Atlantic Coast Camellias

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COVER NOTE

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Clara and Fred Hahn, President Mildred Robertson, Ronald K. Jones and James R. Baker at ACCS Convention, Myrtle Beach, SC, October 9, 1993.

IN THIS ISSUE

PRESIDENT'S MESSAGE

Mildred S. Robertson

According to the calendar, summer is officially over and we are now in the midst of the autumn season. But, as I write this letter the week before Thanksgiving, we still have daytime temperatures in the eighties and nighttime temperatures in the fifties. We are still dry in our area. A minimal amount of rain broke the long drought but more is sorely needed. All of these conditions are having an effect on our plants.

Those of you who were not with us in Myrtle Beach this October missed a good convention. We had an attendance of approximately 120 persons. We enjoyed a lot of good fun and fellowship. The program on Saturday night was educational and very well received. Our auction and the sale of raffle tickets brought in a significant amount of money for our treasury. We appreciate the cooperation of our members who contributed plants and other items for the auction and also those who bid on and purchasded the items. A very special thanks also goes to Sadie Lyon who has every year for a number of years painted a lovely camellia to be raffled.

The Camellia Show Season has begun. Already we have attended three shows and have seen some beautiful blooms, especially outdoor ones. The number of blooms at these shows has been down over previous years. A common complaint heard at all of the shows is that flowers in the greenhouses are simply not opening. This is certainly true for us. At several of the shows we have attended, we did not have a single bloom to exhibit.

Now that Bill and I are retired, we plan to avail ourselves of the opportunity to attend some of the shows which we were unable to in the past. We look forward to seeing some old friends and in making new acquaintances.

As we approach the end of the year, this is a time to reflect back on the many blessings which we have received. One of the greatest is our association with all our fine Camellia friends and with the lovely flower which brought us all together.

We wish for you a very happy and joyous holiday season and a prosperous New Year. We certainly look forward to seeing all of you somewhere along the Camellia Circuit.

"The Homans of Brunswick, GA
Columbia, SC, October 23, 1993 Mid-Carolina Show"
by Shepherd

EDITOR'S NOTE

Dave Scheibert

1993 continued its surprises into December. The venerable camellias along main street in Marshallville, Ga. delayed normal blooming time over a month and Massee Lane Gardens are no exception, even with early gib. And all camellias in the southeastern U.S. have followed this example. This camellia slow down should prompt thinking camelliaphiles to submit their theories on the cause or etiology of this unwelcome trick that has held back the number of camellias in our early shows. There were 276 blooms in our early show at Perry, Ga. on October 16, 1993 versus 780 blooms two years ago which even exceeded the number at our show at Massee Lane Gardens on November 13, 1993.

To stimulate the flow of ideas a triad of possible causes of delayed camellia blooming is proposed. A combination of drought, low humidity and high temperatures may well be responsible. It was mentioned in the last editor's note that Dr. Luther Baxter had pointed out that temperatures above 97-98 degrees F. cause a camellia plant to divert moisture from buds to vegetation in order to preserve plant life. Initial bud formation was good in June but slow bud growth became obvious after record July heat with early gibbing in late August. To remedy this deprivation of moisture to flower buds fine mist as used by Bob Hill or several hosings on a 96 degree F. plus afternoon could be of help. The sparsity of blooms at camellia shows has remained up to the end of November and bull nosing of buds has been more common.

I'm looking forward to having some new camellia authors in this issue. Dr. Dan Nathan has an article that will open your eyes on pH of camellia growing mixes. Contributions from Louise Gerbing and Tom Perkins as well as Charlie Bush are awaited. Ivan Mitchell is another contributor. Charlie Bush's writings are excellent and reflect knowledge, common sense and simplicity. Agnes West Kohler, president of the Pioneer Camellia Society, and Harry and Zenobia, editors of their newsletter, are sent thanks for their kind remarks and promotion of the Atlantic Coast Camellia Society. More thanks also go to Donna and Bill Shepherd. It is a great pleasure to present an informative homegrown edition of the ACC Journal.

ACCS - Myrtle Beach, October 9, 1993
Anne Cole won the camellia sun catcher.
by Shepherd

IVAN MITCHELL

It was natural for an editor to desire to visit a camellia friend in his garden and Ivan graciously invited Elizabeth and me. Ivan Mitchell is a courteous very capable camellia expert whose garden is on the east shore of Lake Santa Fe just north of Melrose, FL. Delores and Marion Edwards are among his closest friends and he and Marion could fill volumes on camellias. The late November day was perfect, sunny and warm.

We slowed as we entered Ivan's drive to enjoy the camellias and azaleas in bloom on either side. The well pruned plants demonstrated their health through their rich green shiny leaves. Warm greetings were exchanged on the front walk and Ivan escorted us through his home to the lake side. Many diamonds of light covered the water to the Southwest in the light breeze. Ivan pointed out that the fish feel well camouflaged in the clear brown water of the lake due to oak and cypress leaves which fall into the water. Lake Santa Fe drains to the North but the river goes underground and comes out in the Suwannee River.

Ivan was born in Charleston, Il. in 1909 and moved to Orlando, FL in 1930 to find a job as Industrial Arts Teacher. Five years later he entered his life's work with the Prudential Insurance Company in Lakeland, FL with later promotions in Tampa, Orlando and Jacksonville, FL from where he retired in December 1970, as Vice President, Regional Marketing in the South Central Home Office of the Prudential. Ivan's deep feeling and caring for people was displayed as he spoke of the many people he trained and the few he helped guide to other occupations. He heard from most of these few for years as they became successful in other ventures. Helping others has been one of the cornerstones of Ivan's life.

Miss Cecile Strickland of Pine Mountain, Ga. and Ivan were married in June 1936, and had one son, Joel Ivan. Their first home in Tampa was a mere $4,000. Ivan recalls a neighbor, a cartoonist who drew the comic strip, "Moon Mullins", who would hang up cartoons on a clothes line and laugh at them along with the neighbors. On retiring in 1970 Ivan and Cile bought the lake home of a hunting and fishing friend in Melrose, FL. The Prudential moved Ivan's smaller camellia plants to Melrose from Jacksonville.

At this point Ivan read the first six pages of a paper in progress about camellias entitled "How It Used To Be". We look forward to this being in the next Atlantic Coast Camellia Journal and thank Marion Edwards for the stimulus.

Ivan then suggested a garden tour on this sunny warm afternoon. Preparation included a hat and Deep Woods mosquito repellant. Ivan had planted a number of camellias in his neighbors front yard on the north side. Just beyond the garage we were introduced to the citronella plant and a cactus with a cutting of each. We also fell heir to pink grapefruit and tangerines which proved to be as sweet as Florida sunshine.

The camellia plants were well tended and pruned. The foliage was rich green and shone in the sun mirroring the plants health. A number of plants were blooming without gib

and with rich red tones and good flower form. It was evident that Ivan had a weakness for variegation in the moired pattern, many of which had been grafted by Marion Edwards. Old and new varieties were well represented. Ivan went before and lovingly turned blooms to show their best face. Ivan knew the origin of each plant and retold stories of many camellia friends. He feels that camellias are like good hunting dogs that store up good memories in the heart of their masters, and I'm sure most of you can identify with that. Ivans voice was soft and the garden walk unhurried as if the sun would hang in the clear blue sky another 12 hours. It was clear that Ivan loved all camellias large and small and that they formed the second cornerstone of his life.

Several cultural tips were discussed by Ivan. He feels that root pruning is important for older plants and easier in sandy soil in which roots grow more quickly. He attaches a pruning saw to an old-fashion scythe handle and cuts a two foot deep circle two to three feet in radius around the plant. This also cuts roots invading from outside. Pruning the top will keep the plant in balance. In the cut area one may place cotton seed meal, super-phosphate, milorganite and/or chicken manure. These fertilizers may also be used in bark or humus amended soil when planting camellias. At time of vegetative bud break in Spring, Ivan suggests a foliar spray containing urea and sugar to stimulate healthy new growth and also a top dressing with cotton seed meal and castorbean meal. The latter also repels the mole and shrew pests, if needed. For dieback Ivan removes as much diseased wood as possible and paints with 20% chlorox covered with tree kote, but also likes Walter Homeyer's method of using griseofulvin paste covered with tape or a band aid. Ivan suggests that sports or mutants be propagated by rooted cuttings rather than grafting to decrease the chance of changing the mutation.

On return to the den Ivan spoke of the 1930's when camellias were sold and exhibited as white, pink and red ones. For Christmas in 1936 Cile received from Ivan a Pink Perfection and Alba Plena but the latter proved to be Herme. Early cultural information was shared between camellia growers. The ACS formed in 1945 and with show regulations the camellia shows evolved. The camellia Nomenclature in 1950 assisted camellia identification by name, size, color and form. Ivan's garden has grown to over 500 camellias.

Ivan's camellia introductions include Jo Cinda, Eventide, Little Hooper and Little Deb. Cile Mitchell is a pod mate of Delores Edwards and was registered by Hulyn Smith. Writings by Ivan include Rejuvenating Old Camellias, Miniatures, the Best 25 Camellias, Mutations and How It Used To Be (in preparation).

Ivan has watched the number of camellia nurseries decline and feels this is due to those in the hobby grafting their own camellias. He has generously shared shrubbery and new camellia scions with nursery owners. He tells of rooting 1000 plants of Mrs. D.W. Davis and giving them to D.W. Davis, a nurseryman, for propagation and sale. Ivan feels that our camellia shows could appeal to more people if

camellias were demonstrated as landscape plants, bouquets and corsages.

The following quotes will help us know Ivan better: "Regardless of your product, people is your business; I'm a very straight person; power of observation is very important; we must repay gifts of others with gifts to others; I have a strong streak of Irish sentimentality."

After a warm, relaxed and rewarding visit, the sun touched the west shore of Lake Santa Fe. We had a pleasant smiling goodbye with a hug for me and a kiss for Elizabeth. Ivan spoke more than once of his life long love of camellias, family, people and hunting and fishing. He is a man at peace and thankful to experience another season of camellia blooms. Thank you, Ivan, for sharing with us.

ACCS Myrtle Beach, October, 1993
Marion & Delores Edwards
by Shepherd

Perry Show, October 16, 1993
Low-country boil, October 15, 1993
Bill Shepherd, Jim Pinkerton, Parker Connor, W.H. Rish
by Shepherd

A PRIMARY pH GREENHOUSE CALAMITY

Dan Nathan, M.D.

The 1967 ACS yearbook contains an article "Testing of the Soil pH" by Dr. Chiun T. Ling. It is based on a talk given by Dr. Ling to the Pioneer Camellia Society of Maryland, as reported in the Pioneer Camellia News, March 1966. It is a lesson in pH but contains the following paragraph; "The most favorable (optimum) pH of the soil for plants varies according to species. Some plants will tolerate soil pH as low as 4 to 5; these are the so-called acid loving plants such as camellia, azaleas, rhododendron, holly, kalmia, pines, firs, spruce, erica, etc... But most of these plants grow best at pH 5.5 to 6.5. Certain plants such as peonies, like soil pH slightly on the alkaline side." "Question: What is the best pH for camellia growth?"
"Answer: the camellia will tolerate a pH of between 4.0 and 5.0 but it will grow best around 5.5 to 6".

In THE CAMELLIA by Feathers and Brown published in 1978, Chapter III Basic Culture, Section F, Nutrition Part I Fertilization, written by Woodford F. Harrison, page 57. "Acidity is measured in terms of pH which is a logarithmic scale going from zero to fourteen. Neutral is pH 7; below 7 is acid; above this is alkaline. Camellias prefer 4.5 to 6. They will grow in less acid soil than that, but not at their best." And further down, "Sulfur is of the best ways of keeping the soil around the plant slightly acid."

Quoting AMERICA'S GARDEN BOOK by James and Louise Bush Brown, renewal copyright 1967. Publisher, Charles Scribner & Sons, page 250. "Soil requirements C. Japonica requires a light, acid soil which is abundantly supplied with organic matter. Soils with a pH ranging from 4.5 to 6.5 are suitable for C. Japonica. A pH of 5.5 being considered optimum.

H. Harold Hume in CAMELLIAS, KINDS, AND CULTURES, McMillan 1951, page 174, states "Soil's may be acid, neutral, or alkaline." In reaction, it has been found that a satisfactory soil reaction for camellias is pH 4.5 to 6.5. Under usual cultural conditions it is well to maintain the reaction within these limits, and above pH 6.5, is inadvisable though sometimes tolerated.

The 1950 ACS yearbook contains two articles which refer to the pH of soil for camellias. SOILS AND SOIL TREATMENT FOR CAMELLIAS, by Harry L. Daunoy, page 210, and SOIL ACIDITY AND CAMELLIA GROWTH, by Nathan Gammon, Jr., and R.J. Wilmut, page 216. Daunoy said that "plant nutrients are not readily available where the soil is pH 4.0 or lower, or when the pH is higher than 7.5. Most soil workers are in accord that in most soils, nutrients are readily available within the range of pH 5.5 and 7.0. In pine land soils which have a pH of 5.0 or lower, camellias will grow better if lime is added enough to raise the pH to 5.5 or 6.0. When the soil becomes neutral (pH 7.0), productivity may fall off sharply, even though fertilizer has been added. On the other hand, strongly alkaline soils of pH 8.0 to 9.0 may become

highly productive if the pH is lowered to 7.0 by using acidifying amendments, while further reduction in pH 5.5 may release nutrients, elements, in unbalanced and toxic amounts, and cause injury instead of benefit."

Gammond and Wilmot comparing 'Sarah Frost', 'Pink Perfection', 'Prince Albert', and 'Rainy Sun', rooted plants, found a slight variation in plant tolerance and growth according to pH. The growth and budding was not followed long enough for a final report, but suggested that pH 4.5 killed 'Sarah Frost', pH 3 killed 'Prince Albert', and 'Rainy Sun'. In view of the general healthy condition of the other plants in these pots, death was not attributed to the nutrient medium. Several plants were damaged by die back during the course of the experiment. After much discussion, the article closed with this statement, "it would appear that the growers of the camellia are very fortunate in that they have selected a plant that is capable of good growth over an extreme wide range of soil acidity." And in the third from last paragraph, "further study will be required to determine if the pH range of 6.0 to 5.0 is the most favorable for blooming."

The SOIL TEST HANDBOOK FOR GEORGIA, by the Georgia Cooperative Extension Service of Agriculture, University of Georgia, Athens, Georgia, Editor C. Owen Plank, June 1988, makes the following statement for azaleas, rhododendrons, and camellias. Recommendations pH: 5.0 to 5.5 if the pH is less than 5.0. (See table 0, page 31)

CAMELLIA CULTURE, edited by E.C. Tourje', McMillan Company, 1958, in the chapter of Camellias, by Tukuji Furuta, page 325, soil pH states, "Several investigations have been conducted on the influence of soil pH on camellia plant growth. The results all show that the plants will grow under a wide range of soil pH from quite acid to mildly alkaline," thus there seems to be little support of the contention that camellias "need" strongly acid soils to grow. The influence of the soil pH on the availability of the nutrient elements is the important consideration, and if the elements are available, the soil pH is not important.

The SOIL TEST HANDBOOK FOR GEORGIA, Georgia Cooperative Extension Service, College of Agriculture, University of Georgia, Editor C. Owen Plank, Extension Agronomist, SOIL TESTING AND PLANT ANALYSIS, June 1989, page 194, Crop azaleas, rhododendrons, and camellias. Recommendations, desired pH, 5.0 to 5.5.

The above information has permeated the educational institution and various educational materials, resulting in the advice given me by my county agent, after soil analysis that my camellias needed to be grown in a little more acid media. My average pH was 6.5. He recommended sulfur at the rate of a half teaspoonful to a gallon pot, for all my container grown plants. My 83 year old yard man was given a measure and shown how to do this, and after what I thought was adequate instruction and demonstration on various size containers, I turned him loose to do the job, while Muriel and I were off on a trip. Using the measure

apparently was too tedious for an old farm hand, so he started to use the palm of his hand as a measure, and completed the job. Several months later my plants started looking wilted, dropping leaves, and slowly dying. Bare rooting revealed a loss of roots. I suspected root rot fungus, Phytophthora cinnamoni. Plants were bare rooted, soaked in a solution of Aliette, repotted, and drenched with the same solution, to no avail. They continued to die. The county agent sent soil samples and two potted plants to the Cooperative Extension Service, University of Georgia, College of Agriculture, for evaluation with a report of no fungus, but physiological problems. The plants continued to wither, lose leaves, and die. I then noticed globs or excesses of sulfur in some of the containers, and then decided to do a pH study of all the distressed plants.

My potting soil mix consists of half pine bark with an average pH of 6.5 and half of a nursery rooting and potting media with a pH of 6.5 to 6.8, containing 10% granite dust, 90% ground pine bark, and Dolomitelime 50 so the mixture will have an average pH of 6.5 to 6.6. On grafting of my understock, I add about half an inch of builders sand with a pH of between 6 and 7. All my purchased grafts and understock is repotted in this mixture. A total of 433 potted grafts were in study with 392 plants lost and 38 survived. Of the 392 lost, 206 were repotted after bare rooting and soaking and drenching in Aliette. These never the less, died. The repotting was done when root rot was suspectted and before a report from two plants sent by the Extension Service of the University of Georgia Department of Agriculture for soil studies. Their report was negative for root rot fungus phytophthora; probably excessive watering. Although my greenhouse had an automatic watering system set to deliver from half an inch of water per week, I do increase to two inches in very hot weather. I later found that my 83 year old yard man who I had instructed to add a half teaspoon of sulfur per gallon pot size and gave him a measure to use. This being too tedious for him, he used the palm of his hand to measure the sulfur with. I found globs of sulfur in many of the pots, resulting in me doing my own pH study on each pot with the following results.

pH 3-4: 10 plants survived
(2 later died)
67 repotted and lost; 133 original plants lost for a total of 200

pH 4-5: 8 plants survived
(1 later died)

pH 5-6: 10 plants survived
66 repotted and lost;
7 original plants lost for a total of 73

pH 6-7: 10 survived
43 repotted and lost;
9 original plants lost for a total of 52

Total survived: 38

Total lost (not repotted): 183

Total lost repotted:	209
Total lost later:	3
Grand Total	433

Incidentally the grafts were from the years 1988-89, 1989-90, 1991-92, 1992-93. I divided my groups according to the following pH ranges 3 to 4, 4 to 5, 5 to 6, and 6 to 7. I tabulated the repotted plants separately according to the same scale. Plants in pots not in this study 4 with a pH of 6.5, are in the ground.

I have pooled growers and exhibitors in this area, Dr. Walter Homeyer, William Hardwick, Marvin Jernigan, Hulyn Smith, Dr. Dave Scheibert, Jim Pinkerton, Buck Mizell, Elliot Brogden, Joe Austin, Fred Hann, and Geary Serpas. They all felt that from their experience, a pH of 6.5 was the best level for healthy plants, less die back, better blooms, and foilage. Yes we all agree that the camellia is an acid loving plant, but not too acid that can be detrimental in fact catastrophic as can be seen from my experience. A pH between 6 and 7 with 6.5 average being best.

When I first started growing camellias, I was advised by both Mr. Dave Strother and Mr. Maxwell Murray, that I would have to use lime on my camellias about every 4 to 5 years, because of the oak tree mulch I had in my yard where the camellias were planted. They suggested about a half ton to the half acre I had in camellias, and added that they did the same thing down at Massee Lane because of the peanut hulls they were using for mulch. This was to prevent the soil from becoming too acid.

After reviewing all the literature available to me, I have documented the salient excerpts of the articles and references and I realize that there are many factors other than pH that influence ideal plant growth. I have found that pH influences the availability of the various nutrient elements in the soil. Further more, the osmotic effect of the pH on the roots themselves, is a major consideration. Too acid a soil will cause death of the plant, purely by killing the roots, a sterile "root rot". I agree that the camellia is an acid loving plant, but not too acid. In my experience a pH between 6 and 7 is ideal with 6.5 being best.

Perry Show, October 16, 1993
Low-country boil gathering, October 15, 1993
Tom Evans, Paul Dahlen, Muriel Nathan, Dot Evans, Marie Dahlen
by Shepherd

Insect and Mite Pests of Camellia

James R. Baker*
Extension Entomologist
North Carolina State University

In the Southeast, beetles, aphids, mealybugs, planthoppers, scale insects, mites and voles attack camellia. Fortunately, plant pests tend to be sporadic in their distributions and often natural control agents in the environment are sufficient to regulate pest populations. From time to time, a pest may become locally abundant and may cause so much damage that pesticide treatments may be warranted.

BEETLES

Rhabdopterus beetles are interesting in that they feed mostly at night and only on the new growth of rhododendron, camellia, photinia, and other shrubs in the lasdscape. The most common beetle in this genus is the cranberry rootworm. They leave characteristic holes in the leaves that are narrow and straight or crescent shaped. Sevin™ or other pesticides should give adequate control of these beetles although such new growth may be damaged by the pesticides. Mavrik™ insecticide is safe to use o new growth and has the advantage of long residual activity on the leaves. By the time Mavrik™ wears away, the growth will be too old to be attractive to the cranberry rootworm beetles. Although it is relatively expensive, Mavrik is used at a rate of one-sixth to one-third teaspoon per gallon of water so that a small container will make many gallons of dilute spray. Only the new growth needs to be treated as this is the only part of the plant likely to be damaged by this pest. Fortunately, insects vary from year to year in their abundance so that it may not be necessary to treat for Rhabdopterus beetles each year.

Weevils that attack ornamental plants feed almost entirely on the margins of the leaves. Some weevils have a very damaging grub stage that attacks roots. The Fuller rose beetle is a weevil that does more damage in the adult stage than as a grub in the soil. This weevil tends to feed at dusk or dark during the summer and early fall. Fuller rose beetle has a pale oblique line along each side.

Twobanded Japanese weevils tend to have two dark bands across the back. Twobanded Japanese weevils are remarkable because they are resistant to several insecticides commonly used in the home garden including Sevin™ , malathion and diazinon. Fortunately they are susceptible to Orthene™ insecticide that is labeled for home use and has the advantage of being systemic and not very toxic to people. Twobanded

Japanese weevils are also susceptible to Mavrik™ . Commercial growers and landscapers can also use the pyrethroids Mavrik™ , Talstar™ or Tempo 2™ for control.

APHIDS

It is amazing that aphids that are genetically identical can have so many body forms. Through the spring and summer, there are no male aphids, and female aphids give birth to live young. If the aphids are numerous, some of the offspring develop into black, winged forms. Some of the offspring develop into wingless forms that are much paler than the winged ones. When the tiny aphids are first born, they are so small they tend to resemble mites.

There is one more "form" of aphids that confuses horticulturists: parasitized aphids. After it is stung by a parasitic wasp, the poor aphid becomes bloated and tan in color. Sometimes all of the aphids remaining on a plant may become parasitized giving the impression of an infestation by a "new, tan" species of aphid that is very difficult to control (the immature wasps manage to fasten the aphids to the leaves with silk so that no matter what kind of pesticide is applied, the aphids seem to persist on the plant).

Aphid populations increase dramatically because they reproduce parthenogenetically and because they migrate into new areas from time to time. In warm weather, parasitic wasps, lady beetles, syrphid fly maggots, lace wings and other predaceous insects feed on aphids so that aphid populations often decrease rapidly as well. Aphid populations are sometimes devastated by Verticillium lecanii, a fungus that infects aphids as a sort of super athlete's foot disease.

The green peach aphid and melon aphid are pests of camellias and many other ornamental and vegetable plants. They are both resistant to many insecticides. Orthene™ , soaps and oils should give adequate control of resistant green peach aphids and melon aphids.

MEALYBUGS

Mealybugs suck out sap and excrete honeydew, a sweet sticky liquid. Most mealybugs lay eggs in a dense, waxy mass called the ovisac. Males pupate in a fluffy cocoon of wax. Infested plants are disfigured by the mealybugs, honeydew, male cocoons, and the ovisacs. Not only that, but as the mealybugs feed, they inject their saliva into the plant. Some plants are very sensitive to the saliva and dieback or become stunted or wilted in appearance when large numbers of mealybugs are feeding.

Control of mealybugs is not easy. If only a few plants are infested,

mealybugs can be removed with a cotton swab dipped in rubbing alcohol. The plant can then be washed with a mild soapy water emulsion to remove residual wax left by the mealybugs (about 2% soap, not detergent). The plants must be observed closely for a few weeks and new mealybugs removed as they appear.

There is a soap actually labeled for use as an insecticide for mealybug control on ornamental plants (Safer's Insecticidal Soap™). This soap is available from garden shops and plant centers. Soaps are popular with some horticulturists because of their relative safety to people. One commonly used insecticide in the home and home garden is malathion (2 teaspoons per gallon of water). Plants can be sprayed thoroughly or dipped into the pesticide mixture. Malathion is a synthetic organophosphate insecticide of relatively low toxicity.

The ovisacs complicate control measures because pesticides do not readily penetrate into the ovisac to kill the eggs. Consequently it is recommended that plants infested with mealybugs be treated at weekly intervals at least twice and probably three times for complete control. This allows time for the eggs to hatch and the new mealybugs to emerge from the ovisacs.

PLANTHOPPERS

Flatid planthoppers are small insects that secrete a fluffy, white residue as they feed. This species is not particularly damaging to ornamental plants although their presence may be aggravating to horticulturists. Malathion or some other contact insecticide should give adequate control.

Immatures of Acanalonia conica often secrete enough white, fluffy wax that they completely obscure themselves from view. When the nymph is disturbed, it often jumps 12 to 18 inches (hence the name "plantHOPPER"). Planthoppers excrete a sweet, sticky substance called honeydew in which dark fungi grow. These fungi are called sooty molds because infested plants often become dark gray or almost sooty black. Sooty molds are not parasitic on plants, they merely use the plant as a subtrate as they develop on the honeydew. Planthoppers are not particularly resistant to pesticides.

SCALE INSECTS: Soft Scale Insects

The cottony camellia scale infests many types of plants in Florida and the tropics. In North Carolina it seems to be limited to camellias, Taxus, Chinese holly and jasmine. June is a good time to spray as the lady beetles that specialize on feeding within the egg sacs of cottony scales will have then departed for their aestivating sites. If the scales are sprayed earlier, the lady beetles would be killed but not the cottony camellia scale eggs that

are protected by the waxy ovisac the mother scales secrete around the eggs. Consequently, spraying earlier will do more harm than good. In June and July, one of the sprayable formulations of Sevin™ should give wonderful control.

One other soft scale insect pest of camellia is called the Indian wax scale because of its origin in India. This scale is difficult to control from August through May because of its thick, white wax. In June, when the crawlers are out, is the optimum time to spray. Sevin™ will do an excellent job then.

SCALE INSECTS: Armored Scale Insects

Camellia parlatoria scale insect are armored scale insects. Female scales have oval armor that is dirty brown or brownish gray in color. Males have similar but smaller armor that is more narrowly oval in shape. Ornamental plants seem to be more tolerant of chaff scales than oleander scales. Horticultural oils are labeled and effective for armored scale insect control on ornamental plants in the landscape and nursery. Apply a horticultural oil on any nice day except when the foliage is new and tender. Use the dormant season rate (usually 4% or 10 tablespoons of oil per gallon of water) during the winter and the summer season rate (usually 2% or 5 tablespoons of oil per gallon of water) in late spring and summer. Do not spray when tender leaves may be burned by the pesticide mixture. Wait a few weeks and give the shrub another application. These two treatments should give you adequate control of these scales. If you notice scale insects on the foliage later in the spring or summer, you should treat again with not more than a 2% mixture of horticultural oil (5 tablespoons of oil to each gallon of water).

Camellia scale insects are armored scales that usually feed on the lower leaf surface of camellias and sasanquas but infest hollies as well. (The major difference between camellia scale insects and tea scale insects is that the male armor of camellia scales is brownish whereas the males of tea scales have snow white armor.) Camellia scales are not particularly resistant to pesticides. Cygon™ gives very good control and one of the horticultural oils can also be used for camellia scale control.

Peony scale can be quite damaging to its host plants. Infested plants are often stunted and have noticeable dieback. One of the more obvious signs of the peony scale is the lower portion of the armor that adheres to the stems of infested plants long after the upper armor and body of the insect has fallen away. The lower portion of the armor is circular and white (3-4 mm in diameter) whereas the upper armor of the live scale blends in almost completely with the bark. Because the peony scale is an armored scale, the best chemicals for control are horticultural oils or Cygon™ on azaleas and camellias. Infested plants should be treated with horticultural oil once and again in two weeks or be treated with Cygon.™

Tea scale is a serious pest of camellias and Chinese hollies in the Southeast, but it has also been reported from bottle brush, dogwood, euonymus, ferns, mangoes and other ornamental plants. Infestations occur on the leaves, usually on the undersides. Heavily infested camellias look unhealthy and may drop their leaves prematurely. Tea scale females lay from 10 to 16 eggs each. The eggs hatch in a week to three weeks, depending on the weather. The crawlers emerge and migrate to the newer foliage of the plant and begin to feed. In about two months the new generation of scales matures and they begin to lay eggs. The hatching of the eggs occurs throughout the year, although development is much slower in cold weather than in warm weather. Cygon™ (dimethoate) and several horticultural spray oils are on the market for the control of tea scale. These sprays should be directed thoroughly to the underside of the leaves. The best time to spray is in the spring after cold weather has passed although it is appropriate to begin applications whenever the scales are first discovered. The oils should be applied once and again in 14 days. Two applications 14 days apart should be sufficient.

MITES

The southern red mite is the most common spider mite pest of camellias, hollies and other broad leaved evergreens in the landscape. It is one of the "cool weather mites." Southern red mites do most of their damage in spring and fall. They are relatively inactive in cold weather and often die out in bitterly cold weather (and very hot weather). Only Southern red mite eggs survive these inclement periods. Cygon should give adequate control. The oils are also effective for spider mites but they will not kill the eggs unless applied at 4% during the dormant season of the plant.

PINE VOLES

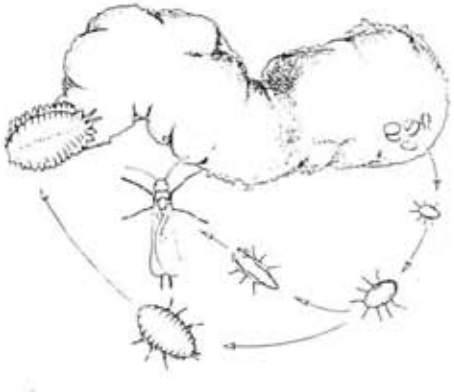
Pine voles are small rodents native to the Southeast. Voles damage ornamental plants during the winter and very early spring by consuming the bark and sap wood at the base of the stem or by consuming bulbs and tubers. Occasionally small shrubs are chewed completely off so that the whole plant gently tumbles over! Many times the damage occurs in new subdivisions that were wood lots in the near past. Pine voles sometimes occur in yards that have "natural" areas with thick mulch that provides cover for the voles.

Control of pine voles is not easy since the damage usually occurs before the presence of the voles is discovered. One way to monitor for the presence of voles is to place small boards or other flat objects on the mulch

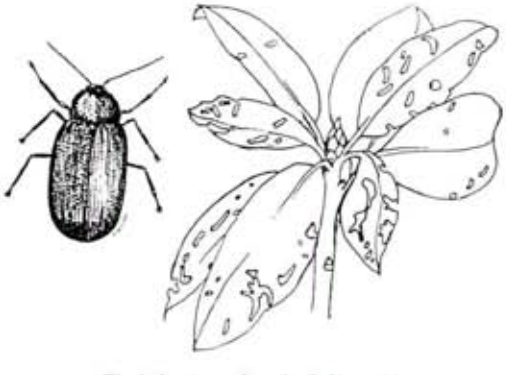
or soil near plants that need to be protected (camellias, ornamental junipers, fruit trees and other thin barked trees and shrubs). From time to time, place slices of apple under the boards. If voles are present, they will feed on the apples and give away their presence.

Baits and sprays are presently not labeled for home use. In order to use a poisonous bait, the user has to have a permit from the Wild Life Commission. These permits do not seem to be easy to obtain. It would probably be easier to obtain a permit to trap the voles (voles are considered wild life in North Carolina and are thereby protected by state law). Once the permit has been obtained, homeowners can use rat traps or mouse traps for vole control although it requires some ingenuity as voles prefer to ramain hidden in shallow runs through the thatch or under pine straw or mulch. The run can be opened and the mouse trap placed across it. Then the trap should be covered with a box to keep it in the dark and to allow the spring to snap shut. The traps should be baited with apple and peanut butter. Vole tunnels do not go deep. It is possible to protect ornamentals by surrounding them with a barrier of hardware cloth 18 to 24 inches wide that is buried about 6 inches deep.

*Presented by Dr. J.R. Baker at Atlantic Coast Camellia Society, October 9, 1993.



Life stages of the citrus mealybug.



Rhabdopterus beetle (left) and its damage to rhododendron.

Camellia Diseases

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Camellia Flower or Petal Blight

Camellia flower or petal blight affects only the open flowers of camellias. It does not affect leaves, stems, roots, non-opened buds or fruit (seed pods). The cause of the disease is a fungus, Sclerotinia camelliae, which affects only camellias. It does affect several species of camellia but the fungus is usually active from January 1 through April, coinciding with the normal flowering period of C. japonica. Since C. sasanqua blooms in the fall, it escapes infection. Buds of C. japonica, which are gibbed and thus bloom in the fall, also escape infection.

Most Camellia japonica cultivars bloom naturally from January 1 to April 1, depending on location. Along the Gulf Coast they might bloom even earlier than January 1, while in the Piedmont section of the Carolinas they bloom later. Regardless of the time when camellias bloom at their peak, the fungus is active and its growth and spore production is synchronized with this peak blooming period. Activity for the fungus begins with the germination of the fungal survival structure (the sclerotium) which is a black, hard body that generally takes on the shape of the lower part of the old camellia petals. During germination, a structure called a stipe, grows upward until it comes in contact with light at which time the tip expands to form a saucer-shaped structure called an apothecium. The apothecia are about the color of pine straw and they are usually about one-fourth to one-half inch in diameter. Regardless of the size of the apothecium, (ium, singular--ia, plural) mature spores are produced in the upper surface of this structure and are forcefully ejected into the air currents which distribute them downwind at random. Millions of spores are released periodically from these apothecia over a period of several days. There may be from one to a dozen apothecia that arise as the old ones are expended. The spores are microscopic in size and are vulnerable to various environmental effects which usually restrict their spread to a few hundred yards, but they can be viable up to a mile. The fungus can spread from camellia to camellia only by wind-borne spores released from apothecia. There are no spores formed on the diseased flowers.

The fungus responsible for azalea petal blight, Ovulinia azaleae is a close relative of the camellia flower blight fungus. However, the azalea

petal blight fungus produces thousands of spores from apothecia plus spores which are produced on the diseased flowers and can be spread to other azalea flowers. It is this mass of spores which, during favorable environmental conditions (warm, cloudy, moist weather) cause the almost complete, simultaneous collapse of all the flowers on a particular azalea plant.

Two other fungi need to be mentioned, Sclerotinia sclerotiorum and Botrytis cinerea. Both of these fungi can attack camellia flowers but neither cause the formation of the characteristic sclerotia at the base of the flower. Botrytis is a widespread fungus that survives as sclerotia in or on the soil. Its spores, are wind-borne and infect the leaves, stems, flowers and fruits of many plants, such as flowers of marigold, stems of snapdragons, leaves of dogwood, as well as strawberry fruit. Sclerotinia sclerotiorum is also active during cool weather and it also has a wide host range including the camellia flower. It can be locally serious, but is is rarely seen. It does not produce a sclerotium at the base of diseased camellia flowers and it does not spread from flower to flower. Botrytis can spread from flower to flower. Ovulinia from azalea petals does not affect camellia flowers, and the camellia flower blight fungus (S. camelliae) does not affect other plants.

When ascospores of S. camelliae are blown to petals of open camellia flowers, they typically germinate and the developing growth of the fungus penetrates the flower and then grows throughout the petal tissue. The affected tissue turns light brown in color, particularly noticeable on the white and pink cultivars. The disease is equally damaging on the red camellia cultivars but it is not as noticeable on these flowers. Brown spots are formed within 1 to 2 days after infection when temperatures are in the 60s. When the temperature is in either the 40s or 50s the rate of fungal growth in infected camellia petals is greatly reduced so that it may take 3 to 5 days for symptom expression to develop. After a few days, the lower part of the flower is invaded and a ring of mousy gray fungal tissue forms where the flower base was attached to the plant. This represents an important diagnostic feature. After 2 to 3 weeks have elapsed, the base of the affected flower begins to harden and develops into a hard, black sclerotium which either will germinate the following year or remain dormant for serveral years and then germinate.

The disease affects all cultivars of winter and spring flowering camellias. If one has difficulty diagnosing the problem, then place several flowers suspected of having flower blight in a plastic bag (without additional moisture), close the bag and leave it for a couple of weeks. The presence of a hard dark mass at the base of the flower will confirm the problem as being flower blight caused by Sclerotinia camelliae. This disease can be distinguished from frost injury and mechanical injury by the brown color of diseased tissue compared with a whitish to light tan color resulting from

frost injury. Severe freeze injury causes about the same color as flower blighted tissue, but all flowers in an area are affected by a freeze whereas some flowers almost always escape flower blight infection.

Certain cultivars, such as Betty Sheffield (all types) spot severely with water which looks very much like the beginning stages of petal blight, but these lesions from water spotting do not continue to enlarge and no sclerotia form. However, this cultivar can be affected by petal blight so observe the flower carefully.

No control program for this camellia disease is 100 percent effective. The best program for control is to keep the fungus out of the yard. However, ascospores can be blown in from a nighbor's yard if they have this camellia disease. Ascospores can be blown for about 1 mile.

Picking up and destroying the old flowers is still the best control program for flower blight. On small plants, all flower buds could be removed at one time before they begin to open. Keep all weeds and other plants that furnish any ground cover out from under camellia plants.

Occasionally ground covers are recommended for growth under camellia plants, such as ajuga, periwinkle, various ivies, Hypericum and many other ground cover plants. However, when infected flowers fall to the ground, these plants act as a moist chamber that enhances sclerotial development. If you have camellia flower blight, use pine straw as a mulch. Prune the lower branches so air can circulate freely beneath the plants. This practice permits easy pick-up of the flowers.

Another control procedure is to use chemicals that prevent the completion of the fungal life cycle. These chemicals are applied to the ground surface to prevent the development of the apothecia and the ascospores. These chemicals affect only the apothecium but have no effect on the survival of dormant sclerotia. Sclerotia are resistant to chemicals and also to weather factors such as rain, drought, heat and cold and alternate wetting and drying. Several chemicals have been tested for the control of apothecia by applying them to the soil surface. Two points should be remembered when using any of these materials: (1) a single apothecium can produce millions of spores and so the amount of control achieved by these materials is governed entirely by the thoroughness and effectiveness of the application; and (2) the use of successive applications results in better control because of the good probability of applying the chemicals on spaces missed during the first application. Also, it doesn't matter how well you do the job if your neighbors do not also control the fungus. The best chemical for this use is Terraclora.

Another approach to flower blight control is to cover the soil with some material such as black plastic which physically deters the development of the apothecia (and thus the ascospores) because light is needed to induce apothecial development. This approach is useful for small areas,

particularly greenhouses. The material must cover all areas where the old diseased flowers may have landed.

Still another approach to camellia petal blight control is to spray the flowers and provide some protection during the flowering period. This requires numerous, frequent sprays during the winter and spring and is probably not economical. If you elect to spray, the best fungicide labeled for this use is Bayleton 25 WP.

Sanitation, exclusion and fall gibbing represent the best control methods yet available. There is a great need for a systemic fungicide that can be applied either to the ground or to the foliage which will control this problem for camellia growers.

Dieback

Dieback is a poor name for this disease since the stem does not progressively die back but rather a sudden death occurs of an entire branch or of the entire plant. Close observation reveals a canker at a certain point on the stem which has developed from infection that most probably occurred through a leaf scar. This disease develops progressively, leading to a canker, may kill small stems the first year, while large branches, or entire plants may live more than 10 years after the initial infection has occurred. Cankers are usually sunken because the dead cells, killed by the fungus, are surrounded by living cells which continue to grow. Cankers are much harder to see on cultivars that do not form a ridge of tissue around the canker. Eventually, most of the cells in the canker area of the stem are killed limiting the amount of water which can be conducted through the canker area and thus, under stress, the top dies from lack of water. The canker could be considered more like girdling a plant.

Infectious camellia dieback is caused by the fungus, Glomerella circulata. Spores are produced on the cankers in the spring of the year when the temperature ranges from abotu 59 degrees to 77 degrees F and are spread by splashing rains and insects, particularly ants and flies. When they walk on the moist spore masses, they pick up some of them on their feet and then either crawl or fly to other locations laden with the fungus spores. When they land or crawl on newly created wounds, they leave a few spores of the fungus which are adequate to infect the wounded plant.

With the exception of tea (Camellia sinensis), all camellia species tested are susceptible to dieback. Within the species C. japonica, there are varying degrees of resistance to infection. For example, the cultivars Professor Sargent, Governor Mouton and Cho-Cho-San are immune to highly resistant, while the cultivars Guilio Nuccio, Ville de Nantes, Tiffany and Mathotiana are very susceptible to dieback. Several thousand seedlings and many cultivars of C. sasanqua have been tested over a period of several

years and, thus far, none has been found to be resistant, although there are apparently small differences in susceptibility to this fungus. The symptoms on the stem of a C. sasanqua plant infected in the spring (May) could develop into a large canker by fall (September or October) or, the canker could girdle and kill the stem. Rarely does the individual canker become longer than about 2 inches. When the bark is stripped away from the canker area exposing the wood, there is chocolate brown dead tissue. The fungus can be recovered from any portion of the dark tissue, but not from the white tissue which is apparently healthy. Under natural conditions this fungus does not affect any other known hosts outside of the genus, Camellia.

Natural infection by the spores normally occurs through wounds on the plant stem. Lawn mower or pruning wounds provide excellent avenues of entrance but the most natural is infection through leaf scar wounds. When the leaf falls, the remaining scar is subject to infection for 1 day. This may not seem very long, but the most likely time for an old leaf to fall off is generally during spring rain. The spores of the fungus are splashed by the rain at random, some landing on newly formed leaf scars. From impact to infection a leaf scar must be wet only 8 to 16 hours depending on the temperature.

Another means of infection is during grafting. During this process, the wood (both scion and understock) is wounded and kept in a very humid environment which facilitates healing of the scion and understock. However, both wounding and high humidity favor disease development. The fungus can grow at temperatures as low as 50 degrees F or as high as 86 degrees F but at both high and low temperatures the growth is slower. This means that, at these temperatures, the infection period is longer than occurs at moderate temperatures, such as 59 degrees to 77 degrees F.

The fungus can also infect cuttings, since wounds are created by cutting the stem and by pulling off the lower leaves. Except on resistant cultivars, such as 'Governor Mouton', infection is usually accomplished very easily when the fungus is applied to any leaf scar or wound.

Here are some steps for control:

1. Grow C. sasanqua or C. oleifera understock from seed rather than from cuttings. Isolate the seelings from diseased plants.
2. When collecting scions or cuttings, collect them from healthy plants.
3. Soak scions (or cuttings) in an appropriate fungicidal suspension for 30 minutes just prior to sticking. Captan is frequently used for this.
4. Stick cuttings in sterilized sand away from any possibly diseased plants.
5. Plant the cuttings or grafts in partial shade (pine is excellent) and keep them properly pruned so that air can circulate freely.

6. When beginning with camellias avoid highly susceptible cultivars such as 'Ville de Nantes' and 'Tiffany'. Instead, use highly reistant cultivars such as 'Governor Mouton' and 'Professor Sargent'. All C. sasanqua cultivars thus far tested are susceptible, but 'Mine-no-Yuki', 'Setsugekka', 'Daydream', 'Apple Blossom' and 'Maiden's Blush' appear to have some resistance.
7. Do not plant newly acquired healthy cultivars near diseased plants.
8. When dieback and/or canker are seen on branches or the main stem, cut out all of the affected tissue (all dark wood) and destroy it.
9. Spray camellia plants with an appropriate fungicidal suspension (Captan) just after pruning or after cuttings and scions are removed.
10. Spray camellia plants with an appropriate fungicidal suspension (Captan) during the period of maximum leaf fall.
11. Control insects such as ants with insecticides because they carry the spores from cankers on the stem to the top parts and can carry them directly to the leaf scars.
12. Avoid over-crowding and over-fertilization, particularly with high nitrogen fertilizers.
13. Do not use overhead irrigation during April, May and June on greenhouse grown plants or during May or June on outdoor plants. Overhead irrigation provides a method of spreading the spores to leaf scars where the leaves have recently fallen.

By following these practices, one can reduce dieback and canker, but it is doubtful one can ever completely eradicate this problem on camellias in the South.

Leaf Gall

Camellia leaf gall is a famous disease that has but one life cycle per year which occurs during late April or May (perhaps slightly earlier in the southern states). Leaf gall, caused by the fungus Exobasidium camelliae, affects Camellia japonica. Exobasidium camellia var. gracilis affects C. sasanqua and occasionally C. oleifera (not to be confused with the C. sasanqua cultivar, Narumigata, which is often called "oleifera"), and some hybrids such as Valley Knudson (C. saluenensis x C. reticulata 'Buddha'). The form of Exobasidium that affects C. japonica will not affect C. sasanqua and vice versa. Also, Exobasidium vaccinii that causes leaf gall of azaleas and rhododendron will not attack camellias. Other species of Exobasidium also cause leaf and shoot galls on other ornamental and wild plants.

The very distinctive symptons are characterized by thick, fleshy leaves. Most leaves in a developing vegetative bud are affected, but occasionally only one or two leaves, or parts of a few leaves, are affected. The optimum time for symptom expression is May, although the time may vary from location to location. Galls on the affected buds develop at about the time of normal new vegetative growth in the spring. As the galls mature, the lower side of the leaf (lower epidermis) breaks away, exposing the white mass of spores on the surface which are then either wind blown or spread by splashing water. The disease may be very alarming to the grower, but it rarely is damaging except from an aesthetic point of view.

Control involves one of two approaches. First, physical control involves removing and destroying all the galls as soon as detectable. It is difficult to find all the galls, but this is absolutely necessary in order to control this disease. (One other problem, your neighbors must also cooperate since the spores can be blown in from outside your yard.) Secondly, chemical control involves the use of fungicides during the spore production period. Our knowledge about control of this disease by chemical means is not satisfactory, but usually spraying with a fungicide (maneb) will help. About 3 to 4 sprays applied during May and June should help to control the disease.

Variegation

It is common knowledge that camellias have either solid-colored or variegated leaves. Variegated leaves are normally green with yellow mottling or splotching. More spectacular than variegation of the leaves is variegation of red and pink flowers. Many cultivars are sold as either solid colored flowers or as variegated such as Adolphe Audusson and variegated, Burgundy Queen and variegated, Carter's Sunburst Pink and variegated, Diamond Head and variegated or DonMac and variegated. There are two types of variegated flowers. They are infectious (virus-induced) and non-infectious (genetic). In the virus-induced, infectious type, the variegation is irregular and may be slight to severe. In white-flowered cultivars, it is impossible to destroy color because white represents the absence of color and thus there is no flower color to destroy. Most virus diseases of plants are harmful but the severity varies from virus to virus as well as the effect of a given virus from host to host.

The virus that causes camellia variegation affects Camellia japonica, C. sasanqua, C. oleifera, C. reticulata, C. hiemalis, C. sinensis and camellia hybrids. There are probably many more Camellia species susceptibel to infection by the virus. Virus of camellias in this country is spread during vegetative propagation. There seems to be one exception to the above which is as follows: a solid colored camellia growing alongside a variegated

one will sometimes make a root graft and under these conditions the solid one becomes variegated. The virus responsible for this type of variegation (irregular mottling and chlorotic splotching) moves throughout the root system of the affected plant and enters the root system of the non-affected plant through the root graft and from there goes throughout the roots, stems, leaves and flowers and becomes systemic (meaning throughout the system).

Another means of spread is to use a variegated scion on a solid understock. If a union occurs and then the scion dies, the new growth of the understock (for example, a C. sasanqua cultivar) will be systemically infected. Therefore, any cuttings and/or scions taken from this infected plant will then be passed on to the cuttings or graft.

The virus is not transmitted through the true seed so that C. sasanqua seedlings make good understock since they are virus-free and resistant to root rot (caused by Phytophthora cinnamomi). The presence of virus in the scion or cutting does not affect either its grafting or rooting capabilities. Once a plant is systemically affected by a virus it usually remains infected for the remainder of its life although the virus is not equally distributed throughout the plant and symptom expression is variable.

There are several strains of the virus. Some may variegate the leaves but show very little symptom expression on the flowers, while others may show symptoms beautifully on the flower but very little if any symptoms on the leaves. Four virus strains have been reported and there may be others. The symptoms may be so severe that the leaves sunburn and then drop off. If such is the case, some of the defoliated branches may show dieback, but this type of dieback should not be confused with dieback caused by the fungus Glomerella cingulata, which kills, not by defoliation, but by destruction of conductive tissue.

As mentioned earlier, variegation of camellia flowers can be caused by genetic variability. Some cultivars, such as 'Herme' and 'Lady van Sittart', have variegated flowers but the difference is in the pattern. The flower color is regular and appears more as regular stripes throughout the flower rather than irregular white blotches mixed with irregular colored parts of the flower. In this case, one flower of a specific cultivar such as 'Herme' (of a specific type) looks very much like all of the other flowers on that particular cultivar.

Virus variegation may be considered harmful if it causes the loss of the original solid colored scion. However, infection of a cultivar such as 'Adolphe Audusson' by the virus, may greatly enhance the beauty of the flower.

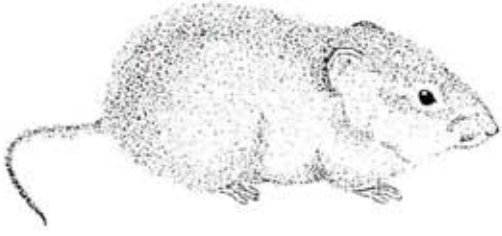
Root Rot

Root rot of camellias, particularly Camellia japonica, is caused by the fungus Phytophthora cinnamomi. This fungus attacks many ornamental plants plus various pine species, particularly short leaf pine, Pinus echinata, causing little leaf disease. Several pine species are used as partial shade for growing camellias and this is highly desirable since camellias do better in shade of this type. Thus, the pathogen may already be present in the soil when camellias are planted. It can also be a serious problem in container grown plants.

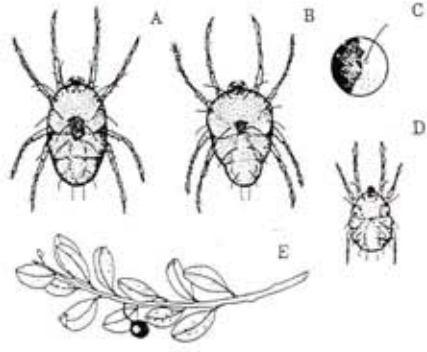
Camellia plants with Phytophthora root rot show symptoms of general decline, low vigor and lack normal dark green foliar color. Such plants often show symptoms of twig dieback that can be confused with the dieback or canker disease caused by Glomerella cingulata. Plants of any age can be attacked. Infected plants die gradually over several years or may die completely in just a few weeks. When above ground symptoms become apparent, the root system is often completely destroyed.

Since Camellia sasanqua is highly resistant to Phytophthora root rot, it has been a standard practice for many years to graft other camellia species onto Camellia sasanqua seedling root stocks. Due to the high cost of grafting plants, many nurseries at present produce camellias from cuttings. Plant susceptible cultivars in well drained soil or raised beds. Purchase disease free plants. If the problem is serious, consider planting in another location or drench with Subdue or Aliette.

*Presented by Dr. R.K. Jones at the Atlantic Coast Camellia Society, October 9, 1993



A vole.



Southern red mite. A, Female. B, Male. C, Egg. D, Larva. E, Damage to Japanese holly.

Waddell Mariculture Center

Louise Gerbing

Members of the Atlantic Coast Camellia Society attending the 1993 Hilton Head Camellia show were treated to a tour of the Waddell Mariculture Research and Development Center. The tour was led by Personal Relations expert, Dee Dee Heyman. Dee Dee, already known to the group for her love of camellias and her culinary talents, further impressed us with her knowledge of "Sea Farming".

We were welcomed at the Waddell Mariculture and Research Center, located near Hilton Head Island. The Center is on a 50 acre portion of a 1,200 acre tract dedicated to the preservation of the area's natural resources.

The Mariculture Complex is located adjacent to the Colleton River. The complex consists of a 10,000-square-foot research building, a 2,600-square-foot fish and shrimp maturation building, a 25,000-square-foot outdoor pad for tank culture, staff quarters, conference rooms and 22 ponds ranging in size from 1/4 acres to 1 and 1/4 acres. The ponds are lined with high density polyethylene overlain with soil bottoms.

The Waddell Mariculture Center was constructed in 1983 & 1984 for the purpose of developing techniques for propagating and farming marine and brackish water species of finfish, mollusks and crustaceans. The center is also developing techniques for commercial aquaculture and producing juvenile fish for fishery management and stock evaluation.

Cooperation between the area universities and the center offers opportunities and facilities for graduate research, and provides expertise from university staff. An old house on the edge of the compound has been restored and serves as a dormitory and meeting place for graduate students and visiting scientists.

Shrimp farming in South Carolina began before the Waddell Mariculture Center began operation. The center has led in intensification of pond production by developing the right balance of stock density, feeding rate, aeration rate, and water exchange. An acceptable production of native white shrimp has been achieved, but the growth rates are less than that of the Pacific species. Therefore most of the shrimp grown commercially in South Carolina are Pacific white shrimp. Waddell Mariculture Center has been instrumental in developing techniques for growing these Pacific white shrimp for commercial harvesting. The center has been able to grow Pacific shrimp to commercial size in 8 months. One acre of water can produce 30,000 pounds of shrimp. One of the highlights of the tour was to see and hold one of these large living shrimp. We had eaten some of these 8 per pound giants the night before, barbecued on a skewer.

WMC has also done pioneering work on growing red drum in ponds. Large numbers of red drum juveniles are produced for stock enhancement and fishery management projects. Of special interest was the feeding of large striped hybrid bass.

South Carolina is well-suited for intensive pond production of sea foods, but is not the best location for a shrimp hatchery. Shrimp farms in South Carolina now import postlarvae shrimp from stocking ponds. The WMC is working towards developing techniques to raise temperature and salinity, and remove suspended solids from east coast water to make it suitbale for hatching shrimp.

An impressive sight is the 60 fiberglass tanks, ranging in size from 4 to 20 feet in diameter. These tanks are supplied with a mixture of high-salinity seawater and fresh deep-well water.

This magnificent facility has the capability of distributing water to ponds and research buildings at the rate of 2,400 gallons per minute. With boilers, heat exchangers, water chillers, filtration systems and sterilization systems the facility is managed by a total staff of twenty to twenty five scientists, biologists and maintenance personnel. In spite of the variety of projects taking place, we were impressed with the cleanliness and organization throughout.

Developing technology for Commercial growth and preservation of natural resources have formed an ideal partnership in this South Carolina Coastal area. We left, convinced that South Carolina Coastal areas are in good hands.

Waddell Mariculture Center, Hilton Head, SC, Nov. 7, 1993
Louise, George Gerbing and others.
by Shepherd

Is It Dieback?

C.C. Bush

When I began growing Camellias, I was instructed by my guide and mentor, Luther Brent, to grow japonicas as they were easier to grow than hybrids. He suggested that I start with Marie Bracey, Mathotiana, Betty Sheffield and Tomorrow's Dawn. I followed his advice and enjoyed a degree of success.

Later I inquired of the availability of a beautiful Buddha bloom, and Mr. Brent advised me that it was very difficult to grow. He said that it was susceptible to "dieback". He stated that it was a reticulata, and that they seem to him to be more likely to develop dieback than did the japonicas. Naturally I wanted to know why. He explained to me that the structure of the stem was softer, the bark more rugose, the cambrium layer thicker, the medulla thinner and the pith larger than japonicas. The stem structure was not as resistive to dieback fungus. He advised me to refrain from growing reticulatas and reticulata hybrids. He added that if you must have a reticulata, the Crimson Robe seemed to be less susceptible to dieback than any of the retics which he had tried to grow.

As time passed, I failed to heed the words of wisdom from R.L. Brent and began acquiring more and more of the retic hybrids. The beauty of the blooms obtained justified the risk and the relative short life expectancy of the plant. Having won the best retic hybrid award several times stimulated me to acquire and graft more and more of them. As the seasons passed, my greenhouse contained as many reticulata hybrids as japonicas.

As the number of retic hybrids increased, so did the dieback or withering of leaves and stems. I used about one pound of benlate and one quart of 3336F per year in an effort to control dieback. I added spreader sticker and sprayed periodically in an effort to stop or inhibit dieback. I continued to have the symptoms and the branches continued to wither and die. Almost weekly, I pruned out the dead branches and painted the resultant wound with a paste made with two tablespoons of benlate, two teaspoons of captan mixed with one-fourth cup of distilled water to which ten drops of chlorox had been added. This paste was generously applied to the wound. I was given the proportions by John Edwards, as the remedy to prevent dieback from entering the plant. I have never had a dieback canker form on the wound if it had been coated with this paste.

In spite of all the precautions, I still had a problem with branches dying. Each week I pruned out a basketfull of dead limbs, but I noticed the dying limbs always occurred on the retic hybrids. I was not having dieback on the japonicas or the non-retic hybrids.

When the weather starts getting cooler, all of us begin placing our container grown plants between the plants we have growing in the ground

in the greenhouse. In the process of moving my plants, I brushed against some of the branches. The limbs of some of the retic hybrids broke off. I noticed that the leaves had started to shrivel as if with dieback. On examination, I found a small borer approximately 1/32 to 1/16 inch in length and white in color with a brown head. In appearance, it was the identical borer which infects peach, apricot, plum and dogwood trees and which resulted in the death of rhododendrons and Exbury azaleas which I had attempted to grow. In retrospect, I don't recall seeing any canker on the main trunk of retic hybrids which is indicative of the dieback fungus. The point of entry for the borer seems to be on the lower side of the branch and is approximately the diameter of a .5 mm lead in a mechanical pencil. Maybe a little smaller - possibly .3 mm lead. When the branch is flexed, it will break at the point of entry and on close examination, you will see that the pith has been eaten and has turned dark. The borer is in place either on the branch which has broken off, or on the part of the branch attached to the main trunk. With a 5x glass, you will have little trouble locating the culprit unless he has fallen to the ground. In that case I have not located the borer.

On my discovery of the borer, I researched borers as a pest in camellias and was unable to find any reference to borers. I then referred to my FARM CHEMICALS HANDBOOK '93 to locate some chemical which would eliminate borers. My findings indicated to me that Lindane should be sprayed on the trunk and together with Dimethoate or Cygon 2E. The Lindane is a contact killer and Dimethoate a systemic erradicator.

I located a bottle of Lindane at the local Wal-Mart store and Cygon 2E at a local Agricultural Coop. I sprayed the Lindane according to the instructions on the bottle with a pump sprayer and applied the Cygon 2E with a three inch paint roller with a four foot handle attached to the lower four or five inches of each plant in the ground as well as those grown in containers.

Within one week, all further dying branches when examined indicated that the borers had been killed. In ten to fifteen days, I will again spray with Lindane to kill any eggs or infant borers which may be on the plants. I feel that one application of Cygon 2E will last until the blooming season is completed.

Spraying the plants for borers with benlate is like soaking your feet in Johnson's Foot Soap when you have a toothache. It makes your foot feel good, but does absolutely nothing for the toothache.

The problem with die-back is still one of the major obstacles in growing camellias, but in my situation, what I had erronously hypothesized to be dieback fungus was a borer which had been responsible for the death of a lot of branches on my retic hybrids. Drying up and death of a branch does not always indicate dieback. My assumption that all dead branches

indicated dieback almost resulted in my destroying all of my retic hybrids by treating them with a dieback fungus remedy. As a result of the discovery of borers present on reticulata hybrids and an effective treatment, I think I will try again to grow the very beautiful Buddha and all of its progeny.

Possibly other growers will examine their dying branches to see if they have a borer problem. In the event others have borer problems, then the problem of dieback will be reduced considerably. The expense of borer remedy is not as great as the present fungicide remedy on the market.

In conclusion, it is my belief that borers are responsible for a large amount of dying branches which have been erronously attributed to the dieback fungus. Borers can be effectively controlled by the use of Lindane spray and Dimetholate insecticides when applied as per the instructions on the container. However, I must emphasize that these are very toxic chemicals and must be applied at the prescribed dilution rate with the required personal protection in use as prescribed in the instructions and precautions statement on each package of Lindane and Cygon 2E.

Donna and Bill Shepherd
ACCS meeting, October, 1993
by Scheibert

A Sad Little Story From A Camelliaphile

Thomas H. Perkins, III

The year of 1993 started off for me with a great deal of promise with my Camellia collection. After going through the hassle of conducting our host Conference of the International Camellia Society in New Orleans in early 1992, I decided to spend more time and effort on the Camellias in 1992 and added many prize winning cultivars to the collection. I also secured scions of entirely new Chinese cultivars sent to me by Gao Jiyin of the Subtropical Forestry Institute of Fuyang, Zhejiang Prov., China. These were the best scions I have ever seen sent from overseas and I had them custom grafted to produce about 130 plants of 58 cultivars. I looked forward to seeing all of these strange new varieties bloom this season. I remember that I corrected the pH and sprayed for insects and dieback, etc.

In early Spring the disaster occured, I have been a long time user of Fertilome Azalea-Camellia Fertilizer which has a formula of 9-15-13 with trace elements. I used the product as I had many times before and then I noticed that all of the new growth came out with the absence of chloryphyl in the foliage. It was not very long before this new growth started to wilt and die. At that time I went back to the product label and found way down at the bottom of the label in red the statement "product not recommended for container plants". I also looked at the contents label and found that there was a disclaimer stating that there was not more than 13% of chlorine.

As this was going on I approached my supplier, a local seed store about my seeming problem and he said that he was contacting the maker and that he would see that they contacted me to answer my questions. I asked specifically if he would insist with them that they explain the large amount of chlorine in the mix as that seemed to be the culprit. In the meantime, more and more plants continued to die. I took as many plants as I could and washed the outer laye of soil off most of my plants to stop the poisoning of the rootstock. This seemed not to have much effect as I had lost about 175 plants and the prospect that some would have only a short time to live.

I had no response to my appeal to the fertilizer maker except a message on my answering machine that they would try to get back to me. In August I had to go to South Africa for the International Camellia Society Conference for three weeks. Upon return I found that about 30 more plants had died. Some others look pretty bad and I have been thinking of placing all of the remaining plants in the ground in an effort to save them as nature has a way of nuturing plants that we can't manage absolutely in containers. The company finally sent out a salesman to survey the damage

and I insisted that they take samples of the rejected soil from the containers and some samples of the remaining fertilizer that I had retained. I asked for an analysis of this evidence and a report to me.

At first, I thought that I would not pursue this loss with the company that manufactured this product but it has now developed into a major disaster and I think that the company bears responsibility for this loss as the product is a danger to horticulturists who rely on the products of major producers. I have sent a copy of my losses to the Fertilome company outlining the cost of the various cultivars with special value as to foliage and flower. I must say that I was remiss in not reading more carefully the instructions on this product but I think that with the possible toxic nature of this product that it should not be on any market. I am still awaiting some action on the company's part or at least some explanation of the use of the large amount of chlorine (not stated as a chloride). I recommend that everyone stop using this product and possibly their other product that they market for Roses and vegetables, etc.

It is a sad story and I hope others do not experience it. My monetary loss is about $2600.00. Paper is dated December of 1993.

ACCS - Myrtle Beach, October 9, 1993
Clara Hahn won painting by Sadie Lyon.
by Shepherd

SHOW DATES

(ACS COOPERATIVE SHOWS)

PLACE, LOCATION, SPONSOR

Tampa, FL; Tampa Garden Center; Tampa Bay Area Camellia Society ..... January 8, 1994

New Orleans, LA; Clifton L. Ganus School Gym; Camellia Club of New Orleans ..... January 8, 1994

Gainesville, FL; Oaks Mall, Gainesville Camellia Society ..... January 8-9, 1994

Aiken, SC; University of South Carolina-Aiken; Aiken Camellia Club ..... January 8-9, 1994

Conroe, TX; Coushatta Camellia Society ..... January 8-9, 1994

Mobile, AL; Springdale Mall; Camellia Club of Mobile ..... January 15-16, 1994

Tallahassee, FL; Tallahassee Mall; Tallahassee Camellia and Garden Club ..... January 15-16, 1994

Winter Park, FL; Camellia Society of Central Florida ..... January 15-16, 1994

Ruston, LA; Lomax Hall, Louisiana Tech; Ruston Camellia Society ..... January 15-16, 1994

Charleston, SC; Citadel Mall; Citadel Mall Merchants' Assn. & Coastal Carolina Camellia Society ..... January 22, 1994

Ocala, FL; Appleton Culture Center, Ocala Camellia Society ..... January 22-23, 1994

Tuscaloosa, AL; West Alabama Camellia Club ..... January 29-30, 1994

Lakeland, FL; First Federal Florida; First Federal Florida ..... January 29-30, 1994

Deland, FL; First Presbyterian Church, Volvsia Co. Camellia Society ..... February 5, 1994

Jackson, MS; Deposit Guaranty National Bank Plaza; Jackson Camellia Society ..... February 5-6, 1994

Thomasville, GA; Garden Center, Thomasville Garden Club ..... February 12, 1994

Birmingham, AL; Botanical Gardens, Birmingham Camellia Society ..... February 12-13, 1994

Columbia, SC; Columbia Mall, Mid-Carolina Camellia Society ..... February 12-13, 1994

Atlanta, GA; Atlanta Botanical Garden, North Georgia Camellia Society ..... February 19-20, 1994

Fayetteville, NC; Fayetteville Camellia Society Cross Creek Mall ..... February 19-20, 1994

Baltimore, MD; Hunt Valley Mall, Pioneer Camellia Society ..... February 19, 1994

Wilmington, NC; Tidewater Camellia Club ..... February 26-27, 1994

Slidell, LA; LaQuinta Inn, Ozone Camellia Society, ACS Convention ..... February 26-27, 1994

Nashville, TN; Cheekwood, Middle TN Camellia Society ..... February 26-27, 1994

Warner Robins, GA; Houston Mall; Middle Georgia Camellia Society ..... March 5, 1994

Fresno, CA; Fashion Fair Mall; Central California Camellia Society ..... March 12-13, 1994

Greensboro, NC; Holly Hill Mall, Piedmont Camellia Club ..... March 12-13, 1994

Norfolk, VA; Norfolk Botanical Garden; Virginia Camellia Society ..... March 26-27, 1994

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