

HOSTS OF PHYTOPHTHORA CINNAMOMI

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The avocado root rot fungus, *Phytophthora cinnamomi*, also attacks many other plants. In 1952 we published a list of the plants that the fungus was known to attack at that time (3); this is a revision of that list, with the addition of 85 host plants.

The new list includes 207 plants, in 97 different genera, and includes a very wide range of plants. Included are such diverse types of plants as conifers (pines, cypress, juniper, incense cedar and others), many broadleaved trees such as Eucalyptus, chestnut, oak, walnut, sycamore; fruit trees including avocado, peach, pear, apricot; tropical plants such as pineapple, papaya, macadamia; many woody ornamental plants (azale, hether, camellia, rhododendron,) and a wide variety of others.

In the case of avocado, this fungus primarily invades and rots the small feeder roots. It can cause other types of diseases on other plants, however, including rot of large roots, cankers on trunks and stems, and fruit rots.

Phytophthora cinnamomi has been described from many regions: Australia, New Zealand, Malayan archipelago; North, Central, South America and Mexico; the Caribbean, South Africa, some Pacific Islands (Fiji, New Guinea, Ponape), England, southern Europe, and U.S.S.R. (Caucasus). It is generally restricted to the tropical or warmer temperate regions of the world. The first description was on cinnamon trees in Sumatra in 1922 (2).

The fungus was first reported from the United States in 1930; this was on rhododendron nursery plants in New Jersey (6). In the 1930's it was described as the cause of root diseases of chestnut, chinkapin, red pine, and several types of coniferous and broadleaved nursery stock in the southeastern United States (1).

The fungus was first reported on avocado in Puerto Rico in 1929, where it caused severe root rot (4). It was first isolated from California in 1942 (5), although reports indicate that the disease had been present in California for many years prior to that. The avocado root rot fungus has since then been isolated from avocado in most of the avocado-producing countries of the world; Argentina, Australia, Bolivia, Brazil, Chile, Costa Rica, Cuba, El Salvador, Fiji, Honduras, Mexico, Peru, Puerto Rico, St. Croix, South Africa, Trinidad, Trust Territory of the Pacific Islands (Ponape), and Venezuela.

Following is a list of the plants attacked by *P. cinnamomi*. In the case of entries starred with a single star (*), the fungus has been reported only on nursery stock. In the case of entries starred with two stars (**), the susceptibility of that plant has been established by

means of artificial inoculation; the fungus has not been found on those plants under natural conditions.

LITERATURE CITED

1. Crandall, B. S. Root disease of some conifers and hardwoods caused by *Phytophthora cambiyora* (*P. cinnamomi*). *Plant Dis. Repr.* 20: 202-204. 1936.
2. Rands, R. D. Streepkanker van Kaneel, veroorzaakt door *Phytophthora cinnamomi* n. sp. *Meded. Inst. voor Plantenziekten Dept. Landb. Nijv. en Handel* 54:1-53. 1922.
3. Thorn, W. A. and Z. A. Zentmyer. 1952. Hosts of *Phytophthora cinnamomi* Rands, the causal organism of avocado root rot. *Calif. Avocado Society Yearbook* 1952:196-200.
4. Tucker, C. M. Report of the Plant Pathologist. Report of the Puerto Rico Agr. Exp. Sta. 1928:29-35, 1929.
5. Wager, V. A. *Phytophthora cinnamomi* and wet soil in relation to the dying back of avocado trees. *Hilgardia* 14:519-532. 1942.
6. White, R. P. Two *Phytophthora* diseases of *Rhododendron*. (Abst.). *Phytopath.* 20:131. 1930.

HOST LIST PHYTOPHTHORA CINNAMOMI RANDS

CONIFEROUS TREES

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Abies nordmanniana</i>	Fir, Nordmann	Southeast U.S.
<i>Abies alba (pectinata)</i>	Fir, Silver	Southeast U.S.
<i>Abies sibirica</i>	Fir, Siberian	Southeast U.S.
* <i>Abies fraseri</i>	Fir, Fraser	Southeast U.S.
<i>Calocedrus decurrens</i>	Incense Cedar	So. Calif.
<i>Cedrus atlantica</i>	Cedar, Atlas	Southeast U.S.
<i>Cedrus deodara</i>	Deodar, cedar	So. Calif.
<i>Chamaecyparis lawsoniana</i>	Port Orford Cedar (Cypress, Lawson)	So. Calif., Oregon British Columbia, New Zealand, Louisiana
*Parl. var. <i>allumi</i>	Cypress, Scarab	Oregon
*var. <i>ellwoodii</i>	Cypress, Ellwood	Oregon
*var. <i>fletcheri</i>	Cypress, Fletcher	Oregon
*var. <i>lutea</i>	Cypress, Golden	Oregon
*var. <i>nestoides</i>	Cypress, Birds Nest	Oregon
var. <i>columnaris</i>	Cypress, Columnar	Holland
var. <i>wisseli</i>	Cypress, Wissel	Holland
var. <i>lombartii</i>	Cypress	Holland
var. <i>glauca</i>	Cypress, Steel	Holland
<i>Cupressus lawsoniana</i>	Cypress, Green	Australia
var. <i>viridis</i>	Lawson	

EVERGREEN BROADLEAVED TREES

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Aleurites fordii</i>	Tung oil tree	Southern U.S.
<i>Carica papaya</i>	Papaya	Peru
<i>Casuarina</i> sp.	Australian Pine	Brazil
<i>Cinchona officinalis</i> (<i>C. ledgeriana</i>)	Quinine Cinchona, medicinal Cinchona, ledgerbark	Peru, Guatemala, Malaya
<i>Cinchona pubescens</i> (<i>C. succirubra</i>)	Quinine	Peru, Guatemala, Malaya
<i>Cinnamomum burmanni</i>	Cinnamon, Malay	Sumatra
<i>Cinnamomum camphora</i>	Camphor tree	So. Calif.
<i>Citrus aurantium</i>	Orange, Sour	Brazil
<i>Eucalyptus</i> spp.	Eucalyptus	Australia
<i>Eucalyptus marginata</i>	Eucalyptus, Jarrah	Australia
<i>Laurus nobilis</i>	Bay, Grecian (True Bay)	Russian (Caucasus)
<i>Lithocarpus densiflorus</i>	Tanoak	Southeast U.S.
<i>Macadamia integrifolia</i>	(Queensland Nut) Macadamia Nut	Calif., Hawaii
<i>Macadamia tetraphylla</i>	Macadamia Nut	Calif., Hawaii
<i>Ocotea architectorum</i>	Ocotea	Peru
* <i>Olea</i> sp.	Olive	Australia
<i>Persea americana</i>	Avocado	Argentina, Australia, Bolivia, Brazil, Chile, Costa Rica, Cuba, El Salvadore, Fiji, Florida, Hawaii, Honduras, Mexico, Peru, Puerto Rico, South Africa, So. California, Trinidad, Trust Territory of Pacific Islands, & Venezuela So. Calif.
** <i>Persea Donnell-Smithii</i>		So. Calif.
** <i>Persea durifolia</i>		So. Calif.
<i>Persea floccosa</i>	Avocado, Oaxaca	So. Calif.
<i>Persea gigantea</i>		So. Calif.
<i>Persea indica</i>	Persea, Madeira Bay	So. Calif.
** <i>Persea lingue</i>		So. Calif.
** <i>Persea longipes</i>		So. Calif.
** <i>Persea nubigena</i>		So. Calif.
** <i>Persea pachypoda</i>		So. Calif.
** <i>Persea portoricensis</i>		So. Calif.
<i>Persea schiedeana</i>	Avocado, Coyo	So. Calif.

DECIDUOUS BROADLEAVED TREES

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
* <i>Betula alba</i>	Birch, White	Oregon, Southeast U.S.
<i>Betula papyrifera</i>	Birch, Paper	Oregon, Southeast U.S.
** <i>Castanea alabamensis</i>	Chinkapin, Alabama	Oregon, Southeast U.S.
** <i>Castanea alnifolia</i>	Chinkapin, Trailing	Oregon, Southeast U.S.
** <i>Castanea ashei</i>	Chinkapin, Ashe	Oregon, Southeast U.S.
** <i>Castanea crenata</i> (<i>japonica</i>)	Chestnut, Japanese	Oregon, Southeast U.S.
<i>Castanea dentata</i>	Chestnut, American	Southeast U.S., Oregon
** <i>Castanea henryi</i>	Chinkapin, Henry	Southeast U.S.
** <i>Castanea margaeretta</i> var. <i>arcuata</i>	Chestnut	Southeast U.S.
* <i>Castanea mollissima</i>	Chestnut, Chinese	Southeast U.S.
* <i>Castanea ozarkensis</i>	Chinkapin, Ozark	Southeast U.S.
** <i>Castanea pumila</i>	Chinkapin Allegheny	Southeast U.S.
<i>Castanea sativa</i>	Chestnut, European	Southeast U.S., England
<i>Castanea</i> sp.	Chestnut	France, Argentina France, Italy, Portugal, Spain, Switzerland, Yugoslavia Southeast U.S.
** <i>Cercis canadensis</i>	Redbud, Eastern	Southeast U.S.
<i>Fagus</i> sp.	Beech	England
<i>Jacaranda</i> sp.	Jacaranda	Australia (New South Wales)
* <i>Juglans hindsii</i>	Walnut, Hinds Black	Oregon
* <i>Juglans nigra</i>	Walnut, Eastern Black	Southeast U.S.
<i>Juglans regia</i>	Walnut, Persian	Southeast U.S., Oregon France & Switzerland
<i>Nothofagus</i> sp.	Falsebeech	New Zealand
* <i>Platanus orientalis</i>	(Sycamore Plane, Oriental	Southeast U.S., Argentina
* <i>Prunus armeniaca</i>	Apricot	Australia (New South Wales)
<i>Prunus persica</i>	Peach	Australia, New Zealand
<i>Prunus persica</i> <i>nectarina</i>	Nectarine	Australia (New South Wales)
<i>Prunus</i> sp. (Mariana + Myrobolan stocks)	Plum	Australia (New South Wales)
<i>Punica</i> sp.	Pomegranate	Australia (New South Wales)
* <i>Pyrus</i> , sp.	Pear (Bartlett) Winter Nelis)	Oregon

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Quercus agrifolia</i>	Oak, California Live	Australia (New South Wales)
<i>Quercus alba</i>	Oak, White	Southeast U.S.
<i>Quercus borealis</i>	Oak, Northern Red	Southeast U.S., France
<i>Quercus montana</i>	Oak, Chestnut	Southeast U.S.
<i>Quercus pedunculata</i> (<i>robur</i>)	Oak, English	France
<i>Quercus robur</i>	Oak, English	Southeast U.S.
<i>Quercus robur</i> var. <i>pedunculata</i>	Oak, English	Southeast U.S. France
<i>Quercus suber</i>	Oak, Cork	Portugal, Russia Southeast U.S.
<i>Quercus toza</i>	Oak, Pyrenees	France
<i>Quercus, virginiana</i>	Oak, Live	Australia (New South Wales)
<i>Quercus, sp.</i>	Oak	So. Calif., Australia
* <i>Robinia pseudoacacia</i>	Locust, Black	(New South Wales) Southeast U.S.

SHRUBS, PERENNIALS, ANNUALS

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Acacia huegelii</i>	Acacia	West Australia
<i>Acacia juniperina</i>	Prickly Wattle	Australia, (N.S.W.)
<i>Actinotes helianthi</i>		West Australia
<i>Adenanthos obovata</i>		West Australia
<i>Amperia ericoides</i>		Hawaii, Australia
<i>Ananas comosus</i> (<i>sativus</i>)	Pineapple	(N.S.W. & Queensland), South Africa, Fiji
** <i>Antirrhinum majus</i>	Snapdragon, common	England
<i>Astrotricha floccosa</i>		Australia, (N.S.W.)
<i>Azalea mollis</i>	Azalea	Australia
<i>Azalea sp.</i>	Azalea	Maryland, Australia
<i>Baeckea brevifolia</i>		Australia
<i>Banksia grandis</i>	Banksia, Greatcone	West Australia
<i>Banksia littoralis</i>	Banksia, Shore	West Australia
<i>Bossiaea eriocarpa</i>	Sun Bush, Wooleaf	Australia (N.S.W.)
<i>Buddleia veitchiana</i>	Butterfly Bush	Australia (N.S.W.)

<i>Calceolaria crenatiflora</i>	Calceolaria, Common	Australia
** <i>Calceolaria</i> sp.	Calceolaria, Common	Australia
** <i>Calluna vulgaris</i> (L.) var. <i>alba</i>	Heather, Scotch	Oregon
** <i>Calluna vulgaris</i> var. <i>aurea</i>	Heather, Scotch	Oregon
<i>Camellia fimbriata alba</i>	Camellia	Australia (N.S.W.)
* <i>Camellia japonica</i>	Camellia, Common	Australia, Ala., La., Fla., So. Calif.
* <i>Camellia magnoliaeflora</i>	Camellia, Common	Australia
<i>Camellia Otome</i>	Camellia, Common	Australia (N.S.W.)
* <i>Camellia sasanqua</i>	Camellia, Sasanqua	Florida, Australia
<i>Camellia triumphans</i>	Camellia	Australia (N.S.W.)
* <i>Camellia</i> sp.	Camellia	Australia
<i>Ceratopetalum gummiferum</i>	(Christmas Bush) Christmas Coachwood	Australia
* <i>Chamaelaucium uncinatum</i>	Geraldton Waxflower	Australia
<i>Conospermum longifolium</i>		Australia
<i>Coriaria sarmentosa</i>	Coriaria, New Zealand	New Zealand
* <i>Daboecia cantabrica</i> var. <i>alba</i>	Irish Heath, Bell	Oregon
<i>Dampiera linearis</i>		West Australia
<i>Daviesia ulicifolia</i>	Daviesia	Australia
<i>Daviesia squarrosa</i>	Daviesia	Australia
<i>Dillwynia ericifolia</i>		Australia
<i>Dillwynia floribunda</i>		Australia
<i>Dillwynia uncinata</i>		West Australia
<i>Dodoneae triquetra</i>	Hopseed Bush, Three Corner	Australia (N.S.W.)
<i>Eleocharis hookerianus</i>	Eleocharis, Hooker	New Zealand
<i>Embothrium coccineum</i>	Chilean Firebush	Australia
<i>Epacris microphylla</i>	Australiaheath	Australia
<i>Epacris pulchella</i>	Australiaheath	Australia
<i>Epacris puburascens</i>	Australiaheath Purple	Australia
* <i>Erica arborea</i> var. <i>alpina</i>	Heath, Alpine Tree	Oregon
* <i>Erica carnea</i>	Heath, Spring	Oregon
* <i>Eriac ciliaris</i>	Heath, Fringed	Oregon
* <i>Erica cinera</i>	Heath, Twisted	Oregon
<i>Erica gracilis</i>	Heath	Germany
* <i>Erica hymedalis</i>	Heath, Winter	England
* <i>Erica mediterranea</i>	Heath, Bisay	Oregon

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
* <i>Erica nivalis</i>	Heath	England
* <i>Erica regerminans</i>	Heath	California
* <i>Erica terminalis</i> (<i>E. stricta</i>)	Heath, Corsican	Oregon
* <i>Erica tetralix</i>	Heath, Crossleaf	Oregon
* <i>Erica vagans</i>	Heath, Cornish	Oregon
* <i>Erica willmoreana</i>	Heath	England
* <i>Erica</i> sp.	Heath	Germany
<i>Eriostemon crowei</i>	Eriostemon	Australia
<i>Grevillea buxifolia</i>	Grevillea, Boxleaf	Australia (N.S.W.)
<i>Hakea dactyloides</i>	Hakea, Finger	Australia (N.S.W.)
<i>Hibbertia cunninghamii</i>	Button flower,	Australia
<i>Hibbertia subvaginata</i>	Cunningham	Australia
<i>Hibiscus</i> sp.	Button Flower	Australia (N.S.W.)
<i>Horea elliptica</i>	(Rosemallow)	Australia
<i>Hypericum</i> sp.	Hibiscus St. Johnswort	Australia (N.S.W.)
* <i>Ilex crenata</i>	Japanese Holly	Maryland
<i>Lasiopetalum floribundum</i>		Australia
<i>Leptospermum lambethii</i>	Tea Tree	Australia (N.S.W.)
<i>Leptospermum scoparium</i>	Tea Tree, Broom	New Zealand
<i>Leucopogon pulchellis</i>	Whitebeards	Australia
<i>Leucopogon microphyllus</i>	Whitebeards	Australia
<i>Leucopogon verticillata</i>	Whitebeards	Australia
<i>Leycesteria formosa</i>	Himalaya Honeysuckle Showy	Australia (N.S.W.)
<i>Lilium philippinense</i>	Lily, Philippine	Australia
<i>Lomandra</i> sp.	Iron Grass	Australia
<i>Lupinus</i> sp.	Blue Lupin	Australia
<i>Macrozamia reidlei</i>	Macrozamia	Australia
** <i>Mathiola</i> sp.	Stock	England
<i>Micrantheum ericoides</i>	Micrantheum	Australia
* <i>Myrtus (communis) compacta</i>	Myrtle, Compact	So. Calif.
<i>Neoppanax arboreum</i>		New Zealand
** <i>Nicotiana glutinosa</i>	Tobacco	England
<i>Oxylobium trilobatum</i>	Pointedpod, Mountain Holly	Australia (N.S.W.)

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Passiflora</i> sp.	Passionfruit	Australia (N.S.W.)
<i>Petrophila fucifolia</i>	Comb Bush (Drumstick)	Australia (N.S.W.)
<i>Phyllocladus alpinus</i>	Celery Pine Mountain	New Zealand
<i>Phyllota phyllicoides</i>		Australia
<i>Podocarpus drounyiana</i>	Podocarpus	Australia
<i>Pultenaea elliptica</i>	Pultenaea	Australia
<i>Pultenaea reticulata</i>	Pultenaea	Australia
<i>Pultenaea</i> sp.	Pultenaea	Australia (N.S.W.)
<i>Rhododendron</i> (<i>macro-</i> <i>phyllum</i>)	Rhododendron	Coast New Jersey
<i>californicum</i>		
** <i>Rhododendron</i> <i>carolinianum</i>	Rhododendron	Carolina, New Jersey
** <i>Rhododendron</i> <i>catawbiense</i>	Rhododendron, Catawba	New Jersey
** <i>Rhododendron</i> <i>caucasicum</i> (var. <i>Boule de Niede</i>)	Rhododendron, Caucasian	New Jersey
** <i>Rhododendron</i> (<i>Azalea indicum</i>)	Rhododendron, Indica	Australia, New Jersey
** <i>Rhododendron</i> <i>maximum</i>	Rhododendron, Rosebay	New Jersey
* <i>Rhododendron</i> <i>mucronulatum</i>	Rhododendron	Southeast U.S.
* <i>Rhododendron</i> <i>ponticum</i>	Rhododendron, Ponticum	New Jersey
<i>Rhododendron</i> sp.	Rhododendron	Australia, Argentina, Maryland, Germany
** <i>Richardia scabra</i> (<i>Richardsonia</i> <i>scabra</i>)	Mexican Clover	Hawaii
** <i>Ricinus communis</i>	Castorbean	Hawaii
** <i>Schizanthus</i> sp.	Butterfly flower	England
* <i>Senecio</i> sp.	Cineraria	England, Scotland, Belgium
<i>Spartium junceum</i>	Weavers Broom (Spanish Broom)	Australia
<i>Sprengelia incarnata</i>		Australia
<i>Styphelia longiflora</i>		Australia
<i>Syncarpia laurifolia</i>	Turpentine-Myrtle, Burra murra	Australia (N.S.W.)
<i>Thomasia grandiflora</i>	Wrenflower	Australia
<i>Trachymene billardieri</i>	Laceflower	Australia (N.S.W.)

SCIENTIFIC NAME	COMMON NAME	REPORTED FROM
<i>Ulex europaeus</i> <i>floro-pleno</i>	Gorse, Common Double	Australia (N.S.W.)
<i>Vaccinium</i> <i>corymbosium</i>	Blueberry, Highbush	Canada (Ontario)
<i>Vaccinium australe</i>	Blueberry	U.S. (North Carolina)
* <i>Viburnum</i> sp.	Viburnum	Maryland
** <i>Vicia faba</i>	Broad Bean	England
<i>Vitis</i> sp.	Grape	Australia (N.S.W.)
<i>Woodsia pungens</i>		Australia (N.S.W.)
<i>Xanthosia pilosa</i>		Australia (N.S.W.)
<i>Xylomelum occidentale</i>		Australia

* Reported only on nursery stock.

** Reported infected by artificial inoculation.