare them for germination. This was a common practice years ago when little was known about protective barriers that had evolved to prevent seeds from germinating at times unfavorable to seedling survival. Ernest Wilson, writing in 1929, said of *Davidia*, "The nuts with pulp removed should be sown out-of-doors so soon after they are ripe as is possible, say in November. If there be much delay in sowing the seeds, the probability is that they will not germinate until spring of the second season." Older Arnold Arboretum records show erratic patterns of *Davidia* seed behavior with sparse germination strung out for a couple of years in some cases.

The handling and pretreatment of *Davidia* seeds can be simplified and hastened by the use of plastic bags. After the leaves have fallen, the fruits remain on the trees and can be easily seen for collection. When placed in a plastic bag in a warm location for a week or two, the fleshy pulp softens and can be separated from the nuts by kneading while still in the bag.

Germination of *Davidia* seeds is very peculiar. Two hundred nuts planted about 1 in. deep in plastic flats were placed in a warm greenhouse. After a period of six months, sections of the nut walls were pushed out by partial development of the seedlings. When this became a general condition the trays were transferred to a 40°F refrigerator for 3 months. Three trays were left in the warm situation as a control.

When those moved to cold were returned to warm conditions, a general germination took place. In the three control trays (not provided with cold) there was no seedling development.

In the natural scheme of seed dispersal, adaptations have evolved which usually lead to the seeds being scattered. Seeds of

Davidia, however, are packed closely together within a nut. They germinate simultaneously and this leads to a tight cluster of seedlings competing with one another.

An efficient method of pretreating *Davidia* seeds is by the use of polyethylene plastic bags. A medium of sand and peat moss in equal parts is combined with the nuts and placed in the bags. In proportion, the medium would be three or four times the volume of the seeds. It should be moist but not wet. Binding the top of the bag with a rubber band makes the unit vapor proof for the entire stratification period. With this method any change that takes place within can be observed through the transparent wall of the bag. By using the timing described above, germination should follow.

BOTTLE BRUSH BUCKEYE (*AESCULUS PARVIFLORA*) AND ITS PROPAGATION

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Aesculus parviflora, the bottle brush buckeye, is native to South Carolina, Georgia, Florida, and Alabama, and differs from other members of the horsechestnut family in several ways. It is not a tree but a large shrub that spreads by stoloniferous shoots forming a thicket about 10 ft tall. In the area of Boston, Massachusetts, it flowers in July long after other members of the genus have done so and at a time when there are but few woody plants in flower. It is quite shade tolerant and creates an impressive display when planted at the edge of a field or along a roadside against a background of trees. Other attributes are freedom from insect and disease problems, good yellow autumn color, and the ability to remain free of competing vegetation. Despite its southern origin, Rehder's Manual (1) rates *A. parviflora* as a Zone 4 plant, capable of surviving temperatures to -20°F .

Flowers and Fruiting. In July, highly conspicuous upright panicles of flowers develop above the plant on terminal shoots. It is astonishing to see the profusion of pollinating insects that visit to work the flowers. Various kinds of butterflies, bees, bumblebees, and wasps all appear in abundance. Both staminate and hermaphroditic flowers are present and fruit production is relatively sparse.

This year (1987), the fruits were ready for collection by late September. The fruits were loosely attached, the husks were