Hosts of the Parasitic Alga *Cephaleuros virescens* in Louisiana and New Host Records for the Continental United States

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*Cephaleuros virescens* Kunze is a plant-pathogenic green alga (Chlorophyta) that belongs to the family Trentepohliaceae. *C. virescens* occurs worldwide in tropical and subtropical regions (Africa, India, China, Japan, Australia, Central and South America, West Indies, continental United States, and Hawaiian Islands), generally between 32° north latitude and 32° south latitude where temperature and moisture conditions are suitable (9). The alga is a common plant parasite along the Gulf Coast of the southern United States, occurring as far north along the Atlantic coast as North Carolina (17). *Cephaleuros* is the phycobiont of two parasitic lichen species, *Strigula camplanata* (Fee) Mont. and *S. elegans* (Fee) Mull. Arg., which also occur commonly in the southern United States but are not often recognized as parasites (7,14,16).

*C. virescens* is the species most often cited in the literature as a plant parasite (9). However, *C. parasiticus* Karsten was recently identified in Louisiana (3,8) as the causal agent of a magnolia leaf spot that was erroneously described as being caused by the fungus *Glomerella cingulata* (Ston.) Spauld. & Schrenk (4). In contrast to *C. virescens*, which grows on its host's epidermis but beneath the cuticle layer, *C. parasiticus* occurred intercellularly in leaf spots on *Magnolia grandiflora* L., and caused a large amount of tissue destruction.

*C. virescens* is the incitant of leaf, stem, and fruit diseases on economically important tropical plants such as tea (*Camellia sinensis* (L.) O. Kuntze), pepper (*Piper nigrum* L.), coffee (*Coffea arabica* L.), oil palm (*Elaeis guineensis* Jacq.), litchi nut (*Litchi chinensis* Sonn.), vanilla (*Vanilla planifolia* Andr.), guava (*Psidium guajava* L.), cacao (*Theobroma cacao* L.), and citrus (*Citrus* L. spp.) (9,13,17–19). Leaf spot infections are the most common form of parasitism, but since the alga is strictly subcuticular, these infections are usually of minor importance on most hosts (9–11,17,18).

Wellman (17), however, reported instances of defoliation of coffee and mango in Central America caused by "numerous infections" of *C. virescens*. A severe foliage disease of guava that was caused by *Cephaleuros* was also reported in Florida (12). Stem infections of host plants are more damaging and may result in swelling, bark splitting, and tissue and twig death (9,10,13,17–19).

A *C. virescens* host list from Brazil (2) included 214 plants listed by the complete Latin binomial. 119 listed by the genus only, and 115 listed by the common name only, for a total of 448. Wellman (17,18) recorded nearly 200 hosts of *C. virescens* from the American tropics. The published host list for the continental United States contained about 40 species through 1960 (15,19). Revised Florida host lists (1,11) contain 157 plant species and cultivars, many of which are tropical plants from central and southern Florida. These lists also contain 27 species that are susceptible to stem infections by *Cephaleuros*.

A host list of *C. virescens* from Louisiana was begun in 1972 and included 145 plant species by 1977 (5,6). Most collections were made within a radius of about 80 miles of Baton Rouge. The northernmost point at which *C. virescens* was collected was Vicksburg, Mississippi, about 32.5° north latitude. The list presented here contains 218 plant genera, species, and cultivars from 62 families. Of this number, 167 are new host records for the continental United States. The following 10 plant families account for over one-half, i.e., 117, of the hosts listed: Aquifoliaceae, 15; Caprifoliaceae, 7; Compositae, 7; Ericaceae, 8; Fagaceae, 12; Leguminosae, 8; Magnoliaceae, 7; Oleaceae, 8; Rosaceae, 32; and Theaceae, 13.

This list contains representatives common to the Gulf Coast except for the tropical areas of southern Florida. Noteworthy in the Louisiana list is the large number of deciduous plant species that are leaf spot hosts of *C. virescens*. Early literature described hosts of the alga as commonly having leathery, long-lived leaves (16,17). Wellman (17), however, found *C. virescens* parasitizing the soft, tender foliage of tomato and tobacco in the American tropics. The recognition of algal parasites on many deciduous and herbaceous species is difficult, since algal thalli may be less than 1 mm in diameter at the time of leaf drop and therefore easily overlooked. Examples of this type of host from the Louisiana list are species of Acer, Alnus, Betula, Carpinus, Campsis, Lonicera, Sambucus, Solidago, Cornus, Diospyros, Quercus, Liquidambar, Carya, Lagerstroemia, Liriodendron, Platanus, Ulmus, Lantanna, Viitis, and Celosia.

Leaf spot damage to the majority of *C. virescens* hosts in this study was of a minor nature and usually limited to death of cells just beneath the algal thallus. Tissue necrosis was verified on representative samples of each host by hand lens and/or binocular microscopic examination. Microscopic examination of algal leaf spot sections from *Magnolia grandiflora* revealed death of two to four cell layers, including the epidermal cells, beneath the algal thallus. Occasionally, tissue necrosis extended through the entire leaf to the lower epidermis of some hosts, including *M. grandiflora*. Leaf spots almost always occurred only on the upper leaf surfaces; an exception was *Camellia japonica* L., on which algal thalli often grew both on leaf surfaces. The most damaging infections were those on twigs and branches of woody species that resulted in swelling, bark cracking, and tissue death. In southern Louisiana, 2- and 3-year-old twigs and branches of pecan (*Carya illinoiinensis* (Wangen.) C. Koch) and sycamore (*Platanus occidentalis* L.) are frequently infected with *C. virescens*, and infected bark is often killed and sloughed (*unpublished*). The effect of these infections on vigor, growth, and fruit production of the trees has not been determined.

The addition of 164 species and cultivars to the known hosts of *C. virescens* in the continental United States brings the total to 287 (combined Louisiana and Florida lists). This is not far short of the frequently cited Batista and Lima host list from Brazil (2) containing 307 different genera and species. Hosts common to both lists include tropical plants grown in Florida.

The plant families and genera are listed here in alphabetic order, followed by the host common name and plant organ on which the algal infection was observed. *Hortus Third* (1976) was the principal source for currently accepted scientific
names and authorities for cultivated plants. The severity of infection is noted only in instances when host response was moderate to severe or leaf spotting was especially heavy. An asterisk (*) indicates a new host record for the continental United States.

ACERACEAE
Acer distylum Siebold & Zucc.*; maple; stem.
A. negundo L.*; box elder; leaf, stem.
A. rubrum L.*; red maple; leaf, stem.

AMARANTHACEAE
Celosia cristata L.*; cockscomb; leaf.

ANACARDIACEAE
Rhus copalina L.*; dwarf sumac; leaf.
R. radicans L.*; poison ivy; leaf.

ANNONACEAE
Asimina triloba (L.) Dunal; pawpaw; leaf.

APOCYNACEAE
Allamanda cathartica L.*; common allamanda; leaf.

ARALIACEAE
Hedera helix L.; English ivy; leaf.

ASCLEPIADACEAE
Matelea carolinensis (Jacq.) Woodson*; climbing milkweed; leaf.

BERBERIDACEAE
Mahonia bealei (Fort.) Carriere;* Oregon grape holly; leaf.
M. Fortunei (Lindl.) Fedde*; Chinese mahonia; leaf.
Nandina domestica Thunb.*; heavenly bamboo; leaf.

BETULACEAE
A. negra (Thunb.) Steud.*; Japanese alder; leaf (moderately severe).
Betula nigra L.*; river birch; stem (moderately severe).

Carpinus caroliniana T. Walt.*; American hornbeam; leaf.

BIGNONIACEAE
Bignonia capreolata L.*; cross vine; leaf.
Campsis radicans (L.) Seem. ex Bur.*; trumpet vine; leaf.

CALTANITIACEAE
Chimonanthus praecox (L.) Link*; winter-sweet; leaf.

CAPRIFOLIACEAE
Lonicera fragrantissima Lindl. & Paxt.*; bush honeysuckle; leaf.
L. japonica Thunb.*; Japanese honeysuckle; leaf.
Sambucus canadensis L.*; American elderberry; leaf.
Viburnum dilatatum Thunb.*; linden viburnum; leaf.
V. japonicum (Thunb.) K. Spreng.*; Japanese viburnum; leaf.
V. odoratissimum Ker-Gawl.; sweet viburnum; leaf.
V. suspensum Lindl.; sandankwa viburnum; leaf.

CELASTRACEAE
Euonymus fortunei (Turcz.) Hand.-Mazz.*; wintercreeper euonymus; leaf.

COMPOSITAE
Aster ericoides L.*; heath aster; leaf.
A. prenalis D. F. *; aster; leaf.
Baccharis halimifolia L.*; groundsel bush; stem.
Solidago altissima L.*; goldenrod; leaf.
S. rugosa Mill.*; goldenrod; leaf.
Trifolium odoratissimum (Walz.) Cass.*; deer’s tongue; leaf.
Verbena walteri Shinners*; wing-stem crownedbead; leaf.

CORNACEAE
Aucuba japonica Thunb.; Japanese acuba; leaf.
Cornus drummondii C. M. Mey.*; roughleaf dogwood; leaf.
C. florida L.*; flowering dogwood; leaf.

CUPRESSACEAE
Cupressus sempervirens L.*; Italian cypress; stem.

CYRILLIACEAE
Cliftonia monophylla (Lam.) Britt. ex Sarg.*; buckwheat tree; leaf.
Cyrrilla racemiflora L.*; leatherwood; stem.

EBENACEAE
Diospyros kaki L. f.; Japanese persimmon; stem.
D. virginiana L.*; common persimmon; leaf, stem (severe).

ELAEAGNACEAE
Elaeagnus pungens Thunb.*; thorny elaeagnus; leaf.

ERICACEAE
Lyonia lucida (Lam.) C. Koch*; tetterbush; leaf.
Pieris japonica (Thunb.) D. Don ex G. Don; Japanese pieris; leaf.
Rhododendron canescens (Michx.) Sweet; wild azalea; leaf (severe), stem (severe).
R. obtusum (Lindl.) Planch.; cultivated azalea; leaf.
R. serrulatum (Small) Millais*; wild azalea; leaf (severe), stem (severe).

FAGACEAE
Castanea mollissima Blume*; Chinese chestnut; leaf, stem.
Quercus acutissima Carruth.*; sawtooth oak; leaf (severe).
Q. alba L.*; white oak; leaf, stem.
Q. chenii Nakai*; oak; leaf.
Q. laevis Walt.*; turkey oak; leaf.
Q. muehlenbergii Engelm.*; yellow chestnut oak; leaf.
Q. myrsinifolia Blume*; Chinese evergreen oak; leaf (severe).
Q. nigra L.*; water oak; leaf.
Q. primus L.*; chestnut oak; leaf.
Q. robur L.*; English oak; leaf (severe).
Q. velutina Lam.*; black oak; leaf.
Q. virginiana Mill.; southern live oak; leaf, stem.

FLACOURTIACEAE
Idesia polycarpa Maxim.*; ligiri tree; stem (severe).

GRANITEA
Arundinaria gigantea (Walt.) Muhlenb.*; canebreak bamboo; leaf.

HAMAMELIDACEAE*
Liquidambar styraciflua L.*; sweet gum; leaf, stem.
Sycopsis sinensis D. Oliver*; leaf (severe).

HIPPOCASTANACEAE
Aesculus pavia L.*; red buckeye; leaf.

JUGLANDACEAE
Carya aquatica (Michx. f.) Nutt.*; bitter pecan; leaf.
C. cordiformis (Wangenh.) C. Koch*; bitternut hickory; stem.
C. glabra (Mill.) Sweet*; pignut hickory; leaf.
C. illinoensis (Wangenh.) C. Koch*; pecan; leaf, stem (severe).
Juglans nigra L.*; black walnut; stem.
J. regia L.*; English walnut; stem.

LAURACEAE
Cinnamomum camphora (L.) J. Presl; camphor tree; leaf.
Laurus nobilis L.*; sweet bay; leaf.
Lindera benzoin (L.) Blume*; spicebush; leaf.
Persea americana Mill.; avocado; leaf.
P. borbonia (L.) K. Spreng.; red bay; leaf.
Sassafras albidum (Nutt.) Nees*; sassafras; leaf.

LEGUMINOSAE
Albizia julibrissin Durazz.*; mimosa; stem.
Cercis canadensis L.*; redbud; leaf, stem.
Cladrastis lutea (Michx. f.) C. Koch*; yellowwood; stem.
Dalbergia sissoo Roxb. ex DC.*; sissoo; stem.
Desmodium Desp. sp.*; beggar’s-ticks; leaf.
Erythrina crista-galli L.*; cockspur coral tree; leaf.
Maackia amurensis Rupr. & Maxim.*; amur maackia; leaf, stem.
Wisteria sinensis (Sims) Sweet; Chinese wisteria; leaf.

LILIACEAE

Homorocallis L. sp. hybrid*; daylily; leaf. Smilax L. sp.*; greenbriar; leaf.

LYTHRACEAE

Lagerstroemia indica L.; grape myrtle; leaf.

MAGNOLIACEAE


MALVACEAE

Hibiscus syriacus L.*; althaea; leaf, stem.

MENISPERMACEAE

Calyccocarpum lyoni (Pursh) Gray*; cup seed; leaf.

MORACEAE

Broussonetia papyrifera (L.) Venten.*; paper mulberry; leaf. Ficus carica L.*; fig; stem. F. pumila L.*; climbing fig; leaf. Maclura pomifera (Raf.) C. K. Schneid.*; osage orange; leaf.

MYRICACEAE

Myrica cerifera L.; wax myrtle; leaf, stem.

MYR SINACEAE

Ardisia crispa (Thunb.) A. DC.; Christmas berry; leaf.

MYRTACEAE


NYSSACEAE

Nyssa sylvatica Marsh.*; black gum; leaf, stem.

OLEACEAE


OSMUNDACEAE

Osmunda regalis L.*; royal fern; leaf.

PLATANACEAE

Platanus occidentalis L.; eastern sycamore; leaf, stem (severe).

POLYGONACEAE

Brumichia ovata (Walt.) Shinners*; ladies eardrops; leaf.

POLYPODIACEAE

Cystopteris falcata (L. f.) K. Presl; holly fern; leaf.

RHAMNACEAE

Rhamnus caroliniana Walt.*; Indian cherry; leaf.

ROSACEAE


SAPINDACEAE

Koelreuteria paniculata Laxm.*; varnish tree; leaf. Sapindus utilis Trab.*; soapberry; leaf, stem.

SAXIFRAGACEAE

Hydrangea macrophylla (Thunb.) Ser.*; French hydrangea; leaf. Philadelphus coronarius L.*; mock orange; leaf.

SOLANACEAE

Solanum pseudocapsicum L.; Jerusalem cherry; leaf.

STERCULIACEAE

Firmiana simplex (L.) W. F. Wight*; Chinese parasol tree; leaf.

STYRACACEAE

Halesia diptera Ellis*; silver-bell; stem.

SYMPLOCACEAE

Symposium tinctoria (L.) L’Her*; common sweetleaf; leaf.

TAXODIACEAE

Cryptomeria japonica (L. f.) D. Don*; Japanese cedar; leaf.

THEACEAE


ULMACEAE

Celtis laevigata Wild.*; sugarberry; leaf. Ulmus alata Michx.*; winged elm; leaf, stem. U. americana L.*; American elm; leaf, stem.

VERBENACEAE

Callicarpa americana L.*; French mulberry; leaf. Lantana camara L.*; lantana; leaf. Vitex agnus-castus L.*; chastke tree; leaf.

VITACEAE

Amelopsis arborea Koehne*; pepper vine; leaf. Parthenocissus quinqufovea (L.) Planch.*; Virginia creeper; leaf. Vitis rotundifolia Michx.*; muscadine grape; leaf.

ZINGIBERACEAE

Hedychium coronarium J. Konig*; ginger lily; leaf.

ACKNOWLEDGMENTS

I thank Dale Newsom, Martin and Paula Piehl, Beatrix Exner, Wray Birchfield, Shirley Tucker, and Lowell Urbatsch for assistance in identifying plant specimens.
LITERATURE CITED


