

however, that the sex of the tree in this case can be determined by its growth characteristics. That is, that the male tree is quite upright and the female tree quite spreading

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MODERATOR COGGESHALL: Thank you, Ray, for this discussion.

MR. LESLIE HANCOCK (Woodland Nurseries, Cooksville, Ontario): I think this work of Mr Halward is very significant, especially in view of the splendid growth obtained the second year with the cuttings. It is difficult to get seed of a lot of foreign trees. Mr. Halward's results suggest that we should turn our attention to the production of shade trees by vegetative methods

MODERATOR COGGESHALL: At the Arnold Arboretum we have been propagating *Cercidiphyllum* by seeds. These cuttings are much larger than our two-year seedlings.

Our next speaker is William Flemer, III, of the Princeton Nurseries, Princeton, N J. His subject concerns the budding of *Sophora japonica*.

Mr. Flemer presented his paper, entitled "The Propagation of *Sophora japonica* by Budding." (Applause).

## THE PROPAGATION OF *SOPHORA JAPONICA* BY BUDDING

WILLIAM FLEMER, III

*Princeton Nurseries*

*Princeton, New Jersey*

The propagation of *Sophora japonica* by budding is by no means new to the nursery world. Back in the days of our Victorian ancestors when grotesque horticultural "novelties" were popular no matter how peculiar looking, it was common practice to bud *Sophora japonica pendula* on six or seven foot stems. This produced a tree similar to the weeping Ash (*Fraxinus excelsior pendula*) and certainly its equal in ugliness. Two more useful forms, *Sophora jap. columnaris* which was narrow and pyramidal in form and *Sophora japonica violaces* with lavender colored flowers, were also budded, but these have long since disappeared from the trade and have apparently been lost.

For many years *Sophora* was just another rather rare leguminous tree only occasionally used as a lawn specimen, usually on some Landscape Architect's specification. With the arrival of various serious tree diseases on the national scene, most of these lesser known trees were subjected to more careful scrutiny in the search for better shade trees. *Sophora* has received much favorable attention in recent years for this purpose, and we at Princeton have been enthusiastic in publicising its good qualities.

Eastern nurserymen who have had experience in growing the tree have noted how difficult it is to make it stretch out and grow during

the first years of its life. The tree starts out vigorously enough in the spring, but presently the shoot begins to branch excessively and become stunted almost with a "witches' broom" type of formation. Further investigation disclosed that this malformation is the result of toxins injected into soft growing tip in the course of the feeding activities of several minute leaf hoppers especially the genus *Empoasca*

This condition disappears later in the life of the tree for two apparent reasons. First, the leaf hoppers apparently have certain well defined limits as to how high above the ground they will feed and they no longer attack the branches as the tree exceeds this limit. Second, as the tree matures, in common with other trees generally, it makes but one flush of growth, and this takes place early in the season before the leaf hoppers build up. In pushing a young tree in the nursery to secure a straight trunk, intensive cultivation and heavy, fertilization are employed to force a long continuous thrust of growth which falls prey to the attentions of the leaf hoppers during the heat of summer. They have proved very difficult to control by spraying, as many broods occur in a given season and tolerance of insecticides develops.

In examining blocks of *Sophora* an occasional plant appears which is not attractive to leaf hoppers. Isolation and comparison of these rare individuals shows an occasional specimen which is of markedly better form than the regular run of the species and hence doubly worthy of vegetative propagation. The principle is well known in its application to selection of various Maple clones for resistance to *Empoasca fabae* and in *Ulmus americana* clones resistant to Elm Leaf Beetle.

This rather lengthy preamble establishes the reasons for budding sophoras. The actual process is simple enough. Vigorously grown one year seedlings as near pencil size as possible are lined out in the spring as early as the ground can be worked. These are cultivated and weeded carefully to insure rapid growth during the summer. Bud sticks of the current year's growth on older selections are cut in August, selecting the largest wood available because the size of the resultant whip is directly traceable to the size of the bud set the season before. The buds are peeled and inserted in August in exactly the same manner as apple or pear buds, and wrapped with rubber budding strips.

The following spring the understocks are cut back to the bud and after growth starts, any suckers which appear are rubbed off. A light four foot bamboo stake is inserted on the opposite side of the understock and the developing whip is secured to it by several ties during the course of the growth. The plastic-coated wires sold as "quick ties" have proven quicker and cheaper to use than raffia. At the end of the growing season, stake and ties are removed and the subsequent culture of the tree follows established practices.

Specimens of ordinary *Sophora* seedlings, of a selected type, and of a budded understock are on display for those interested.

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MODERATOR COGGESHALL: Thanks, Bill, your discussion was very interesting.

MR. FRANK O ANDERSON (Belle Valley Nursery, Erie, Pa.): How old is this plant before it will bloom?

MR. FLEMER: It takes a long time, about 15 or 20 years.

MR. FILLMORE: Are the buds de-wooded?

MR. FLEMER: They are de-wooded. We use only the shell of the bark with the bud attached.

MR. JOSEPH C. MCDANIEL (University of Illinois, Urbana, Ill.): Have you tried budding *Sophora* on anything else?

MR. FLEMER: No, we haven't. I doubt if it would take on either *Gleditsia* or *Robinia*

MR. CARL E. KERN (Wyoming Nurseries, Cincinnati, Ohio): I understand that the roots of *Sophora* trees grow straight down, like the horse radish. If permitted to grow in the nursery, the main root will go three to four feet straight down. Therefore, root pruning is necessary.

MR. FLEMER: It is true that they have deep taproots. Our experience has been that we get better growth if we dig the *Sophora* as two-year-old trees and actually transplant them, than if we merely run a blade under them and leave them where they are. The same thing is true of honey locust trees. I think Jack Siebenthaler will agree. If you run the blade under them it glazes the ground or something underneath the tree and they stand still and refuse to grow, whereas, if you transplant them and prune them severely with the shears, they grow much more rapidly.

MODERATOR COGGESHALL: Our final talk this afternoon is also concerned with the propagation of roses. Mr. Harold A. Barnes, Barnes Roses, Inc., Huron, Ohio, will discuss the budding of roses.

Mr. Barnes presented his paper, entitled "The Propagation of Roses by Budding." (Applause)

## PROPAGATION OF ROSES BY BUDDING

H. A. BARNES

*Barnes Roses, Inc.*

*Huron, Ohio*

In the fifteen minutes which has been allotted for the "Propagation of Roses by Budding" I shall try to cover the most important details. I shall devote the first part of my talk to the actual technical details of the subject and the second part to some of the pitfalls and details which may not be fully understood at the moment.

Present day commercial propagation of roses is done by budding, not by grafting as in years gone by. In the beginning, as with any crop, we must start with the plot of land involved for the crop. Roses, of course, grow best in clay soils, but contrary to this, my first crop of roses was raised on pure sand, and for a beginner, I still consider that first crop a good one.