

getting together the plants when the investigations were started in 1939.

The species and related genera in the collections now number a total of 20, from many foreign countries in addition to the United States, that are used for various research purposes. Adaptation and general cultural requirements, in addition to their uses in locations in home and other types of plantings, have been investigated. The *Sasanquak* seems to hold considerable promise in certain places since there are some that are quite satisfactory. Plants of tea apparently can be grown successfully over the South. They should find their place in various arrangements since the plants are bushy and rather dense in growth, but also with attractive small to medium sized white flowers. There are red flowered forms in the Orient but so far it has not been possible to obtain any of these.

In addition to work on classification, the research has included propagation methods and nutrition. The germination of seed in pots with sphagnum moss was found to be successful and convenient. This permitted frequent examinations and those seed which had germinated could be removed and

placed in pots containing satisfactory soil and grown until they are large enough for transplanting.

Methods for making cuttings have been studied also. It was found that the type and character of the cut was not a factor in the rooting of cuttings so long as wood of proper age and condition was used, together with a suitable rooting medium.

R. J. Wilmot was born in Rochester, New York, January 8, 1898, and died May 7, 1950, at Gainesville, Florida. He was graduated from the University of Tennessee with a B. S. in Agriculture in 1922 and received his M. S. A. Degree from the University of Florida in 1931. He was associated with the Florida State Board from 1927-1933, and Assistant Horticulturist, Florida Agricultural Experiment Station, from 1933-1950. From the organization of the American Camellia Society in 1945 until his death he served as its Executive Secretary.

Mr. Wilmot's untimely death removed an authority on camellias from among ornamental horticulturists. He was in demand as a judge and served a number of camellia shows each year.

## NOTES ON CAMELLIA DISEASES

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Camellias were popular garden plants in Florida and the South many years ago. That interest has been revived in recent years to such an extent that they are now one of our most important woody ornamentals. Like every crop plant grown in quantity, they have their troubles.

The fungous disease known as die-

back continues to be the most serious disease of camellias in Florida. The symptoms are only too well known to almost every nurseryman and private grower of camellias. If you do not have it in your planting, you are lucky or persistent. This trouble is most noticeable in the Spring when the new growth is expanding or has just expanded. At that time a new shoot wilts suddenly, dries out and turns brown. Such dead leaves and twigs are very brittle and easily broken off. However

it leaves an infected area on the main stem. At other seasons, branches or large portions of the plant may die, gradually turn brown and persist for several weeks. In every case the cambium layer, between the bark and the wood is dead or dying at the junction of the living and dead portions of the stem. These are the conspicuous symptoms of the disease but they are evidently the result of earlier infections.

In August of 1949, it was discovered that dead flower and shoot buds formed that same year could be found on bushes in plantings where dieback was known to occur. Isolations made on artificial media in the laboratory proved the same organism was present in the tissue just below these dead buds that was found in the dying shoots. These buds, inconspicuous though they may be, are the first symptoms of dieback infection. They also account for the fact that spraying with fungicides during the fall and winter have not been effective in controlling the dieback disease. By that time, the infection has penetrated the buds and cannot be reached by sprays. The infection period is evidently between the time when the buds are set and the early part of August, that is, during the rainy season. It is evident then that protective sprays must be applied as soon as the new flush of growth has set if they are to be effective. They must be put on before infection has occurred. This means that the time of application should be in late May or early June, as late as possible but before the summer rainy season sets in. One application of a persistent fungicide should be sufficient since camellias make little or no new growth during this period. Certain copper-containing fungicides that do not break down chemically, as long as they are on the plant are the most desirable. Two such fungicides are sold under the trade

names Copper A and COCS. There may be others.

Although the spraying program recommended above should prevent most of the new infections, it must be supplemented by careful pruning to remove those infections that are already present. Indeed some growers have eliminated dieback from their plantings by pruning alone. If dieback lesions are pruned out frequently and completely and the prunings destroyed, no spraying will be necessary but such a policy demands frequent examinations of the plants and a ruthless determination to eliminate all of the infection every time a dead twig is removed.

Phytophthora root rot of camellias is a comparatively new disease in Florida. During the past three years several instances of the trouble have come to our attention, most of them in nurseries. In one case the infected plants had been brought from an out-of-state area where the disease had been previously reported. Another larger outbreak could not be traced to the source. This disease affects, primarily, the small or feeder roots of the plant, killing them back to the larger roots and thus starving the plants. Small plants, seedlings or rooted cuttings, do not survive attacks very long. Old plants may linger for several years before dying completely. As far as we know now, infected plants cannot be cured. Soil infested by the fungus can be treated with some good sterilizing agent before resetting. If you are careful to buy only vigorous rapidly growing stock, you are not likely to introduce phytophthora root rot into your plantings.

Camellia scab is an alarming disease, although it does not threaten the life of a plant. It attacks the Japonica varieties almost entirely and the results are disfiguring. The symptoms appear in several different forms and no one is

sure yet whether more than one disease is involved in the trouble we call collectively, camellia scab. Sometimes corky lines or star-shaped ridges form on the upper surface of the leaves; sometimes rough corky warts form on the lower surface; at other times water-soaked blister-like areas develop on the lower surfaces. The same fungus has been isolated rather consistently from all of these manifestations but these symptoms have not been reproduced when the organism was inoculated into healthy camellias. So far control by spraying has not been effective. Apparently no other treatment has been tried.

Leaf gall is a conspicuous although relatively unimportant disease of camellias. Japonicas are seldom affected and most of the trouble occurs on Sasanquas. The symptoms, occurring as the new shoots develop in Spring are startling. Instead of developing normally, scattered shoots grow rapidly and bear very thick fleshy leaves much larger than healthy leaves. A little later, the thin membrane covering the under surface splits or tears, revealing a continuous layer of dusty white spores of the casual fungus. No signs of the disease are apparent until the following spring. Growers pick off the malformed shoots as soon as they notice them and this seems to be the only control necessary. Only rarely does more than one affected shoot occur on a plant.

Algal spot is a disease of the leaves found on all species of camellia. It occurs on mature foliage, never on new growth. It is characterized by round raised gray or orange spots one eighth to one fourth inch across on the upper surface of the leaves. The causal alga is yellow-orange to orange-red when in active growth or producing its fruiting bodies. It is common on many other leathery-leaved plants such as magnolia,

citrus, avocado, etc. A single application of any good copper-containing fungicide is effective in preventing the alga from reproducing although it does not always kill the organism. The spray should be applied before the rainy season sets in.

There are several other troubles of camellia in Florida that only occasionally assume more than minor importance. Several leaf-spots attract attention from time to time but seldom merit spraying for their control. The root-knot nematode may infect camellias large or small. The fact that these plants are usually grown in an acid soil which is covered with a generous mulch probably accounts for the infrequency of damage by this pest. Occasionally young plants lined out in infested soil will suffer severely. Less often more mature plants become heavily infested. Plants heavily infested with root knot often show symptoms of severe sunburning which cannot be explained by any increase of light intensity.

In closing I should like to mention the present status of another camellia disease known as camellia flower blight. This trouble was first found in the United States in California, a little later in Oregon. Much more recently an infection was discovered in Georgia. A survey conducted last year during the flowering season covered all the Southeastern States as far west as Texas, north to Tennessee and North Carolina and a few collections in New York. Nearly two million plants were examined and 497 blooms taken for checking in the laboratory. Two positive cases were found in Georgia and North Carolina. Later, following a flower show the disease was discovered in Louisiana. A total of 86,458 plants were examined in Florida and no camellia blight was found.

Florida has quarantines against all

the infected areas. The disease is a bad one. It destroys the flowers but affects no other parts of the plant.

Every precaution is being taken by the Florida State Plant Board to prevent its spread into Florida.

## FACTORS AFFECTING THE KEEPING QUALITY OF CUT FLOWERS

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For many years methods have been sought for prolonging the life of flowers after they have been cut from the plant. This information is needed by those who use flowers in the home and by those handling cut flowers commercially. Several individuals (1, 2, 3, 4, 5, 6, 7) have done work which gives information on the keeping qualities of cut flowers.

Cut flowers usually carry enough stored energy in the stems to develop completely and, therefore, do not depend upon food produced by foliage to keep them alive. The factor that usually limits their length of life is lack of water for the stem, foliage and flowers. Loss of water may be too great due to low humidity, high temperature and air circulation or the end of the stem becomes plugged, preventing enough water from being taken up by the stem to supply the top.

Most of the work in the past on factors influencing the keeping quality of cut flowers was based on the reduction of bacterial decomposition of the stems submerged in water. Disinfecting chemicals, cutting of the basal portions to eliminate clogging of the conducting vessels and clean containers were used. Ratsek (5) showed that copper containers aided in keeping qualities, and ascribed it to the disinfecting action of copper.

### The Effect of Copper

Laurie (3) reported on work done at Ohio State on the effect of copper on

the life of cut flowers, as supplied by copper containers, copper wire, copper shavings, copper shot and brass shot. The results indicate that the prolongation of the life of cut flowers as affected by copper varies with the kind of plant used. One group included those which kept 1 to 2.7 days longer than the controls. In this group were such flowers as asters, calendula, snapdragon, clarkia, annual chrysanthemum, stocks, pansy, marigold, daffodil, godetia, nemesia, salpiglossis and Boston yellow daisy. The second group showed no difference in keeping quality between controls and copper containers. In this group may be placed schizanthus, rudbeckia, myosotis, feverfew, centaurea, penstemon, leptosyne and others. In only one case did copper prove detrimental and that was the carnation in which the keeping time was reduced one day.

### Cutting Stems Under Water

Dorner (1) found that flowers cut under water lasted longer, presumably due to the elimination of air from the conducting vessels. Laurie (3) reported that the effect of cutting stems under water as compared with those cut in the air also varies with the plant used. Plants aided by being cut under water were snapdragon, carnation, sweet pea, aster, annual chrysanthemum, marigold and Boston yellow daisy, while calendula and stocks showed no difference in effect. Anatomical studies of the stems showed a direct correlation in this respect between stems with large conducting vessels and those with small, the