SUCCESSES AND FAILURES IN GRAFTING JAPANESE MAPLES

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The title translated means — I have some good news and some bad news. Although I lack much formal training most of my training came from the trial and error method of doing and reading; failing; regrouping and failing again — and when limited and ultimate success did come — as Gleason would say — "How sweet it is". I could spend all of my allotted time speaking of failures, but any success is replete with failures so let us look on the bright and positive side.

I will define the term "grafting" to bring this talk into sharper focus. Grafting is the art of joining parts of a plant together in such a manner than they will unite and continue to grow as one plant. In the plant industry, grafting must be fast, efficient and precise if good economy is to be effected. Our end result should produce a vigorously healthy tree of superior quality.

Briefly, let me review with you the pre-grafting, grafting and post-grafting procedures and, along the way, I will discuss specific points that have a direct bearing on the success or failure in the grafting process. I invite you to relax and come with me on an exciting adventure into the world of grafting the beautiful maples of Japan.

ROOTSTOCK

Let us begin by examining the rootstock or understock. In our operation, *Acer palmatum* 'Littleleaf' is used exclusively for the production of rootstock seed. Most commercial grafters of Japanese maples in the U.S. use this tree. Its qualities are indeed magnificent when analyzed. It is fast growing and has a superb root system. It has a high degree of compatibility with all known cultivars of *A. palmatum*, *A. p.* 'Dissectum' and *A. japonicum* — and incidentally, it is a beautiful tree in its own right. In addition to using seed taken from *Acer palmatum* 'Littleleaf', we have instituted a program of rooting cuttings taken from this cultivar. Such rooted cuttings are potted and become an extremely valuable source of graftable understocks, thereby reducing our complete dependency on importing seed from Japan.

For the past 10 years we have systematically removed the 25 fastest growing understocks from batches of thousands of seedlings. These have been carefully tagged and set aside and now form the basic stock trees from which high quality cuttings are

taken for rooting and expressly grown as understocks for grafting. Seedlings are graded and approximately 25% are rejected as being below par in quality for grafting. These rejects are ideal for bonzai, however, and are sold for that purpose.

An extremely wide range of growth characteristics have been observed in young 'Littleleaf' seedlings. For example, after a 4 year period, some seedlings grown from seed taken from the same tree will show a minimum terminal growth of 2 to 3 inches while others show a maximum shoot growth of 4 ft. These measurements have been taken over the past several years. I like to think of grafting on rootstocks of this superior understock as plugging into a top power source or hooking a booster rocket to a wagon. In short, something is going to move and move they do!

Rooted cuttings are often grafted with excellent results after just one growing season, but by waiting a second year, a stronger plant emerges from the greenhouse in the spring. Seedlings and cuttings are potted up in 2-1/2 and 2-1/4 inch rose clay pots — the latter giving more grafts per square foot of bench space. Understocks are grown in a (hopefully) rabbit-free fenced-in compound. We have suffered untold losses to Bugs Bunny and his pals, he is enemy No. 1 to the Japanese maple. Entire crops have been cut down by this ambitious fellow who finds the texture of the wood so inviting for sharpening his teeth; indeed, it can look like a rotary mower was run through the seedling area.

POTTING MIX

Several years ago, in conjunction with Dr. Craig Oliver of Penn State University, we ran a series of tests for potting mixes expressly designed for container-growing of Japanese maples. The results were interesting and the mix that did the job for us was 3 parts good garden loam (pH-6); 3 parts sphagnum peat moss; 3 parts horticultural perlite (medium); 1 part dehydrated cow manure plus 1/2 lb. ground dolomite limestone per cubic yard of mix.

In December the young understocks must be brought in to an unheated cool house or well ventilated greenhouse. Do not make the mistake of leaving the potted understocks in the frames and then hopefully get them as you need them. You may wait too long and a severe freeze will lock them in as if they were set in a block of concrete. You will then wait around and day by day watching your grafting program go down the drain. We experienced this and it severely affected our grafting program. In the cool house the understocks are kept on the dry side but not to a point of dessication.

TIMING

The orderly progression of transferring batches of flats into the greenhouse to awaken the sleeping plants begins about Christmas time. Batches are color coded with plastic tape to prevent possible mixup with other batches or flats that may not be ready for grafting. The greenhouse is run at 60 to 65°F and approximately 15 to 20 days later, the understocks may be showing signs of growth activity. When you see the new white tips just forming on the roots, this is the ideal time to start grafting. A word of caution — don't allow the understocks to remain in the greenhouse too long past this point or they will come into leaf, the timing will be off and it will be too late to graft. Control of timing the admission into the greenhouse of batches of flats is tricky. A scientific approach must be devised or you will surely wind up with no trees to graft, or too many to graft, and a very erratic work flow schedule. The trick is to know your grafting production capacity. How many technicians are grafting? How many trees can they graft per day? How many trees do you plan to graft? A safe rule to follow is to allow 60 working days before the warming March air arrives. With these precautions, you can plan your grafting program.

Keeping charts on production has proved to be invaluable for subsequent grafting seasons. The chart is also used to keep notations on greenhouse temperatures in relations to the time the understocks take to break dormancy.

GRAFTING ROOM

I like to think of the grafting room as the surgery room where thousands of operations are performed and the technician as a surgeon very proficient in the art of grafting. The grafting room should be a comfortable and well lighted area. The technician should be comfortably seated with attention being paid to adequate lighting. We use a series of overhead flood lamps so as to eliminate shadows plus a small, high-intensity spotlight to cover the operating area. White oilcloth is used on the grafting table to aid in reflecting light and to make an easier job of cleaning up at the close of each day's activities.

SCIONS

There are over 230 different cultivars of *Acer palmatum*, *A.p.* 'Dissectum' and *A. japonicum*. We are grafting about 100 of these cultivars. The selection and collection of scionwood from the many trees can be a job in itself. Strict adherence to identification tags is mandatory during this process and, indeed, from here on until the tree goes to the ultimate purchaser. The gathering of the scions is done a week or so before they are needed. They are immediately wrapped in a wet cloth and stored in a refrigerator

at 35°F. In selecting scionwood, I prefer straight wood from the current year's growth. The old rumor that scions of Japanese maples can not be taken in freezing weather is absolutely not true. However, special precautions must be observed when taking wood at below freezing temperatures. The wood should be wrapped outside and put immediately in the refrigerator at 35°F so that it will thaw slowly.

GRAFTING

We use two types of grafts — the side tongue graft and the wedge graft, as shown in Figure 1. In both of these grafts, a high degree of success has been noted for the last 4 years — at least 97%. Both methods of grafting are fast and dependable with a good amount of cambial surfaces coming in contact and should take a good technician approximately one minute to complete on a production basis. Every effort is made to match the size and diameter of the understock to that of the scion but, in reality, our scions run slightly smaller than the understock at the point of union.

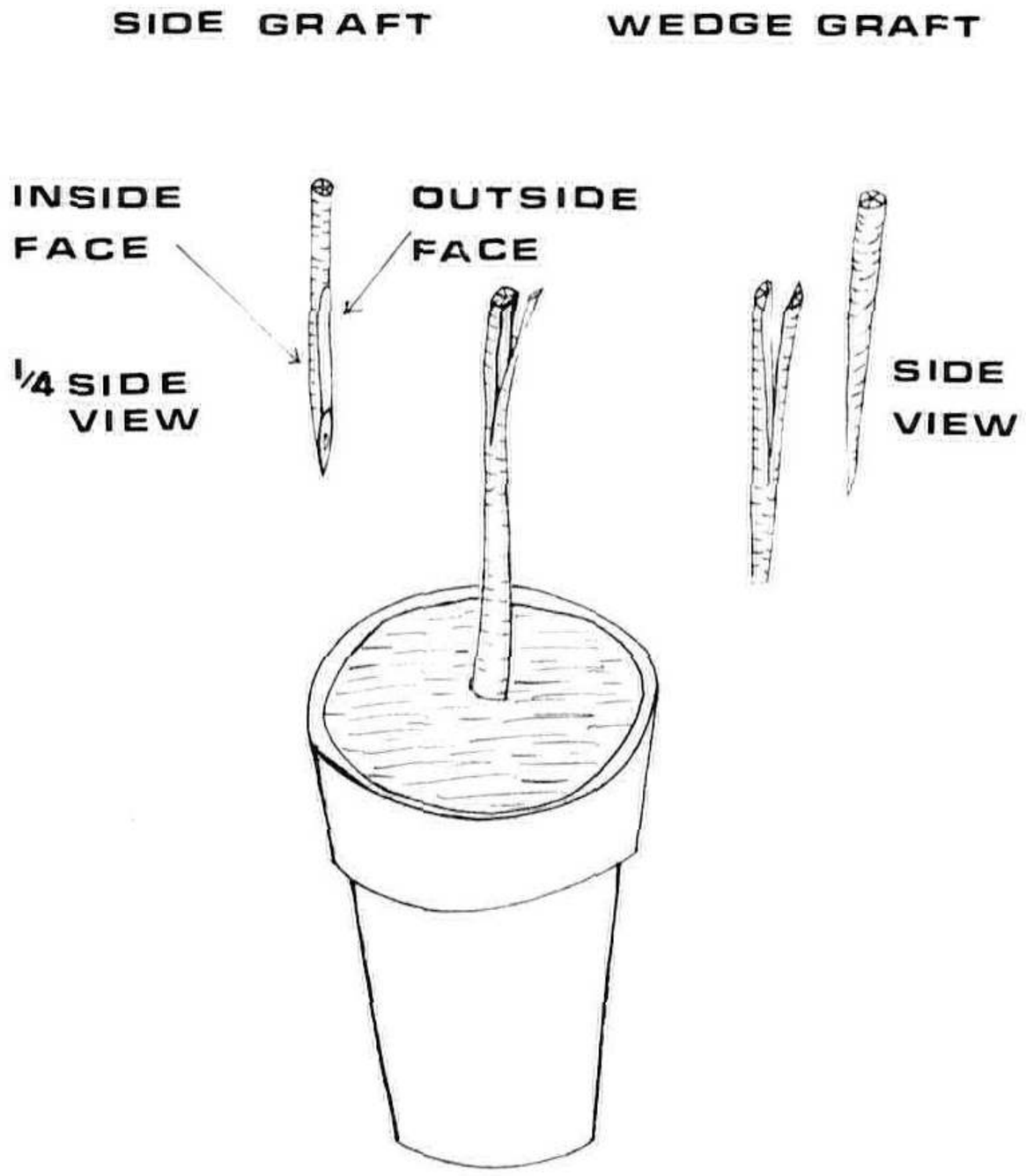

Figure 1. Side and wedge grafts used in propagating Japanese maple. Note slanting cut made at the base of the scion used in the side graft.

The side tongue graft is made by cutting the top off the understock at a point approximately 3 inches above the soil line. We use a linoleum knife, or grafting knife, if preferred. A 1-1/4 inch cut is made on the understock and extreme care is taken not to cut too deeply into the understock. The cut should go no deeper than 1/5 to 1/4 of the diameter.

The scion is selected and, in all cases, a small portion on the end to be grafted is cut off and discarded. A small wedge is fashioned by making cuts on both sides and the tip is cut off on a 45^0 angle. The lower buds are removed with a sharp downward brush of the thumb; however, at least two sets of buds are left remaining on the scion. Scion length ranges from a few inches to 6 to 8 inches on some of the larger grafts, particularly on *A. japonicum*. On many *A. p.* 'Dissectum' or cutleaf varieties, the graft is made 5 to 8 inches high on the understock. The reason for this is the great amount of lateral growth produced by the cutleaf cultivars. It gets the new growth off the ground, so to speak.

The wedge graft is made with a center cut directly down into the center of the understock, cutting down to a depth of 1-1/2 inches. The scion is fashioned by selecting wood approximately the same diamenter and, as in the side tongue graft, discarding a small portion on the base. A perfect wedge is made with the cut approximately 1-1/4 inches long. With both types of grafts wedges are inserted firmly in the understock with maximum care being taken to align the cambium layers.

BINDING

Binding is done with rubber grafting strips 5 inches long and 3/16 inches wide. Other nurseries use string to bind the union with equally good results. Binding is from top down, keeping the rubber strip flat to prevent cutting into the soft bark of the Japanese maple. Do not bind too tightly nor too loosely, but the union must be firmly held together.

WAXING

The new graft is dipped in paraffin wax to seal the union from the air. Wax temperature is maintained exactly at 140^0F by a thermostatically controlled electric heating element. The wax dip should be quick and should cover the entire union. We have never found evidence to prove that the 140^0 temperature was injurious to buds or woody tissue of the scion. New lower melting point waxes are equally as efficient but more costly.

SANITATION

Sanitation will determine success or failure from here on. In late fall, the greenhouse should be drenched with malathion, benlate and daconil. True, we have an overkill situation here, but we want to start with and maintain a sanitary environment for the young maple grafts.

Medium grade horticultural perlite is used on the benches and the pots are plunged to the mid-point. As soon as the pots are placed on the bench, a spray of daconil fungicide is applied.

TEMPERATURE CONTROL

Temperature control is now acute. Every effort must be made to maintain a temperature of 60 to 65°F. If the temperature should push upwards to between 80 and 90°F — most certainly bleeding from the understock will occur and virtually "drown" the graft, and there you are, with a beautiful failure on your hands. Cool Ray liquid glass shading has proved entirely satisfactory on both plastic and glass greenhouses. Adequate ventilation goes hand in hand with maintaining temperature and good sanitary conditions. Fans are left running continuously.

WATERING

In several weeks the union of the graft has taken; new growth is pushing and the requirements for water are increasing. Do not hesitate to water now. We have lost young trees at this point because of failure to water properly. Temperature of the greenhouse should still be kept in the 65° range.

REMOVING GRAFTED TREES FROM GREENHOUSE

By mid-May, you may be anxious to bring your new grafts out of the greenhouse, but a word of caution is in order. Five years ago, on May 15th, we removed several thousand new grafts from the greenhouse. That night we encountered a light frost which froze much of the tender new foliage. This resulted in the loss of several hundred trees which could not make new leaves. Our trees do not leave the greenhouse now until June 1st, at which time all danger of frost is past. Most young grafts can stand full sunlight but some light shade is beneficial before the transition to full sunlight.

By mid-July the graft unions are strong enough so the grafting rubbers may be removed; this step coincides with repotting the grafted plants to one quart containers.

A BRIEF REVIEW OF THE 12 REASONS FOR POSSIBLE FAILURES ARE AS FOLLOWS:

1. Failure to use or select proper understock.
2. Failure to protect young understocks from rabbits.
3. Failure in not bringing understocks in soon enough to prevent their freezing solid in the frame.
4. Failure in poor procedures for taking scions below freezing.
5. Failure to observe good sanitary conditions in the greenhouse and on the grafting bench.
6. Failure in matching and sizing scions to understocks.
7. Failure in binding the grafts too tightly or too loosely.

8. Failure by grafting too early or too late (in short — poor timing).
9. Failure to dip the grafts in wax so as to completely cover the union.
10. Failure to maintain proper ventilation and air movement in the greenhouse.
11. Failure to water properly, especially after grafting.
12. Failure by bringing the young grafts out of the greenhouse too soon and subjecting them to frost.

Now you know the causes of failure — eliminate them and you will have **SUCCESS.**

MODERATOR ZONDAG: Our next paper is entitled, "Growing Crapemyrtles in a Marginal Climate", by Ben Davis and Lonnie Lankford.

GROWING CRAPEMYRTLES IN A MARGINAL CLIMATE

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Ozark Nurseries is located in the Cookson Hills (a part of the Ozark Mountain range) in northeastern Oklahoma. This places us in USDA plant hardiness zone 7a. Although the average minimum temperature for this zone is given as 0 to 10°F, we nearly always experience 2 or 3 days of -5°F or lower at sometime during the winter.

This climate makes it difficult to grow crapemyrtle [*Lagerstroemia indica*] by the conventional method of propagating from unrooted hardwood cuttings lined out directly in the field. Because of the cold winter temperatures, cuttings lined out before mid-April are many times freeze-damaged. Late planted cuttings do not make enough growth in one season for most of the plants to reach salable size. It is very risky to leave them in the field 2 years because in most years the 1 year old plants will nearly all be winter-killed. We have tried digging all of the plants at 1 year, before extremely cold weather, grading out the plants large enough to sell, and lining back out the smaller plants. As a rule this did not work well because, while the plants were too small to see, they were too large to transplant easily through our transplanting machines. This practice usually resulted in poor stands from these re-lined out plants.