including my time and that of the other directors of the firm.

KIRK CLARK: This is to Loren Oki. Have you put into your spreadsheet a "fudge factor"?

LOREN OKI: Yes, the calculations are very precise, but we also use a "production factor" of 10%, which indicates more transplantable plants than we calculate.

JAPANESE MAPLE PROPAGATION AT MONROVIA NURSERY

STEVEN A. HOTTOVY

Monrovia Nursery Co:Oregon
12600 SE Alderman Road
Dayton, Oregon 97114

The numerous cultivars of Japanese maples, *Acer palmatum*, comprise an interesting group of desirable landscape plants. Their variations in leaf form, color, and habit, merit special placement in the landscape. To preserve these characteristics, Japanese maples are traditionally grafted on to seedlings of *Acer palmatum*.

At Monrovia Nursery Company, we are propagating the cultivars by grafting and budding. The propagation method used is determined by the time of year and the size of the scion and rootstock. During late winter, stick budding and side cleft grafts are utilized. In the late summer, chip budding is used.

Stick-Budding. Stick-budding uses a small stick with several sets of buds as a scion. The rootstock must be actively growing and in the bark slip stage for a successful union. This method is particularly useful if there is a caliper difference between scion and rootstock.

In late winter, dormant seedling *Acer palmatum* rootstocks of approximately pencil thickness are brought into a greenhouse held at 72°F. Kept thoroughly watered in this warm environment, the seedlings quickly resume growth and enter the bark slip stage, usually in about three weeks. A color change or "greening" of the stems is a good indication. As the upper buds swell and begin to break it is time to stick-bud.

Dormant leafless scions are collected from container-grown stock. The scions can be held in cold storage for several days if wrapped in damp newspaper.

The grafter cuts a 1 in. T-bud cut near the base of the rootstock. This bark is opened by slipping the budding blade under the bark. The scion is formed using a shallow 1 in. cut on one side and a short basal nick on the opposite side. The scion is slipped into the open T-bud matching the long shallow cut. Clear plastic chip bud tape

(0.002 × ½") is used to secure the graft. The entire scion is covered by wrapping, tying at the top. The grafts should knit in about one month. The chip bud tape is removed prior to any scion bud sprouting. When the chip bud tape is removed, a small piece of masking tape is placed around the base of the graft to protect the union. When the scion's new growth reaches the several leaf stage, the upper rootstock is removed above the graft union. After further growth of the scion, the plants are moved outside to be hardened off prior to being canned into one gallon containers.

Side Cleft Graft. Side cleft graft uses a scion with several sets of buds similar to the stick bud but usually the wood is of larger caliper. This method also requires the rootstock to be actively growing but the "bark slip stage" is not critical. Side cleft graft is useful when the scion and rootstock are of similar caliper.

In late winter, dormant seedling rootstock is moved into a greenhouse to begin active growth. When the upper buds start to swell the seedling is ready to graft. Dormant leafless scionwood is collected in the field, trying to match rootstock caliper closely.

The grafter makes a 1 in. diagonal cut down into the rootstock near the base. The scion is formed by making identical 1 in. cuts on opposite sides of the wood that taper to the base. This wedge shaped scion is inserted into the side cleft of the rootstock and the cambiums lined up. Only the graft cut is wrapped. A rubber budding strip is used to secure it. The rubber strip and any exposed cuts are painted with a thin coat of tree paint. The grafts are placed in poly tents at 78°F to knit. After approximately one month, the grafts will have knitted sufficiently for scion growth to begin. The tents are gradually vented to harden off the new growth. When the scion growth reaches the several leaf stage, the rootstock is cut back to the graft. The plants are grown on as previously mentioned.

Chip Budding. Chip budding uses a single bud removed from the scion with a chip of wood. The rootstock must be actively growing for a successful union. This method is particularly useful in producing a single stem whip for tree production, or when scionwood is limited.

In August, seedling *Acer palmatum* rootstocks in the field are graded to pencil thickness and the lower leaves and branches are removed.

Actively growing scions are collected from container-grown stock. Care is taken to match the size of the wood to rootstock. The scion is defoliated by trimming the leaves off, leaving a small stub of petiole to protect the bud. The scions are wrapped in damp newspaper and stored briefly in a cool place. It is important to use the scion as currently as possible.

The grafter selects a smooth, straight area, low on the rootstock. The first small cut is made across the stem at about a 30° angle, to a depth of ⅓ the stem. The second cut is made 1 in. above

the first, angling down to connect with it. The chip of rootstock is removed and discarded.

Identical cuts are made on the scion to remove the desired bud. The bud should be centered on the chip. The bud chip is placed in the rootstock, resting on the lip of the prior cuts. Cambiums match easily if the wood is of similar caliper. The chip bud is wrapped with the chip bud tape, covering the entire bud, tying above the bud. The buds knit in 30 to 35 days. When a small ring of callus is noticeable around the edge of the chip bud, the tape is removed. The budded rootstock is allowed to go dormant in fall.

In February, the upper rootstock is pruned back just above the chip bud. The cut should angle away from the chip bud to prevent the spring sap flow from "drowning" the bud. As the days warm, the bud breaks, producing a single stem whip. When the shoot from the bud is about one foot tall, it is staked. The first season, the main emphasis is on producing height in the maple. The second season the main emphasis is on building caliper and branching.

By utilizing these three methods of Japanese maple propagation, we can spread the work load for the grafting crew, and produce "Distinctively Better" Japanese maples in containers.

GRAFT INCOMPATIBILITY: EFFECT OF CYANOGENIC GLYCOSIDES ON ALMOND AND PLUM CALLUS GROWTH

CHARLES W. HEUSER

Department of Horticulture
The Pennsylvania State University
University Park, Pennsylvania 16802

Abstract. The effects of the cyanogenic glycosides, amygdalin and prunasin, and their breakdown products, cyanide and benzaldehyde, on callus from 'Marianna 2624' plum (*Prunus cerasifera* Ehrh. × *P. munsoniana* Wight & Hedr.), and on that from two almond cultivars (*P. dulcis* Mill. 'Nonpareil' and 'Texas') were compared. Prunasin inhibited the growth of 'Marianna 2624' plum and 'Nonpareil' almond callus but not 'Texas' almond. Amygdalin inhibited 'Marianna 2624' plum callus growth but promoted growth of both almond cultivars. All 3 cultivars were inhibited to the same extent by sodium cyanide; however, benzaldehyde was strongly inhibitory to 'Marianna 2624' plum callus at 0.05 mM, but a concentration of 5 mM was required to similarily inhibit growth of either almond callus. The greater sensitivity of 'Marianna 2624' plum callus to the cyanogenic glycosides and benzaldehyde suggests that benzaldehyde is an important factor in the almond/plum incompatibility.

Tissue compatibility or incompatibility in plants can be regarded as a physiological tolerance or intolerance, respectively, between the protoplasts of different cells (7). Although substantial research on stock/scion incompatibility has accumulated (4,8), little