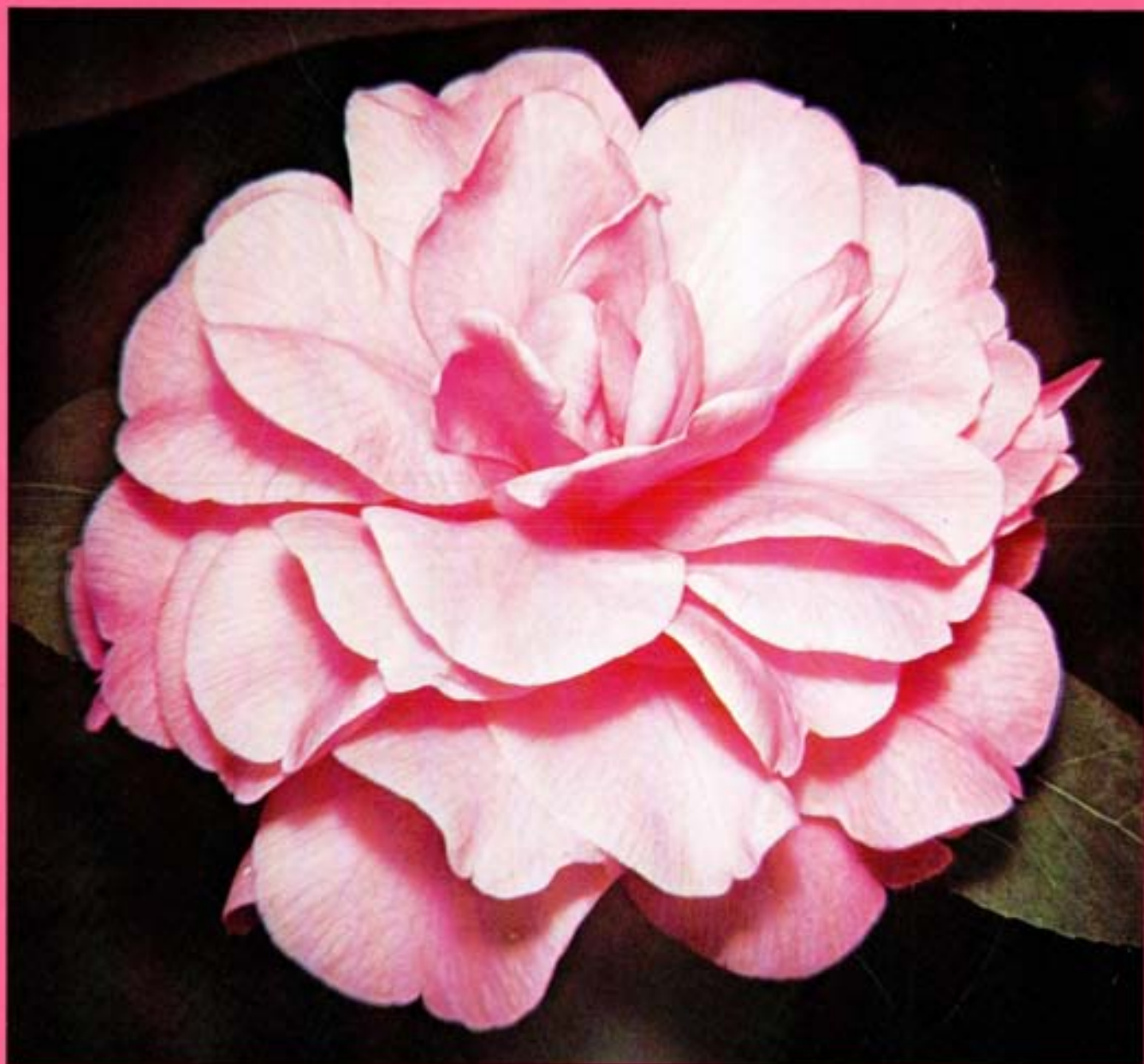


The *Camellia* Journal



'Grant Black'

ACS Reg. No. 1600

A chance *C. japonica* seedling of Ferol and Sam Zerkowsky of Tammia Nursery, Slidell, Louisiana. A medium size light pink formal double with part to all imbricated petals. Good growing mid-season, generous bloomer. There just seems not to be enough pretty formals. Propagated by Tammia Nursery. See page 3.

THE CAMELLIA — BASICS AND RESEARCH — SPECIAL ISSUE

AN OFFICIAL PUBLICATION OF THE AMERICAN CAMELLIA SOCIETY

VOL. 34, NO. 4

PRICE \$2.00

NOVEMBER, 1979

Camellias — New Opportunities

W. L. ACKERMAN¹



Fig. 1. Fragrant-flowered camellia hybrid 'Fragrant Pink' *C. rusticana* x *C. lutchuensis*.

Most of us think of camellias as the brightly colored blooms of spring-flowering *Camellia japonica* and autumn-flowering *C. sasanqua*. However, Sealy, in his Revision of the genus *Camellia*, describes 82 recognized species and 16 others still too little known for their status to be determined. A wide variation in foliar and floral characters reflects a great diversity between species, but all are of oriental origin. Distributed in southeast Asia between 10°S and about 40°N latitude, they extend from Nepal and Tibet in the west, across

¹ Research Horticulturist, U.S. National Arboretum, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C. 20002.

(Continued on page 6)



Fig. 2. Fragrant-flowered camellia hybrid 'Cinnamon Cindy' *C. japonica* x *C. lutchuensis*.

The Camellia Journal

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Volume 34

Number 4

November, 1979

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OFFICIAL PUBLICATION
OF THE

American Camellia Society
(USPS 555-900) (ISSN 0008-204X)

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Executive Secretary—Editor

Address Communications to: Executive Secretary,
American Camellia Society, P. O. Box 1217,
Fort Valley, Georgia 31030

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ACS offices are located at Masee Lane 5 miles
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can Camellia Yearbook*, published in December.

Entered as second class matter September 1, 1960,
at the Post Office at Fort Valley, Georgia, and
additional office of entry, under Acts of August
24, 1912.

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President's Message



ROY C. STRINGFELLOW

This is being written in August
after being informed by Brownie that
I *must* get this message to him at once
to meet the deadline for the No-
vember Journal.

These editors seem to know im-
mediately when they run into a pro-
crastinator. I keep getting gentle re-
minders—that this article is in, that
article is in, and that Phil Ireland has
already sent in his "Horticulturally
Speaking" article. Keep after me
Brownie, I'll make the deadline yet.

As the show season starts in No-
vember, and after gazing into my
crystal ball in August, I can't quite
discern what will happen to our shows
this coming season. It doesn't take a
look into the ball to be aware that in-
flation is really here or that the energy
crunch is for real.

However, these are "Chicken Little"
days in America and the American
Camellia Society. Everyone has pick-
ed up the cry "the sky is falling," and
if we say it is, so must it be.

As Americans, we have already
talked ourselves into a recession, and
have done such a good job of it that
a depression no longer sounds out of
the question.

As American Camellia Society mem-
bers we are crying, "what will happen

to our Society? And with the gasoline
shortage, what will happen to our
shows?"

I know I am walking uphill against
the stream of public opinion, but
pardon me, if you will, for this one
gasp of positivism.

Bad as things are, I have an idea
that they've never been so good. Fur-
thermore, the worst that things have
been in this country is better than
most of the world has it, and they
were still lining up to get here the
last time I checked.

We in this Society must all work
towards getting new members. Don't
worry about our shows. We will have
them, and they will be beautiful!

The biggest challenge in this nation
in the 1980s may not be energy—it
may simply be bringing the American
people together and this certainly ap-
plies to the American Camellia So-
ciety membership.

At any rate, the next time you per-
sonally pick up the chant "the sky is
falling," sit down and count your
blessings, say thank you God.

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A Beginner's Guide to Camellia Physiology¹

DONALD E. DAVIS²

The dream of the amateur camellia grower is to produce a plant loaded with blossoms each as perfect as any single blossom that occurs naturally on the plant when all environmental conditions are just right. This paper was written to help the amateur understand enough about the physiological processes that occur in a camellia plant to improve his chances of fulfilling his dream and to more easily understand his failures. The discussion will center primarily on the use of gibberellin, cold damage, and selecting a suitable place to grow camellias.

If we are to deal with physiological

¹ This paper is based in part on a lecture presented to the Auburn Men's Camellia Club on January 8, 1979.

² Department of Botany and Microbiology, Auburn University Agricultural Experiment Station, Auburn, AL 36830.

considerations in growing camellias, we must start at the beginning which is for all camellias, as it is for all of us, with the fertilized egg. In the case of camellias it may be necessary to go back through many grafted plants to get to that original fertilized egg. If conditions are right the fertilized egg starts dividing and the one original cell is followed by two cells and this by 4, 8, 16, 32, etc. The process involved is mitosis. It is an astoundingly accurate process that almost always results in two new daughter cells, each having precisely the same genetic information that was present in the original fertilized egg. During these first divisions each new cell may enlarge until it becomes as large as the mother cell. The process soon results in thousands of cells all small and

densely packed with protoplasm (the living material in the cell) and each able to divide again. As the process continues, some of the cells near the center of the mass quit dividing and enlarge greatly, often becoming 20 or more times larger than the original cell. In time, the resultant mass of cells (the embryo) has developed to the point that it is possible to recognize two primary areas of cell division, one on each end of the embryo, with larger and less frequently dividing cells in between. These enlarged cells soon begin to differentiate from one another and it is possible to distinguish strings of cells running lengthwise in the embryo that are longer than the others. These cells will eventually become tiny vessels that transport water in the developing plant. Each of the cells in the vessel went through three processes; cell division, cell enlargement, and cell differentiation. The embryo continues to grow and when the seed is planted it gives rise to a seedling. The

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'Brenda Ann Hart'—Medium japonica, rose pink formal double. *ACS Journal* back cover, February 1978. Grafts: 6 yr.—\$40.00; 5 yr.—\$35.00

'Martha Israel'—Medium, white formal double, 6 point star center. Front cover *ACS Journal*, August 1977. Grafts: 8 yr.—\$50.00; 7 yr.—\$40.00

'Mayer Israel'—Medium, blush pink formal with pink flecks. Outside back cover *ACS Journal*, August 1977. Grafts: 8 yr.—\$50.00; 7 yr.—\$40.00

'Janette Habas'—Large, white, full peony to anemone form. *ACS Journal* front cover, August 1976. Grafts: 6 yr.—\$40.00; 5 yr.—\$35.00

'Sam Zerkowsky'—Large, soft pink peony or anemone center of pink and white petaloids mixed with golden stamens. Rows of pink petals form a skirt. Mid-season, bushy, heavy bloomer. *ACS Journal* cover, August 1975. Grafts: 8 yr.—\$50.00; 6 yr.—\$40.00; 5 yr.—\$35.00

'Tammia'—Miniature, formal double, pink edged petals, white and blush petals. A Show winner. *ACS Journal* cover, November 1973. Grafts: 8 yr.—\$45.00; 6 yr.—\$40.00; 4 yr.—\$30.00

'Dorothy Hills'—Medium japonica, formal double, swirled petals. Blush pink center shading to darker pink; mid-season. *ACS Journal* cover, November 1976. Grafts: 7 yr.—\$50.00; 6 yr.—\$40.00; 4 yr.—\$35.00

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first root to emerge develops from the group of dividing cells at basal end of the embryo and the area of cell division at the other end gives rise to the stem of the seedling. There is, however, another region of cell division of interest to the camellia fancier. Some of the cells just outside of the water conducting tissue never lost their ability to divide. They are between the bark and the wood and by their divisions give rise to more bark and wood and thereby to growth in diameter of the stem. This region of cell division (the vascular cambium) is important to the camellia fancier because it is the area that must be matched in the stock and scion if a graft is going to take.

The process by which the cells enlarge is of particular interest. Cells enlarge because water moves in and makes them swell, but the walls around the cells tend to prevent the cells from swelling. How easily the cell wall stretches is thought to be influenced by chemical messengers

synthesized in the stem tip or root tip that move to the regions where cells are enlarging. One of the first of these messengers to be identified by scientists was indole acetic acid (IAA) which was later called an auxin and which still later was put in a group of chemicals called plant growth regulators. IAA is synthesized by plants but other growth regulators having auxin-like activity have been made by man to use in controlling how plants grow. However, auxins are involved in a lot of things besides cell wall stretchability and growth. Two important uses of growth regulators are causing cuttings to root and fruit to develop on the plant even when pollination and fertilization have not occurred. In this latter instance, the result is a seedless fruit which is often larger and of better quality than normal seeded ones. Some of the more potent man-made growth regulators, such as 2, 4-D and 2, 4, 5-T, are applied in excess to kill sensitive plants. During World War

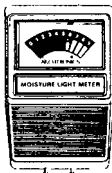
II, there was a great deal of interest in the possibility of using growth regulators to kill crops and their existence and use was one of the carefully guarded war-time secrets.

At about this same time the Japanese discovered another group of growth regulators that we now call gibberellins. The gibberellins were found as a result of basic research on a disease of rice called bakanae or foolish seedling disease. This disease is caused by a fungus infection which causes very rapid stem elongation and prevents the production of grain. Subsequent investigation showed that the fungus caused this effect because it produced gibberellic acid which was absorbed by the rice plant. This compound is now called GA₃ and is only one of a large family of gibberellins. Apparently all plants produce one or more gibberellins; over 40 have been identified.

The gibberellins, like other growth regulators, have many different effects on the growth of plants. When applied to sugar cane, they increase the growth of cane so much that yields are often doubled. Gibberellins often eliminate the need for a cold period to break the dormancy of buds and, like the auxins, they may make possible the production of seedless fruit. The large, seedless, green grapes that we receive from California are all the result of using one or more of the gibberellins. The gibberellins are also widely used by camellia growers. All the buds on the camellia contain a stem tip which by its growth gives rise to all of the parts of the bud. A microscopic examination of the stem tip shows that it consists of a smooth central knob of rapidly dividing cells and that lower down there are tiny wrinkles on the outside of the stem tip. These wrinkles, by their growth, give rise to bud scales, leaves, or flower parts. The petals of a camellia flower could have become leaves or bud scales if they had gotten the proper chemical message soon enough in their development. Many camellia growers have observed bud scales whose tips or edges were colored

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much like the petals. In this case, the chemical messenger that influenced the cell differentiation did not affect all cells equally.

Many camellia growers use gibberellin (GA_3) as a chemical messenger to speed up camellia bud development. Most apply gibberellin when they can see well developed flower buds. At that time the bud is dormant, and remains inactive until there is enough cold to stimulate the synthesis of enough of the natural chemical messenger to stimulate growth of flower parts and opening of the buds. By applying gibberellin the grower supplies the messenger and the buds open sooner than under natural conditions. In the southeast this means that many buds will open and produce beautiful flowers that might otherwise be killed by cold later in the season. Furthermore, because gibberellin also increases the elasticity of the cell walls, the cells will be bigger and the flowers more spectacular. However, it is water moving into the cells that causes cell enlargement. Last year in Auburn, many growers were disappointed because the gibberellin didn't seem to do much good. However, the fall season was exceedingly dry and thus one can imagine that the buds may have said, "I got your message but I can't do anything about it unless you send me some water."³

Cold damage and cold tolerance are also areas that are not fully understood by many camellia growers. Several things are involved in cold tolerance. First, when a bud begins to swell it is doing so because individual cells are swelling due to water entering these cells. The additional water dilutes the cell contents and they are much more easily frozen just as would happen if you added more water to an automobile radiator without adding more antifreeze. Another aspect of cold tolerance is the development in the cells of an antifreeze (a mater-

ial which lowers the freezing point of the cell sap). Plants in which this has happened are said to have become cold hardy. Many plants, if "warned" of coming cold, respond by developing more antifreeze. Plants are "warned" that cold weather is on the way by the nights getting longer and cooler. Plants vary markedly in their response to the warning from those that do not respond at all to those that become very cold hardy. Even among camellias, there is a lot of variability.

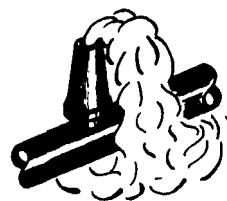
The warning of coming cold with the resultant increase in cold tolerance on the one hand and the enlargement of cells diluting the antifreeze on the other hand are important considerations in explaining the probability of cold damage. Camellias may be injured by an early cold spell that overpowers the plant's cold hardiness. Another kind of damage occurs when an unseasonably warm period interrupts the cold period in the winter or a late cold spell occurs in the spring. In both instances the cold period has been sufficient to cause the plant to break dormancy and the cells are ready to expand as soon as the weather is warm enough and moisture is available. When the warm period comes, the buds begin to swell, the antifreeze is diluted and if the cold weather returns the swollen buds or flowers are killed.

Protection against cold damage of this latter type is most easily done by picking a good place in which to grow the camellias. Many have found that camellias do particularly well under pines. The pines help in two ways. During the daytime the shade of the pines keeps the temperature lower and thereby decreases the probability of a temporary warm spell causing buds to swell prematurely. The other factor is that it is warmer at night under the pines. On very clear, still, cold nights when the temperature reaches 25° F in the open it may be only 30° under nearby pines. Everyone is aware that it is considerably cooler in the daytime in the shade of a pine tree but few realize that the same foliage that interferes

with heat input from the sun also decreases heat loss. The earth and everything on it is continually losing heat by reradiation in essentially the same manner that it gains heat from the sun. The only difference is that the heat loss from the earth is by invisible radiation. The same clouds that interfere with heat input from the sun also interfere with heat loss from the earth. Thus, it is common to hear such expressions as, "you don't have to worry about a frost tonight, it's cloudy." The primary benefit of using smudge pots to protect citrus from cold is that the smoke interferes with heat loss, not the fact that the smudge pots are producing some heat. On clear, still nights the temperature is significantly lower at the bottom of a hill. This is because cold air is heavier than warm air and drains down the hill and tends to collect at the bottom. The effect is enhanced if some obstruction, such as a dense hedge, tends to prevent the cold air from draining out of the area. Such places

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³ It is assumed that the reader recognizes that these are only very crude analogies intended to help him visualize what is happening. The real explanations are much more complicated.

are referred to as frost pockets and are avoided by growers of frost-sensitive crops such as apples, peaches, citrus, and grapes and should be avoided by camellia growers.

So far, cold damage has been discussed only in terms of damage caused by decreased temperature in the living cell. In truth, cold probably causes more damage by its indirect effects on water relations than by cold *per se*. Most often the damage caused by frost is desiccation of the frosted area rather than by the cold. The frost that forms on the leaves and flowers is mostly formed from water withdrawn from inside the plant. Citrus growers sometimes use sprinklers to decrease frost damage. Oranges may be covered by ice frozen from the water sprayed on them and yet suffer only minor damage while nearby unsprinkled plants are severely injured. Water from the sprinkler provides protection because it prevents desiccation caused by frost and because the water is warmer than the air and adds heat to the system. It takes a lot of cold air to change water to ice.

(Continued from cover 2)

mainland China to Korea and Japan on the east. They grow in climates ranging from tropical and sub-tropical to temperate. Camellia species are adapted to outdoor culture in the United States in the East from Florida to coastal New England and in the West from California to Washington. The past three winters have been devastating to many camellias in the Washington, D. C. metropolitan area and northward, resulting in a need

Cold may cause desiccation in another way. The camellia cannot take up water as rapidly from a cold soil as from a warm one. If a series of cold days is followed by a warm day with lots of sunshine and wind, the tops of the camellia may lose more water than can be supplied by the roots. A common result is the killing of tips of petals of partially opened buds. Sometimes the whole plant is severely stressed and may die. This type of injury occurs in area where light intensity and wind velocity are high and bare soil is exposed. An example of such a site is the south side of a house where wind is channeled between two buildings. Heavy mulching to conserve water and insulate the soil against cold will decrease the probability of this kind of damage.

When planting camellias it is well to remember that two areas may vary markedly in their suitability even though they are only a few yards apart. Keeping the factors mentioned above in mind will make it possible to choose a site where cold damage is least likely to occur.

for re-evaluation of cold-hardiness among some of the more widely grown cultivars. Breeding advances toward greater adaptation to northern climates appears to at least partially overcome these recent setbacks.

Because of their economic importance, Camellias have a long history of cultivation.² *Camellia sinensis* and, to a lesser degree, *C. irrawadiensis*, are the source of commercial tea. Although the use of tea likely predates historical records, the earliest written record of the tea plant seems to be that of "Ren Tsz' Chun Ts' ui" about 500 B.C. Of comparable antiquity are various uses of many camellia species; for the edible oils from the seeds, for dye pigments, pH conditioners, and liquid fermentation from the wood ash, for medicines from

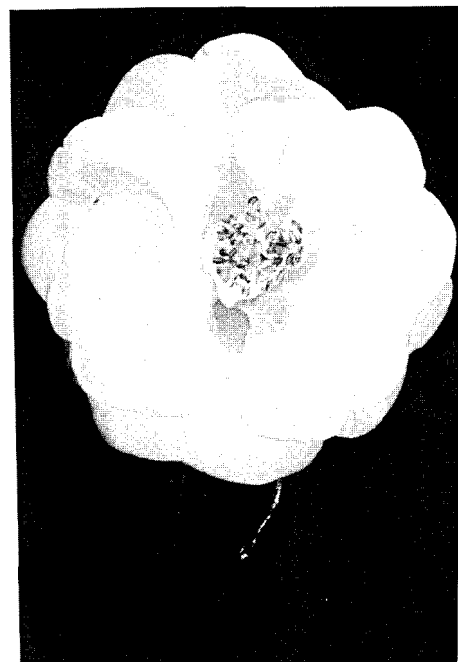


Fig. 3. Cold-hardy camellia selection 'Frost Queen'.

plant extracts, and for spear heads from the hardened wood.

Some 36 *Camellia* species have been successfully introduced into the United States, but many of them are rarely grown by camellia growers.

Most of the minor species have small flowers of little commercial interest. They are difficult to hybridize with commercial cultivars, and it takes many years of backcrossing to get hybrids that are worthwhile. However, continued breeding solely within popular species such as *C. japonica* and *C. sasanqua* (intraspecific hybridization) severely narrows the possibilities of genetic variation. Eventually, the law of diminishing returns catches up with this type of breeding, and increasingly greater efforts must be made to achieve new variations in flower and plant characteristics. Interspecific hybridization involving the minor species provides the potential for the development of truly new forms of camellias.

The first interspecific camellia hybrids produced were the *williamsii* hybrids, crosses between *C. saluenensis* and *C. japonica* made in the early 1930's by J. C. Williams of Caerhays Castle, England. During the next several decades other interspecific hybrids were bred by S. R.



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² For a complete history of camellias see the chapter entitled "History" in *The Camellia, Its History, Culture, Genetics and a Look Into Its Future Development*, Edited by David L. Feathers, Associate Editor Milton H. Brown.

Clarke of England, B. W. Doak of New Zealand, E. G. Waterhouse of Australia, D. L. Feathers, J H. Asper, and W. E. Lammerts, all of California, and K. Sawada of Alabama. These plant breeders were the pioneers of camellia interspecific hybridization. The *williamsii* hybrids were extremely successful in their combination of new flower colors and forms with good plant habit and hardiness. Their popularity is reflected in the large number (over 70) of registered cultivars grown today.

The success of the *williamsii* hybrids spurred camellia breeders to explore other species combinations. The introduction of *C. reticulata* cultivars from China into the United States in 1948 and the early 1950s led to its hybridization with *C. japonica*, *C. saluenensis*, and other species. *C. reticulata*, with its large showy flowers but poor straggly plant habit, was a perfect candidate for hybridization. Any hybrid progeny that improved plant characteristics while retaining the excellent flower quality was a distinct improvement. Here again success was achieved, with the added bonus of greater hardiness than that of the parent *C. reticulata*.

By the early 1960's substantial numbers of cultivar hybrids were distributed throughout the camellia world. Camellia breeders advanced to backcross and second-generation hybridizing. It was perhaps only natural that backcrosses of *williamsii* cultivars to *C. japonica* would take the lead. These were closely followed by second-generation combinations involving *C. reticulata*, *C. cuspidata*, *C. pitardii*, and others.

It was also in the early 1960's that hybridization programs on both the Pacific and Atlantic coasts extensively explored species compatibility within the genus. At that time, C. R. Parks of California and the author expanded the numbers of interspecific camellia hybrids from a dozen or so to almost 150 species combinations. This work dramatically increased the knowledge of compatibility relationships within

the genus. However, with perhaps the exception of hybrids from *C. lutchuensis* and from *C. granthamiana*, few of the F₁ (first generation) hybrids had significant commercial value. Although many interesting and unique floral and plant characteristics were developed among the F₁ generations, few had the direct commercial value of the *williamsii* hybrids. It will take one or more backcross generations or outcrosses with other species before the full potential of many of these hybrids can be properly evaluated.

Two aspects of the interspecific hybridization programs that merit special mention are the search for floral fragrance and the search for cold hardiness. During the past 17 years floral fragrance from *C. lutchuensis* has been combined with species having large flowers. 'Fragrant Pink' (Fig. 1) and 'Cinnamon Cindy' (Fig. 2) were the first of these interspecific hybrids, introduced in 1966 and 1968, respectively.

The late R. K. Cutter of Berkeley, California, was a strong advocate of acquiring highly fragrant cultivars. His efforts resulted in the introduction of 'Virginia Cutter' and 'Alice Cutter'. Unfortunately, most F₁ hybrids involving *C. lutchuensis* are highly sterile and are of limited breeding value. This obstacle was overcome by colchicine treatment of 'Fragrant Pink' to produce a fertile tetraploid named 'Fragrant Pink Improved'. This new fertile hybrid in turn was used to produce a series of backcross hybrids. The first of these to be named was 'Ack-Scent', released in 1978.

The search for greater cold hardiness has been equally difficult. Here, Parks and the author, taking different breeding approaches toward the same objective, have succeeded in developing cold-hardy strains that may well extend the cultural limits of camellia northward. Spring-blooming cultivar 'Frost Queen' (Fig. 3), introduced in 1970, was field-tested at winter temperatures as low as -8°F without appreciable injury. Evaluations from cooperators indicated that some flow-

er bud injury occurred at -3°F, leaf burn at -10°F, and severe plant injury, but survival, at -26°F. The past three winters have shown that most *C. sasanqua* cultivars are susceptible to prolonged freezing temperatures and drying winter winds. The *C. sasanqua* collection at the National Arboretum has been reduced through winter killing during the past three years from over 200 specimen plants to about a dozen. However, *C. oleifera* plants in the same area have shown neither plant nor flower damage. Hybrids of *C. oleifera* with *C. sasanqua* and *C. hiemalis* field tested for two winters show hardiness comparable to *C. oleifera*. The flowers of these hybrids offer much the same size, color range, and character of *C. sasanqua* on plants with smaller, thicker, leaves of equal ornamental attractiveness. One promising hybrid, a cross between *C. oleifera* and *C. hiemalis* was registered as 'Frost Prince' in 1978, and is presently being propagated for distribution. Surveys of the most cold-resistant *C. japonica* cultivars at the National Arboretum and Washington, D. C. suburbs indicate that 'Variety Z', 'Frost Queen' and 'Leucantha' have been outstanding. A breeding program, was begun last year of inter-crossing these three cultivars which may lead to even greater cold hardiness than the parents themselves.

In contrast, species introduced from tropical and sub-tropical Asia, such as *C. hongkongensis*, *C. miyagii*, *C. granthamiana* and *C. kissii* would appear to offer promise for greater sun- and heat-tolerance, useful for extending the range of camellias southward.

BOB WINE

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Interspecific hybrids among these species were distributed last spring to a group of cooperating camellia growers now living in southern Florida. Also, camellia hybrids have been developed that extend the blooming season throughout much of the summer, that have willowy pendulous branches suitable for hanging basket culture, and that have new foliage which ranges from pink through red to deep purple for several weeks before being masked by chlorophyll pigmentation.

The major advances in interspecific hybridization have occurred during the past several decades. This is an exceptionally short time if one considers that it frequently takes a decade or more to develop, propagate, and distribute a new camellia hybrid. Yet, impressive as the accomplishments may be, plant breeders have only begun to use the great reservoir of genetic variation in *Camellia*. If plant breeders, limiting themselves to the 36 camellia species now in the United States, were to explore all interspecific crosses including reciprocals there

would be 1,225 possible interspecific combinations. Experience indicates that not all of these combinations would result in viable hybrids. Some species do not appear to be compatible with certain other species. As an example, the author has explored 243 interspecific combinations and obtained valid hybrids from 124 of them. If we assume that this ratio is typical of the genus, then exploring all 1,225 possible combinations may well provide 625 new hybrid combinations including reciprocals. The use of hormones and other chemicals in conjunction with pollination and the recent experimentation in somatic hybridization could greatly increase the number of viable hybrid combinations achieved.

Because the many camellia species available to researchers have such diverse genetic characteristics, the combinations resulting from hybridization offer almost endless possibilities. The author believes that the camellias of the future will be a combination of the best qualities of the various species.

—ACS—

Camellia Nutrition

E. C. ("GENE") SNOOKS

At first glance it might seem rather odd to call this article "Camellia Nutrition" as opposed to the more common term "fertilization". Upon closer examination the appropriateness will become apparent. Plants of all types are made up of only three major elements: carbon, hydrogen and oxygen. These are all derived from air and water. Only minute amounts of other elements, extracted from the soil, are found in plant cells and these are called minerals. It is these mineral constituents which we will discuss; their sources as well as their role in plant nutrition. The needs of the *genus camellia* will be given particular attention.

The nutritional requirements of plants must be supplied by the growing medium surrounding the roots. Usually this will be soil or one of the currently popular "soil-less" growing mixes. In a well balanced soil the nutritional needs of the plant may be satisfied for many years. In container culture, with the limited soil volume, additions or supplements must be made at regular intervals for proper growth and flowering.

Generally speaking, the mineral content of the soil must be supplemented as the nutrients become exhausted. This loss of nutrients occurs not only from use by the plant but (especially in container culture) by leaching of the soil by water. These nutrients can be added via organic or inorganic fertilizers. The controversy has raged for years over which is best. Both have advantages and disadvantages. Organic sources are limited in supply, are generally lower in mineral content, slower to act, but less likely to damage the roots from excessive applications. They also often contribute to the buildup of beneficial soil bacteria. On the other hand the benefits of inorganic sources are immediate availability to the plant's roots, concentrated sources of supply and a wider range of sources. In the case of trace elements it is almost impossible to find suitable organic fertilizers. One must also remember that *all* organic fertilizers must be converted to an inorganic form by soil micro-organisms before they become available to the plant.

The pH or acid/base level of the soil

must also be considered as a part of the nutritional program. Exactly how this works can be seen from Figure 1.

The "big-3" minerals are Nitrogen, Phosphorus and Potassium. These are the three numbers usually seen on any fertilizer package. Note that they are always listed in the order given above and that they are listed in alphabetical order. These might be thought of as equivalent to the human body's need for protein, fats and carbohydrates. The minor elements are iron, calcium, magnesium, and sulphur and these are similar to our mineral needs for iron, calcium and phosphorus. The trace minerals are numerous and might be thought of as equivalent to our needs for vitamins. Hence the title "*Camellia Nutrition*".

NITROGEN

Of the three most essential nutrients, Nitrogen, Phosphorus and Potassium; Nitrogen is, by far, the most important for good plant growth. Plants are able to absorb nitrogen in either the nitrate or ammonium form. The former is the most usual. All new cells contain protoplasm which contains large amounts of nitrogen. Nitrogen also plays a major role in the production of chlorophyll, the green pigment of plants as well as other plant substances.

Symptoms of nitrogen deficiency in plants include slow growth and stunted plants, a yellow-green color (chlorosis), and "firing" of tips and margins of leaves, especially the more mature leaves. Since nitrogen is mobile within plants and tends to move from older to newer tissue when in short supply, the chlorosis will be evident in older leaves first. Nitrogen is readily leached from soils and thus must be renewed frequently.

On the other hand, an excess of nitrogen will cause burning of root tips which may cause death. Another symptom of excess nitrogen will be noted in burned leaf tips and margins, especially of the new growth.

PHOSPHORUS

Phosphorus is absorbed in several forms depending upon the pH of the soil. Available soil phosphorus may be only 1% or less of that present. It is not mobile in the soil to any great extent and is best provided in the soil mix whenever possible. Experiments have proven that phosphorus absorption is increased when a supply of nitrogen is present. This is especially true when the phosphorus is applied to the soil rather than being uniformly present in the soil.

The roles of phosphorus in plant development are numerous but the most notable is in the stimulation of early growth and root formation. It is doubtful, due to its low solubility, that an excess will ever be encountered.

Deficiency symptoms include weak, spindly, short growth while at the same time the

foliage will be unusually dark green. In advanced stages a purplish coloration of the foliage may occur and the tips of leaves start dying. Being an important nutrient in seed development, hollow seed capsules may also be noted.

POTASSIUM

Potash is a common name for this element. Potassium aids in the transfer of sugars for starch formation. It is also required in the opening and closing of stomata which are the breathing cells in the leaf surfaces. To camellia growers it is most important in the development of buds and flowers.

Symptoms of potassium deficiency include weak stems and poor development of buds and small bloom size.

Not only must these elements be present for proper plant development but the amount of one in relation to the others is important. Again, like with humans, the diet must be balanced. Furuta, et al.* concluded from their experiments that a 3-5-4 relationship of nitrogen, phosphorus, and potassium produced the best growth.

Although camellias receive a balanced ration of the major elements, Nitrogen, Phosphorus and Potassium (Potash), the mineral needs are not satisfied. Iron, Sulfur, Magnesium and Calcium are generally called the minor elements but this term should not mislead you into thinking they are not important. They are "minor" only because they are needed in much smaller quantities than the major elements. Their role in the nutritional requirements of plants are, indeed, major.

IRON

Iron is required for the formation of chlorophyll in plant cells. Though it plays an important role in several other processes, it is the chlorophyll role which we note first as evidenced by pale green coloration of the leaves, but with green veins. Other symptoms are twig die-back and in severe cases, death of entire limbs or plants. Furuta, Tol., C. W. Bell, and H. P. Orr. 1954. "Influence of Rate and Analysis of Fertilizer on the Growth and Survival of Three Camellia Varieties. *Amer. Cam. Yearbook* 1954: 138-140.

There is ample iron in nearly all soils but rather it is a case of availability. This may be due to an imbalance (excess zinc manganese), poor aeration or high pH. In arid regions the soils and water supplies combine to produce alkaline soils (high pH) and make the iron unavailable. Immediate correction can be had by the addition of iron in the form of the sulfate or preferably in a chelated form. Long term results are available only by correcting the soil balance or pH.

SULFUR

Sulfur is essential for protein synthesis and is present in many plant oil com-
(Continued on page 10)

Front Cover Flower

'Grant Black' is named for a pioneer in the development of Hydroponic Culture. When he and two associates in New Orleans began experimenting in the early 1930's the U. S. Department of Agriculture had done no work on this but was very interested. When the U. S. A. entered the World War II it became impossible to get the needed chemicals, so research was abandoned. They gave their successful results to the U. S. Department of Agriculture, including the delicious hydroponic tomato. Grant Black favored the Camellia among his interest in many plants.

The *C. japonica* 'Grant Black' first bloomed in 1973. It was significant because we never have enough pretty formal double flowers. This medium light pink bloom has 60 to 70 petals in 8 to 10 rows, part to all imbricated. It won Blue Ribbons in its class when exhibited in Mobile and New Orleans. It is ACS Registration Number 1600.

A fine outside bloomer in this area in December, January and February. The plant is a medium upright grower with dark green leaves. It is being propagated by Zerkowsky's Tammia Nursery, Slidell, Louisiana. (See ad page 3.)

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Thank you very much for your support of the ACS and the ACS Endowment Fund in the past; we look forward to having you among our membership for many years to come.

The year coming up is 1980—*THE YEAR OF THE CAMELLIA!* Why does not each one of us get or give one *new membership* for 1980. Send in as many new members as you can. Let us see what State can top them all in '80!

pounds. The high oil content of camellia seeds indicates its importance in this plant process. The most common symptoms of sulfur deficiency in plants are small and spindly plants, retarded growth rate, delayed maturity and a light green to yellowish color in young leaves. Older leaves may be affected in severe cases. Powdered sulfur and sulfate fertilizers are good sources.

MAGNESIUM

The role of magnesium is complex and varied but includes the vital photosynthesis process and activation of many other plant enzyme reactions. It also acts as a balancing agent in cases of excess potassium. Deficiencies are recognized by yellowing of leaves between the veins much like that noted with an iron deficiency but in this case the chlorosis is found almost exclusively in older leaves. Leaves also curl upward along the margins and margins are often yellowed with a green "Christmas tree" area along the mid-rib of the leaves. Magnesium sulfate (Epsom salts) is the best readily available source.

CALCIUM

Just as we need calcium for strong bones, plants need it to build cell walls. It is non-mobile in plants and hence, when deficient the younger tissue is affected first. It is generally so abundant that a lack is seldom evidenced except in very acid soils. Symptoms of a deficiency include death of terminal buds, abnormally dark green foliage, premature shedding of buds and blossoms and weakened stems. Where needed, bone-meal and dolomitic lime are good sources.

TRACE ELEMENTS

To put these minerals into proper perspective in human terms, they might be considered as similar to vitamins. They, like

vitamins, are needed in very small amounts, play vital roles in the overall life cycle, and in some respects are not completely understood. Certain plants are more dependent than others upon adequate supplies of some of these minerals or at least possess better indicators of deficiencies.

ZINC

Zinc is essential to the production of many plant enzymes and especially to indoleacetic acid which regulates growth. It is also the trace mineral most often needed in western soils. Symptoms of a zinc deficiency include: decreased stem length, mottled leaves, dieback of twigs after the first year, and rosetted leaves.

MANGANESE

A perfect example of the need for balance in plant nutrition is manganese. It assists iron in chlorophyll formation, yet, when in excess it may induce iron deficiency. Manganese is generally required where zinc deficiencies occur. Detection is via gradation of pale green coloration with darker color next to veins. No sharp distinction in color is noted as with iron deficiency.

COPPER

The role of copper is not clear. It appears to act as an activator of enzymes and protein synthesis. It may also play a role in vitamin A production. Copper is toxic to plant life at low levels and should not be applied unless the need has been established. Symptoms include stunted growth, dieback of terminal shoots, wilting and/or death of leaf tips.

BORON

In areas of low rainfall such as our deserts, excess boron rather than a deficiency is the rule. Where high rainfall or irriga-

tion with low boron water is practiced, a deficiency may occur. Boron plays a key role in certain cell division processes. A lack is first noted in new growth with death of terminals. This causes lateral buds to develop and produce tufts of growth known as "witches broom". Other symptoms include reduced flowering and improper pollination.

MOLYBDENUM

This element is the key to utilization of nitrogen. Hence the symptoms are similar to those related to nitrogen deficiency . . . stunted growth, lack of vigor and pale color.

CHLORINE

Though an essential mineral for plant development, it is almost never lacking due to its universal presence in nature.

As must be obvious, it isn't a simple matter to provide a complete diet yet many of the elements essential for plant development are found either in the soils or as impurities in our fertilizers. Many are required in very small amounts and with the trace minerals, especially, care must be taken not to over-do. For example, the practice of applying massive doses of iron, so common with camellia growers, is not to be recommended. It is far better to provide smaller rations at more frequent intervals.

RECOMMENDED READING

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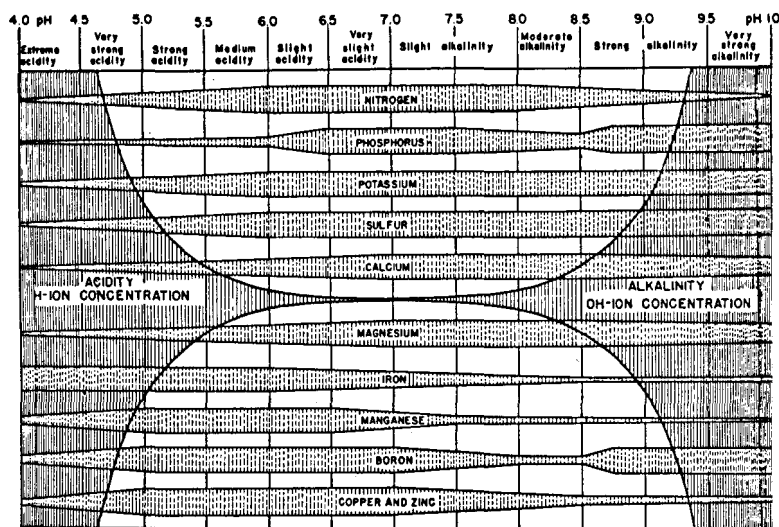


FIGURE 1. Chart showing general trend of relation of a soil's reaction (pH) and associated factors to the availability of its plant nutrient elements. Each element is represented by a band whose width at any particular pH value indicates the relative favorableness of this pH value and associated factors to the presence of the element in readily available forms (the wider the band the more favorable the influence), but not to the actual amount necessarily present, this being influenced by other factors, such as cropping and fertilization.

pH—Dr. Jekyll or Mr. Hyde

CLYDE X. COPELAND

That old devil pH has probably caused as much confusion and fear among camellia growers as would be felt by a bunch of long tail cats in a room full of rocking chairs.

Camellias are classified as acid loving plants, and after killing over 100 bushes in trying to be sure that the soil was sufficiently acid it was decided that it might be well to do a little research on the subject.

To my surprise there was very little detailed information in the available camellia books on that elusive scoundrel pH, so textbooks on the subject became commonplace around the house.

It seems now to be generally felt by many camellia growers that plants do best in a soil mixture where the pH is between 6 and 7 with about 6.5 being ideal. In a discussion of this matter with a soil scientist he would immediately point out that the correct pH of the soil is of vital importance in providing proper nutrition to the plants.

A Danish Biochemist, S. P. L. Sorenson, devised the system called pH for expressing the acidity or alkalinity of solutions. He established a pH scale of measurement from 0 to 14. At the midpoint 7, the solution is neutral. Any pH value below 7 indicates an acid solution, and above 7 denotes an alkaline solution.

The acidity or alkalinity of every water solution or mixture of soil and water is determined by its content of Hydrogen Ions and Hydroxyl Ions. Water molecules break up into these two Ions and when there are more Hydrogen Ions than Hydroxyl Ions the solution is acid. If there is a larger number of Hydroxyl Ions the solution is alkaline or basic.

The pH scale is based on logarithms of the concentrations of the Hydrogen and Hydroxyl Ions. This means that a solution with pH of 5 has 10 times the Hydrogen Ion concentration of a solution with a pH of 6, and a solution with a pH of 4 has

a 100 times the Hydrogen Ion concentration of a solution with a pH of 6. From this it is easy to understand the increase of acidity between two whole numbers on the pH scale.

If you have not long since thrown this article aside I know that you feel it is time to get down to the nitty-gritty of this whole pH business.

The availability to plants of many important and essential nutrients is very closely related to the pH of the soil. Bacteria and other microorganisms living in the soil convert nitrogen, sulfur, and phosphorus from compounds, in which these nutrients are unavailable to plants into simpler forms that can be utilized by the plants. The growth of these bacteria is greatly enhanced when the pH of the soil is neutral or only slightly acid and thus speeds up the process by which these important nutrients become available to plants. The availability of phosphorus in soil declines as the soil becomes either strongly acid or alkaline.

In the Southeastern part of the country the soil used in most container culture often rapidly becomes too acid, and upon testing, it is not unusual to find a pH of around 4. Such a low pH can indirectly cause certain elements to become toxic to plants. For instance, in such strongly acid soils aluminum, iron, manganese, copper and zinc may be found in dissolved form in quantities sufficient to become toxic to plants. As the soil is neutralized the toxicity is corrected, but if the pH is increased too much (a pH of 8 or above) the solubility of these elements becomes so low that the plants actually suffer from a deficiency of these same elements. Molybdenum, another of the trace elements, is most often unavailable to plants in strongly acid soils, but becomes available as the pH of the soil is increased to near neutral.

For camellias most plant nutrients are available at a pH between 6 and 7. If when soil is tested and this range

of pH is indicated do not take it for granted that it will always remain that way. It must be remembered that every substance dissolved in water is acid, neutral or alkaline and as a result the pH of the soil can easily change.

Since in this part of the country many of the plants are grown in containers and there is a constant battle to prevent the container mixes from becoming too acid it may be well to mention the so-called liming of our soil.

The materials generally used to raise the pH to the proper level of 6.5 are agricultural limestone, dolomitic limestone, and basic slag. The agricultural limestone generally is about 80% calcium carbonate. Dolomitic limestone normally contains around 45% magnesium carbonate and close to 50% calcium carbonate. Basic slag, a by-product in the smelting of iron ore, varies greatly in different regions. Typical basic slag contains calcium silicate, calcium oxide, magnesium oxide and phosphoric oxide.

Dolomitic limestone seems to be the choice in this area. Where plants are grown in containers a level tablespoon is used in the so-called 3-gallon container every spring. The finer the limestone is ground the quicker the results. Furthermore because limestone becomes less soluble at a pH of 7 or above the danger of overliming is somewhat reduced.

Hydrated lime is not recommended. This product is a calcium hydroxide and except in extreme cases it should not be used as it is too strong and reacts too rapidly. Burned or quick lime contains calcium oxide, is caustic and is too dangerous to handle.

A statement was noted by one authority that pH in soil systems is a most uncertain quantity both with regard to measurement and to interpretation. So it is really hard to determine whether that old pH is a Dr. Jekyll or Mr. Hyde, but the one thing that is certain and that is he will always be here to haunt us in our dreams of producing show winning blooms.

Horticulturally Speaking

By the Horticulture Committee

Winter camellia culture, notwithstanding the dangers of generalizing and the uncertain assumption that the law of averages should preclude four hard winters in a row, appears to fall into two major categories, depending on whether the prospect of winter weather in the area is freedom from frost or the probability of freezing in varying degrees.

In much of the South and in California, the largest portion of the U. S. camellia belt, winter is camellia blooming time. Caryll Pitkin, of San Marino, California, writes that conversations with his fellow camellia growers in southern California indicate that "we all agree that there is not much to do . . . Winter is the time to enjoy our flowers." Harold C. Rambath, of Sacramento, comments that "The Winter season is no doubt the best time for Camellia growers. The major jobs have been done." J. K. Blanchard, of North Carolina, holds that "Winter is the time to enjoy our flowers," as does Dr. Hubert Racoff, of

Columbia, South Carolina, with the view, "Winter is the time to relax and enjoy the blooms."

At the other end of the spectrum, growers in areas prone to varying degrees of freezing weather, such as Maryland, Virginia, the Potomac Valley, and, from time to time, other parts of the country, such as Oregon, are obliged to concentrate on measures to preserve plants and buds from the severity of a winter which they hope will never be realized.

Nevertheless, there are some cultural matters in which all camellia growers must be commonly concerned with the objectives of maintaining the quality of the plants and of improving the blooms.

Moisture

Maintenance of proper amounts of moisture during the winter is one such concern. In fact, in the eyes of Caryll Pitkin, it is the No. 1 winter problem. Dr. Racoff holds that "Failure to keep plants watered during the

winter can result in severe cold damage as evidenced by loss of buds, leaf burn, bark splitting and even death." A plant deficient in moisture cannot withstand long winter freezes, as many growers in the Northeast found to their sorrow in the winters of 1976-1977 and 1977-1978, when deficiency of water in the late fall and early winters resulted in plants dying from lack of water. They had been unable to draw moisture from the soil during the long periods of freezing weather at the same time that they underwent transpiration during the periods of sunshine.

If the plants have not had sufficient moisture by early winter it must be provided for them in the winter. Checking the supply of moisture is essential, particularly of container plants, since they will dry out before one realizes it. If the ground should freeze for long periods, warm intervals can be used to drench the plants. If the water will not or cannot soak in, foliar-spraying may be tried, particularly if transpiration has been heavy.

Mulching

Most articles on camellia culture touch on mulching, which is as it should be. Early winter is the time to check, if it has not been done, as recommended, in early fall, and to add one's favorite mulch to that already about the plants, up to four inches or even more in colder areas. Coarser bark or woodchips appear, in some growers' opinion, to be the least effective as mulches against winter cold. Some growers with available oak leaves have found that these placed under existing mulch tend to break down and improve the soil without appreciably diminishing aeration of the soil.

An often repeated recommendation is that in colder areas mulches should be slightly pulled back from the trunk of the camellia plant so that the bark may remain dry and thereby reducing the possibility of damage from sudden freezes. If plants are in containers, they should be buried in the ground or mulch should be piled over the top and about the sides of the containers.

Pruning, Shaping and Disbudding

"It is a good plan to carry a pair of pruning shears any time we visit the garden," advised Caryll Pitkin. "We usually see a branch that should be removed because it is interfering with a flower's opening or just isn't going where we want it to go . . . Also, every time we look at the plants we find multiple buds that we have overlooked before. Thin them out! You'll get better blooms, that is for sure. Most of us also follow the practice of having a few clothes pins handy to pin back leaves which prevent blooms from opening properly." Harold Rambath suggests that if you have not already disbudded, growers should not be in a hurry to get it done.

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Grafting

In many areas, grafting can be undertaken. J. K. Blanchard, of North Carolina, believes that in areas with climates similar to North Carolina, grafting can be done "any time from the first of December on into the spring." Dr. Racoff, of South Carolina, prefers January and February as good grafting months. If the grafts are placed outside, Mr. Blanchard counsels protection during cold spells. One method of protection which he uses when the rootstock is in the ground is "to take a plastic milk jug, cut out the bottom, place the jug over the graft and bank sawdust up to the top of the jug, leaving only the very top of the jug exposed for light. The base of the sawdust pile around the jug should be about 18 inches across." Dr. Racoff uses much the same method except that he piles sand around the plastic jug.

Mr. Blanchard is also concerned with the importance of good rootstock. He suggests that if rootstock is being grown in the ground that it be transplanted to a container a year before it is to be used. That gives the grower a chance to observe the growth pattern of the various rootstocks and to weed out the inferior.

Fertilizing

Consensus of opinion concerning fertilizing in winter is that, while it is a matter of individual experience as in all other seasons, if a good fertilizing program had been carried out, little is needed for outside plants in the winter. For greenhouse plants, one Committee member sometimes uses Ortho 10-8-7 liquid fertilizer containing minor elements, one tablespoon to a gallon of water. About a pint of mixture is given each plant in a four-gallon container. Some growers, including many in southern California, continue fertilizing through the year with a mixture of no, or very light, nitrogen content. Mr. Carlos Deupree, of Mobile, Alabama, suggests that a soil test is essential before a fertilizing program can be set up.

Gibbing

Although the season for gibbing in northern areas, as in the Potomac Valley, is over by the end of September, elsewhere gibbing may continue to stimulate blooming in late winter and early spring, particularly for those growers who exhibit in winter and spring shows. Gibbing may be done every ten days or two weeks through January and February. Mr. Deupree suggests that his own practice may be of interest. He gibs two buds on opposite sides of a plant every week from September onwards. He selects one bud on the south side and another on the north side. The bud on the south side will usually bloom several days before the other, thus giving two chances of hitting the show with a fresh bloom at its peak of perfection.

Planting New Camellias

February is recommended by Dr. Racoff as a good time to plant camellias in his general area of South Carolina. He suggests that growers should visit camellia shows with the purpose of studying and selecting additional varieties most suited to their needs. Plants, especially those of variegated varieties, are best bought only after seeing them in bloom, so that the quality of the blooms may be judged.

"Bill" Hyatt, of Lake Charles, La., suggests also that transplanting can be advantageously done in winter in frost-free areas. He points out, however, that "newly transplanted camellias are much more vulnerable to winter injury than well established plants. For transplanted plants of three feet or more, he counsels giving them support by a strong stake or by 'guy lines'."

Petal Blight

Attention is called by Dr. Racoff to the appearance of camellia flower blight or petal blight in his area in the winter. In the milder areas, such as Charleston, S. C., it has been confirmed that it has occurred as early as mid-December. In the area around Columbia, petal blight is seen in late February. Growers must be on the alert to remove and to destroy promptly all infected flowers. Blooms allowed to fall to the ground and left there will be the main source of infection for as long as five years.

Dr. Racoff counsels the use of Terraclor (PCNB, Pentachloronitrobenzene) or Benlate, applied around camellias to inhibit the development of the infective stage of the fungus. The treatments should be started early in December and continued every month to six weeks through March. These treatments will not, of course, prevent infections from air-borne spores coming in from neighboring sources.

He has listed recommended usages of Benlate and various forms of Terraclor:

Terraclor: 20% dust, 2½ pounds per 100 square feet applied around the plant to the soil or in the mulch.

Terraclor: 75% wettable powder, 5 ounces per 100 square feet applied around the plant to the soil or in the mulch.

Terraclor: 75% wettable powder, 5 ounces to ten gallons of water plus 10 cc. (2½ teasp.) of household detergent sprayed or drenched around the plant to the soil or to the mulch. This should cover 100 square feet.

Do not get Terraclor on the flowers or the foliage.

Benlate, one tablespoonful to two gallons of water to which is added a few drops of spreader sticket. Spray or drench the soil or the mulch around the plant. Be sure to wet the soil or the mulch thoroughly. Two gallons of spray should cover 20 square feet.

The soil or mulch around the plants should not be disturbed following treatments.

Measures against Sudden and Deep Freezes

For those areas which must take extra measures against sudden and deep freezes, several suggestions are made. Mulches, as already suggested, should be increased. If containers are kept outdoors all winter, efforts must be made to put them in the ground or more or less bury them in piles of mulch. Moisture must be maintained.

Protection from the wind must be considered. It has been estimated that the temperatures under overshadowing trees is 5% higher in winter and 5% lower in summer. Division of opinion exists on the effectiveness of windbreaks. Some Committee members hold that windbreaks of eight feet high can be helpful. Others maintain that they make little difference. Camellias planted where buildings break the wind do seem to have fared better than those in windswept areas.

To those growers who hopefully cover their plants with 'Visqueen' or other plastic material, Bill Hyatt sends a word of caution. Do remove the plastic covering from the plants before the sun can create a heat "build-up" under the cover. Many plants have been seriously injured by the failure to uncover the cover.

For those growers, who, in spite of their precautions, have plants and/or buds which appear to have been damaged by the cold, the Horticulture Committee advises that all may not be lost. Growers should be slow to take drastic action by immediately cutting away the damaged parts. Give the plants a chance to show what they can do. Experiences of the past three winters suggest that while some plants have indeed not recovered, many plants which appeared to have been irreparably damaged may put out new growth and emerge by mid-summer, perhaps diminished in size but with every sign of regaining good health and vigor.

For camellia lovers whose climate provides them with winter blooms, the Horticulture Committee suggests that full use of camellias be made for Christmas. Decorate with them; make camellia wreaths not only for yourself, but also for your friends and neighbors and for your houses of worship. Use the green leaves with red blooms wherever possible. When you make your Christmas list, add camellias and/or membership in local Society and/or a membership in ACS as gifts. The recipients will love them and cherish the memory of you and your thoughtfulness.

(Contributions with suggestions and recommendations on winter camellia culture have been made by Committee members J. K. Blanchard, Carlos Deupree, Onis D. Hyatt, Caryll Pitkin, Herbert Racoff, Harold Rambath, and Robert Sansing, Jr.—The Chairman.)

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<i>Place, Location and Sponsor</i>	<i>Date</i>
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Pineville, Louisiana, Pineville Community Center, Central Louisiana Camellia Society	November 3-4, 1979
Savannah, Georgia, Men's Garden Club of Savannah	November 3-4, 1979
Shreveport, Louisiana, Mall St. Vincent, Men's Camellia Club of Shreveport	November 10, 1979
Fort Valley/Marshallville, Georgia, Massee Lane Headquarters of ACS, Middle Georgia Society	November 10-11, 1979
Greenville, Alabama, Greenville Community Center at R. A. Beeland Park, Greenville Camellia Society	*November 10-11, 1979
Charleston, South Carolina, Main Office of First Federal Savings & Loan Assn., 34 Broad Street, Coastal Carolina Camellia Society & First Federal Savings & Loan Assn.	November 17-18, 1979
Gulfport, Mississippi, Westside Community House, Gulfport Men's Camellia Society, Inc.	*November 17-18, 1979
Monroe, Louisiana, Central Savings Bank & Trust Company, 300 DeSiard Street, Northeast Louisiana Camellia Club	November 17-18, 1979
New Orleans, Louisiana, New Orleans Hilton Hotel, Southern Camellia Society	November 17-18, 1979
Port Arthur, Texas, Mingle Motors Show Rooms, Greater Port Arthur Camellia Society	November 17-18, 1979
Valdosta, Georgia, First State Bank & Trust Company and Valdosta Camellia Society	*November 17-18, 1979
Brookhaven, Mississippi, Main Office of Brookhaven Bank & Trust Co., Brookhaven Camellia Society	November 24-25, 1979
Albany, Georgia, The Albany Mall, 2601 Dawson Road, Men's Garden Club of Albany	December 1-2, 1979
Gainesville, Florida, First Florida Savings and Loan Association, (In conjunction with ACS 30th Annual Fall Meeting) Gainesville Camellia Society	December 1-2, 1979
Houston, Texas, Saks Fifth Avenue, Houston Camellia Society	December 8, 1979
Jacksonville, Florida, Regency Square, Camellia Society of North Florida	December 8-9, 1979
Moss Point, Mississippi, Merchants & Marine Bank, Moss Point Camellia Society	December 8-9, 1979
Pineville, Louisiana, Community Center, Hwy. 28, Twin City Camellia Culture Club	December 8-9, 1979
Slidell, Louisiana, Municipal Auditorium, Ozone Camellia Society	December 8-9, 1979
Tallahassee, Florida, Governor's Mall of Apalachee Parkway, Tallahassee Camellia Society	December 8-9, 1979
Beaumont, Texas, Parkdale Mall, Southeast Texas Camellia Society	December 15, 1979
Baton Rouge, Louisiana, Baton Rouge Camellia Society	January 5-6, 1980
Conroe, Texas, Coughatta Camellia Society	January 5-6, 1980
Panama City, Florida, Municipal Auditorium, Camellia Society of Panama City	January 5-6, 1980
Pensacola, Florida, Municipal Auditorium, Men's Camellia Club, Inc.	January 12-13, 1980
Ruston, Louisiana, Ruston Holiday Inn, Ruston Men's Camellia Society	January 12-13, 1980
Dallas, Texas, North Park Shopping Center, at North Central Expressway and Northwest Highway, Dallas Camellia Society	January 13, 1980
Aiken, South Carolina, Kennedy Junior High School, Pine Log Road, Aiken Camellia Club	January 19-20, 1980
Mobile, Alabama, Springdale Plaza Mall, Camellia Club of Mobile	January 19-20, 1980
Charleston, South Carolina, Charles Towne Square Mall, Coastal Carolina Camellia Society & First Federal Savings & Loan Assn.	January 26-27, 1980
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Shreveport, Louisiana, Mall St. Vincent, Men's Camellia Club of Shreveport	February 2, 1980
Fort Walton Beach, Florida, Fort Walton Camellia Society	February 2-3, 1980
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Columbia, South Carolina, Columbia Mall, Mid-Carolina Camellia Society	February 9-10, 1980
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San Diego, California, Balboa Park, San Diego Camellia Society	February 9-10, 1980
Tyler, Texas, Citizens First National Bank, Tyler Camellia Club and Citizens First National Bank	February 10, 1980
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 Washington, D. C., National Arboretum, Camellia Society of the Potomac Valley April 19-20, 1980
 Slidell, Louisiana, Ozone Camellia Society December 6-7, 1980

* Changes since last issue.

—ACS—

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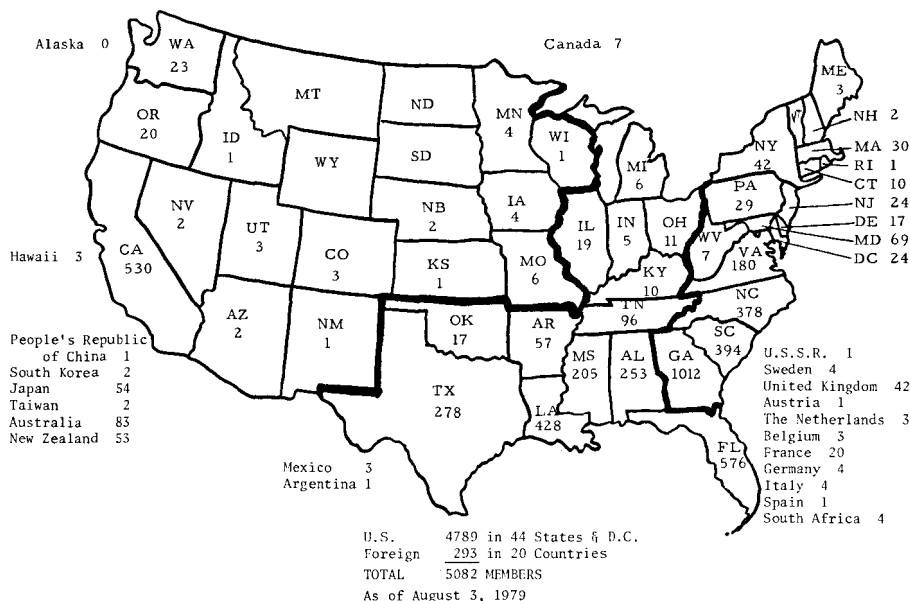
Name and Description	ACS Registry Number	Originator
'Lois Coker', small to medium, white, formal double, <i>C. japonica</i> seedling of 'Magno- liaeflora', mid-season to late	1576	Robert R. Coker
'Lasandra', large, deep rose var. white, peony form, <i>C. japonica</i> seedling of 'Tiffany', mid-season	1577	Paul Gilley
'Jimmy Gilley', large, dark red var. white, semidouble, <i>C. japonica</i> chance seedling, mid-season	1578	Paul Gilley
'Kay Berridge', medium, rose pink, white and red mingled, formal double, <i>C. ja- ponica</i> chance seedling, mid-season	1579	Paul Gilley

—ACS—

FUTURE MEETINGS OF THE ACS

November 29-December 2, 1979 Gainesville, Florida
 January 24-27, 1980 Jackson, Mississippi
 November, 1980 (Exact date to be announced later) Charleston, South Carolina
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Hardwood and Softwood Bark Potting Mixtures for Ornamental Plants

DR. F. A. POKORNY

Department of Horticulture, University of Georgia,
Athens, Georgia

Growers involved in the production of container-grown crops have generally eliminated field soil as the principal growth medium. Natural soils seldom possess the physical characteristics necessary for use as a potting medium and therefore, inorganic and organic amendments are used to improve the physical properties of the soil. With increasing labor costs, scarcity of good top soil, lack of uniformity in the physical and chemical properties of many natural soils, and disease and weed contamination, today's production scheme dictates that the potting medium be "tailor made" from organic and inorganic constituents. This is done to provide suitable physical characteristics for the optimum production of the desired crop.

Tree bark, both hardwood and softwood, is one organic material that has received considerable attention as a potting medium or medium component. The advantages of using bark are: (1) it is a renewable resource, (2) comparatively, it is available at a lower cost to the grower than other organic materials such as peat moss, and (3) bark can be milled and screened to provide a uniform material that is reproducible, thus providing some degree of standardization.

HARDWOOD BARK

Processed or ground hardwood bark should be used in potting medium preparation. Gartner *et al.* (6) suggest that 35% of the particles should be smaller than 1/32 inch while approximately 10% should be larger than 1/8 inch in diameter. The remainder of the particles should be in the size range of 1/32 to 1/8 inch

in diameter. Plant growth tests have shown that if most of the particles were large (1/8 inch or larger) poor growth occurred because of inadequate water retention. If the particles were mostly small (less than 1/32 inch) poor aeration and poor drainage resulted in poor growth. Generally, an ideal particle distribution of hardwood bark is obtained by processing the hardwood bark through a 1/2 inch mesh screen.

Avoid the use of fresh hardwood bark for incorporation into the potting mixture because plant growth inhibition has been encountered with fresh material (5). Growth inhibition will vary depending upon the species of hardwood bark used and the season of the year when the bark is harvested. Gartner *et al.* (6) reports that greatest inhibition is obtained with bark harvested in winter from ash, maple, cottonwood and walnut while bark of sycamore suppressed growth the least. It is thought that growth inhibition is due to the phenolic compounds present in fresh hardwood bark.

Severe nitrogen deficiency is also encountered when fresh hardwood bark is used. This problem is difficult to overcome simply by nitrogen additions during the course of routine fertilizer application. However, the presence of phytotoxins and the problem of nitrogen depletion can be overcome by proper composting procedures. Gartner *et al.* (5) has shown that about 3% nitrogen or 3 lbs. nitrogen/cu. yard of potting medium will satisfy the nitrogen requirement for composting. The following additions to 1 cu. yard of a 2/3 hardwood bark

—1/3 sand potting mixture are recommended: (a) 6 lbs. ammonium nitrate, (b) 5 lbs. superphosphate, (c) 1 lb. elemental sulfur and (d) 1 lb. iron sulfate, (7). Mixing in a rotary or drum type mixer is necessary to get uniform blending of materials. Hand mixing is inadequate to get a thorough blend of materials. Also, the mixture should be moist; a 60% moisture content is ideal. After mixing, the potting mixture is stockpiled in large piles rather than placed in small layers. About 60 days is needed for adequate composting with the piles turned several times. The compost pile should be covered with plastic or canvas to prevent drying out. Temperatures will reach about 150 degrees F. The problems of phytotoxicity and nitrogen depletion will be removed by proper composting before use. Another benefit of composting, as Hoitink *et al.* (8) points out, is the reduction and for some crops, elimination of the need for soil fungicides and hazardous fumigants.

In preparation of the hardwood bark potting mixture, lime is usually not added prior to composting nor is it added after composting is complete. While hardwood bark has an initial pH of about 5.2 the pH of the bark when moistened increases. Initial studies investigating the liming practices with hardwood bark potting mixtures has demonstrated that adding pre-plant lime to the potting mixture will result in a pH of 8.0 and higher with resulting chlorosis and poor growth (5). Best growth has been obtained with hardwood bark potting mixtures when no lime was added. Spectrographic analysis of hardwood bark samples shows a calcium level of about 4%. Also magnesium and other micronutrients are present in hardwood bark in sufficient amounts (6).

Morris and Milbocker (10) have reported suppressed growth and chlorotic leaves of Japanese Holly grown in hardwood bark (Red Oak) caused by excessive amounts of available manganese in the soil solution. This is

probably due to a suppression of iron uptake by the plant and might be alleviated by adding supplementary iron, especially in slowly released forms.

Good plants can be grown in a wide range of mixtures of hardwood bark with other components. Initially, processed bark was used as a peat substitute in a standard ratio of 1:1:1 soil, organic matter, perlite (v/v). Gartner (5) is suggesting a potting mixture of 2/3 hardwood bark—1/3 sand but has had good results with a 4:1 v/v ratio hardwood bark to sand as well as with 100% hardwood bark.

Bark is difficult to wet if it is allowed to dry out. After potting, water plants thoroughly 2 or 3 times. If the medium becomes quite dry, the use of a wetting agent may be necessary to rewet it. Also, a regular fertilization program is essential during the course of plant production. Nitrogen previously added during composting is only for offsetting that needed for decomposition.

SOFTWOOD BARK

Pine bark is readily available in many areas of the South and is also very useful as a potting medium com-

ponent. One of the major advantages of using pine bark in the potting medium is its resistance to decomposition (1).

Research at the University of Georgia has shown that a milled pine bark with 70-80% of the particles in the range of 1/42 to 3/8 inches in diameter and 20 to 30% of the particles smaller than 1/42 inch has proven very satisfactory as a potting medium amendment (14). This particle distribution is similar to that reported for hardwood bark by Gartner *et al.* (6). If the pine bark is too coarse too little water retention results in poor plant growth and conversely, if too many fine particles are present, excess water and poor aeration result in poor growth.

In contrast to hardwood bark, composting of pine bark media has not been shown to be highly beneficial; however, most growers prefer to use an aged pine bark in contrast to fresh bark. Self (17), and Self and Pounders (18, 19) have shown that many plants could be planted immediately after preparing the pine bark potting mix without the necessity of long term composting. Planting delayed for 30 days of composting was also satisfactory but after composting 60

days poor results were obtained due to excessive leaching and to salt accumulation depending upon the fertilizer additives incorporated (17, 20).

In limited studies at Georgia, Japanese Holly grown in media containing fresh pine bark or material aged for 3 to 6 months yielded plants of similar quality whether additional nitrogen was added to compensate for potential N depletion on decomposition or not (unpublished data). Laboratory tests indicate that only 1/4 lb. nitrogen/cu. yard will provide adequate nitrogen for microorganisms acting on the pine bark (unpublished data). This quantity is most probably taken care of in the normal fertilization program.

Pine bark is acid in reaction with an initial pH ranging from 4.1 to about 5.0 (4, 14). PH of pine bark does not rise substantially, as is the case with hardwood bark, but remains acid in reaction. Pre-plant addition of lime at the rate of 13 to 15 lbs./cu. yard is necessary to raise the pH into the range of 6.0 to about 7.0. If dolomitic limestone is used, about 60 to 90 days are required for the necessary pH change to occur. To raise the pH rapidly, hydrated lime (8.3 lbs./cu.



GRAND "YOUNG" MEN OF CAMELIAS

Here we see the venerable W. Lee Poe of Birmingham on the left holding what are probably awards for his prize-winning camellias. Lee is a consistent winner and has also introduced some gorgeous varieties including 'Louie Hairston' and 'Evelyn Poe'. Standing with him is "Herb" Brown at the Chattanooga, Tennessee Camellia Show. (Photo by George Griffin)

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yd) may be added at the time of mixing but allow about 7 days to pass before potting so that plant injury does not occur from the reaction of the hydrated lime (11). Self (16) indicates that gypsum be added pre-plant at the rate of 2 lbs./cu. yard of potting mix.

In recently completed research in Georgia, it was found that nitrate base fertilizers (calcium nitrate, potassium nitrate) are preferred nitrogen sources for fertilization in comparison to ammonium sources of nitrogen. When ammonium supplied over 50% of the nitrogen, plant growth was suppressed. It is thought that this growth suppression is due to the tie-up of the ammonium by the bark particle rather than due to ammonium toxicity (9). Self (16) has shown that Osmocote 18-5-11 at 5 or 10 lbs./cu. yd. and Special 7 are adequate for azalea growth. If Birmingham slate is included as a potting mix amendment, iron could be deleted from the pre-plant fertilizer addition (15).

Successful plant growth has been achieved with a wide range of potting media containing pine bark as the organic amendment. We have had successful results with 1:1:1 v/v soil, sand, pine bark, 1:1:1 v/v soil, perlite, pine bark, 1:1 v/v pine bark, sand,

1:1 v/v pine bark, perlite, and in 100% pine bark (12, 13).

Dry pine bark is difficult to wet. Below a moisture content of about 35% (wet wt basis), a surfactant may be needed to insure thorough wetting of the pine bark medium (2). Bark is like a sponge—it is filled with internal pores which are capable of holding moisture (3). In the laboratory, to insure thorough wetting, bark particles must be submerged in H₂O and placed in a vacuum for 72 hours. This of course, is not practical in the nursery, but I cite this to illustrate the resistance to wetting of dry pine bark.

In the final analysis, each grower must decide upon a potting mixture which is most adaptable to his own needs and develop a management program to produce the best plant at the lowest cost. Our studies and those of others strongly suggest that milled pine bark can be utilized successfully in preparing potting media for container plants and that plant growth comparable with other organic soil amendments will be achieved. An outstanding characteristic of pine bark is its resistance to decay. This is important to the container-plant producer since rapid decomposition of the organic fraction can result in rapid alteration of the air-moisture relationship existing within the medium. Overwatering and poor drainage can result with developing plant root problems.

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'Black Lace'	'Dr. J. V. Knapp'	'Harriet Bisbee'	'Margaret Davis'	'Premier'	'Tiffany Var.'
'Black Tie'	'Drama Girl Var.'	'Hawaii'	'Margaret Weems'	'Punkin'	'Tinsie Var.'
'Blaze of Glory'	'Dryade'	'Henry J. Henry'	'Margaret Wells'	'Ragland Supreme'	'Tiny Me'
'Blond Betty'	'E. G. Waterhouse Var.'	'Homer Fritchie'	'Martha Norwood', R & V	'Ray Lange'	'Titrangi'
'Blushing Beauty'	'Easter Morn'	'Hopkin's Pink'	'Mary Agnes Patin'	'Rena Swick Var.'	'Tom Cat Var.'
'Bon Bon'	'Edgewood'	'Hopkin's Pink Coral'	'Mary Beth'	'Richard H. Clere'	'Tom Knudsen'
'Bon Bon Blush'	'El Dorado'	'Howard Asper', R & V	'Mary Boyce'	'Richard Nixon'	'Tomorrow's Crown Jewel'
'Bon Bon Red'	'Elegans Supreme'	'Imp'	'Mary Knock'	'Rose Parade'	'Tomorrow's Leanne'
'Brooksie's Rosea Superba'	'Ellen Daniel'	'In The Pink'	'Mary P. Taylor'	'San Dimas'	'Tomorrow's Park Hill'
'Buddha'	'Elizabeth Cooper'	'Ivory Tower'	'Mary Paige'	'Sandy Walters'	'Tomorrow's Queen'
'Can Can'	'Elizabeth Dowd'	'Jackie Mann'	'Mary Taylor Blush'	'Sarah Alice Ruffin'	'Tomorrow's Tropic Dawn'
'Carnival Prince'	'Elizabeth Haynie'	'Jean Bardow'	'Mary Taylor Pink'	'Scentsation'	'Tootsie'
'Carnival Princess'	'Elizabeth Le Bay Blush'	'Jennifer Wright'	'McVey's Nuccio'	'Scotty Forbes'	'Touchdown', R & V
'Carnival Queen'	'Ella Ward Parsons'	'Jerry Wilson'	'Melinda Hackett', R & V	'Sea Foam'	'Touch of Pink'
'Carroll Waller'	'Elsie Jury'	'Jerry Wilson Pink & Var.'	'Memento'	'Silver Chalice'	'Tricia'
'Carter's Sunburst Pink' & Var.	'Erin Farmer'	'John Taylor', R & V	'Midnight'	'Silver Etching'	'Twilight'
'Carter's Sunburst Var.'	'Ernest Gill'	'Johnny Reb Pink'	'Midnight Serenade'	'Silver Ruffles'	'Valentine Day'
'Chameleon'	'Evelyn Poe'	'Jonathan'	'Mike Witman', R & V	'Silver Star'	'Veiled Beauty'
'Charlean', R & V	'Fancy Free'	'Judge W. T. Ragland'	'Milo Rowell', R & V	'Silver Triumph'	'Verna Halbert'
'China Doll'	'Fashionata'	'Julia Hamiter'	'Miss Charleston', R & V	'Silver Waves'	'Water Lily'
'China Lady'	'Fircone', R & V			'Snowman'	'W. H. Rish Var.'

Please order from this ad. We have many varieties that are not listed. If you want something that isn't listed here, please ask for it

P. O. BOX 6626
JACKSON, MISS. 39212

RAY GENTRY

601-372-3726

NURSERY LOCATION—5475 Interstate 55 South—8 miles from Downtown Jackson

BIRMINGHAM CAMELLIA SHOW

YOU ARE INVITED TO EXHIBIT IN AND ATTEND OUR

Twenty-Eighth Annual Camellia Show

EASTWOOD MALL — BIRMINGHAM, ALABAMA

BORDERED BY OPORTO AVENUE ON WEST-CRESTWOOD BLVD. (same as Atlanta Hwy.) ON NORTH-MONTCLAIR ON SOUTH-MONTEVALLO ROAD ON EAST. I-20 EAST EXITS ON OPORTO

FEBRUARY 9th and 10th, 1980 — Admission Free

SATURDAY SHOW: 2:30 P.M. to 9:00 P.M.

SUNDAY SHOW: 1:00 P.M. to 6:00 P.M.

sponsored by

THE BIRMINGHAM AREA CHAMBER OF COMMERCE

staged and presented by

MEN'S CAMELLIA SOCIETY OF BIRMINGHAM

assisted by

THE MEN'S CAMELLIA CLUBS OF AUBURN, PENSACOLA AND TUSCALOOSA

in cooperation with

THE AMERICAN CAMELLIA SOCIETY

SHOW SCHEDULE OF SILVER TROPHIES AND AWARDS

1. Best Japonica in Show—Evelyn Hughes Holle Memorial Award
2. Best very large Japonica Bloom in Show
3. Best large Japonica Bloom in Show
4. Best medium large Japonica Bloom in Show
5. Best medium Japonica Bloom in Show
6. Best small Japonica Bloom in Show
7. Best miniature Japonica Bloom in Show
8. Best white Japonica Bloom in Show
9. Best 'Louise Hairston' Bloom, Solid or Variegated. Trophy donated by Mr. and Mrs. William Hairston
10. Best 'Sam Zerkowsky' Bloom, Solid or Variegated. Trophy donated by Ferol and Sam Zerkowsky
11. Best Reticulata Bloom (Includes Hybrids with Reticulata Parentage)
12. Best Hybrid Bloom with other Parentage
13. Best 3 Japonica Blooms, same variety
14. Best 5 Japonica Blooms, 2 or more varieties
15. Best 3 Reticulata Blooms (Includes Hybrids with Reticulata Parentage)
16. Best 3 Hybrid Blooms, with other Parentage
17. Best Mutation (Sport) Bloom in Show (mark card Sport)
18. Best Jefferson County Bloom grown outside unprotected. Limit three (3) blooms per exhibitor—Greenhouse owners disqualified in this category
19. Best Seedling—Japonica
20. Best Seedling Reticulata or Retic. Hybrid
21. Best Seedling Hybrid with other Parentage
22. Sweepstakes
23. Sweepstakes Runner-up
24. Silver Trophies or Tupperware to the 22 Blooms comprising the Court of Honor. Runner-up to each best Bloom award will be the first Honor Bloom for that category and receive silver. Other Honor Blooms by judges' vote receive Tupperware.
25. Best Tricolor Designs Arrangement in Show will receive Silver Trophy
26. Best Table Arrangement in Show will receive Silver Trophy
27. Best Creativity Designs Arrangement in Show will receive Silver Trophy
28. Best in other Tricolor, Tables, Creativity Arrangement classes will receive the same kind of Silver Trophy as do the first Honor Blooms

SPECIAL NOTE: Our entry cards have been changed to the following for singles or trays: Japonicas, green cards except for small and miniatures, gray cards (Mark card for small). Retic or Retic hybrids, gold card. Non-Retic hybrids, gold card. (Mark card Non-Retic). Seedlings, pink card. Outside, white card (Jefferson County only)

BIRMINGHAM CAMELLIA SHOW

THIS IS AN OFFICIAL SCHEDULE FOR YOUR USE

Please direct any request for Show Information to:

GEORGE E. GARRISON
1032 South 50th Street
Birmingham, Alabama 35222

+ + +

RULES FOR HORTICULTURAL SECTION TWENTY-EIGHTH ANNUAL CAMELLIA SHOW BIRMINGHAM, ALABAMA

1. No more than one Blue, one Red and one White ribbon shall be awarded to each variety.
2. Best Bloom in Show and Best Bloom in each other category will be selected from single entries **ONLY**.
3. No Bloom shall compete in more than one category.
4. Chemically treated blooms will be judged with untreated blooms and outside blooms.
5. Plants from which flowers are exhibited must have been owned by and in possession of entrant not later than January 1, 1980.
6. Wiring blooms to wood from parent plant is not only permissible but desirable.
7. More than one bloom to a single stem will disqualify the entry.
8. If only one bloom of a variety is entered, it shall constitute a class, and it will be judged against the standard of perfection for the variety, and awarded a Blue, Red or White ribbon, or no ribbon at all, at the discretion of the judges.
9. Judges may refuse to award a prize in a given variety and class if they deem the entries to be below show quality.
10. There will be no limit of blooms of any variety, and the exhibitor may win Blue, Red or White on the same variety if so chosen by the judges.
11. Blooms in competition for awards or prizes may be exhibited by amateurs only. The word "amateurs" is not to be rigidly construed, but sensibly and reasonably, to the end that those who earn their livelihood in whole or in part, from the business of dealing in Camellias commercially, shall be prohibited from exhibiting blooms for awards and prizes.
12. Classification and Entry Committee is authorized to reject entries of poor quality.
13. Flowers shall be placed alphabetically so that both the exhibitors and the public may find any flower with ease.
14. Flowers will be received from 7:30 A.M. until 11:00 A.M., Saturday, February 9th, 1980 and judging will begin thereafter.
15. **No person, which includes judges and exhibitors, will be allowed on the floor during placement of blooms between 7:30 and 11:00 A.M., only bloom committee members appointed during this time.**
16. The Show Chairman shall have the authority to destroy all or any of the entries at the conclusion of the show, this by reason of the danger of flower petal blight.
17. The decisions of the Judges on Bloom Awards are final and are not subject to revision by the Show Committee or any other person or committee.
18. The Show Committee reserves the right to interpret the Rules and make further rules for the proper conduct of the Show.

+ + +

Show Headquarters: Holiday Inn—Civic Center, 2230 - 10th Ave. North. Hospitality hours and Banquet will be at this location also. When you make reservations and when you register advise Reception Desk you are with the Camellia Show. There is a special rate. A special room is available to protect your blooms on Friday night if needed. Ask for key at the desk.

+ + +

IT WILL BE "NICE TO HAVE YOU IN BIRMINGHAM"

THE
Jackson Camellia Society

JACKSON, MISSISSIPPI

EXTENDS A CORDIAL INVITATION TO ALL CAMELLIA LOVERS

to attend the

THIRTY-FIFTH ANNUAL MEETING

of the

AMERICAN CAMELLIA SOCIETY

and the

29th ANNUAL CAMELLIA SHOW OF THE JACKSON CAMELLIA SOCIETY

Convention Hotel: JACKSON HILTON

Dates: JANUARY 24-26, 1980

Show location: WALTER SILLERS STATE OFFICE PLAZA

(Flowers to be entered from 7:30 a.m. to 10:30 a.m., Sat., Jan. 26, 1980)

Storage of flowers will be available for out of town guests.



REGISTRATION INFORMATION

AMERICAN CAMELLIA SOCIETY ANNUAL MEETING
January 24, 1980 - January 26, 1980

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

REGISTRATION FEES	On or Before January 1, 1980	After January 1, 1980
Full Convention	\$60.00	\$65.00
Friday & Saturday Only	55.00	60.00
Saturday Only	30.00	35.00

Please Enclose
Registration Fee
Make Checks Payable To:
Jackson Camellia Society

Mail to:
J.H. Brooks
531 Warrior Trail
Jackson, MS 39216

If arriving by air: Date _____ Time _____
Airline _____ Flight No. _____

Tentative Program for American Camellia Society Annual Meeting

JACKSON HILTON HOTEL, JACKSON, MISSISSIPPI

January 24, 1980—January 26, 1980

Wednesday, January 23	Hospitality room opens 5:00 P. M.
Thursday, January 24	8:30 A. M. Registration
	9:00 A. M. Hospitality Room opens
	10:00 A. M. Committee Meetings
	2:00 P. M. A.C.S. Board Meeting
	4:00 P. M. Endowment Board Meeting
	Shopping tours and visits to Camellia Nurseries will be arranged for those not attending Board Meetings.
	5:30 P. M. Reception for ACS President until
	7:00 P. M.
	8:30 P. M. Opening General Meeting of American Camellia Society, all visitors and delegates attending.
Friday, January 25	8:30 A. M. Registration
	Hospitality Room open for coffee and donuts
	9:30 A. M. Educational program with special guest speaker until
	11:00 A. M.
	2:00 P. M. Jackson Planetarium presents special show for Camellia visitors
	3:00 P. M. Tour to Old Capitol and Tea at Governor's Mansion
	7:30 P. M. Mississippi-bred Catfish Supper. Casual dress
Saturday, January 26	9:00 A. M. Registration
	10:00 A. M. Slide program hosted by Tom Perkins
	1:30 P. M. Judges Lunch at Hotel
	2:00 P. M. Camellia Show Preview for ACS members
	2:30 P. M. Camellia Show opens
	6:30 P. M. Hospitality Hour at Hotel
	7:30 P. M. Annual Banquet and Entertainment

—ACS—

Y'all Come!

Jackson Camellia Society, Jackson, Mississippi

Members of the Jackson Camellia Society look forward with great pleasure to hosting the Annual Meeting of the American Camellia Society at the "Crossroads of the South" on January 24, 25 and 26, 1980. We remember what a great time we had together in 1964, and we look forward to renewing the friendships who were

with us then as well as making many new friends.

Jackson has grown a lot in the past 16 years. We have nearly doubled in population as well as area. Those of you who will be returning will notice many changes. Although the King Edward Hotel, our convention headquarters in 1964, still stands guard in

all its sturdy strength at the "lower" end of Capital Street, it houses only memories of past splendors now. This year our Convention Headquarters is the Jackson Hilton, and their efficient staff is ready to make you welcome and look after your comfort.

Guarding the "upper" end of Capital Street is the Old Capitol, Mississippi's most historic building. Occupied in 1839, it replaced Mississippi's first State House, as 30 x 40 two-story brick building on the north-east corner of Capital and President streets, built in 1822. Since ACS's last visit with us several new State buildings have been added to our "new Capitol" complex. (The "new" Capitol was built in the early 1900s.) Our show will be held in the plaza of the new, modern Walter Sillers State Office Building and we know you will be thrilled with the breath-taking beauty of the camellias displayed in the stark splendor of the contemporary architecture.

Our Governor's Mansion, which has been restored and placed on the National Register, will be the scene of our Governor's Tea honoring members of ACS. One of the recent additions to Jackson's places of interest is the Planetarium and Art Center. The result of many years of planning and hard work by our civic leaders, this complex would be a credit even to cities much larger than Jackson. A very special show and display is planned especially for our ACS visitors as well as a tour of the historic Old Capitol.

As a result of Sherman's ruthless burning of the city in 1863, Jackson became known as "Chimneyville". The "Great Easter Flood" of 1979 left us with a similar feeling of devastation. We thought for a period that we were destined to be known as the "Atlantis" of the 20th century. The State Fairgrounds, Coliseum, YMCA, Trade Mart and many businesses as well as hundreds of beautiful homes, were inundated under up to ten feet of water. A number of our camellia gardens and camellia houses were ruined. Our water and power supplies were in grave danger but were saved by heroic

effort on the part of public officials and local volunteers. However, the same indomitable spirit which built a planned state capital city at Le Fleur's Bluff on the Pearl River in 1822, and re-built a clean, bright city from "Chimneyville" in 1863, has once again overcome adversity. We are

transforming Capital Street into a lovely mall; we hosted the International Ballet Competition in its first meet in the United States just two-months after the terrible flood; and, we are waiting at the "Crossroads of the South" to make you welcome on January 23. Y'all come!

—ACS—

JACKSON CONVENTION AND SHOW HONOR CAPTAIN AND MRS. J. H. BROOKS

The Twenty-ninth Annual Camellia Show of Jackson Camellia Society, which is being held in conjunction with the Thirty-fifth Annual Meeting of the American Camellia Society in Jackson, Mississippi, January 24-26, 1980, is being dedicated in honor of Captain and Mrs. Joseph Howard Brooks, who have contributed much to our society for many years.

After thirty years of service to his country as a chaplain in the United States Navy, "Cap'n" and "Miss Ruth" retired and moved to Jackson in April, 1951. Chaplain Brooks had served as Chaplain to the Fourth Regiment, United States Marines, in Shanghai, China, Assistant to the Chief of Chaplains in Washington, D. C., Chief Chaplain, Fifth Naval District, San Diego, California; Chief of Chaplains, Pacific Fleet during WWII, and in many other stations around the world. They looked forward to retirement in their home state of Mississippi, and immediately became active in cultural affairs of the community, attending Jackson's Second Annual Camellia Show in 1952 and joining our Society soon thereafter. They had been introduced to camellias during their last tour of duty in Pensacola, Florida.

"Cap'n" has served the Jackson Camellia Society in many capacities in-



Capt. and Mrs. J. H. Brooks receiving at the Mississippi Governor's Mansion, 1964 ACS Meeting.

cluding that of President, and is now our Treasurer. "Miss Ruth" is always on hand to lend her support. When the ACS Annual Meeting was held in Jackson in 1964, Chaplain Brooks was our General Chairman. We had such a good time hosting that convention! We look forward with joyful anticipation to the 1980 Annual Meeting of the American Camellia Society in our city, and with great humility and hearts full of love, we dedicate this endeavour to Joseph Howard Brooks and Ruth Jaco Brooks, during this, their 64th year together.

—ACS—

Book Reviews

Ishii's Selected Japanese Camellias Including Sasanquas, Yuzo Ishii, Author, Takasi Tuyama, Editor and Toshio Yamada, Illustrator; Publisher is tained from Kiyoshi Yahikozawa, Ex-Seibundo Shinkosha Publishing Co.,

Ltd. The book is covered in light tan linen with maroon type and in an attractive slip case. The book can be ob- port Dept., Orion Books, 55 Kanda-Jimbocho, 1-chome Chiyodaku, Tokyo 101, Japan for 18,000 Y, plus postage,

or US \$150.00 pp.

This 210-page book has the dimensions of 10" x 14". Beautifully illustrated. This book may well be referred to, as it has by a friend of mine, as the Japanese "Berlèse" volume. The paintings are ideally done and representative of the flower in each instance. There are 63 color photos of *C. japonica* and *C. sasanqua* and "Vernalis-group". You will see many of "your old friends" but also many of the Japanese varieties not generally distributed outside the Orient. There are also exacting paintings of petals, sepals, leaves and other parts of camellia flowers. The entire text, of course, is in native Japanese; but even that does not detract from the value of this lovely book to the library of a camelliaologist.

Azaleas and Camellias, Fred C. Galle, Director of Horticulture, Callaway Gardens, Pine Mountain, GA; Countryside Books, A. B. Morse Co., 200 James St., Barrington, Ill. 60010; \$1.50 postpaid. This 48-page paperback book contains much useful information on azaleas and camellias as well as evergreen rhododendrons. There are several good color photos of azaleas, camellias and rhododendrons. You should include it in your library.

The Lagerstroemia Handbook/ Checklist; Donald R. Egolf, Research Horticulturist, U. S. National Arboretum and Anne O. Andrick, Agricultural Research Technician, U. S. National Arboretum; American Association of Botanical Gardens and Arboreta, Inc.; \$3.00 from Dr. Mildred Mathia Exec. Dir., Dept. of Biology, 124 Botany Bldg., University of California, Los Angeles, CA 90024. For anyone growing or thinking about growing Crapemyrtle should have this book in his library. It contains history, culture, information on pests and diseases, research, etc. The "Checklist" is, in fact, a nomenclature list and descriptions and a separate listing as to color and height attained. It is paperback and contains 72 pages including six color photos and some black and white.



Jackson Hilton

JACKSON, MISSISSIPPI

HOTEL HEADQUARTERS
AMERICAN CAMELLIA SOCIETY

JANUARY 24-26, 1980



Jackson Hilton
750 North State Street
Jackson, Mississippi
39205 601/948-8605

Name _____
(Please Print)

Address _____

City _____ State _____ Zip Code _____

Arrival Date _____ Hour _____ P.M.

Departure Date _____ Hour _____ P.M.

ROOMS REQUIRED
INDICATE SINGLE OR DOUBLE _____

NO. OF ADULTS _____

AMERICAN CAMELLIA SOCIETY-January 24-26, 1980

Camellia Root Rot

D. L. GILL

WHAT IT IS

Camellia root rot is a common disease of camellias first exhibited by a yellowing of the foliage followed by an unthrifty condition and marked by stunting. Limbs may die back and often the entire plant dies. Symptoms are more likely to occur in hot weather. Brown lesions are present on the feeding roots from the time of earliest above ground symptoms. These lesions increase in size until the root dies. Often new roots form above the diseased ones and these too may develop symptoms.

Several fungi, especially species of *Phytophthora* and *Pythium*, may be factors in disease development. *Phytophthora cinnamomi* is the fungus most likely to cause the disease. It is widespread in the world and is known to attack over 900 plants including pines and other plants in camellia growing areas.

While these fungi can cause the disease, similar effects can occur with plants when drainage is poor and plants suffer from lack of soil aeration. This lack of soil aeration also favors the development of the species of *Phytophthora* and *Pythium*.

CONTROL

Selection of more resistant plants is the first line of attack in control. Varieties of *C. sasanqua* are usually more resistant to poor drainage and the root rot fungi than *C. japonica*

and some other species of camellia; thus good growing *C. sasanqua* should be used for understock for overcoming the disease.

The characteristic of the growing medium (soil) will have an effect on the disease. A soil in which approximately 50% of the soil volume is composed of soil particles and the remaining 50% consists of pore spaces is considered ideal. Under best conditions, half the pore space should be filled with air and the other half with water. Soils with less pore space are poorly aerated and drained. Thus, it is often desirable to amend soils by adding some material as peat, perlite, bark, gravel, slate or other to improve aeration. Some materials break down in the soil after a time, and lack of aeration may develop later.

Site selection to provide good drainage is important in disease control. Areas with a hard-pan subsoil should be avoided or amended. Spots where water collects from pavement, downspouts or otherwise should be avoided or corrected if plants must be placed in such locations. In heavier soils many growers plant on a mound for relief. Too deep planting, alone or with attack of fungi, will also kill plants.

Plants grown in containers should be in a well drained growing medium. These plants require better soil aeration than do plants growing in the

open. Containers are better placed on sand, gravel, pavement, soil or other material where water does not collect following rain or watering rather than on plastic where water often collects causing poor drainage.

Sterilization of the growing medium is sometimes used. This may be by heat (steam or otherwise) or by methyl bromide fumigation under a plastic cover away from roots of plants. *Caution: Methyl bromide is an extremely poisonous gas and must be used with all care. Only commercially licensed operators may apply it.* Much of the same effect can be obtained by placing the medium in a pile 12-18 inches deep in a sunny location during summer, sealing with a clear plastic cover, and allowing the summer sun to heat it for two weeks.

Greater difficulty is often encountered following sterilization because of recontamination by a causal fungus. It may be carried by tools, water hoses, feet, infested soil, drainage water, or other means. Since competing organisms were eliminated by sterilization, the pathogen is not restricted.

Some drenches may be used for treatment but none are now registered for use on camellias. Results are likely to be variable. Most do not kill the fungus in the soil and are unable to get into the roots in which the fungus is growing. Thus, fungus action is only delayed. Often as good results may be obtained by digging a diseased plant, washing the roots, and replanting in a clean, well drained growing media.

BEA & NEAL ROGERS

Belle Fontaine Nursery

RT. 3, BOX 546, THEODORE, ALABAMA 36582

PHONE (205) 973-2000

'Oscar B. Elmer'. A very deep red very fine camellia. Mid-season. See February 1979 *Journal*.

'Sarah Alice Ruffin'. A very fine large white. Mid-season to late.

'Elaine Smelley'. A medium formal double pink with white edge. M-L. Similar to 'Diddy's Pink Organdie' but not the dieback.

NEW SCIONS:

'Hody Wilson'
'Al Gunn'

LERIO CANS

'Notre Dame'
'Arcadia'

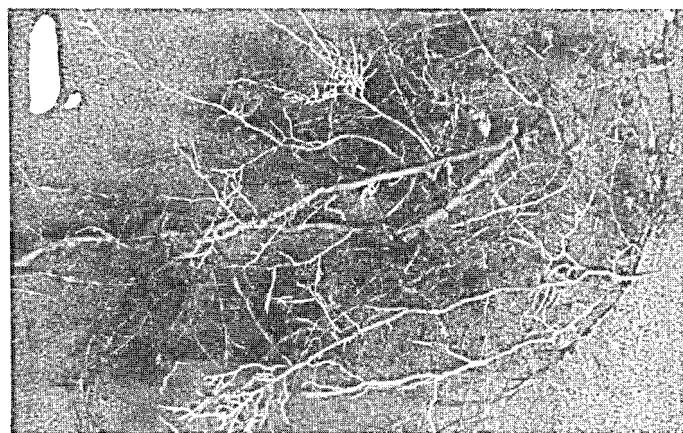
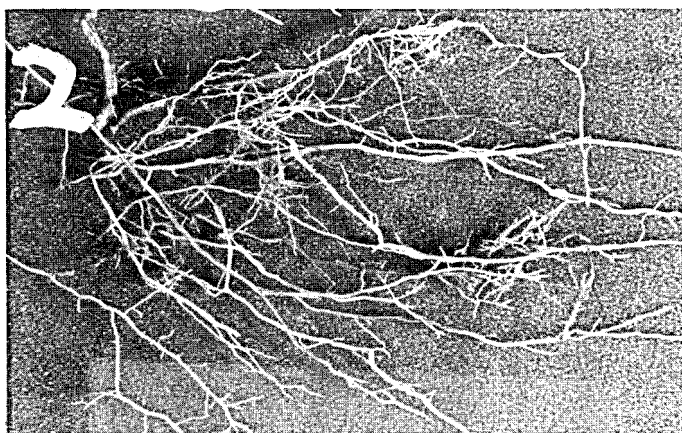
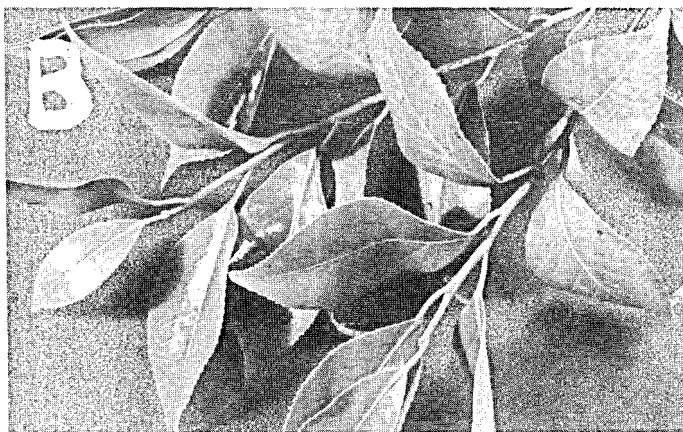
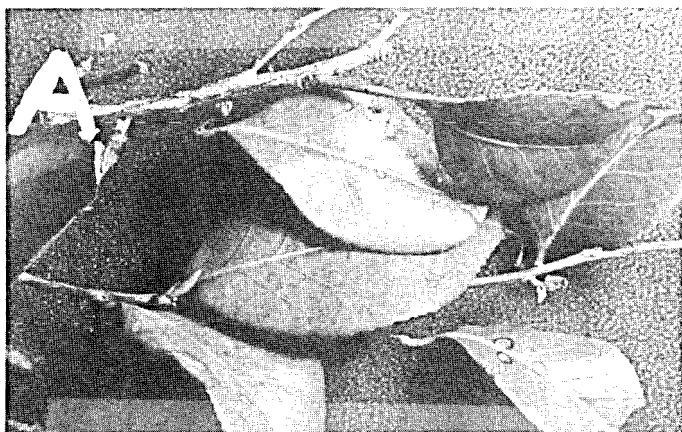
SCIONS

'Curtain Call'
'Katie'

GRAFTS

STA-GREEN FERTILIZER

Symptoms — An Important Key to Correcting Plant Growth Difficulties



Can you match the camellia top growth with the roots listed above? If you matched "A-1" and "B-2", you are right.

In Figure B, there is an abundance of leaves, new healthy growth and no dieback. The roots of this specimen are white and fleshy and should provide the necessary water and nutrients to the above ground parts. In contrast, plant A exhibits no new growth, dead twigs, and sparse foliage. Note the lack of new growth. The roots of this plant show very few white, fleshy roots and an abundance of dead roots. This indicates that the top to root ratio is out of balance. Therefore, poor plant quality must be expected.

What causes the root disorders?

In the Nursery

- (2) Over watering
- (1) Root rot induced by poor sanitation
- (4) Too frequent fertilizer application
- (3) High soluble salts
- (5) Cold injury

Around the Home

- (1) Root rot disease
- (2) Poor soil drainage
- (3) Heavy soil
- (4) Improperly planted
- (5) Improper application of fertilizer

Prepared by: Eugene H. Moody, Sr., Extension Plant Pathologist

"Schultz-Instant"

LIQUID PLANT FOOD

10-15-10

Concentrated, High Analysis — All Purpose — 10-15-10 "Starts and Feeds" all Plants Indoors and Outdoors.

Available at your store or send \$1.25 for 5 1/2 oz., \$2.50 for 12 oz. (includes mailing).

7 DROPS PER QUART WATER

"Schultz-Instant"

SOLUBLE FERTILIZER

20-30-20

Concentrated, High Analysis — All Purpose — 20-30-20 crystals. Grows Vegetables, Flowers, Roses, Trees, Shrubs, Lawns, Etc., in Yards, Gardens, Greenhouses.

Available at your store or send \$7.95 for 5 lb (includes mailing).

1/4 TSP. PER GALLON WATER

SCHULTZ CO. — St. Louis, MO. 63043

SEND FOR OUR FUND RAISING OFFER

Camellia Flower Blight Control— Possibility or Probability¹

LUTHER W. BAXTER, JR., AND W. M. EPPS²

Sixty years ago (1919) a Japanese scientist by the name of K. Hara first described camellia flower blight. The title of the article was "On a sclerotinia disease of Camellia" (5). Hara (6) published a second paper on the subject in 1927, but both of these publications are in Japanese and were unknown to Americans. Hansen and Thomas in 1940 (4) described an unknown camellia disease which had been found first in 1938 at Hayward, California. Hayward is a small town 20 to 30 miles southeast of San Francisco in Alameda County. In 1946, Thomas and Hansen (11) published a second paper at which time they acknowledged the work of Hara, since Professor Iwao Hino had been kind enough to make these papers available to them. By 1950 the disease was known in Georgia, Louisiana, Oregon, and North Carolina (1, 2). Later it was found in many other states (Texas, South Carolina, Florida, and Alabama), so that by 1970 camellia flower blight was scattered widely throughout the camellia belt, both out-of-doors and in greenhouses.

The cause of camellia flower blight is a fungus, *Sclerotinia camelliae* Hara, a relative of *Ovulinia azaleae*, responsible for azalea petal blight, and of *Monilinia fructicola*, the cause of peach brown rot. It differs from these two fungi, however, in that it does not produce a repeating spore stage and no flower to flower spread can occur. This fungus, *S. camelliae*, infects only camellia flowers, but apparently it will attack flowers of most, if not all, *C. japonica* cultivars and it also attacks flowers of *C. sasanqua*, *C. reticulata*, and camellia hybrids.

The fungus attacks camellia flowers during January, February, and March depending on the season and the location. It apparently is most active when the temperatures range from 60 to 65 F, but it can be reasonably active at temperatures as low as 50 F and as high as 75 F. After flower infection occurs, the fungus forms hard black resting structures called sclerotia at the base of the diseased flower. It also forms microconidia on the dead flower (at this time the flower is usually a rusty brown color), which appear as black beads of liquid on the surface of the diseased petals. The formation of microconidia and sclerotia (only at the base of the flower) are signs of the fungus which make possible accurate diagnosis of camellia flower blight. The sclerotia produced on the flower are black and irregular in shape and are capable of survival for at least 5 years in the soil debris after the flower disintegrates. After the affected flowers have disintegrated, the sclerotia, which remain free among the leaves and litter, are extremely difficult to detect. A sclerotium may occasionally develop on an affected flower which is lodged in camellia branches. During the following December, January, February, or March, the sclerotia resume physiological activity and germinate to form apothecia (little brown, fleshy cups about pencil eraser size [5 to 10 mm in diameter]) in which are formed the ascospores (the seed of the fungus). These spores, when ripe, are forcibly ejected into the air and are spread by air currents. If a spore falls on an open camellia flower and the environmental conditions are favorable, infection results and the cycle is complete.

How can the disease be controlled? Basically, there are three options available: (1) reduce inoculum potential (the number of overwintering

sclerotia and hence the number of spores produced); (2) protect susceptible host tissue; (3) a combination of 1 and 2.

1. There are several means of reducing inoculum potential, all of which reduce the number of spores, but none of which show much promise of eradicating the fungus from a community.

a. Pick up and destroy all camellia flowers. If this could be accomplished throughout an entire neighborhood for 5 or more years the inoculum potential could be drastically reduced, but probably not eradicated because flowers get covered up or carried away, or some of them are simply missed. This single practice, however, still represents the best mechanism of controlling the disease. Of course after the camellia flowers are picked up they should be destroyed and should *never* be thrown on a trash dump or put in a compost pile.

b. Apply black plastic to the soil underneath the camellias. Sclerotia will germinate under the plastic but they must have light before the spores will develop. Again, this must be done on a community-wide basis, not just on your property. It has been found by Zummo and Plakidas (12) at Louisiana State University that the spores of the fungus can be windblown for at least one-fourth mile. Thus reducing the inoculum potential by covering the sclerotia is a difficult time-consuming task when attempted on a community-wide basis.

c. Spraying the ground with chemicals as the old infected flowers fall may provide a means of getting a reduction in the inoculum potential. More properly, the soil beneath camellias should be sprayed with any one of several fungicides, as reported by Haasis and Nelson (3). One such material is PCNB (penta-

¹ Contribution No. 1672 of the South Carolina Agricultural Experiment Station. Published with approval of the Director.

² Professor and Professor and Head Emeritus, respectively, Department of Plant Pathology & Physiology, Clemson University, Clemson, SC 29631.

chloronitrobenzene), which is used at the rate of 200 lb. per acre. Ferbam (sold under various trade names, such as Fermate by du Pont) is another excellent material for reducing inoculum potential but a detergent, such as Dreft, Tide, etc. must be added to the ferbam at the time of application. Ferbam is used at the rate of 6 lbs. per 1000 ft² of the surface area. Harvey and Hansen (7) reported good results with sulfur used at the rate of 1 lb per 180 ft². These materials should be applied one time only in late fall (November) before the sclerotia become active. These materials are toxic to the fungus so that apothecia do not form.

Other materials have been tested and some found effective, but the shortcoming of this technique is the same as for picking up the flowers—it must be a community-wide project. It is

also expensive and time-consuming.

- d. A combination of a and c administered throughout a community should reduce inoculum potential to a very low level. If only a few sclerotia are missed, however, millions of spores are discharged into the air and losses may be quite serious in spite of the efforts made to control the disease. It really doesn't matter whether the flower has one spot or 100 spots.
2. A second option available to camellia enthusiasts is protection of the flower against infection. Workers in Louisiana (8, 9) and Arkansas (10) have done an excellent job of researching this area. This method, basically, consists of applying protectant fungicides to the open camellia flowers. In this case the community is only indirectly involved obviously if there is a high level of inoculum (large numbers of ascospores) the chance for most

flowers to become infected is increased. Therefore, for protection to work, the plants must be sprayed frequently throughout the flowering season so that newly opening flowers, as well as older flowers, can be protected. The prime requisites for such a material are that (1) it should not leave an objectionable spray residue on the flowers, (2) it must be toxic to the fungus but not toxic either to the plant or to the people using it, and (3) it should have reasonable persistence qualities. For example, in our laboratory we have tested many materials and benomyl (sold by du Pont as Benlate) possesses these qualities. Certainly there are many more candidate fungicides and one need only read the work of Dr. Holcomb (8, 9) to decide the proper rate, timing, and material to use. Since flowers are continuously opening over a long period of time (as compared to azaleas which make a spectacular



JAPAN

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Included in the fare is the roundtrip from Los Angeles; all hotels, rail and boat trips, an English-speaking guide, private coach, all breakfasts, several lunches and dinners and all events of the ICS Congress. Contact for details: Milton H. Brown, American Camellia Society, P. O. Box 1217, Fort Valley, GA 31030 or write directly with copy of letter to ACS Headquarters to:



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show by all the flowers opening more or less together), the plants need to be sprayed at least weekly if not twice a week. Protecting the flowers with repeated fungicidal sprays (one to two times weekly throughout the flowering season) is a real logistics problem. This system is designed to protect the flowers so that many of the flowers (perhaps 75 to 90%) will be free of infection. This system will reduce the inoculum level over a period of time (by reducing the number of infected flowers reaching the ground to form sclerotia) but without a spray program adopted each year, there will be adequate inoculum for high levels of flower infection the following years.

3. A combination of 1 and 2 will probably work best; that is, reducing inoculum level by one or more of the methods discussed, plus protecting susceptible host tissue by spraying.

Obviously what is needed is a chemical that can be applied to the soil after Thanksgiving (or Christmas, depending on location) which can be taken up by the roots of the plant and translocated to the flowers where it can protect all developing flowers against infection for the entire flowering season. A second approach would be to find a material, not to be taken up by the roots in order to protect the flower on the plant, but a fungicide that could be sprayed onto the infected flowers on the ground which could prevent sclerotial formation. Since the fungus in the infected flower normally requires 10 days to 2 weeks minimum (usually 17 to 25 days) to produce sclerotia after infection, a weekly, or perhaps even fortnightly spray program, could prevent sclerotial development.

Basically, we are working with a fungus that does not have a weak point in its life cycle. It is hoped that some of the above observations and discussion will encourage more work on this disease.

Finally, through the imaginative efforts and the generous financial con-

tribution of Mr. David L. Feathers, of Lafayette, California, a fund has been established through the American Camellia Society to FIGHT BLIGHT. A sum of \$20,000 is available to anyone who comes up with a cure for camellia flower blight caused by the fungus *Sclerotinia camelliae*. Also, a prize of \$1000 is available each year (until a cure is available) to someone who makes a reasonable contribution toward a potential cure. It is not mandatory to give the award annually since research in certain years may not be deemed worthy of an award by the research advisory committee. For example, pruning off the lower branches may give better air circulation so that (1) many of the affected camellia flowers dry out before sclerotia are formed or (2) picking up flowers under the plants would be easier where the lower branches were removed, may be ideas worthy of consideration for an award except that these ideas have been thought of and used before. Thus, for an award to be offered, the idea must advance our knowledge of the disease in some way so that a possible control practice (or cure) may evolve.

Let's pitch in and find the cure. Let's make it a probability—not just a possibility. Happy Hunting!

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—ACS—

In Memoriam

FREDERIC HEUTTE

Frederic Heutte, founder of and associated with the world-famous Norfolk Botanical Gardens until his retirement in 1966, died at the age of 80 on July 28, 1979. Fred has been active with camellias for decades and has served on ACS Committees, and has held offices in the Virginia Camellia Society. He had shared camellias with many societies and people including a beautiful specimen plant of 'General Dwight Eisenhower' for the Camellia Society of the Potomac Valley to plant on the White House grounds when the General was President of the United States. He attended many ACS Conventions, the most recent being the ACS/ICS Convention in Perry, Georgia last November.

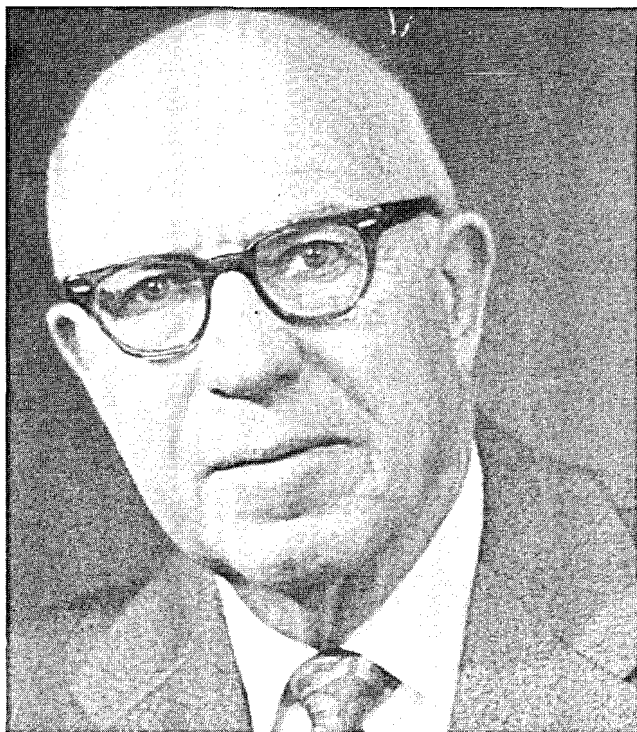
Fred published a book in 1977, *Gardening in the Temperate Zone*, which was well received; and, for many years he wrote the interesting gardening column "Weeder's Digest" in *The Virginian-Pilot* and *The Ledger-Star* in Tidewater, Virginia. He had received many public service awards from the city, state and religious groups as well as the Gold Medal Award of the Garden Club of America. He was also recognized for his gardening expertise by the Royal Horticultural Society of England.

He is survived by his wife Florence in Norfolk, a daughter Mrs. Dolores Henry of Atlanta, a son, Frederic A. of Washington and seven grandchildren.

ANYONE CAN BECOME A
MEMBER OF THE PRESIDENTS
CLUB

In Memoriam

WILLIAM BARKSDALE JOHNSTON



All of the Camellia World mourns the death of William Barksdale Johnston who died on September 10th. While returning from a nice visit to Egypt, Bill was taken ill aboard the airliner on the way to New York City on September 4th. We were advised by Evelyn that a stewardess, who was also a Registered Nurse, gave him such good care and that the Trans-World Airline was outstanding during the crises. Equipment was at Kennedy Airport to rush him to the hospital. The stewardess also made arrangements for Evelyn at a nearby hotel. Bill is survived by his wonderful wife, Evelyn, and two children, Randolph and Julie. How proud Bill was of this fine family. Bill will be missed wherever camellia enthusiasts grow camellias or whenever two or more of them get together to "talk camellias".

I think that no finer tribute can be paid to Bill than repeating sentiments expressed by his good friend Judge Sherrill Halbert in dedicating the 1978 *American Camellia Yearbook* to William Barksdale Johnston.

"William Barksdale Johnston, 'Bill' to Camellia-philis, is another hometown boy who has made good. He was born, reared and educated in Fresno, California, and has practiced his profession there for almost half a century. There he met and married the

lovely Evelyn Wickersham, and there, in turn, they reared their two children, Randolph and Julie. Bill has been a member of the Kiwanis Club for nearly twenty years, and has taken part in many community affairs. He was responsible for establishing Legal Aid Services in Fresno County, and has been President of the County Bar Association. Busy as he has been, he has not forgotten his church. He is an active member, and has been Moderator of the First Congregational Church.

"Bill" has excelled in the Camellia World. Not only has he held every office of the Central California Camellia Society, but, as a Life Member, he has been unstinting in his support of the American Camellia Society. He and Evelyn have attended every meeting of ACS held since 1969. He has faithfully served as a Director-at-Large, a Vice President, a member of the Board of the Endowment Fund, and now as the President of our Society. He has been most conscientious in carrying out the duties of President, and because of his legal training, has done much to make certain that the Charter and By-Laws are kept current. A most important contribution is the institution of the Fight Petal Blight Campaign. On the success of this campaign well may ride the future of camellias, and with 'Bill' at the helm, its success is assured.

"Bill" is well traveled and has been welcomed wherever camellias are grown in the United States or 'Down Under'. He and Evelyn have on two occasions visited Australia and New Zealand, where they have made many friends and have developed a fine relation between camellia enthusiasts in both halves of the hemisphere.

"For your keen interest in camellias, for your unusual ability, your astute judgment, your unswerving integrity, your unfailing courtesy, your warm friendship, your ever-helping hand, your pleasant disposition, your hearty good fellowship, your abiding devotion to your wonderful family, for your love of God and your fellowman—for all of these qualities and attributes, we proudly dedicate this 1978 Yearbook of the American Camellia Society to you, 'Bill'."

On two visits to Massee Lane while he was President of our Society, Bill worked all day each time to learn "what makes ACS tick". His compassionate attitude won the hearts of all of us at Massee Lane, from the men toiling in the gardens to the folks toiling in the office. Our lives have been greatly enriched by knowing Bill—William Barksdale Johnston.

Tea Leaves for Combatting Petal Blight

WOODFORD F. HARRISON

The report of Mrs. E. W. Dabbs' use of tea leaves to prevent petal blight (American Camellia Society Journal, August 19, 1977) prompted the Plant Experimental Committee of the Northern California Camellia Society to investigate more fully Mrs. Dabbs' routine of the use of spent tea leaves as a mulch. Several members of the committee used tea leaves, in the same manner as Mrs. Dabbs, during the blooming season 1978-79, with parallel controls in a customary experimental fashion. In no instance has success been reported as a result of the tea-leaves treatment. There is no question, however, that this kind of a mulch does give the camellia plants vigorous, deep-green-colored growth.

During the fall of 1978 it occurred to the writer that if tea leaves could be beneficial, as reported by Mrs. Dabbs, then there must be some portion of the tea extract that would be of value in stopping petal blight. Tannic acid might well be such a chemical, so several of the committee carried out tests with dry powder tannic acid, and with tannic acid solution. In the case of tannic acid solution, application was made on the roots as well as sprayed on the foliage, in separate experiments. Application of the dry tannic acid was made monthly—January, February and March—preferably to at least 2 similar plants, alongside 2 plants without tannic acid, for control.

Experiments with a 1% tannic acid solution in water were performed by applying to the roots in one instance, and in the second by spraying on the foliage.

Ken Hallstone carried out the experiment with tannic acid solution in the following manner: The solution was made up by dissolving 1 oz. of tannic acid in a gallon of water. This is not a 1% solution but rather .75%.

He applied 2 gallons of this solution to the roots of Valentine Day, Arajeshi and Spanked Baby. Alongside he had control plants without treatment. He counted the blooms and classified those that had blight and those that were free of blight. It is sufficient to say that the amount of blight on treated and untreated plants did not show any significant difference.

Frank Pursel carried out the tannic acid experiment as well as the use of tea leaves. The 1978-79 season was especially bad for blight in this area. He found no benefit from the use of either tannic acid or tea leaves.

The writer carried out the dry tannic application, as described above, on Coronation, but also without apparent benefit. He also used the foliage spray method, with a 1% solution, on other varieties, with no con-

clusive results. He has a single Lady Clare plant, about 50 years old, that year after year has had considerable petal blight during the part of the blooming season with the highest humidity and temperatures. Regretfully there was no matching plant for control purposes. He did, however, during the 1978-79 blooming season of this plant, spray it on a weekly basis with a 1% tannic acid solution. The plant was not entirely free of blight but did appear to have much less than in former years even though this season was particularly bad for blight. He also used the Dabbs' tea-leaves experiment on plants of Pirouette. This variety does not tend to have a great deal of petal blight, but there seems no question that the amount of blight was about the same on the treated as on the untreated plants.

Even though these tests gave negative results, the experiments will be repeated and improved upon during the 1979-80 blooming season. Comments from other camellia growers who have used tea leaves to prevent blight will be much appreciated.

—ACS—

Hybridizing: Northern California Style

FRANK PURSEL

Over 150 hybrid seedling blooms were observed this year, all with some *C. reticulata* blood in the crosses. Grafts were made of three for further evaluation. One has a rosebud center like 'Valentine Day' but a different color. Another looks like red crepe paper, and the third has a sheen like we've never seen before. The petals look like they were painted with lacquer. This flower is rather small, only going 4½ inches, but I have made many crosses using the pollen of 'Crimson Robe', 'Arch of Triumph', and some of my large, heavy textured seedlings. Pods have formed on all crosses made, and should have around 50 seeds to harvest this October. As this seedling is dark red, and all of the crosses made were on red-flowered

camellias, it will be interesting to see how many of the seedlings will be dark red with sheen. The seedling has 'Crimson Robe' as the seed parent, and *C. lutchensis* as the pollen parent back crossed to 'Crimson Robe'.

In 1977 Mr. Andoh sent *Cleyera* seeds from Japan to Jim McGregor. These seeds were germinated and some grafted to speed up bud set. With luck, the grafted plants should bloom this year, and every attempt will be made to cross this yellow, scented *Cleyera* using camellia pollen. As the *Cleyera* blooms very early, it will be necessary to use stored pollen.

Three years ago, every member of the Northern California Camellia Society received a "Retic" hybrid seedling to grow (90 seedlings). These

seedlings were all of the same cross ['Crimson Robe' x ('Cornelian' x 'Mrs. D. W. Davis') seedling]. As the blooming season progressed, members would bring in seedling blooms for evaluation. Out of 20 or so blooms one was so outstanding ten grafts were made. The rest should bloom this coming season with the hope another winner will show up.

Some of these new hybrids will be shown at the ACS National Convention in Jackson, Miss. in late February 1980, if we have a mild enough winter for early blooms in Calif. Ray Gentry will be introducing at least three new "Retic" hybrids at the show: 'Cornelian' x 'Mrs. D. W. Davis' named 'Hulyn Smith'; another, same cross, 'Dick Goodson'; and a ('Cornelian' x 'Mrs. D. W. Davis' seedling) x 'Cornelian' called 'Redwood City'.

By back crossing, using the same parents over and over again, one sees a great variation in the seedlings' blooms, size, texture, growth habit, etc. The seedlings are either much better than the parents, or much worse. The foliage change becomes quite striking—six inch leaves to one inch leaves. Albino seedlings are not uncommon. Up to now, all of the oddball plants have not produced flowers of any merit. On the other hand, most of the normal looking seedlings have a superior flower. By this I mean larger size, better texture. As the color and form are not different

enough from existing camellias, there is no point in introducing what I call "another camellia".

As of now, the only hope the hybridizer has in introducing a different camellia, basically, is in the form. *Just think what scent and yellow will bring to the camellia world!*

'Brigadoon' seedlings that have a mixture of "Retic" and *C. japonica* in the pollen are showing extreme vigor. The progenies are attaining a length of 6' in three years with very thick leaves. The first one to bloom had a pink flower about 5" with a peony center. Many buds had formed the length of the plant, but a freeze snapped most of them off the branches. I've tried using *C. reticulata* pollen on 'Brigadoon' without any *C. japonica*, such as 'Cornelian', 'Crimson Robe', etc., with poor results—too few blooms and plant growth is very whiplike. I have made many crosses again this year using hybrid seedlings as the pollen parent. Up to now, all the pods have only held one very large seed which germinates

within three weeks. The blending of *C. saluenensis*, *C. japonica*, and *C. reticulata* may bring some interesting new hybrids in the near future. *C. lutchuensis* seedlings seem to take forever to grow. Two-year old plants (6) are only 6" high. They are supposed to have "Retic" and *Japonica* pollen, but they don't show any hybridity yet. I had no idea why the seedlings were growing so slowly. They had been kept under ideal growing conditions (greenhouse, lights, etc.). The first of April, 1979, they were moved outside, and it immediately became apparent that "Lutch" seedlings like cool growing conditions. New growth has started, and the seedlings have a healthy look. From now on will move "Lutch" seedlings out of the greenhouse as soon as they have germinated. They may even do better if they aren't started under greenhouse conditions.

Every year I promise myself to cut down on pollinations, but a quick count shows I will have another 300 to 400 seeds to plant again this year!

—ACS—

Ode to Kramer's Supreme

KEN HALLSTONE
Lafayette, Ca.

Of all the *C. japonicas* with floral fragrance, I must rate 'Kramer's Supreme' as number one. It is an excellent large peony flower in a good turkey red color, possessing a pleasing fragrance. The plant has good growth habits as well as beautiful lush green foliage. It has proved itself as a pollen parent in the spectacular show-winning flower, 'Dr. Clifford Parks'. If only it were not so reluctant to set seed it would be the hybridizers' delight.

I have been trying religiously to set seed on 'Kramer's Supreme' since 1974. In fact I bought a second large plant so I would have more flowers with which to work. This was fortunate because my original plant is now sulking.

Using my regular technique of hybridizing as reported in the A. C. S.

Yearbook 1976, 'Kramer's Supreme' was able to elude me until 1977. On February 28 I was successful in setting a seed on 'Kramer's Supreme' by using a gibbed flower and gibbed pollen. The long banana-shaped pod contained one viable seed. The pollen parent was the best of Dr. Robert Cutter's 'Bud-frat' series—*C. reticulata* 'Buddha' X *C. fraterna*. The foliage of my new hybrid shows definite 'Buddha' characteristics and when it blooms, hopefully it will be an excellent fragrant flower. Again on February 8, 1978, using gibbed pollen from the hybrid 'Alice Cutter' and a 'Kramer's Supreme' flower I made a successful cross. Cross pollination is the general rule with *camellia japonica*, but it is possible if not probable that the above cross was a "self". To make the cross I covered the gib-

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bed flower with a paper bag just before the flower opened and left it on until the flower was almost spent. I lifted the bag and removed the entire corolla of the flower leaving only the reproductive pistil. I then applied ample 'Alice Cutter' pollen to all the branches of the ovary, replaced the bag and waited about a week before removing. When harvested in the fall, the pod contained three seeds of which two (when cracked open for planting) were empty. The remaining viable seed was planted, sprouted, developed a plumule, then was attacked by fungus and died. I will never know whether it was a "self" or if I actually made the cross.

For the 1979 blooming season, in October I gibbed six or seven fat buds on my 'Kramer's Supreme' and was planning a real assault on this reluctant seed setter. Everything was fine until in late November we experienced three nights in a row of temperatures near the mid twenties. All of the gibbed buds, some showing color, turned brown and eventually dropped off without opening.

Since the only success I have had in setting seeds on 'Kramer's Supreme' has been with gibbed flowers and gibbed pollen what would I do now? First of all I knew that I wasn't going to give up. Since I didn't have

any gibbed flowers why not make the flower think it was gibbed and remove the growth bud, which I did on four crosses. Because I had one success by removing the entire corolla, why not try that again, which I did on four crosses. With the highly complex pistil that 'Kramer's Supreme' possesses I tried four crosses by shortening up the style so the pollen wouldn't have to travel so far to the ovary. I had just obtained a fresh jar of rooting powder, so why not dust a little of it on the stigma before applying the pollen, which I did on four crosses. And what's wrong with trying four crosses using my regular technique, which I did. Altogether twenty crosses using five different techniques were made between the 12th of March and the 24th of April. The temperatures at the times the crosses were made ranged from 58° to 70°.

What happened? I set one seed pod on 'Kramer's Supreme.' Which one of the methods used was the successful one? You probably guessed it — my regular old technique of emasculating, applying ample pollen and bagging the results. The cross? Oh yes!

'KRAMER'S SUPREME' X
'VIRGINIA CUTTER'.

—ACS—

Water Quality and the Vase Life of Camellia Blooms

JAMES E. McCORMACK

The suitability of the water solution in which the stem of a cut flower is held is a major factor affecting the vase life of the flower. Vase life is also influenced by other environmental factors, such as air temperature, humidity, light, vase sanitation, and preharvest and harvesting conditions, but such factors will not be considered here. The following discussion will be confined to the characteristics of the water solution used in vases and water picks.

The benefits that can be derived

from using high quality water and a floral preservative to extend the vase life of cut flowers have now been well documented (5). The use of 8-hydroxyquinoline citrate (8-HQC) and sucrose (sugar) as a preservative in vase water is now generally recognized as increasing the vase life of most cut flowers. Snapdragons, carnations, chrysanthemums, gladiolus, asters, stock, roses, and other flowers have been shown by scientifically designed studies to have an extended vase life and improved flower quality when

held in solutions containing quinoline salts and sucrose. Research horticulturists seem now to be in general agreement that 8-HQC and sucrose should be the principal ingredients of a good floral preservative (1,5).

Informal and unpublished observations and studies confirm the belief that good water quality and the addition of a good preservative will increase the vase life and improve the quality of most flowers, including camellias. Several investigators have used an 8-HQC plus sucrose preservative — they believe successfully — to improve the flower opening and the lasting quality of the blossoms on cut dormant branches of lilac, forsythia, and dogwood. There apparently have been no reports of any cut flower that has not responded favorably to an improvement of vase water quality or the addition of a good floral preservative containing 8-HQC and sucrose.

The environmental factor most recently recognized as significantly affecting vase life is water quality. During the past 15 years, many studies have sought to evaluate various chemicals and formulations as additions to water to increase vase life. These studies generally were made entirely with distilled water without analyzing the effect of differences in water quality if tap water had been used. It is only fairly recently that water quality has been recognized generally as a major factor affecting vase life.

The principal technique for improving water quality is the substitution of distilled or deionized water for straight tap water. Because distilled water is better than deionized water (5) and is generally easier for a camellia fancier to obtain, deionized water will not be considered further here. Camellia growers may note, however, that clean rain water and the condensate from air conditioning and refrigeration systems may be the equivalent of distilled water.

The level of impurities in tap water is often measured in total dissolved solids (TDS). The quantity of dis-

solved solids (TDS) that will reduce flower vase life is difficult to determine and varies according to the kind of impurities present. Some are toxic in very small amounts. However, it has been found that TDS in excess of 100 ppm (parts per million) generally reduce vase life (4). The quantity and nature of the dissolved solids in tap water vary over an extremely wide range in the United States, with the highest TDS levels generally found in the western and southwestern parts of the country. However, the TDS levels in the remainder of the country often exceed 100 ppm.

The reported increases in the vase life of flowers achieved by substituting distilled water for tap water and by using a good floral preservative seem remarkable. In a recently reported study in Ohio of factors affecting vase life, Staby and Erwin (5) found that the vase life of the chrysanthemum 'May Shoesmith' in distilled water with Oasis Floral Preservative (8-HQC 150 ppm plus sucrose 2%) was 5.6 times as long as in straight tap water having TDS of 470 ppm. The vase life in distilled water with the preservative was 2.4 times the vase life in tap water with the same preservative, demonstrating the effect of a difference in water quality when a floral preservative is used. The vase life in distilled water without a preservative was 3.3 times the vase life in tap water without preservative. The chrysanthemum variety used in the study has a normally poor vase life (5). The flowers had a vase life of only two days in tap water (TDS of 470 ppm) without preservative, 4.6 days in the same tap water but with the previously mentioned preservative, and 11.2 days in distilled water with the same preservative.

Although distilled water may seem to contribute more to flower vase life than floral preservative, the addition of a preservative is very useful. The addition of the preservative in the Ohio study nearly doubled the vase life obtained with distilled water without a preservative. The addition of the preservative also makes possible

the very welcome elimination of the practice of changing vase water and recutting stems every day or so. When distilled water and a good floral preservative are used, the vase water does not need to be changed during the life of the flower, except to add solution when needed.

When the first article suggesting the use of 8-HQC and sugar as a flower preservative appeared more than five years ago in the *Camellia Society of the Potomac Valley Newsletter*, 8-HQC could not be obtained in the Washington, D. C. area. We, therefore, obtained one pound of 8-HQC directly from the manufacturer and distributed it to our interested members in a liquid concentrate to be added with sugar to tap water. We did not become aware of the advantages of distilled water until early this year. Consequently, our experience with distilled water is extremely limited.

Because of the limited number of camellia blooms available in our area for testing, it has not been possible for us to conduct tests and make comparisons of the type that have been reported for florist flowers. However, we have had the experience of bringing to a fully open state camellia blooms that were only partially open when the treatment began. For example, a partly-opened cup-shaped 'Tomorrow Var.' bloom $2\frac{3}{4}$ inches in diameter was cut just before a hard freeze and placed in a tap water solution containing 300 ppm 8-HQC plus 3% sugar. Eleven days later, the bloom was fully open, $4\frac{3}{4}$ inches in diameter, and still in fresh condition. It had been held in the open in an unheated room above freezing for four days and in a clear plastic covered container at 73°F. for the remaining seven days. There have been a number of similar experiences involving several varieties, but no successful openings of buds that had not opened partially before being cut from the plant. Some light and the presence of a leaf or two may be helpful, but we have occasionally found some further opening and growth of ca-

mellia flowers while held in darkness in a refrigerator. The use of distilled water might also help.

Some of our members routinely use solutions containing 8-HQC and sucrose in water picks to hold camellia blooms in a refrigerator for a show or for future displays or flower arrangement. It is our impression—we have no direct comparisons with equivalent blooms in untreated water—that 8-HQC plus sucrose has substantially prolonged the life of blooms in storage and enhanced the quality and sometimes the size of the blooms. The use of the preservative may have also been the principal cause of some blooms' opening beyond their peak form while in a refrigerator.

Our holding solution was made this year for the first time with distilled water. There were not enough blooms available, and there were no direct comparisons on which to draw a supportable conclusion as to the efficacy of the change to distilled water. But the combination of distilled water with 8-HQC plus sucrose did prove to be entirely satisfactory. Several blooms, one of which made the Honor Court, were cut 15 days before the spring show of the Camellia Society of the Potomac Valley. The blooms were held until show time in a preservative solution of distilled water, 8-HQC, and sucrose in a refrigerator. At the close of the two-day show, the then 16-day old blooms were found to be still in a completely fresh condition, except a 'Clark Hubbs' that turned purplish but was otherwise turgid and fresh appearing.

Our camellia experience and the well documented published research with other flowers leads us to believe that the combination of distilled water, 8-HQC, and sucrose is very definitely a good one for camellia growers.

The technical explanations and descriptions of how 8-HQC and sucrose act to increase vase life are very interesting and have been presented in extensive detail in many research reports dealing with florist type flowers. Examples of such studies (1,2,3,5)

provide good guides and starting points for experimental work with camellias. They also furnish extensive references to similar and related investigations.

Because of the extremely wide differences in tap water quality, the increase in vase life that you can achieve in your area by substituting distilled water for tap water could be much less or much greater than reported in the Ohio experiments previously described. Naturally soft water contains little dissolved solids, is generally relatively acidic, which is desirable (1,5), and usually should be as good or almost as good, as distilled water in a floral preservative solution. Softened water and the naturally hard water from which softened water is made contain relatively large quantities of dissolved solids and are generally low in acidity. The substitution of distilled water for hard water or softened hard water should substantially prolong vase life and improve the keeping quality of blooms held in storage.

A preservative solution of any desired composition can be prepared easily with the chemical 8-HQC and table sugar. However, the problem of buying 8-HQC in the small quantity usually needed and the task of weighing the very small quantities needed to make up a reasonable supply of solution may suggest to many grow-

ers the use of a commercial preservative. Oasis Floral Preservative, when used at the rate recommended by the manufacturer provides 2% sucrose and 150 ppm 8-HQC. This compares with the 1% to 4% sucrose and 300 ppm 8-HQC suggested in the earlier *Camellia Society of the Potomac Valley Newsletter* articles. The proportions are probably adequate since the sucrose amount is about average and the 8-HQC level is apparently not critical. Other commercial preservatives may serve as well as the Oasis product but their composition is not known to me.

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—ACS—

Does Treatment of Camellia Flowers With Growth Regulators Before Pollination assist in Fertilization?

W. L. ACKERMAN AND MARGOT WILLIAMS*

For a number of years many camellia breeders, including ourselves, have wondered whether certain growth regulators can improve fertility in camellia crosses. With the increased use of interspecific hy-

bridization as a means for developing new combinations of plant and flower characteristics, this question takes on greater importance. Interspecific crosses have a much lower percentage of successful fertilizations than do intraspecific crosses. Thus, any procedure that increases seed production is a valuable aid to the breeder.

A number of chemicals have given highly variable results in tests with cross pollinations. In most cases, the tests were per-

formed without untreated checks of the same crosses, by which the effectiveness of the substances could be determined. The purpose of this paper is to help resolve the question of the usefulness of two growth regulators commonly used as aids in fertilizations.

Some years ago, we noted that a number of flower buds of *C. japonica* 'Frost Queen' that had been treated with gibberellic acid to induce early flowering appeared to have a higher percentage of capsule formation than did untreated flowers crossed with the same pollen source. Unfortunately, comparative records were not taken, and this casual observation could not be substantiated.

Experiments during the 1978-79 season were designed to test the usefulness of the potassium salt of gibberellic acid (GA) and naphthalene acetic acid (NAA). Flowering plants growing in ground benches in a greenhouse at the U. S. Plant Introduction Station, Glenn Dale, Maryland, were used as seed parents: P. I. 228188 *C. rusticana* 'Hatano' and P. I. 277764 *C. x Williamsii* 'November Pink'. These were selected for their past performance as reliable seed setters. Two pollen sources, P. I. 229973 *C. hongkongensis* and P. I. 162475 *C. oleifera*, were selected to represent two levels of compatibility in interspecific crosses. The two seed parents crossed with *C. hongkongensis* pollen represented intraspecific crosses of moderate difficulty, whereas the two seed parents crossed with *C. oleifera* pollen represented intergeneric crosses of considerable difficulty.

Leaf buds adjacent to flower buds were tagged and treated with 20,000 ppm (2%) GA or 15,000 ppm (1.5%) NAA when the flower buds first showed color. The method used to prepare the flowers for treatment was that considered standard by camellia growers for "gibbing" flowers for show purposes: the end of the leaf bud was snapped out, forming a cup into which solution was added. Flowers on each of the two seed parents were treated with GA or NAA. An equal number of flowers on each plant were tagged but were not chemically treated. As each flower developed to the proper stage it was pollinated with stored pollen of *C. hongkongensis* or *C. oleifera*, as predetermined earlier in the experiment. Flowers of all crosses were emasculated, pollinated, tagged, and recorded as of date of activity. Some tagged flowers of both chemically treated and untreated portions of the experiment came into receptivity without being pollinated and were thus lost from the experiment. They account for the unequal numbers of representatives for each test in Table I.

Table I shows the number of flowers pollinated in each test, the number and percentage of seed capsules, the number and percentage of viable seeds, and the statisti-

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TABE 1. COMPARISONS OF CAPSULE AND SEED PRODUCTION IN CAMELLIA FLOWERS TREATED WITH GIBBERELIC ACID AND NAPHTHALENE ACETIC ACID AND UNTREATED FLOWERS.

Hybrid Cross	Flower Treatment	Number Flower Pollinated	Number Seed Capsules	Percent Seed Capsules	Chi-Square Value	Number Viable Seeds	Percent Viable Seeds	Chi-Square Value
<i>C. rusticana</i> x <i>C. hongkongensis</i>	GA	72	37	51	8.81**	37	51	0.21
<i>C. rusticana</i> x <i>C. hongkongensis</i>	none	88	25	28		42	48	
<i>C. rusticana</i> x <i>C. oleifera</i>	GA	58	14	24	4.64*	6	10	1.07
<i>C. rusticana</i> x <i>C. oleifera</i>	none	72	8	11		12	17	
<i>C. x Williamsii</i> x <i>C. hongkongensis</i>	NAA	32	8	25	0.07	8	25	1.00
<i>C. x Williamsii</i> x <i>C. hongkongensis</i>	none	57	13	23		20	35	
<i>C. x Williamsii</i> x <i>C. oleifera</i>	NAA	27	2	7	1.01	2	7	1.01
<i>C. x Williamsii</i> x <i>C. oleifera</i>	none	42	1	2		1	2	

* Indicates significant difference (0.05% level).

** Indicates highly significant difference (0.01% level).

Statistical calculations based on Snedecor, G. W. and Cochran, W. G. 1967. *Statistical Methods*. Ed. 6, Iowa State Univ. Press, Ames, Iowa. 534 pp.

cal significance of differences in fertility between chemically treated and untreated flowers. The use of GA on *C. rusticana* flowers before pollination with *C. hongkongensis* increased seed capsule formation from 28 percent to 51 percent, a highly significant difference. However, seed capsules from GA treated flowers averaged fewer viable seeds than did those from untreated flowers. Gibberellic acid increased viable seed production from 48 (untreated) to 51 (treated) percent, which is not a significant difference. Similarly, GA increased the percentage of seed capsules from 11 percent to 24 percent of crosses of *C. rusticana* x *C. oleifera*, which was a significant difference. Here the percentage of resulting viable seeds was actually lower, 10 percent, for the treated compared to 17 percent for the untreated flowers. However, again there was no significant difference in viable seed production within this test.

The results show that GA as used in this study effectively increased the percentage of seed capsules, but not the percentage of viable seeds in camellia interspecific crosses over those of untreated flowers of the same crosses. The ability of GA to stimulate capsule formation has apparently lead to the false impression that its use increases seed set. It appears that GA stimulates the growth and development of ma-

ternal tissues surrounding the ovules independent of any beneficial effect on fertilization and/or embryo development. Many seed capsules resulting from GA treated flowers are void of viable seeds while many others have fewer seeds per capsule than those from untreated flowers of the same crosses. At harvest time, this leads to the impression that GA actually has a detrimental effect on viable seed production. Actually, those capsules without seeds undoubtedly would not have formed if the flowers had not been treated with GA. Yet, their presence reduces the overall seed to capsule ratio. It may be concluded that GA has no positive effect on fertilization and/or embryo development, but there are suggestive indications that GA may have a negative effect. However, the latter impression is not supported statistically.

Comparisons between NAA treated and untreated flowers in crosses of *C. x Williamsii* x *C. hongkongensis* gave somewhat higher percentages of viable seeds for untreated flowers, while the reverse situation was true for the *C. x Williamsii* x *C. oleifera* crosses. In neither case were the differences of statistical significance. Although NAA has been found of some value in stimulating fertilization in certain herbaceous plants, there is little indication of positive effects on camellia flowers.

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Application of Electrophoresis to Taxonomic and Breeding Problems in Camellias

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Camellia collectors as well as plant scientists are deeply concerned with varietal purity and correct nomenclature. Since camellia varieties often cannot be absolutely

identified by their morphological characteristics, many "discussions" over varietal origin and identification are found in the camellia literature. Often these debates fail to reach

a final resolution. In such cases, the need for an accurate alternate approach to cultivar nomenclature is evident. Preferably the approach ought to be fairly simple, highly reproducible, and affected very slightly or not at all by the environmental conditions under which the plants are grown. These requirements seem to be ideally fulfilled by the technique of gel electrophoresis of enzymes. Because enzymes more closely approximate primary gene products than do complex morphological characters, the banding patterns obtained in a gel more nearly reflect the genetic make-up of the plant. Hence, the probability of correctly identifying a specific cultivar may be increased. This technique is currently finding wide applicability in the crop sciences and has been used to identify cultivars of citrus (Torres *et al.*, 1978), safflower (Bassiri, 1977) and others.

In our laboratory we are just getting underway on a program of enzyme analysis of both cultivated forms and wild accessions of *Camellia japonica*. This paper reports the development of methods suitable for the separation of isozymes* from mature leaves,

A brief explanation of the technique seems in order. The theory underlying electrophoresis is relatively simple. It essentially boils down to the fact that charged particles migrate when placed in an electric field. In this case the charged particles are enzymes, which are largely composed of linearly linked amino acids each of which contributes in one direction or another to the net charge on the protein molecule. An extract from the tissue of interest is placed in a medium such as starch and subjected to an electric current which facilitates separation of isozymes by taking advantage of their different net charges. Following their separation in the gel, the enzymes are identified by staining reactions dependent on their specific catalytic activities. A single minor mutation in the hereditary material coding for one of the enzymes being stained for can result in an electrophoretic mobility difference, if the substituted amino acid(s) carries a charge different from the one it replaces. An important consequence of this is that minor mobility differences of the *same* enzyme in *different* cultivars can be detected. Theoretically a large number of enzyme systems can be examined. This would result in a highly specific "fingerprint" of a small portion of the genome of the plant. Hopefully, each cultivar examined would be character-

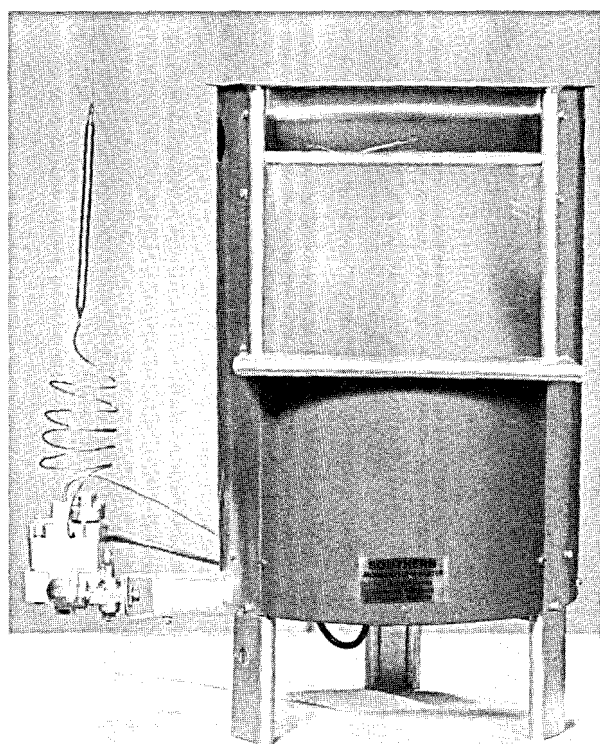
* (or highly similar forms of the same enzyme with essentially identical activity.) and their preliminary usefulness in identifying named cultivars. Furthermore, the potential this technique offers for solving other taxonomic and breeding problems within *C. japonica* is discussed.

TABLE 1. Isozymes * of some common cultivars of *Camellia japonica*. Values indicate anodal migration distances in millimeters. N.D. = not determined.

Name	ACPH	ADH	ALD	GDH	GOT-1	GOT-2	6-PGD	PGM	PGI
'Berenice Boddy'	26	36, 32	30	19	N.D.	46	N.D.	71, 68	64, 57, 55, 53
'Glen 40'	26	36, 32	30	19	19, 12, 6	46	26	72, 69, 66, 60, 54	64, 60, 58, 56, 54
'Grace Bunton'	26	32	30	19	19, 12, 6	47, 46, 45	26	72, 69, 66, 60	64, 57, 55, 53, 51
'Billie McCaskill'	26	33	32	19	8	47	27	72, 69	64, 57, 55, 53, 51
'Broad Rose' **	26	33	30	20	6	47, 46, 45	26	74, 71, 66, 60	68, 65, 60, 58, 56, 54, 52
'Pearl Harbor'	26	47, 42	30	20	6	45	27	72, 69, 66, 60	68, 65, 60, 58, 56, 54, 52
'Reverend John Drayton'	28	46, 41, 37, 32	38, 35, 32	19	6	45	26	73, 72, 69, 65, 58, 52	65, 61, 59, 57, 55
'Governor Mouton'	28	36, 32	30	19	6	43, 40, 37	26	71, 68, 61	68, 64, 59, 57, 55, 53, 51
'Dr. Ralph Watkins'	26	33	32	21	10	47, 43, 38	N.D.	77, 70	68, 59, 57, 55, 53
'Pink Champagne'	26	33	32	20	6	44	26	71, 68, 61	64, 60, 58, 56, 54
'Paulette Goddard'	26	36, 32	30	19	6	47, 43, 38	28	72, 69, 66, 60	69, 65, 61, 59, 57, 55, 53
'Debutante'	26	36, 32	30	19	6	47, 46, 45	27	72, 69, 66, 60, 54	65, 62, 60, 58, 56
'Lady Vansittart'	26	36, 32	30	19	6	45	26	72, 69, 66, 60, 54	65, 62, 60, 58, 56
'R. L. Wheeler'	26	42, 37, 32	33, 31	19	6	51, 47, 43	27	72, 69, 66	68, 64, 58, 56, 54, 52
'Herme'	26	32	30	19	6	47	26	72, 69, 66	64, 58, 56, 54, 52, 50, 48
'Lady Clare'	26	43, 38, 33	32	19	8	43	26	72, 69, 66	64, 58, 56, 54, 52, 50, 48
'Willie Hite'	26	32	32	19	19, 12, 6	49	26	72, 69, 66, 60	58, 56, 54
'Sarah Frost'	26	33	N.D.	N.D.	8	49	26	74, 71	68, 57, 55, 53

* Key to enzyme symbols: ACPH, acid phosphatase; ADH, alcohol, dehydrogenase; ALD, aldolase; GDH, glutamate dehydrogenase; GOT-1, GOT-2, glutamate-oxaloacetate transaminase; 6-PGD, 6-phosphogluconate dehydrogenase; PGM, phosphoglucomutase; PGI, phosphoglucose isomerase.
 ** Unregistered chance seedling from Buchanan's Nursery, Raleigh, N. C. (Dr. R. Watkins, personal communication).

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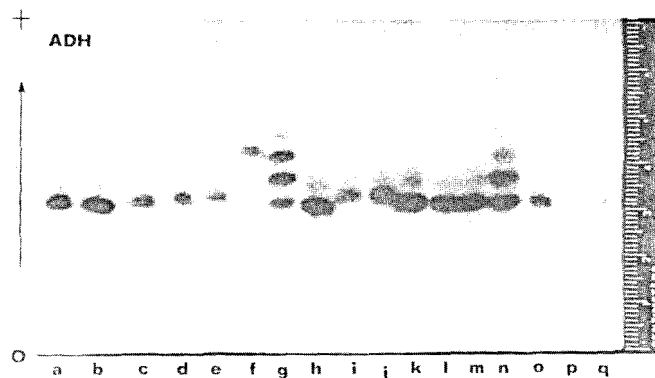


FIG. 1. Isozymes of Alcohol dehydrogenase. Each channel represents a different variety as follows: a, 'Bernice Boddy'; b, 'Glen 40'; c, 'Grace Bunton'; d, 'Billie McCaskill'; e, 'Broad Rose'; f, 'Pearl Harbor'; g, 'Rev. John Drayton'; h, 'Governor Mouton'; i, 'Dr. Ralph Watkins'; j, 'Pink Champagne'; k, 'Paulette Goddard'; l, 'Debutante'; m, 'Lady Vansittart'; n, 'R. L. Wheeler'; o, 'Herme'; p, 'Lady Clare'; q, 'Willie Hite'. Origin at bottom, anode at top.

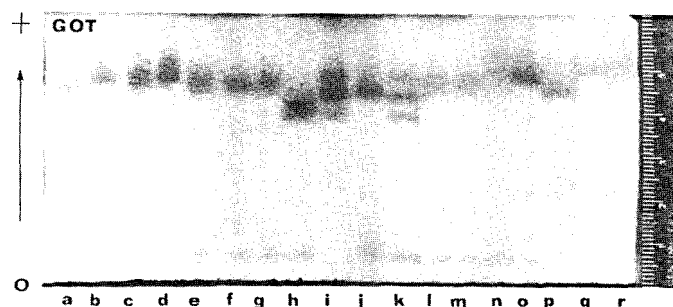


FIG. 2. Isozymes of Glutamate-oxaloacetate transaminase. Each channel represents a different variety as follows: a, 'Bernice Boddy'; b, 'Glen 40'; c, 'Grace Bunton'; d, 'Billie McCaskill'; e, 'Broad Rose'; f, 'Pearl Harbor'; g, 'Rev. John Drayton'; h, 'Governor Mouton'; i, 'Dr. Ralph Watkins'; j, 'Pink Champagne'; k, 'Paulette Goddard'; l, 'Debutante'; m, 'Lady Vansittart'; n, 'R. L. Wheeler'; o, 'Herme'; p, 'Lady Clare'; q, 'Willie Hite'; r, 'Sarah Frost'. Origin at bottom, anode at top.

ized by a unique pattern distinct from all other cultivars.

MATERIALS AND METHODS

Mature leaves (from the previous years growth—in order to assure isozyme stability) of eighteen named varieties were collected from the garden of Dr. and Mrs. Ralph Watkins in Chapel Hill, N. C. They were washed, rinsed with deionized water and ground in a suitable buffer. The extracts obtained were applied to filter paper wicks and inserted into previously prepared starch gels. Detailed extraction procedures and electrophoretic conditions will be presented elsewhere (Wendel and Parks, in preparation). Subsequent to electrophoresis the gels were sliced and stained for the following enzymes according to published methods (Shaw and Prasad, 1970; Siciliano and Shaw, 1976):

Acid phosphatase (ACPH)
Alcohol dehydrogenase (ADH)
Aldolase (ALD)
Glutamate dehydrogenase (GDH)
Glutamate-oxaloacetate transaminase (GOT)
6-Phosphogluconate dehydrogenase (6-PGD)
Phosphoglucose isomerase (PGI)
Phosphoglucumutase (PGM)

Following incubation, the gel slices were rinsed and fixed with water-methanol-acetic acid (5:5:1).

RESULTS AND DISCUSSION

While all eight of the enzyme systems studied exist in the plant in more than one form, the number of isozymes varied from enzyme to enzyme. For example, GDH and 6-PGD were found to consist of primarily a single variant whereas PGM and PGI were characterized by a more complex banding pattern (each isozymic form is recognized as a single band—see Table 1 and Figs. 1 and 2). Examination of Table 1 reveals that all cultivars tested can be unambiguously identified by these eight enzyme systems. In some cases a unique pattern for a single enzyme is enough to distinguish a cultivar (e.g. ADH, 'Reverend John Drayton', channel g, Fig. 1) while other cultivars require the use of more data for their cultivar-specific characterization. Note that the specific forms of the different enzymes collectively constitute an enzyme fingerprint. Separations of the isozymes for two enzyme systems are shown in figures 1 and 2.

The authors recognize that a rather small fraction of the named varieties of *C. japonica* were sampled and that the inclusion of more cultivars might cloud the picture. Nonetheless the results serve to illustrate the approach we are taking. Furthermore, as more enzyme systems become available for analysis (we currently can study fourteen simultaneously) the probability of "fingerprint" duplication sharply decreases.

Whereas the isozyme approach as demonstrated here is of accepted utility it is necessary to issue a precautionary note. The appearance of multiple isozymes for any given enzyme may be due not only to allelic variants at a single locus but may also reflect overlap of variants coded for by other loci specifying enzymes with similar catalytic properties, as well as artifacts arising from extraction and electrophoresis procedures. If the true power of the electrophoretic method is to be realized, it is imperative that the allelic status of the bands being scored are clarified. Consequently, we are currently undertaking a program of genetic analysis with this goal in mind.

Although the identification of cultivars is interesting and important in its own right, we presently have a more ambitious project underway which may eventually result in a bigger payoff for camelliaphiles. There is much discussion concerning which wild forms of *C. japonica* actually gave rise to the cultivated varieties of modern times. Both Sealy (1958) and Tuyama (1968) recognize two fairly distinct natural subspecies *C. japonica* var. *japonica* "bush camellia" and *C. japonica* var. *rusticana* "snow camellia." However, relatively little biosystematic evidence has been generated to demonstrate the relative involvement of the two forms in the evolution of the modern cultivated camellias. There are many specific local adaptation problems that arise in the wide diversity of climates in which these

plants are cultivated, including susceptibility to cold, low humidity, drought, etc. Since the Japanese climates in which camellias are native are quite varied in temperature regimes and rainfall amount and distribution, knowledge of the origin of the cultivated forms will provide clues to the plant breeder who is attempting to synthesize new forms with specific adaptations and hardiness. We are hoping, through an extensive isozyme analysis of both cultivated forms and wild accessions, to make headway in answering some of these questions.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to the University Research Council of the University of North Carolina, Chapel Hill for partial financial support of this project and to Dr. and Mrs. R. Watkins of Chapel Hill who so kindly supplied the plant material.

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—ACS—

A Friend of Mine

JAY BIRD

We wonder whether the nurseries that customarily sell plants to distant customers have considered shipping plants via the parcel delivery services that have come into prominence lately. The termination of some bus routes and discontinuance of the package carrying on other routes makes the alternate method look inviting from the consumers viewpoint, especially since new carriers have been advertising their services recently. Any comments will be appreciated.

In an earlier column we mentioned the use of Osmocote 18-6-12 slow release fertilizer for camellias. We are indebted to the following article "Propagating Woody Plants from Cuttings", by Carl E. Whitcomb, Associate Professor of Horticulture, Oklahoma State University, which appeared in "Georgia Notes", June-July 1979, published by the Georgia College of Agriculture:

"Nutrients for the cuttings

"The incorporation of 8 to 12 Lbs. of Osmocote 18-6-12 per cubic yard into the rooting medium prior to the 'sticking' of the

cuttings greatly increases plant quality. By incorporating the slow-release fertilizer, the rooting medium can be prepared in advance and stored dry for future use. However, mixing must be done after sterilization. It is essential to thoroughly mix the Osmocote into the propagation medium. Otherwise, variations in concentration may either damage the cutting or fail to give proper stimulus to rooting and growth. By incorporating Osmocote into the rooting medium the problems of algae on the surface of the rooting medium and adjacent surfaces in the propagation greenhouse are eliminated. The stimulation of rooting is substantial on some species while others are not affected during rooting, but growth of the liner before and after transplanting is greatly increased. A recent study compared Osmocote formulations 19-6-12 (3 to 4 month release), 18-6-12 (6 to 9 month release and 18-5-11 (12 to 14 month release); each at 3 rates. All 3 plant species studied grew best with Osmocote 18-6-12 at 8 to 12 lbs./cu. yd. This response is thought to be the slower initial

release rate of the 18-6-12 formulation which is controlled by the plastic coating. At the present time, all other Osmocote formulations available have a more rapid initial release.

"A cutting generally does not initiate any roots for 2 to 3 weeks after sticking and thus has little capacity to absorb nutrients. The release rate of Osmocote 18-6-12 more nearly coincides with the root development of the cutting. A study comparing no fertilizer during propagation and several Osmocote formulations and rates on a rate of establishment of purpleleaf Japanese honeysuckle. 'Lonicera japonica', 'Purpurea' was conducted. Following rooting, 30 plants of each treatment were planted in an open field and watered only once. After 1, 2, 3 weeks, 10 plants of each treatment were dug and evaluated for root growth. No additional water was applied and no rainfall occurred during the study. After only 7 days treatment differences could be readily observed. After 3 weeks, plants without any fertilizer in the original rooting system were wilted and few roots extended more than 2 inches beyond the original root ball. However, plants that had Osmocote 18-6-12 incorporated into the rooting medium made substantial top growth, showed no visible signs of moisture stress and developed many roots 8 to 10 inches into the surrounding soil.

"Container versus beds

"The individual container concept allows the rooting medium to be transferred along with the rooted cutting to either the field or to the container for growing. The root system is undisturbed and establishment is very rapid. There is no reusing of the rooting medium and thus no need to sterilize. Generally when cuttings are rooted in small containers, a smaller volume of rooting medium used and likewise, in the cost of rooting medium. Containers can be reused but need to be dipped in 5% chlorox solution (1 part chlorox to 20 parts water) in order to sterilize them (any 5% sodium hypochlorite bleach will work). Bedding plant trays that are uncut and not to be broken apart can be used either once or if labor and facilities provide, can be dipped in a chlorox solution and used again. The advantage is that workers handle multiples of plants at a time rather than individual pots. Therefore labor and space are used efficiently in the propagation house at a very low cost.

"Rooting cuttings in beds can be accomplished for a lower initial investment with several times more plants per sq. ft. of propagation bed. However, because crowding, stunting and disease problems are associated with such propagation beds after several cycles of cuttings, cost per liner is similar for containers and beds. Isolation and removal of diseased plants is easier in con-

tainers. In addition, slow release fertilizer incorporated into the rooting medium, which greatly increases plant quality when liners are propagated in containers, can only be effectively used in the initial rooting medium preparation for beds. Liquid fertilizer can be added to later propagation bed cycles of cuttings but plant response is very limited compared to incorporated Osmocote. IBDU and ureaformaldehyde have been tested and found to be unsatisfactory nitrogen sources for propagation.

"When cuttings are crowded together in bulk beds during propagation, it is impossible to remove and plant liners without greatly disturbing and damaging the root system. Liners in containers are undisturbed and growth is continuous with no transplant adjustment as long as they do not remain in the containers too long."

We understand that Professor Yu-Te-tsum, Director of the Peking Botanical Garden and Deputy Director of the Institute of Botany of the Academy of Sciences in Peking delivered a lecture at the University of Cali-

fornia, Berkeley, May 28, on the origin and classification of *Camellia reticulata* cultivars of Yunnan Province, China. Assisting Professor Yü were Professor Wu, Cheng-Yi, Director, Yunnan Institute of Botany, and Professor Sheng, Cheng-Kui, Research Scientist, Chung-Shan Botanical Garden, Kiangsn Botanical Institute. *Camellia reticulata* has been cultivated in Yunnan Province for hundreds of years. The flowers are prized by the Chinese as the foremost of the cultivated Camellias. The plants will eventually form trees over thirty feet tall, and that date back over four hundred years are still growing around temples near Kunming in Yunnan Province. I am sure it was a very pleasant and informative meeting. Wouldn't it be wonderful if there were some manner in which such an occasion could be broadcast by closed circuit television to camellia people.

We need more contributions. Interesting short topics as well as comments on published topics or items will be welcomed. Forward to Jay W. Ellis P. O. Box 888, Keystone Heights, Fl. 32656.

—ACS—

Planned Parenthood (In *Camellia* Hybridization)

DAVID L. FEATHERS

While I know of no genetic law that guarantees that a deliberate cross made with a definite objective will always yield the result which is desired, there is no question that it makes sense to pursue a preconceived plan rather than leave it to the promiscuity inherent in natural hybridization of a plant so completely lacking in pedigree as the camellia. In this effort, there is nothing more true than the saying "Man proposes but God disposes". So all we can really do is to bring two camellias bearing the desired characteristics together and simply hope for the best. Then if we fail, try it again—or the reciprocal (reverse) cross. Some important crosses I have attempted failed the first time but have succeeded subsequently, after the second or third effort.

A very successful nurseryman visited our place not long ago on a scouting trip and asked if I had anything unusual. He made it clear he was not interested in the big, block-

buster type camellias ("I sell only a dozen or so a year, mainly to the collectors") but the sort of plant he could display in his garden "that would appeal to the public, which would not even know, in some cases, whether it was a camellia." He went on to explain that what he was after were evergreen garden plants of an unusual sort, principally for growing in the ground but something that could also be used attractively in a container. I showed him around the place and he went away with (literally) an armful of cuttings, some taken entirely for the foliage, for there were very few plants still in flower!

Now this was an entirely new experience for me, except perhaps for that little Japanese lady interested almost exclusively in small singles, who does Bonzai work and teaches flower arranging, and comes to see us every year. For some time I had been wondering whether anyone had concentrated his efforts on attempting to produce the sort of camellia that

would particularly appeal to the person who has very limited ground space (or even none at all) and must therefore grow things in containers of one kind or another. What with condominiums and retirement homes becoming increasingly popular, and the fantastic rise in the value of land causing retired persons, willingly or unwillingly, to condense their living space, I had begun to get the impression that the size of plants and plantings would also necessarily have to shrink accordingly. Thus the popularity of such an attractive type plant year-around as the camellia seemed bound to rise, particularly as to those kinds which are slow-growing and do not require much room. Such a plant ideally should be bushy and not require repotting for at least 5 and preferably 10 years. If it had an attractive flower in addition, that would be a plus that would, to many people, make it irresistible. Unusual color or shape of foliage would be an added attraction, especially the kind that has a reddish or bronze color in the new growth. (Some *C. jaune* seedlings have this desirable attribute, and a small flower.)

I have just described the sort of camellia that "sold itself" to my visitor. It so happened that many of these originally were from the Parks - L. A. Arboretum project, from which we took over some 1,100 tiny seedlings quite a few years ago, wherefore I had previously had some experience with this particular kind of camellia. At the time, not much was thought of them but since becoming well-developed flowering plants, to which have been added the seedlings grown from them, their attraction as garden shrubs is obvious to anyone who loves camellias entirely from that concept, or who delights in their delicate, alluring beauty when sprays are used as cut flowers for the home. Now this is but one aspect of motivation in connection with camellia hybridization. There are many others, of course. Make no mistake about it—I admire and grow the big ones, too. But it does seem to me that the dainty, tiny

camellias have not received the recognition they fully deserve. (Surprisingly, at a recent plant auction I found that the only thing I came away with was sasanqua 'Yuletide'—which I should have had years ago.) I guess what I am really leading into in this discussion is, in essence, a comparison of the relative merits of the single flower of a large camellia versus a spray or group of cut flowers—possibly even the attraction of the mass blooming effect of a garden camellia versus the single, show-bench-type of camellia.

There are so many things that can be done with a small flower, for which a massive bloom is unsuited. The current popularity of the miniature camellia is evidence of this, surprisingly at least as pronounced among the fellows as the ladies. This is true among those who regularly exhibit at shows and, besides, isn't a miniature just about the only camellia a man can wear? I have already mentioned sprays as cut flowers for the home, but have been equally impressed by the attention given to this type of exhibit publicly at such well-known shows as Sacramento and the national show at Chelsea in England, which I understand features this type of display of camellias or something akin to it.

Perhaps my thinking in this regard may have been prejudiced, or at least motivated, by the fact that, in a California show a few years ago one of my miniature seedlings was awarded Best Seedling over one of the largest camellias so far produced. It was a very neat little hybrid, formal double with a fine bud center, striped red on white, and no one was more amazed at the outcome than myself. Some time later, this experience was repeated by receipt of the Wm. E. Wylam Award of the Southern California Camellia Society for 'Pink Smoke'—an open-pollinated seedling from the old variety 'Lady Devere'. These happenings are mentioned solely by way of illustration that there does exist a certain recognition of, and appreciation for, the fact that petite camellias

have a definite place in camellia culture.

In the matter of deliberately trying to produce camellias of the sort I have described, one is almost forced to look to the species which have very small flowers. One of the most popular of these is the delightful *C. maliflora* a light pink, roseform bloom with tiny foliage, which is absolutely adorable. Unfortunately, it also appears to be seed-sterile. *C. rosae-flora* and *C. fraterna* are others of this type, which, however, seed fairly freely. Then there are *C. pitardii* and *C. caudata*, the latter having the smallest flower I have ever seen on a camellia, about the size of a man's thumb-nail. I have successfully crossed the latter two in an attempt to produce the smallest-flowered hybrid possible.

If a person has a half-dozen of the camellia species, including the small-flowered types, the possible hybrids that will result from hybridizing with a bit of imagination are manifold. It is very interesting to see what happens through a combination of the big ones with the little ones, as well as intercrossing the latter. The well-known and successful hybridizer in this area, Frank Pursel of Oakland, produced a very attractive, small deep red peony-form flower from a cross of 'Tinsie' ('Bohukan') with the reticulata 'Crimson Robe'. This strikes me as being a new addition to the ranks of the small, neat but attractive ones, of definite merit. Such a camellia, if it has a neat growth habit, would fit into the category I have described above. Quite unexpectedly, I obtained a cute and interesting hybrid which bears tiny pink flowers very early in the season borne at the end of the stem in clusters, which has been named 'Pink Tea'. It comes from a cross of the commercial tea plant, *C. sinensis Assamica* with a red single *C. japonica* seedling.

Then there are also the types of camellia that are quite adaptable to Bonzai or hanging-basket culture. These are both unique and interesting usages of the camellia that one does not encounter sufficiently often. Two

From the Desk of the Executive Secretary/Editor

This will be probably the briefest of these column since 1974; we want to conserve space for the excellent articles on "Basics and Research". The Camellia Show Season has started and beautiful flowers and "beautiful people" now are on the circuit, so to speak. Enjoy your camellias and camellia friends.

1980— —1980
THE YEAR OF THE CAMELLIA

As you know 1980 has been designated The Year of The Camellia. We asked the ICS to take up on its agenda in New Zealand the designation of 1980 as The International Year of The



(Photo by James A. Henkel)

seedlings of the cold-hardy hybrid 'Donation', which the writer has grown for some time, and several from the cross of *C. fraterna* x *C. reticulata* 'Buddha' are all husky and quite bushy, one of the former having lovely, 5-inch salmon-pink veined blooms borne in great abundance on a 10-year-old plant that is not over 2 ft. high and is planted at the top of a retaining wall, down which it cascades. A *C. fraterna* x *C. japonica* hybrid grows almost horizontally, bearing tiny, bell-shaped pale pink blooms in clusters very early in the season. (Friends have insisted on calling this latter one 'Dave's Weeper').

These are but a few of the possibilities toward creating something new that would have a tendency to broaden interest in camellias. Dr. Wm. Ackerman's 'Fragrant Pink' and the 'Improved' version certainly fit into this category and I am sure that, with his unprecedented variety of crosses of the small-flowered species, he must have many others that are equally meritorious. Dr. Clifford Parks produced several of these tiny gems through the use of the small-flowered species *C. lutchuensis*, among many

others, several of which he was kind enough to send me. A quite new one of this general type is from a seedling of the supposedly sterile japonica 'Nagasaki', which is a pendant grower with unusual foliage, and makes an excellent hanging-basket camellia.

In conclusion, the point I am trying to emphasize is that, in these days of tremendous interest in the raising of camellia seedlings and hybridization, we should not be blind to the fact that deliberate breeding for smallness and compactness has been somewhat neglected in the effort to produce the greatest "block-buster" of them all. But I sometimes wonder whether there would be broadscale demand for a camellia larger than 'Howard Asper' for instance, which regularly produces 8-inch blooms (by the ruler) grown here in the open ground without gibbing. At a recent meeting of our local garden club, a visitor displayed a white seedling dahlia of unbelievable size, which he said measured 14½ inches in diameter. It was a really phenomenal flower from a size standpoint, but we already have sunflowers as large and I know of no one interested enough to grow them, except perhaps for their edible seeds!

Camellia. Due to our printing deadline we do not know if this has been done. This is the year for individuals, clubs and societies and nurseries to publicize the beauty and the values of camellias as garden and greenhouse plants. It is also the year that all local, state, regional, national and international camellia clubs and societies to work harder to share the beauty of "our flower". OBTAIN AND HOLD NEW MEMBERS!

LIFE MEMBERS

We are pleased always to add new Life Members to our growing list. We now have 228 Life Members and 11 Patron Members. Since the August issue of the *Journal* the following have become Life Members: Dr. D. Wayne Perry, Torrence, California and W. R. Abercrombie, Houston Texas. Thank you, sirs.

HOBBY GREENHOUSE ASSOCIATION

Do you own a greenhouse? Plan to build one soon? Or just plain interested in Plants? Why not join Hobby Greenhouse Association and share your hobby and interests with others! The group's magazine, *The Planter*, is issued six times a year and is full of timely tips on grow how, know how and greenhouse maintenance. Dues \$5.00 annually. For additional information please write HGA P. O. BOX 951, Wallingford, CT 06492. You will probably find this a fine addition to your regular reading.

—ACS—

STATEMENT REQUIRED BY ACT OF OCTOBER 23, 1962; Section 4369, Title 39, United States Code, SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF *The Camellia Journal* published four times a year at Fort Valley, Peach County, Georgia. (Date of filing: August 1, 1979.)

The names and addresses of the publisher, editor and managing editor are: Publisher, American Camellia Society, Box 1217, Fort Valley, Ga.; Editor and Managing Editor, Milton H. Brown, Fort Valley, Georgia.

The owner is: American Camellia Society, Inc., Box 1217, Fort Valley, Georgia. No individual owners or stockholders (A non-profit organization).

The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

The average number of copies of each issue of this publication sold or distributed through the mails or otherwise, during the 12 months preceding the date of filing (August 1, 1979) was 4,800. Single issue nearest to filing date: August, 1979.

I certify that the statements made by me above are correct and complete.

MILTON H. BROWN
Editor



'Al Gunn'

In 1973 the late Alvin Gunn gave twelve (12) *C. reticulata* seedlings to Willard F. Goertz to propagate. One of these, labeled AG No. 2, bloomed in 1976. It is large to very large, rich pink with bright yellow stamens.

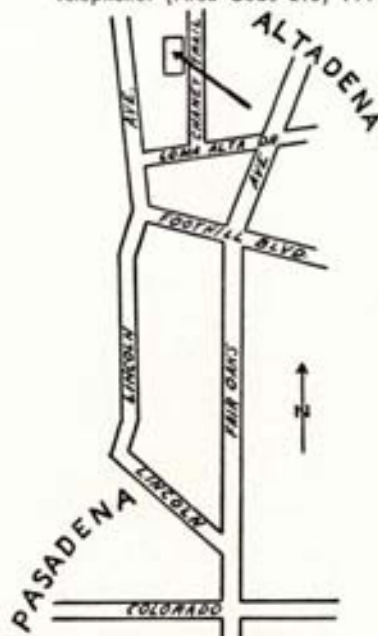
The plant is a very fast growing, open tree-like bush. It blooms early to mid-season. 'Al Gunn' was introduced by Nuccio's Nurseries in 1979. (Photo by Willard F. Goertz. Color separations courtesy of Nuccio's Nurseries and The Southern California Camellia Society.)

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Picture of *C. chrysantha* sent by T. L. Huang of Shanghai, in June 1979

A Yellow Camellia

We are certainly much closer now than ever before in obtaining a species of yellow camellia. When we do obtain it there will be a very limited amount "of wood", and it will be assigned only to A.C.S. Research Advisory Committee initially until we get a sufficient supply to be made more widely available. Also, some pollen is expected as soon as, or prior to, any cuttings; it will, of course, be used for hybridizing purposes. We may, in the next few years, see orange, apricot and peach colored camellias. However, do not get your hopes too high for any immediate breakthrough on these various colors. Hope does spring eternal!

We do have a color picture of a vivid yellow single camellia purported to be "the very picture of *C. chrysantha* in Kwangsi province, its original producing place." There is also another yellow camellia reported to be in the People's Republic of China which we have expressed to its owner an interest in, and which he has promised to send cuttings of to A.C.S.

One description reads as follows: "*Camellia chrysantha* (Hu) Tuyama is an evergreen arbor, 2-5 metres high. The bark color is light grey-yellow. Ovate leathery foliage. The leaf color is dark green. The solitary flower in leaf-axil is 5-6 cm in diameter with 8-10 petals. The stamens are combined with the petals, yellow. The filament is about 5 cm long. There are 6-8 seeds in a capsule. The leaf bud emerges in August

and May. The new leaves will fall down in 2-3 years. It begins to bloom in November. The bloom season will prolong to January next year. The golden yellow flower looks much more elegant and wonderful against the glossy dark-green leaves. The survival rate of this deep-rooted species with few lateral roots is quite low, so it's not easy to propagate."

Another source reports, "A certain kind of yellow camellia of wild growth was found in Kwangsi in the boundary region near Vietnam in 1965. Botanists of our country, Prof. Hu Hsen-hau published it as *Theopsis chrysantha* (Hu) Tuyama. In 1974 Prof. Tuyama revised it as *Camellia chrysantha* (Hu) Tuyama. We considered it alright. Now it belongs to the section *Archecamellia* of camellia. It is a kind of small flower with 3-5 cm diameter, golden colour and no scent. It is most suitable for breeding."

So, now we wait and hope—and hope and wait. We do know that our new camellia friends in the People's Republic of China are cooperating in an exchange program with us to share experiences and to share species and varieties not found in each of our two great countries. It is expected that some of the camellia experts of the People's Republic of China may attend the Congress of The International Camellia Society in Kyoto, Japan in March 1980. Those of us going to that Congress will have some great new experiences on a first-hand basis.