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# Cotton (Texas) Root Rot

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ag.arizona.edu/pubs/diseases/az1150.pdf

This information has been reviewed by university faculty.

PUBLICATION AZ1150
2/2000

## Pathogen:

Soil borne fungus, *Phymatotrichopsis omnivora* (=*Phymatotrichum omnivorum)*

## Host:

Many dicotyledonous trees and shrubs.

## Symptoms/signs:

Cotton (Texas) Root Rot often causes a rapid wilt and death of the host in the late spring, summer and early fall when temperatures are warm. Dead and dying leaves remain attached to the plant. However, infected plants also may decline more slowly, especially at cooler temperatures and when plants are well cared for. The roots of dying or declining plants are rotted. With careful examination under at least 10X magnification, light brown strands or hyphal webs of the fungus can be observed on the root surface. With sufficient moisture, the fungus may occasionally produce a white to light tan sterile spore mat on the surface of the soil near the host, but these mats are not common.

## Environmental conditions:

Rapid wilting and death occurs in hot weather due to the inability of the host plant to take up enough water through its rotted roots. Thus, Cotton Root Rot is usually considered a warm weather disease. However, host plants, especially mature trees, may have been infected for some time and die rapidly in warm weather as transpirational demand for water increases.

## Disease:

Cotton Root Rot occurs throughout the southwestern United States and Mexico. It is easily recognized in infested cotton fields in late summer by large areas of dead plants, hence its common name. It is most common in the low desert areas where winters are mild, but also occurs at higher elevations, up to at least 5000 ft, where susceptible plants are introduced. Disease occurs in different soil types and in areas as diverse as the low lying flood plains of rivers and washes of central and western Arizona and the higher grassland hills of southern Arizona. The pathogen, *Phymatotrichopsis omnivora* (also called *Phymatotrichum omnivorum*), is an indigenous soil borne fungus that is found deep in soils. *P. omnivora* produces hyphal strands that colonize the roots and cause rot of the entire root system. A dense web of hyphae covers the root once the fungus has penetrated and caused decay. The strands grow through the soil and infect healthy roots nearby. The fungus also survives for long periods of time in the soil by producing hyphal structures called sclerotia that have been found as deep as 12 ft in soils. Since *P. omnivora* produces no airborne spores or other reproductive structures, it spreads only by growth of the strands in soil. It has an extremely wide host range and has been reported as a pathogen of over 2000 dicotyledonous plants. Monocots are immune.

## Prevention/control:

Unfortunately, there is no way to test soils for presence of the fungus other than planting a susceptible plant. Since other pathogens can cause root rots and other factors could result in similar symptoms, it is very important that a positive identification of the pathogen be made by an experienced person. Hyphae and strands of the fungus used for diagnosis are easiest to find on fresh tissue but can also be found on older, decayed roots.

## How to sample

If the plant is dead or dying, remove as much of the root system as possible when taking it out. Take several samples of rotting and discolored roots on which the outer or cortical tissue still remains attached. The samples should be pencil size or slightly larger and at least 6 inches long.

### *At a glance*

- **Cotton Root Rot commonly causes a sudden wilt and death of susceptible plants in summer months but may also cause a slow decline, especially at cooler temperatures.**
- **Positive identification of disease by an experienced person is essential.**
- **Replant infested soils only with tolerant or immune plants.**

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Leave soil attached and keep the roots cool (refrigeration is fine) in a plastic bag. Do not add water or wet paper towels. Submit the sample to your County Extension Office or The Department of Plant Pathology, Forbes 204,The University of Arizona, Tucson, AZ 85721. Please send samples early in the week to avoid delays in transit.

## Susceptible plants.

Susceptible plants should not be planted in areas where Cotton Root Rot is known to occur. Trees such as fruit and nut trees, ash, cottonwood, elms, figs, sycamore, bottle tree, silk oak, pepper tree and African sumac are considered very susceptible. Many shrubs including pomegranate, xylosma, cassia, Mexican bird of paradise, oleander, and roses also are very susceptible. Annuals usually escape disease since they are in the ground such a short time or are planted in winter months when the fungus is apparently less active.

## Tolerant and immune plants.

Although many dicotyledons have been found to be susceptible to some degree, some are very tolerant. Mesquites, palo verde, Atriplex, hackberry, jojoba, and cacti are tolerant and remain healthy in landscapes where other plants have died from disease. All monocots, such as palms, yuccas and grasses are immune and are good choices to plant anywhere that Cotton Root Rot has been diagnosed. Citrus, eucalyptus, tamarisk, and pine are considered tolerant, but Cotton Root Rot has been confirmed on all of these trees. Check the list of tolerant or immune plants before planting in any area where Cotton Root Rot has been identified and before replanting a site in which a plant has died from this disease.

Treatments with soil additives, such as manures and fertilizers, are rarely successful and are not recommended for control. Chemical controls have been successful in some cases, but are expensive, must be applied by a licensed applicator, and should be repeated every year or two in order to control disease.

## EXAMPLES OF PLANTS IMMUNE TO COTTON ROOT ROT (MONOCOTS)

*Agave* spp. ..... Agave
*Aloe* spp. ..... Aloe
*Arecastrum romanzoffianum* ..... Queen palm
*Arundo donax* ..... Giant reed
*Asparagus sprengeri* ..... Sprenger asparagus
*Aspidistra elatior* ..... Cast-iron plant
*Bambusa* spp. ..... Bamboo
*Chamaerops humilis* ..... Mediterranean fan palm
*Cordyline australis* ..... Fountain dracaena
*Cortaderia selloana* ..... Pampas grass
*Crinum* spp. ..... Spider-lily
*Crocus* spp. ..... Crocus
*Cynodon dactylon* ..... Bermuda grass
*Dasylirion wheeleri* ..... Desert spoon
*Ensete ventricosum* ..... Abyssinian banana
*Gladiolus* spp. ..... Garden gladiola
*Hesperaloe parviflora* ..... Red yucca
*Hyacinthus orientalis* ..... Garden hyacinth
*Iris spp.* ..... Iris
*Lilium longiflorum* ..... Trumpet lily
*Liriope muscari* ..... Lilyturf
*Musa paradisiaca* ..... Banana
*Narcissus tazetta* ..... Narcissus
*Narcissus jonquilla* ..... Jonquil, daffodil
*Ophiopogon japonicus* ..... Mondo grass
*Phoenix canariensis* ..... Canary Island date palm
*Phoenix dactylifera* ..... Date palm
*Pennisetum setaceum* ..... Fountain grass
*Phyllostachys aurea* ..... Golden bamboo
*Trachycarpus fortunei* ..... Windmill palm
*Tulip gesneriana* ..... Tulip
*Washingtonia robusta* ..... Mexican fan palm
*Washingtonia filifera* ..... California fan palm
*Yucca gloriosa* ..... Spanish dagger
*Yucca recurvifilia* ..... Pendulous yucca

## PLANTS TOLERANT TO COTTON ROOT ROT

*Antirrhinum majus* ..... Snapdragon
*Argemone* sp. ..... Prickle poppy
*Aster spinosa* ..... Aster, Starwort
*Atriplex* spp. ..... Saltbush
*Caragana arborescens* ..... Siberian pea-tree
*Catharanthus roseus* ..... Madagascar periwinkle
*Celosia argentea* var. *cristata* ..... Cock's-comb
*Celtis* spp. ..... Hackberry
*Cercidium floridum* ..... Blue paloverde
*Cercidium microphyllum* ..... Foothill paloverde
*Cercidium praecox* ..... Sonoran paloverde
*Chilopsis linearis* ..... Desert-willow
*Coleus scutellariodes* ..... Common coleus
*Condalia lycioides* var. *canescens* ..... Mexican condalia
*Echinocystis lobata* ..... Prickly cucumber
*Eucalyptus camaldulensis* ..... River redgum
*Eucalyptus rudis* ..... Western Australian floodedgum
*Fragaria chiloensis* ..... Strawberry
*Gomphrena globosa* ..... Globe-amaranth
*Gypsophila paniculata* ..... Baby's-breath
*Helichrysum bracteatum* ..... Straw-flower
*Iberis amara* ..... Rocket candytuft
*Iberis odorata* ..... Candytuft
*Lagenaria siceraria* ..... Bottle gourd
*Lobularia maritima* ..... Sweet-alyssum
*Luffa acutangula* ..... Angled luffa
*Lycium* sp. ..... Wolfberry
*Malvaviscus conzattii* ..... Malvaviscus
*Marrubium vulgare* ..... Horehound
*Mentha rotundifolia* ..... Round-leaf mint
*M. spicata* ..... Spearmint
*Momordica balsamina* ..... Balsam-apple
*Nepeta cataria* ..... Catnip
*Opuntia arbuscula* ..... Prickly-pear cactus
*Oxalis rubra* ..... Wood-sorrel
*Parkinsonia aculeata* ..... Mexican paloverde
*Pelargonium* spp. ..... Geranium
*Petunia hybrida* ..... Garden petunia
*Phlox drummondii* ..... Annual phlox
*Polianthes tuberosa* ..... Tuberose
*Prosopis* spp. ..... Mesquite
*Prosopis velutina* ..... Velvet mesquite
*Propsopis chilensis* ..... Chilean mesquite
*Quercus virginiana* ..... Southern Live oak
*Reseda odorato* ..... Garden mignonette
*Rorippa nasturtium aquaticum* ..... Watercress
*Rosmarinus officinalis* ..... Rosemary
*Salvia azurea* ..... Blue sage
*Salvia farinacea* ..... Mealy-cup sage
*Sambucus caerulea* var. *arizonica* ..... Arizona elderberry
*Simmondsia chinensis* ..... Jojoba
*Tropaeolum majus* ..... Garden nasturtium
*Tropaeolum minus* ..... Dwarf nasturtium
*Verbena hybrida* ..... Garden verbena
*Vinca major* ..... Big-leaf periwinkle
*Viola odorata* ..... English violet
*Viola tricolor* ..... European wild pansy

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, James A. Christenson, Director, Cooperative Extension, College of Agriculture, The University of Arizona.