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Root-Grafting
Camellias

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The one question that Camellia fans are most frequently asking each other this year is, "Where can I get root stock?" The answer usually is, "There just is none available." This situation has been brought about by a series of factors related to the war and also by the tremendous increase in the number of amateurs who are doing their own grafting.

Without doubt there will be an adequate supply of fine root stock available three or four years hence. Meanwhile, we must either sit and wait or else explore other methods of propagation which are faster than rooting cuttings.

Root grafting, a horticultural practice long used with deciduous material offers considerable promise in relieving the shortage of root-stock. Special care is necessary to get satisfactory results but this care will yield the equivalent of eighteen to twenty-four months growth of a rooted cutting in nine months.

**Equipment**

A special propagating house or propagating box is advisable. This may be any size but should provide good drainage, a saturated or near saturated atmosphere and light. Too often propagation beds do not receive enough light. Shading is done only because it reduces temperature. Temperatures as high as 120° F. are satisfactory provided the humidity is high enough. A tight fitting propagating house or propagating box is necessary to maintain high humidity.

A sharp knife, a pair of pruning shears, and a spade are all the necessary tools. A bucket of water for washing the roots before grafting makes the process more pleasant.

**Procedure**

When a plant is dug, we leave a large quantity of roots in the ground. These roots are a total waste if we do not dig them and use them for root grafting. No special care need be exercised in digging the roots other than to avoid needless bruising of them. Once dug, they may be stored in moist sawdust for several weeks or used at once.

The pieces of root should be washed clean of soil and cut into segments that are three to four inches in length. All badly damaged areas should be cut out and discarded. The top of the segment of root should if possible be straight. This makes the cutting of the cleft easier.

The technique of setting the graft is identical to that used in the conventional cleft graft so frequently used with Camellias. The scions should be a minimum of three inches long, however. No wax, mud, or other protective coating of the graft wound is needed since the graft is covered by the propagating medium. Once the union is made, it may be advisable to tie it with raffia, string, or a grafting rubber. Except when the root segment is quite small, the cleft is usually strong enough to pinch the scion firmly in place.

**Care of the Graft**

Upon completion of the graft, it is placed in the propagating medium deep enough to cover all except the top one-third to one-fourth of the scion. A mixture of one-half peat moss and one-half sand has given the writer best results. This should be a little deeper than the medium used for cuttings in order to accommodate the additional length caused by the root segment.

**Development of the Graft**

The graft callus will be well started in about thirty days if conditions are favorable. This can be speeded up by applying a rooting compound (any commercial brand suitable for Camellia cuttings) to Camellia Roots to be used as Grafting Stock

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the scion wedge just prior to making the graft. By the time the grafts have been in the propagating bed sixty days, new roots will be developing nicely from the old root segment. The new roots normally arise at the wound on the bottom of the root segment. They may, however, arise from any point along the root segment. If roots develop on the upper portion of the old root segment, it is probably because the propagating medium is not draining well.

By the end of ninety days the root graft should be not only thoroughly united but should have developed a vigorous system of new roots. The grafts are now ready to remove from the propagation bench and plant in the soil. Particular care should be taken to dig the grafts out of the propagating bed in such a manner that the new root system remains intact. These are the important roots as they will be the ones through which the new plant will absorb minerals and water. If they are destroyed, growth will be greatly retarded.

Assuming favorable growing conditions, the growth of the root grafts will be directly proportional to the amount of new roots developed in the propagating bed. In one year’s time it is possible to get a full 16 inches of growth and a branched plant. Extra large or branched roots do not necessarily give more growth. Roots taken from vigorous plants are better than those taken from weak plants.

When to Graft

It is obvious that new growth is dependent on new root development. Therefore, root grafting should be done at least ninety days prior to the time new growth starts. It is preferable to do it earlier.

Advisability of Root Grafting

Probably root grafting will be restricted to the standard and not too rare varieties because of the amount of scion wood necessary. Such varieties as Alba Plena, Pink Perfection and Mathotiana are good bets for this type of propagation. Even though the root segment may not unite with the scion, the scion may callus over and produce roots of its own. The root graft is really a cutting with a piece of old root added below it to boost it along.
Camellia Die-Back

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For the benefit of new readers who have not followed the Camellia "Die-back" discussion that started in these pages last April, we wish to point out that in August our "Letters" contained a request for a clarification of the term "die-back." When we appealed to Dr. H. Harold Hume for a definition, he arranged with Mr. West to send us the following article which will help camellia growers to identify true "die-back."—Editor.

There is no doubt that the term "die-back" as applied to camellia diseases, has been very loosely used in correspondence and in published articles. The responsibility for this confusion rests squarely on the plant pathologists who have not made a clear-cut description of the disease available to the public. Although plant pathologists are confident that true die-back is caused by a parasitic fungus, publications have been meager, perhaps because no single organism has been proved clearly responsible for the trouble in all areas.

Typical die-back or twig blight is characterized by the dying of all the leaves on a twig or branch suddenly and without previous warning. If it is new growth the leaves and stems wilt, shrivel and turn dark in a very few days. Older, more mature leaves die and turn brown more slowly without shriveling, as though the stem had been cut off. If the bark of the stem is peeled back between the lowest dead leaf and the nearest living leaf, an area of dead discolored bark will be found extending around the stem and thus girdling it. If this is left undisturbed, the infection will gradually progress down the stem until the next lateral branch is killed at the base, causing its leaves to die suddenly. If the dead twig is a lateral, the infection will continue down the stem until the main trunk is reached and attacked. As soon as the bark has been killed completely around this, the whole top of the plant will die suddenly. This process may continue until the whole bush is killed even if it is a large specimen when first infected. Small plants may succumb in a very short time. Occasionally small sprouts on large stems or branches are killed and the infection spreads into the main stem. Here it advances slowly, causing a round or oval canker or slightly sunken area of dead bark to develop. Sometimes cuttings are attacked in the propagation bed and severe losses are incurred.

In other states, particularly New Jersey, Ohio, Pennsylvania and Mississippi, die-back or a similar disease is reported to be caused by the fungus Glomerella cingulata (Ston.) Spauld. & Schrenk.

Cankers seem to be characteristic of the disease in the northern states but in Florida, Georgia and Mississippi, dead shoots and twigs are more typical symptoms. In Florida such fungi as Phomopsis sp. and Diplodia sp. have been isolated more frequently than Gloeosporium sp. (an imperfect stage of Glomerella sp.), but the pathogenicity of neither organism has been proved. It is apparent, therefore, that either more than one organism can produce a similar disease in this state or the true parasite is quickly overgrown by other fungi.

Control measures were recommended by Davis and Pirone.1 Removal of diseased parts by pruning, have held the disease under control in Florida. Care must be taken to remove every diseased twig or branch and to remove all infected tissue (indicated by discoloration) as soon as possible after it appears. Frequent examinations of the planting should be made for two reasons; young shoots quickly shed their leaves when attacked and become very inconspicuous, and infected material should be removed as soon as possible to counteract the potential dissemination of the parasite. All clippings and prunings of diseased material should be burned or buried. Spraying with a copper-containing fungicide is recommended only if the disease is wide-spread in the stock. The correct time to apply the spray in order to derive the most benefit has not been determined but an application is usually made after each pruning.

True die-back or twig blight need never be confused with signs of soil deficiency, toxicity, unfavorable soil reaction, poor drainage, or drouth injury because none of these causes the sudden wilting and dying characteristic of the fungous disease.

Drowning, caused by the soil being flooded for several days, may cause the whole plant to wilt and die which is very rarely true in the case of die-back. Clitocybe mushroom root rot also may kill a whole plant suddenly as has been observed in a few instances.

*Co-author with Lillian E. Arnold of Native Trees of Florida, University of Florida Press.