The technique is uneconomical for commercial application but it is the most reliable vegetative technique known at this time. Other propagation methods are being studied for commercial use

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FRANK GOUIN: Did you check the sugar levels during rooting?

B.E. TANKERSLEY: We looked at the starch level and it was not related. We did not look at sugars.

PROPAGATION OF SYRINGA RETICULATA AND ITS FORMS

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Up to a few years ago the Japanese tree lilac had been known as *Syringa amurensis* var. *japonica* in the trade. The confusion in naming comes from the many botanists that described the tree.

Blume described it in 1855 as *Ligustrum reticulata*. Maximowicz in 1875 used the name *Syringa amurense* var. *japonica*. This name was also used by Franchet and Savatier in 1879. However, Hara is to be credited with the now valid name, *Syringa reticulata*.

In 1876 Dr. W.S. Clark of the Agricultural School in Sapporo, Hokkeido, Japan sent seeds to the Arnold Arboretum where it was grown under the Accession #1111. One can surmise that considerable seed was sent because within 8 years nurseries such as Ellwanger and Barry of Rochester and H.H. Berger of San Francisco besides various nurseries in Europe listed the tree for sale. It is a small tree growing to 10 m. with a peeling shiny bark similar to cherry. It is usually multi-stemmed and flowers toward the end of June with immense, terminal white flower clusters 50 to 60 cm long and 40 to 50 cm wide.

Since it is found in the wild along stream banks, it grows well under moist conditions unlike most lilacs. Sheridan Nurseries grows the tree single stemmed or as an unpruned bush. We found it to be variable in growth and some plants exhibited extreme chlorosis. To grow a more uniform tree and one that would grow without chlorosis we selected a number of plants, of which the best was named 'Ivory Silk'. When budded onto *Syringa reticulata* seedlings it produces an upright 2 to 3m tree within 3 years after budding. The tree calipers well and makes a more oblong crown than the round headed seed form. It flowers after 6 to 8 years and has the further advantage of being hardy as far north as Edmonton, Alberta. *Syringa reticulata* is quite adaptable to city conditions and is used as a street tree in our area. Herbicides such as Simazine are to be avoided as with *Oleaceae*.

PROPAGATION

Seeding. The seed ripens towards the middle of October and is best picked early in the morning or when the weather is damp to prevent shattering. It is cleaned and fall seeded in beds covered with a layer of sand 2 cm to 4 cm thick and mulched with straw. There are 3000 seeds per 100 grams. Germination does not occur until August of the following year and little growth beyond the cotyledons happens in that year. Despite their tender appearance, the seedlings will survive the first winter with only a straw cover Modifications to the seed treatment, such as additional warm-cool periods, have not shown earlier germination.

For the second year a high nitrogen fertilizer, at the rate of 37 kg. of nitrogen per hectare applied each month from May to August, should produce a 25 cm. seedling 2-4 mm thick. As this is not of budding size, the seedling is transplanted for another year when it should develop into a 40 to 50 cm, 5-8 mm plant at the end of the third season after seeding.

Budding of *Syringa* 'Ivory Silk'. The 3 year seedling is lined out into field rows at a spacing of 120 cm × 45 cm.

Budding by T-bud is done in July when growth has hardened. We like to place the bud in the direction of the prevailing wind. Rubber strips are used as ties. These are cut off when union has taken place. In the spring of the following year, the understock is reduced to 10 cm above the bud. The bud is tied to the understock as soon as it reaches 10 cm. The bud does grow straight without staking up to 180 cm. Very seldom does it branch during the first year. The second year after budding any side branches are reduced to 20 cm along the stem and a light head is produced. In late summer, all side branches are removed from the stem. The third year a good head develops and the stem is kept clean. The tree is ready for sale by fall. Transplanting is easy because of the fibrous root system.

Cuttings. The trend in modern tree nurseries is to produce tree cultivars on their own root. We tried to root *Syringa* 'Ivory Silk' because seedlings take as much as 4 years to be buddable and any reduction of this time would be valuable Further the resulting tree grown from cuttings might be more uniform We therefore, ran a trial of 1000 cuttings treated with Hormodin 3 powder on July 12, 1980. Cuttings were 20 to 25 cm long with tips left on. They were placed on a greenhouse bench, in a sand and perlite medium, with misting for 5 seconds every 10 minutes. In October 87% were rooted when dug. The cuttings were placed into cold storage until spring 1981 and planted out into beds. As 80% of the plants flowered, the flowers were removed to stimulate growth. The size of these cuttings was 40 cm at the end of this season. On June 23, 1981, 9000 cuttings were made and 2560 of these rooted. Because of the larger space requirement, these cuttings were made in a shaded outside mist bed. After 6 weeks, not enough root action was observed and we felt the soil temperature was too low. We removed the cuttings, retreated them with Hormodin 3 and placed them in a greenhouse. At this time the results would indicate that our best course of action is to root these cuttings in a greenhouse We can now produce a field liner of the cultivar wanted in 2 summers instead of the 4 years from seed to understock Of course we also eliminated the work of budding. I hope that my talk will help to fill a gap because the demand for this tree far out-distances the supply I am indebted to the Royal Botanical Garden, Hamilton, staff for nomenclature information.

JIM KING: How do you overwinter the rooted cuttings?

JOERG LEISS: The rooted cuttings are removed from the greenhouse in the middle of October and heeled in until No-

vember when the leaves drop. The cuttings are then packaged in a sausage roll. We cut plastic into strips and put sphagnum moss on it and roll the cuttings up in it We have a package that can be easily taken out in the spring and planted. The cold storage is kept at 28 to 30°F over winter We have found that late planting, the first or second week of May, produces more growth than early planting.

MICHAEL DIRR· How do you handle double breaks and does it hinder growing a straight trunk?

JOERG LEISS: In our case the terminal breaks are flowers, so we end up with the shoots from the second node. We normally do what we do when we graft — just knock one break back. Growing a straight tree is the easiest thing.

PROPAGATION OF SOUTHERN PINES BY CUTTINGS

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For the past 30 years, forestry in the southeastern United States has been devoted to genetic improvement of pine trees (21). Major interest in tree improvement has concerned loblolly pine (*Pinus taeda* L.) though longleaf (*Pinus palustris* Mill.), slash (*Pinus elliottii* Engelm. var. *elliottii*) and shortleaf (*Pinus echinata* Mill.) pines are also important. Straightness of bole, branching characteristics and large volume are a few of the traits being examined. Improvement of these desired traits has been through the process of sexual propagation; that is, through controlled breeding to produce improved progeny for successive generations (15). Recently, there has been an increased effort among research foresters to capture these desired traits through asexual propagation by rooting. Since pines in general are difficult to root (18), obstacles have been encountered.

Asexual propagation by rooting allows for a greater recovery of the genetic potential of a tree more quickly than through sexual propagation. As a result of this advantage, research in the area of improving the rootability of the southern pines is being pursued. Grigsby (5) was the first to report rooting success with loblolly pine, but he could not successfully repeat his results. Subsequent research has revealed that quantity of mist, use of fungicides, adjustment of hormone concentrations in rooting powders and girdling prior to remov-