Northern California Camellia Society, Inc.

A Non-Profit Organization

Vol. 5, No. 4 **OFFICIAL BULLETIN** June, 1952

Noble Pearl

Photo by L. O. Huggins, Santa Barbara, Calif.

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The Northern California Camellia Society, Inc. is a non-profit organization of camellia fanciers interested in the culture, propagation, and development of camellias. Meetings are held on the second Monday in each month from October to May inclusive, at 8 p.m., at the Chabot School Auditorium, Oakland. Membership is open to all those with a serious interest in the subject. Annual Dues $5.00. Membership application blanks may be obtained from Bruce Harless, Secretary, 1301 Stannage Ave., Berkeley.

Published by the Northern California Camellia Society, Inc.

COVER FLOWER

NOBLE PEARL (Jewelry, Paochucha) is a large 6-inch, deep-red flower, incomplete-double with petals very crinkled. Large wide leaves. Compact growth. This is one of the celebrated Camellia reticulatas imported from Kungming, China, by Descanso Distributors, Inc., La Canada, Calif.

SOIL CONDITION FOR PLANT GROWTH WITH SPECIAL EMPHASIS ON CAMELLIAS

By J. Vlamis, Ph.D., Assistant Soil Chemist,
College of Agriculture, University of California, Berkeley

Some plants have very exacting requirements with respect to climatic conditions; are supposed to like an acid or some other condition of the soil. Other plants have wide tolerance of growth conditions. Think of the usual garden, such as you may have in your yards: most of those plants could go to almost any part of the country and produce a collection of flowers similar to those you have. Most plants have a wide range of tolerance with respect to soil, rainfall, etc. A good example is corn; it is grown on the West Coast, in New England, in the South. Cotton was grown for a long time in the South; now California surpasses the South in per-acre cotton-production by a wide margin. There is a very wide range in conditions where most plants can grow. But the Camellia has some special peculiarities. The Orchid plant is still more highly specialized, I suppose. The Monterey Cypress grows naturally only in the Monterey area. Another example of a plant that has a restricted range is the Redwood; it grows along the north coast of California. I wouldn't say that the reason why they are restricted to a certain area is known exactly, but it is thought to be related to high humidity; namely, the fog belt.

There are a couple of conditions peculiar to soil. We have large areas of alkaline soil where not even wild plants will grow. Such soil may be reclaimed by adding sulphur, gypsum, or other amendment. Most of our acid soils are up along the north coast of California, approximately paralleling the Redwood belt.

From the point of view of the Camellia which seems to prefer acid conditions, here in the Bay area most soils tend to be on the neutral or on the alkaline side.

You have probably heard quite a bit, over a decade, of work that has been done using water-culture technique (hydroponics) in studying conditions for plant growth. You may wonder why we use such a method. The answer is: You can control conditions and study a simple system; then go to a more complicated system and see to what extent they apply to the soil. What conditions of the soil do we want for growing healthy plants? Many of the things we know now, we learned originally by the water-culture technique.

Even water can become unavailable to a plant. To illustrate I shall give an example of what often happens in the greenhouse. Suppose we are growing plants in water containing nutrients; we have cool nights, then the morning sun comes out and the temperature rises quite rapidly. This causes the leaves to start evaporating water quite rapidly. The roots are wet in water solution, but the temperature of the water where the roots are doesn't rise so rapidly as the temperature of the leaves. The roots cannot take water up fast enough to supply the leaves and they start to wilt. This may not do any permanent damage, however.

So you see, a plant's roots may be absolutely wet in water and yet not be abel to absorb enough moisture to furnish water for the plant. Most plants submerged in water-logged soil, wtih the exception of plants such as rice which is grown in flooded fields, would be killed. Submersion of the plant in water cuts off the oxygen supply and raises the carbon dioxide in the soil to a damaging level. As a result the roots no longer func-

The above talk was given at the April 7, 1952 meeting of the N.C.C.S. and was reported by Mrs. Barlow Hollingshead.

tion actively; they are probably slowly becoming injured and will die shortly. What applies to water absorption also applies to absorption of nutrients. The essential elements that plants require come mostly from the soil, although carbon dioxide and oxygen can come from the air to supply the leaves. If the plant is deprived of water, ultimately it also is deprived of nutrients. In this area we have a wide distribution of heavy clay adobe soil which tends to provide poor drainage and aeration conditions for plants.

We have a keen interest in what to do about these heavy clay adobe soils and I have brought along a kit to demonstrate what you have in adobe soil. I shall use beach sand as a contrast for high-drainage condition; and I shall use equal parts of soil and sand to simulate loam condition. A sample of each soil-medium is placed in a glass tube plugged loosely with cotton; a solution poured into the glass tube will percolate through the soil-medium and flow out into a glass container. Specimen #1 is beach sand; specimen #2 is a mixture of sand and clay; specimen #3 is a heavy type of clay soil.

First I shall use a red-colored solution with negative charge; it is similar to the charge that some important fertilizers have. It would have been better to show what happens to phosphate, which is an important nutrient for plants, but that would require a chemical test. The red solution is poured into each glass tube. As the solution passes through beach sand, it retains its red color and flows out into the glass container. As the solution passes through loam, it loses its red color; the loam has captured the negatively-charged ions. That demonstrates an important property of retaining nutrients that soils have that is useful for plants; that gives a tremendous advantage over sand. The absorption of phosphate is electrical, sticking on to the clay particles in the soil. A favorable rate of percolation of water is desirable. In the third case, there is too much clay in the soil and the water remains standing. While there are lots of nutrients in the heavy soil, they are sacrificed due to poor drainage and aeration.

This demonstrates the different technique you have to use on different types of soil: a heavy soil requires less frequent watering; a sandy soil frequent watering. How often watering is required depends on the amount of clay in the soil, which is a measure of its water-holding capacity.

Now I shall use a solution containing a blue dye with a positive charge like ammonia. As in the previous case, the blue liquid passes quickly through the sand without losing its color. But the blue solution passing through loam loses its color, indicating that ammonia is absorbed by loam. As before, the heavy soil prevents the water from flowing through.

To make the record complete, there is another important factor: the nitrate ion. This nitrate does not behave like others. It is negatively charged but it does not stick to the soil as phosphate does.

Of use in increasing percolation is gypsum (calcium sulphate). The addition of gypsum to a heavy soil tends to produce the same effect as adding organic matter such as compost or straw or leaf mold, to make the soil more porous and more suitable for plant growth. According to microbiologists, the addition of a large amount of organic matter promotes the growth of organisms in soil and causes decomposition at a tremendous rate. Certain carbon compounds are produced which have the ability to act like a binding agent; they take the millions of particles of clay and make small spheres of the particles. That also improves the conditions for plant growth, drainage, etc.

There is another product, Krilium, that has an effect similar to gypsum. Krilium-treated soil has gone three years without requiring to be re-

treated; these experiments will show eventually how long a time a single application of Krilium will last. As a rule, compost-treated soil must be re-treated with compost, for the bacteria chew it up.

Chemically, Krilium is a sodium or calcium salt of hydrolized polyacrylonitrile, which has an effect on particles of clay and soluble salts, called aggregation of colloidal particles.

Application of Krilium to heavy clay soil has a similar effect to that of gypsum but multiplied many times. A single pound of Krilium is as effective as several hundred pounds of compost in increasing the porosity of the soil. Krilium, however, appears to resist microbial decomposition, so that annual applications are not necessary. Since Krilium increases the porosity of the soil, roots penetrate more easily and use up the nutrients; this may mean that plant food must be replenished.

Krilium looks like a pretty good discovery. It was originated by Monsanto Chemical Company and will be out for public sale sometime in 1952; but probably will be quite expensive at first. If you have need for only a small amount, it probably won't matter whether you use organic matter or Krillium.

In studying the nutrient status of soils, we have found there are many deficient in nitrogen; relatively few deficient in potash. An intermediate number of soils indicate a low phosphate condition.

Camellias require an acid condition having a pH around 5.5 or even less, which is getting close to the point of intolerance of many plants. When the pH gets down to 5, you get close to the zone of potential trouble; therefore, you need to protect your plants from too high acidity. One possible reason that Camellias require a relatively low pH is that they may have difficulty picking up sufficient iron from the soil necessary for formation of chlorophyl.

Some ions stick to the soil and others don't. About 90 per cent of ammonia would be tied on to soil; but only a trace of nitrate would be hooked on. We think of ammonia as being alkaline, but actually in soil it creates an acid condition due to its high rate of entry into roots, leaving an acid residue. A heavy soil can take it better than a light soil. Nitrate tends to bring the pH to the alkaline side. It is probably better to use a mixture of the two for most plants, and use ammonium sulphate for plants like Camellias.

When you acidify soil by adding ammonium sulphate, it is not a question of what it does to the soil right now but what the plants do to the soil after ammonium sulphate has been introduced. Ammonium ions are absorbed very slowly. Roughly ten ions of ammonium are absorbed for every one of sulphate. Hydrogen ions have to take its place. You end up with sulphuric acid. Aluminum sulphate is a different type of acidifier. Alumnium sulphate can become toxic and will kill plants. That is one of the reasons you should not go too far below a pH of 5. For most plants it is not toxic above pH 5; but below pH 5 it becomes very toxic. But it must be added that plants vary in their tolerance of high acidity and corresponding aluminum toxicity. It is entirely plausible that Camellias belong to the group of plants that will tolerate a certain amount of acidity for aluminum. There is danger of knocking a plant out fooling around with acids that would bring the soil much below pH 5.

Hormones are used sometimes in the propagation of Camellia cuttings. The actual utility of hormones is questionable; the results are not consistent enough, but worth trying for the sake of building up our knowledge of their effects.

Vitamins are not taken seriously any more with respect to plant growth. A claim was once made that vitamins are beneficial to plants; but

plants manufacture their own vitamins, not only for themselves, but have enough left over for us, too.

BOARD MEMBERS RETIRE

At the end of the 1951-52 camellia year, three directors resigned from the board, after making important contributions toward building a strong and vital society as well as the production of outstanding annual camellia shows.

Secretary Bruce Harless completed two years on the board, having handled the office of secretary 1950-52, chairman of Advance Ticket Sales and chairman of Display Blooms.

Dr. Gordon W. Richmond completed three years as board member, having filled the offices of vice-president 1949-50 and president 1950-51; chairman of Illumination, Public Address System, Background Music at Show, Executive Show Committee.

Dr. Walker M. Wells completed three years as board member, having filled the offices of vice-president 1948-49 and president 1949-50, as well as Executive Show Committee chairman.

At the organizational meeting of the new board a resolution was passed to thank these retiring directors for their outstanding contributions to the Northern California Camellia Society, Inc.

PRIZE WINNERS AND DONORS

Fred E. Heitman, D.D.S., Chairman

Throughout the 1951-52 Camellia season, nurserymen have been generous in providing plants of fine varieties to be used as door prizes and exhibitors' prizes.

At the final meeting of the year on May 12, 1952, officers of the Society provided the plants for prizes; the names of varieties, donors and prize winners were as follows:

May 12, 1952

BLOOD OF CHINA (Victor Emmanuel) One of the most celebrated of the red Camellias — a dark salmon-red. Large and deep incomplete double with yellow stamens intermixed with petals. Late bloomer. Vigorous, compact growth, suitable for tub culture. Donated by DR. FFED E. HEITMAN, Vice-President, Orinda, and won by Mr. and Mrs. C. F. Jensen of Richmond.

VIRGIN'S BLUSH One of the great new varieties. White flushed pink to palest pink. Exquisite petal texture. Double incomplete imbricated, bud center opening to petals intermixed with stamens. Vigorous upright growth. Midseason bloomer. Donated by BARLOW W.S. HOLLINGSHEAD, President, Orinda, and won by Mr. and Mrs. C. A. Roberts of Alameda.

DR. H. V. ALLINGTON, M.D., OAKLAND

Triangular Notch Grafting

A notch-graft can be used on almost any size of understock. On large shrubs several scions can be fitted around the circumference of the understock without the need of splitting it.

I prepare the scion first, cutting so as to produce a triangular wedge tapering smoothly to a point. The outer side of the wedge is composed of undamaged bark and cambium layer.

A V-shaped notch is then cut into the understock to fit the prepared scion. This notch likewise tapers to a point. With care the notch in the understock can be prepared to fit the scion quite accurately so that the cambium layers on scion and understock touch all around.

The scion, or scions, are then held in place with rubber grafting bands or with string or other binding material as desired.

HOW TO GRAFT A CAMELLIA

Courtesy SUNSET Magazine

Photographs by Herbert V. Mitchell, Walnut Creek

Although camellias most often are propagated by cuttings, grafting is sometimes a more useful method.

Suppose that a camellia is strong and healthy but blooms shyly or doesn't have particularly attractive flowers. Rather than discard that plant and lose the advantage of several years' growth and an established root system, use the lower part as an understock and graft it with a desirable variety.

This method can also be used for propagating camellias which do not grow readily from cuttings or produce only meager amounts of satisfactory cutting wood.

Here are other advantages:

If vigorous stock is used, grafted plants grow more rapidly and produce more and larger flowers, until the upper part of plant balances the root system.

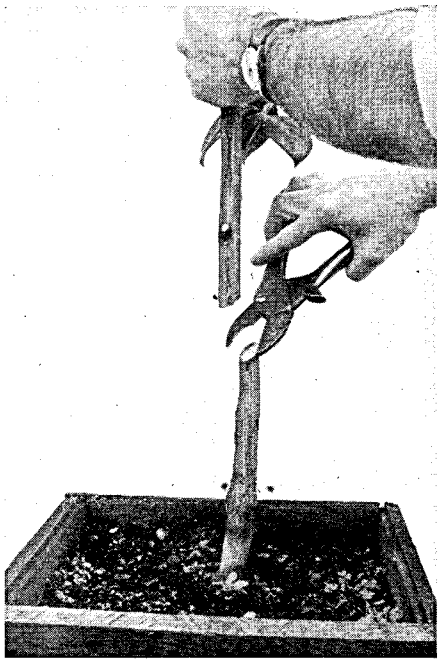
Slow-growing varieties grafted on fast-growing understock will bloom sooner than they would if grown from cuttings.

Three to four-year-old seedlings or rooted-cuttings of Camellia - japonica and C. sasanqua can also be used as understock.

For scions, select the same kind of wood as for cuttings. Use firm wood —it should not be soft nor brittle— from the ends of branches.

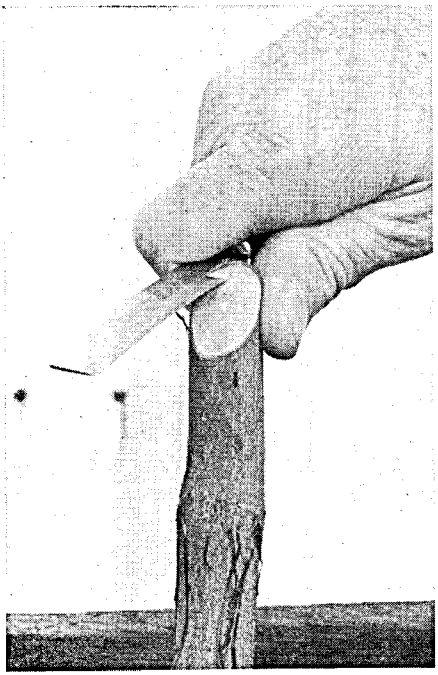
The best time to graft camellias is in early spring just before the plants begin to grow actively. Camellias are most dormant when they are in bloom. Growth starts immediately after.

Herbert V. Mitchell of Walnut Creek prepared a series of photographs to show his technique of cleft-grafting.



1. Six-year-old plant of Camellia japonica used as understock. Cut understock at angle to speed callusing.

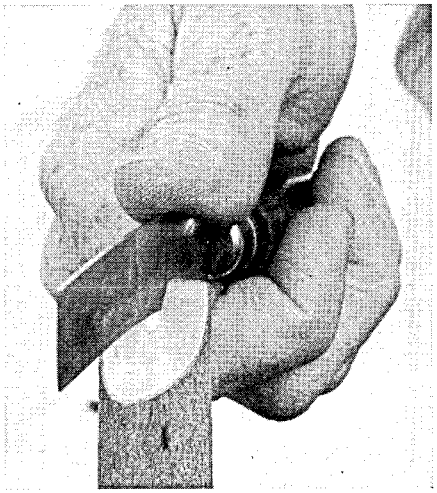
(Ordinarily the understock is cut off about 4 inches above ground. Mr. Mitchell has cut a heel in excess of 6 inches: in case graft does not take, there is plenty of understock left for regrafting; branching takes place at a greater distance above ground, which is often desirable. Ed.)



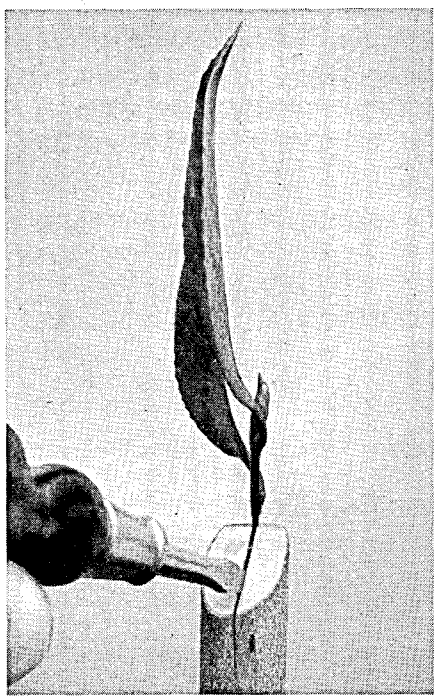
2. Trim cut end of stock with clean sharp grafting knife for smooth clean cut. Top edge is cut off for easier placement of the scion.

(Advantage of trimming top edge, as in photo No. 2: It is easier to see cambium layer on understock when scion is inserted; the cambium layer on scion should match cambium layer on understock.

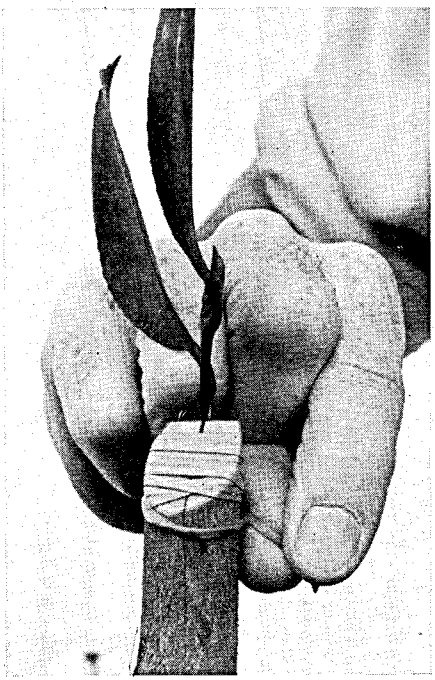
Disadvantage: Any flat surface on face of understock tends to hold droplets of sap, which could serve as a breeding place for fungus. Fungus disease is the villain in graft-failure. Top edge of understock need not be cut off; it won't be quite so easy to place scion, but one chance for fungus growth will be eliminated. Ed.)



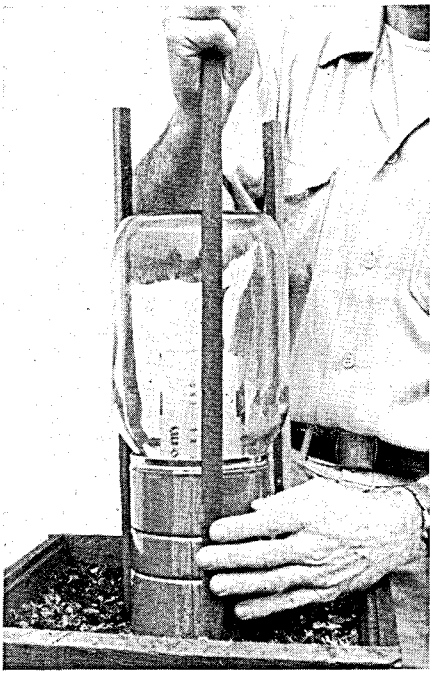
3. Cut vertical split about an inch long, using sharp knife to avoid tearing the dark-green cambium layer between bark and wood.



4. Make tapering wedgelike cut at end of scion. Open cleft in understock with small clean screw-driver, and insert scion in upper end of split.



5...Remove screw-driver and wrap understock with grafting rubber. The scion should fit securely in understock.



6. Jar over grafted plant maintains humidity necessary for callus formation. Vermiculite in can raises soil level; supports jar.

(Wrapping of grafting rubber across surface of cut, as shown in photo 5, may tend to hold droplets of sap and encourage fungus growth—may also retard healing. To avoid these hazards, wrap grafting rubber around bark surface below the slanting cut on understock. Ed.)

(In photo No. 6, the glass jar is a clean gallon-size mayonnaise jar. These may be purchased at a second-hand bottle dealer — see classified section of telephone directory.

Photo No. 6 shows a gallon-size tin can, with top and bottom removed, placed around understock, to hold up glass jar, thus giving greater height to growing space within. Since Mr. Mitchell cut the understock off six or eight inches above the soil, this additional growing space was necessary. Mr. Mitchell used vermiculite inside tin can to raise soil level and to support jar, thus maintaining humidity within. Vermiculite is very light in weight and is sterile.

Common practice is to leave a heel of about four inches on understock. Then the glass jar alone is sufficient to give growing space. If there is any mold or old mulch on soil surface around understock, it must be scraped off, or it may become a source of fungus growth. A half-inch of clean builders' sand may be used to support glass jar and to seal out air, to maintain humidity to keep scion alive. Ed.)

NOTES ON GRAFTING OF CAMELLIAS GLEANED AT PAST MEETINGS OF THE N.C.C.S.

From time to time during the past six years symposiums on grafting have been held at monthly meetings and members have contributed information concerning their grafting experience. Below are comments that may be helpful to those planning to graft next season.

O. E. HOPFER, Oakland

Understock

What kind of camellias do we usually use as understock for grafting? The answer is that we normally try to **take advantage of the root system of an established plant** which may have attained considerable size, but whose blooms are not of the quality which we consider fine today. Sometimes we get discouraged with the performance of a certain variety, and finally we decide to cut its head off and graft a first-class scion onto the established root stock. There is no need to dig up and destroy an entire plant just because we do not like the quality of its flowers. It is much easier to cut it off within a couple of inches of the surface and insert several high-grade scions. If the plant is a large one, with a trunk say of 1½ to 4 inches in diameter, we often use the triangular notch-graft.

Sometimes we have seedlings that have grown to flowering size but have inferior flowers. Since we do not want to be horticultural wasters, we utilize the root stock by grafting onto it a choice variety.

Scions

Camellias which are very scarce are often used to supply scions for grafting; first, because of the paucity of new growth from which to make cuttings; secondly, because two or three scions can be made from the same amount of wood that is used for a cutting; and thirdly, because the single or two-eyed scion grafted onto a well-developed root-system will grow much faster than a cutting on its own roots. This rapidity of growth, however, continues only until nature strikes a balance between the amount of roots and foliage. Thereafter, a grafted plant will grow no faster than one on its own roots.

Combination Grafts

At my home we have grafted all kinds and sizes of camellias, from 4-inch pots up to trees 18 feet tall. Right near our front entrance, for instance, I had planted Jennie Lind which developed into a fine looking tree, but every year the flowers were miserable. Camellia fans would visit my home with high expectations, feeling that here they would surely see some fine foreign importations and the best in camellias — then, mounting my front steps, they would be greeted by Jennie Lind. Well, we watched Jennie grow from 4 feet to 18 feet, and it was such a nicely formed tree and looked so green and glossy we hated to cut it down and start all over. It was not good enough to keep, yet it was too good—just as a green tree—to throw it away. So one Wednesday morning I called Dr. H. V. Allington and suggested that if he felt like doing a little surgery on his afternoon off, I would leave my office at noon and meet him at my home and we would cut down Jennie Lind and work her over. Doc is a whizzer with a scalpel and before we got through we had put in triangular notch-grafts of Adolphe Audusson, Gigantea, and English Donckelari. Now when visitors come to our home during camellia season they see three of the choicest varieties immediately they set foot on the property.

Another tree that I worked over was a large La Peppermint. I tired of its habit of producing blooms which

I could not pick. Every time I tried to twist off a bloom, all I got was a handful of petals; the blooms always shattered. One afternoon I cut it down and grafted eight choice varieties onto it.

Cutting off one of my large seedlings, I grafted 14 choice white varieties, which some day may bloom into a regular symphony in white.
In grafting combinations of varieties onto understock, it is possible to conjure up many interesting combinations, all of which can be grown on one bush; but if you want to maintain a beautiful garden instead of developing a horticultural curiosity shop, you will need to use good taste and judgment in grafting. I have used the art of grafting primarily to do something useful with worthless seedlings and to correct some of my earlier mistakes in judgment when I was an avid camellia collector.

MRS. KREENA SMYTH,
SMYTH CAMELLIA NURSERY,
LAGUNITAS ROAD, ROSS

Grafting Tools

The grafting tools needed are a grafting knife or a 40-cent shoe knife which can be purchased at hardware stores, and a wedge (plant label or screw driver). The wedge is used to hold the cut open.

Understock and Scion

Prepare understock before you do any grafting. It should be thoroughly wetted three or four days before grafting. Then add ½ inch to 1 inch of potting mixture above the soil. The graft is to be sealed with a jar; if you don't have something soft for the jar to seal into, you are not going to have a good seal on the bottom, that is necessary to maintain an even humidity.

Cut understock off about three inches above the ground. Then cut the heel off a little at an angle, clean it and smooth it, using a sharp grafting knife; a clean cut will heal better than a raveled one. Now cut down vertically about one inch into heel.

Prepare scion. One growth bud and one leaf may be used, leaving the leaf whole or cutting off tip of leaf. Cut both sides of the stem end of scion about the shape of a small screw driver, except that it is to be a little thicker on one side than on the other.

Use screw-driver as a wedge in holding cut open while inserting scion. The little green cambium layer on understock and on scion should meet. A magnifying glass may be used for matching the cambium layers. Then bind with grafting band to keep scion secure.

Now take a clean jar and place it over the graft, sealing jar into the potting mix to maintain an even humid condition. Keep jar on top for two or three months.

When callus is formed take plant labels and set one on each side of jar to raise it a little to let in air. On a cloudy day or at night, take jar off altogether. If you have a greenhouse, that's the place to put it; otherwise build a little frame over it with muslin; it should get light without direct sunlight, for the chlorophyll in the leaves has to perform its function.

If any mold develops — watch that carefully, particularly after being in frame about three weeks — apply a vinegar solution (2 teaspoonsful in a quart of water)—with a camel's hair brush.

If the scion does not take but the understock lives, it can be used again for grafting.

Question: Why do you cut understock on slant?

Answer: If the understock is cut on slant, sap will run down and won't stay on top.

W. H. HALL, CAMELLIA HALL NURSERY, SACRAMENTO

Ordinarily we consider that **the best root-stock for grafting is a lush, well-grown plant,** preferably slightly pot-bound. It is important that the understock have a strong, sturdy root system.

If you have a camellia in your garden that you don't think much of, take better care of it before you graft it. I know definitely that the weak, the starved, and the unkempt camellia does not work well as understock.

Grafting Tool

A good sharp knife to use as a grafting tool is important. To protect your hands, it might be a good idea to save that right thumb by using several layers of adhesive tape to protect it from cuts.

Cleft Grafting

We prefer in our cleft-grafting to use **a slanting cut** in cutting down the understock, since we have found that **the slanting cut causes less of that unsightly bulge** as the graft heals. Sometimes by the third, fourth, or fifth year, there is nothing more than a slight waver in the line of the trunk to show where the grafting was done.

We have also found that in cutting the understock it is best to **pick a smooth side for the high side in which you produce your cleft** so that there will be a nice even point for a union, rather than cut where a leaf came out. That particular area of the bark is irregular and the scion does not fit quite so well.

In taking a scion I use only one eye, rather than two or three. In the first place I am stingy with most scions if the wood is rare. In the second place, the grafted plant is off the ground before it starts to branch. If three leaf buds are used, the plant will branch close to the ground. If it happens to be a prostrate or low-growing variety, the branches droop below the pot level and it becomes necessary to prune and reshape the plant after it is well on its way. However, if you are growing in containers, you may like to have an occasional plant that grows that way since it gives that kind of symmetry that the orientals have been famous for centuries. But we have found that the prettiest plant is the one that gets off the ground a bit before it starts to branch.

When inserting the scion, be sure not to put it too far into the cleft. It has been my experience that you can get by having the cambium layer just outside the cleft but not inside. If the cambium layer on the cleft is inside the cambium layer on the scion—the bark edge of the scion being out beyond the bark edge of the cleft—the graft may take sometimes; but never have I found one to take where the scion was inserted so far that the bark layer of the scion was inside the cleft.

Bind with red rubber budding-strips so as to leave no gaps and thus exclude air from the area of the union.

Bins for Grafts

At Camellia Hall Nursery we do not use bottles to cover our grafts; we use bins entirely. These bins are identical in appearance and construction to cold-frames but are deeper. The bins have ordinary "barn frames" on them — comparable to window-sash frames. The front part of the bin is 36 inches high and the rear portion is 42 inches high. They are 16 feet long, with the exception of one which is 8 feet in length. The width is 30 inches from front to rear.

In the bottom of the bins, we have approximately 3 to 4 inches of sand which is kept moist before we insert the newly-grafted plants. From then on it is only a matter of lifting the glass an inch at a time over the whole bin when airing and hardening the callus. When the temperature gets too high, we cover the bins with burlap, even after we have lifted the

glass. In this way we can protect from sun without having to touch the plants.

The greatest advantage of the bins is that they may be opened for inspection without losing all of the humidity.

Our percentage of takes in bins has been as high as 93 per cent, which is considered extremely high for commercial grafting of camellias on a large scale.

GORDON COURTRIGHT, EAST BAY NURSERY, BERKELEY

One of the first things that I learned about grafting was the importance of practicing with a knife—not just once, but 20 to 30 times—on the same kind of wood that is to be cut in grafting.

Cutting Tool

The knife blade that I use is straight on one side and sharpened on the other—similar to a chisel.

Removing Mold from Understock

If the understock has any mold on the ground, it is necessary to clean off the top layer of dirt. For this, we use a broad, flat chisel or a board about 1½ inches wide and scrape off the mold as well as the top half-inch of dirt.

Scion in Cleft-Grafting

When using a two-eye scion, or longer, one bud-eye should be set down into the cleft far enough to meet the cambium layer. **The scion will take much faster if the eye is set into the cambium layer** because there is about forty times as much growing tissue at an eye as on any other part of the cambium layer. It has been our experience that the graft not only takes faster but that it heals over more quickly.

Large Understock

When large understock — ¾-inch diameter or larger—is being used, it is necessary to keep the gap open while inserting the scion. I use a sharpened plant label as a wedge.

On very large understock — 2 inches or so in diameter — the label may be left in the split to prevent the scion from being crushed. We have found that it is not necessary to remove the label from that size understock at all so long as the label is broken off flush with the understock after growth has started.

Tying the Graft

To tie the graft, I use string. Personally, I do not like budding-strips. I believe callusing sets in faster when the wound is not entirely covered. Besides, we can watch the union between the scion and the cambium layer after it has been tied to see that it is still in the right place. Other speakers have mentioned that the graft should be covered completely to keep the air out; but I have not found this necessary, grafting in the greenhouse. We always use a jar to cover the graft and that seems to give enough protection.

Mulching Grafted Plant

After the plant has been grafted, ½ to ¾ inches of sand, leaf mold, or peat—or better, a mixture of all three —is used to keep the air out and make a good seal for the jar.

After Care of Grafts

All too many plants are lost after they have been properly grafted because of improper after care.

Since we keep our grafts in the greenhouse until August, we have no trouble protecting them on cold nights and our plants keep growing right through the season.

The plants are watered thoroughly about a week before they are grafted; after grafting, as little as possible until they have gotten a good start. We keep the grafts on the dry side. After they have been in about a month, we watch them carefully and

do not let them get too dry. I have seen many grafts ruined by too much water; dampness tends to cause mold to develop.

If mold should begin to form, it must be taken off. We use a 15-cent water-color brush and a 5% solution of white vinegar in water to remove the mold. This treatment does not seem to injure the plants.

Shading the Grafts

We cover our jars in the greenhouse with a long piece of cheesecloth to shade the plants and to prevent the glass jars from acting like a magnifying glass on bright, sunny days. After the jars are taken off, we still use the cheesecloth to shade the young plants for at least a month.

Removing the Jars

The jars are taken off the grafted plants after the callusing has taken place and as soon as possible after the plant starts to grow. We remove the jars during the morning to give plants a chance to become accustomed to outside air before night comes. If there is any sign of wilting, we place the jar right back on for a few days—then we try removing it again.

VERNON JAMES, JAMES RARE PLANT NURSERY, HIWAY 17 AT CAMPBELL

About one week before grafting camellias, water the plants to be used as understock thoroughly, since very little moisture will expire from the plant after the top is cut off. If the understock is too wet at the time of grafting, mold will form. And mold is the big bugaboo in grafting.

Treatment for Mold

At the first sign of mold, wipe it off with finger and air the plant. If the day is warm, 1 to 1½ hours will be sufficient. On a cool day, 3 to 4 hours will be required. Such airing should kill any mold that is formed, in the early stages. If the mold persists, use about a 2% solution of white vinegar in water and apply it with a small water-color brush. A fungicide, such as sulphur, could be used, but too strong a solution will burn. Usually a little air is all that is necessary if the mold is caught when it first starts to form.

After Care

After the healing process starts along the base of the scion, let a shoulder build out until the cut or wound is completely closed in. Then, on a cool evening, take the jar off and there will be no ill effects whatsoever.

If quite a little growth has started, remove the jar on a cool evening and check the new growth the following morning. If there is any sign of wilt, put the jar back on. Then the next evening, try removing the jar again.

Question: How long should the jar remain on?

Answer: Leave the jar on until the callus is formed on both sides and quite a littel shoulder is built up. The time required depends upon weather conditions. In the greenhouse, it would take about three weeks to show signs of callus. But on most plants the jar should come off in about six weeks.

Question: Should one water the grafted plant?

Answer: The plant need not be watered if there is still moisture ½ inch down. But don't let the plant get completely dry as that will injure the root more than necessary. I soak the understock well the week before I graft. Then by the time I start grafting, I have a nice moist condition—it isn't too wet and it isn't too dry. Never water the understock the same day that you graft, for you are just asking for mold to form in a humid atmosphere. (continued on page 15)

O. E. HOPFER, OAKLAND

Whip Graft

While like the nurseryman I probably make more cleft grafts than any other type, I want to tell you about my favorite method of grafting—the whip graft. I like the whip graft particularly because when well done, it is impossible to detect the graft union without minute examination. I use the whip graft whenever I find that I have a scion and an understock of the same diameter.

I cut off the understock with a slanting, diagonal cut of perhaps 1½ to 2 inches in length. Then I lay the scion alongside the slanted understock and measure on the scion the exact length of the slanting cut I made on the understock. The length of the slanting cut on the scion must be exactly the same length as the slanting cut on the understock.

After making the slanting cut at the base of the scion, I cut a tongue into the slanting cut on both the scion and the understock. When these two tongues are neatly fitted and the scion carefully wrapped, there are six junctures where the cambium layers are matched up — three on one side and three on the opposite side. Thus, if you are wearing bi-focals and some of your matching-up is done by feel rather than by sight, you have six chances of matching with a whip graft as compared to two chances with a cleft or wedge graft.

I believe that the whip graft is neater, stronger, and avoids all of the humps and bumps and other disfiguring evidence of grafting so characteristic of other more commonly used methods.

ALEXANDER PAYETTE, D.D.S., LOS GATOS

Miniature Grafting

Grafting on understock that is smaller than a pencil is called miniature-grafting.

First, cut a scion; then look for understock exactly that size. The diameter of scion and of understock may be measured with vernier calipers.

Cut off the top of the understock to be grafted, square across, and make a slit with an artist's knife down through the center of the understock. Cut the end of the scion into a V-shape wedge and place it in the slit. With this method there is union of the cambium layers on both sides.

The graft is protected by wrapping the union with grafting band; then it is covered with a glass jar until callus is formed.

After the grafting jar is completely off, is the time to use grafting wax. If the union is not entirely healed, wax should be applied to prevent disease. That large crack that exists will harbor organisms.

Grafting Wax

I make my own grafting wax, using 1 lb. lamb fat, 1 lb. beeswax, and 1 lb. powdered resin. First I render the fat, then add beeswax, gently stirring the mixture. Very slowly, while the other ingredients are boiling I add the powdered resin. I boil the mixture until all the resin is in solution; then empty it into containers. (Cold cream jars are suitable. Ed.) The addition of resin gives an adhesive quality to the wax. It never gets hard, and when callus forms it grows right under it and the wax rolls off.

VERNON JAMES (continued)

Question: Is it all right to graft a fast-growing scion on a slow-growing understock?

Answer: No! Absolutely not! If you do, it will eventually be pinched off.

Question: Can a reticulata scion be grafted onto japonica understock?

Answer: A reticulata scion can be grafted onto any **fast**-growing japonica variety.

Question: Would you keep the grafted plant on the dry side?

Answer: Yes, particularly until the scion is healed.

Question: Do you use any kind of wax or healing compound after the jar is removed?

Answer: Yes. A wax or a tree seal —something like that—may be used to keep the understock from drying out. Let a small callus form and then paint the unhealed portion of the understock with wax or tree seal. In two years time, the callus should completely cover the old stock.

Question: When the plant becomes dry after grafting, how much water should be used?

Answer: Give it only a very light watering because you still have a moist condition at the bottom of the can.

Question: When mold forms after grafting, is it due to an excessively moist condition?

Answer: No. Mold is formed from spores in the air or on one's hand. High humidity gives mold an ideal condition for growth.

Question: How much light should be given the newly grafted plant?

Answer: Place the grafted plant under lath and burlap in the open. I would place the plant, preferably, on the east side of the building where it would get the morning sun and use double burlap. The plant should not be placed in complete darkness, but in more shade than in an ordinary lath-house. Darkness, too, helps mold to develop.

Question: Can old wood be used as scion?

Answer: I have found in grafting that it might take old wood longer to heal because there is a larger healing surface. However, you will get more growth the first year.

Question: Does tree seal have any effect on callus growth?

Answer: I used to use tree seal, but I found it retards callus growth. Use a regular grafting band to catch the top and bottom of scion to protect it from being disturbed while removing or putting on the jar. Put the seal on after the jar is taken off entirely—just on the bare wood. Sometimes, on very large understock there is quite a gap. In that case, fill the whole crevice with tree seal.

Question: When do you do your grafting?

Answer: I usually start right after Christmas. Now, the first week in February, I have about fifty more to do, then I am through for the year.

Question: What age understock do you use?

Answer: I use 3- to 4-year-old understock in gallon cans and 5 to 6-year-old in larger containers. If I want a lot of wood, I take a 30 to 50-year-old plant and graft something on it that I like.

RESULTS OF ELECTION OF OFFICERS AND DIRECTORS FOR THE FISCAL YEAR 1952-53

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VICE-PRESIDENT: David L. Feathers, Lafayette.
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