TECHNICAL SESSIONS
Tuesday Morning, December 14, 1982

The thirty-second annual meeting of the Eastern Region of the International Plant Propagators' Society convened at 8:15 a.m. in the Ambassador Ballroom East of the Amway Grand Plaza Hotel, Grand Rapids, Michigan.

PRESIDENT SPARMANN: Welcome to the thirty-second annual meeting of the Eastern Region of the International Plant Propagators' Society. The local site committee under the leadership of Dick Brolick has done everything to make your arrival and stay a very enjoyable one. At this time I would like to recognize the members of the Internation Board present: Ralph Shugert, Historian; and John Wott, Vice-President-Elect. We have several members here from other Regions. I would like to recognize from the Western Region, Bruce Briggs, Ray Maleike, Steve McCulloch, and Robert Tichnor. From the Southern Region, Stanley Foster and Ted Richardson. A special welcome to you this morning. I will now turn the meeting over to our program chairman, Don Shadow, who has put together an excellent program.

Jim Cross served as moderator for the morning session.

STEWARTIA — PROPAGATIONAL DATA FOR TEN TAXA

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Some of the most interesting and unusual small trees and shrubs for use in ornamental planting are the deciduous taxa of the genus *Stewartia*, which is a member of Theaceae, the tea family (1). Plants grown in the area of Boston, Massachusetts, start flowering in late June and continue to flower into July, a time when the flowering of most woody ornamentals has passed. Figure 1, photographed on May 1st, shows the presence of flower buds and partly expanded leaves. Buds present at this early date remain inactive and blossoms do not appear until late June. Flowering characteristics of most taxa are basically alike, comprising single white flowers, with bright yellow stamens, borne in the axils of the leaves. Exceptions are *S. malacodendron* with purple stamens and *S. ovata f. grandiflora*, where flowers with yellow stamens and flowers with purple stamens may be found on the same plant.

Members of the genus *Stewartia* are found only in eastern North America and eastern Asia. Those found in the Orient can attain heights of 80 feet while the two found in America are shrubby and rarely grow to 16 feet.

Figure 1. *Stewartia* shoot photographed on May 1st showing the presence of flower buds together with partly expanded leaves. Buds present at this early date remain inactive and blossoms do not appear until late June. Photo by Alfred J. Fordham.

The bark of the two American species is somewhat nondescript, while the bark of some oriental species is truly spectacular. As the trunks and branches increase in size, the deciduous outer bark peels away revealing underlying bark which is bright cinnamon in color. When laid bare to the weather, the newly exposed bark undergoes gradual color change. Therefore, a beautiful color pattern, varied in hue, is created by the length of time each section has been exposed to weathering.

Stewartia pseudocamellia 'Korean Splendor' (Figure 2) has an especially long flowering season that starts in late June and continues into early August. Despite the fact that the flowering period lasts for about 5 weeks, individual flowers persist on the plants for only about 24 hours after opening. Open flowers and unopened buds are found together on the plant throughout the long flowering period. After a blossoming period of about 24 hours, the petals (with the stamens still attached) fall from the plant and literally carpet the ground. The ovary and style remain attached to the tree. Meanwhile, new flowers open each day from the vast number of reserve buds which continuously develop. Two species of honey bees and one species of bumble bee have been observed visiting the flowers of *Stewartia*.

PROPAGATION OF *STEWARTIA* BY SEED

Stewartia seeds are produced within five-chambered woody capsules and each chamber, depending upon the species, contains 2 to 4 seeds. In some instances fewer seeds are produced in each chamber due to the abortion of one or more of the ovules. Abortion results because the egg within the

Figure 2. *Stewartia pseudocamellia* 'Korean Splendor.' Open flowers, unopened buds, and partly developed seed capsules are found together on the plant owing to its long flowering period. Photo from Arnold Arboretum.

ovule either was not fertilized, or the egg failed to develop after fertilization. Natural dispersal of the winged seeds of most species is by wind, and in the latitude of Boston, Massachusetts, the capsules open and the seeds are dispersed during late September and early October.

A careful watch must be maintained if one intends to collect seeds since tightly closed capsules may open in a few days, and the seeds will be lost to natural dispersal. Maturity of the seeds can be determined by a color change of the capsules. About mid-September they start turning from green to brown and, at this stage, the seeds are fully developed and the capsules can be collected.

Separation of the seeds from the capsules is a simple matter. When the fruits are placed in a container (such as a paper bag) that is then put in a dry location, the closed capsules will open in a few days. When the container is shaken the seeds will fall out. Separation of the seeds from the capsules can then be accomplished by emptying the contents into a screen of suitable mesh size to retain the capsules but allow the passage and final collection of the seeds. Difficulty in the separation of seeds from capsules may be experienced only with fruits of *Stewartia malacodendron*. The angular seeds are often held tightly within the chambers and their removal may require forceable opening of the capsules.

When kept in dry storage, *Stewartia* seeds lose their viability quickly. As a result they should be sown or placed in pretreatment without delay. All the species tested at the Arnold Arboretum produced seeds that were doubly dormant. In their natural habitats the seeds would require two years to germinate. Seeds dispersed in October, 1982 would be physiologically prepared to germinate by natural seasonal changes in spring of 1984. However, by placing the seeds in a stratifying medium and providing artificial seasons, the seeds can be induced to germinate in about 7 months.

This pretreatment is done in two stages. The container for the seeds and stratifying medium should be a polyethylene plastic bag. Polyethylene plastic has the property of being air permeable yet vapor proof. Twisting the top of the bag and binding it with a rubber band makes the unit vapor-proof for the entire treatment period, and it does not need to be opened until both steps have been accomplished.

At the Arnold Arboretum we used a stratifying medium composed of equal parts sand and peatmoss. The mixture is dampened (moist but not wet) and in proportion the medium should be 2 or 3 times the volume of the seeds. This factor is important since at sowing time the entire contents of the bag are sown. A large volume of medium could lead to some seeds lying at unsuitable depths.

Using seeds of taxa tested at the Arboretum, it was determined that a period of 4 months warm stratification followed by cold stratification for 3 months satisfied the requirements for germination. Seeds placed in warm stratification in early October are transferred to cold treatment in early February and are ready for sowing in early May. This timing is excellent since the seedlings will develop and grow during the lengthening days of spring.

Warm stratification is accomplished by placing the sealed bags in a location where the temperature is subject to normal day and night fluctuations. Our bags were placed in bins on a greenhouse bench where the temperature ranged between 60° and 100°F. Any location where the day and night temperatures vary would be satisfactory. Full sun, however, should be avoided since it might lead to high temperatures within the bags that could be detrimental to the seeds. When the period of warm stratification has been completed, the bag is transferred to a refrigerator to satisfy the cold requirement. At the Arboretum, cold pretreatment was accomplished at about 40°F. However, this temperature is arbitrary and the temperature maintained in the storage area of any refrigerator will suffice for the cold period. Keeping track of the time to move the seeds from one treatment to another is easily done by marking

dates on a calendar or by keeping a card file arranged in chronological order.

The following is a list of *Stewartia* taxa seeds that were germinated by following the procedure outlined above: *S. ovata f. grandiflora, S. malacodendron, S. serrata, S. rostrata, S. sinesis, S. monadelpha, S. pseudocamellia, and S. pseudocamelia* 'Korean Splendor'

It should be noted that *Stewartia* hybrids are beginning to appear among seedlings grown from seeds gathered in botanical garden and arboretum collections. Therefore, it is only safe to propagate seeds taken from isolated individual specimens.

PROPAGATION OF *STEWARTIA* BY CUTTINGS

At the Arnold Arboretum, cuttings of *Stewartia* have been taken as early as June 23rd and as late as August 20th. Although rooting has been partially successful in all attempts over this time period, the greatest number of cuttings have rooted when the cuttings were processed between June 23rd and mid-July.

Although a wide variety of root-inducing materials have been used with good success on *Stewartia* cuttings, indolebutyric acid (IBA) has proven satisfactory. The cuttings are treated with an 0.8% formulation of IBA in talc, with Thiram added at the rate of 15%. High percentages of rooting have also occurred employing quick-dip treatments using a combination of IBA plus naphthaleneacetic acid (NAA) at 2500 parts per million of each. Quick-dip treatment involved immersing the bases of prepared cuttings in the liquid preparation for five seconds.

Rooted cuttings of *Stewartia*, particularly those made late in the growing season, have presented a survival problem during the subsequent winter. When potted or flatted after rooting, the plants have gone into a dormancy from which they never recovered. This loss can be averted, however, if the cuttings are not disturbed after they have rooted. The procedure used is to fill plastic flats with a rooting medium of half sand and half perlite by volume. The cuttings are made, treated, and inserted in the flats which are then placed under intermittent mist. When rooting has occurred, the cuttings are left in the flats and hardened off. In November they are transferred to cold storage where the temperature is maintained at approximately 34°F. In February or March, depending on the work load, the flats are returned to a warm greenhouse and when new growth begins to appear they are transferred to containers. When handled in this manner, the rooted cuttings can be expected to survive and grow. The following is a list of

Stewartia taxa that have been propagated by the procedures described above: *S. ovata*, *S. ovata f. grandiflora*, *S. malacodendron*, *S. rostrata*, *S. henryae*, *S. sinensis*, *S. monadelpha*, *S. pseudocamellia*, *S. pseudocamellia* 'Korean Splendor'

JUVENILE SHOOTS FROM ROOT PIECES

To test if shoots would develop from root pieces, roots of 6 taxa plants were dug in December and cut into 5-in. pieces. These were buried horizontally 1-in. deep in flats of sandy soil. Shoots that arise from roots are physiologically juvenile and often will root quickly. However, no shoot development took place.

LITERATURE CITED

1. Spongberg, S.A. and Fordham, A.J. 1975. Stewartias — small trees and shrubs for all seasons. *Arnoldia*. 35 (4):165-180.

DON SHADOW: Do you know if there were *Stewartia* seeds brought in from China a few years ago?

AL FORDHAM: Yes, there were.

WILLIAM VANDERKRUK: Did you notice any difference in hardiness between rooted cuttings and seedlings?

AL FORDHAM: I have never noticed any difference. Of course, with seedlings you get genetic variation and with cuttings you get the same hardiness as the parent plant.

TOM McCLOUD: You mentioned cold storage. Would a cold greenhouse be satisfactory? Is light a factor?

AL FORDHAM: Any place that can be kept between freezing and 40°F is satisfactory. Light is not a factor.

RALPH SHUGERT: What is the hardiness of the genus in Michigan?

AL FORDHAM: *Stewartia pseudocamellia* would be hardy there. *Stewartia serrata* is the only one that is not hardy with us at the Arboretum — in Zone 5.