

# Pest Checklist For Live Oak

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Live oak (*Quercus virginiana*) has relatively few pests other than humans. Most of the pests found with live oak are secondary to other key stresses generated by climatic and soil changes. This publication is intended to guide diagnostic processes to the most probable non-vertebrate pests across the native range of live oak. This list is not comprehensive but covers most of the important pests of live oak as defined in the literature.

Table 1 provides the pest names, descriptions, and impact ranking in landscapes and parklands. Table 2 provides a reorganized list of the same pest names and impact rankings. Note local pest population spikes and many infection loci can occur in any area, but not represent widespread impacts for the species across its range. Pests with local consequences would receive a lower impact ranking in these tables than pests with potential range-wide impacts. One major pest will be pulled out of the tables and highlighted because of its potential impact on live oak.

## Special Challenge & Impact

The single most important pest in live oak now and into the future is oak wilt. Oak wilt is caused by a fungi *Ceratocystis fagacearum*. Oak wilt is especially damaging in the Western portion of live oak's native range. Oak wilt was first described in 1944 with its initial discovery in Wisconsin. The pathogen is believed to be a recent introduction into the United States. Oak wilt is a vascular parasite which colonizes the water conducting vessels in the outer ten annual increments of sapwood. Almost all infections in live oaks are caused by the fungus growing from one tree into other trees through root connections. Live oaks tend to grow from sprouts off of a shared root system (clonal) and develop root graphs with other live oaks in the area. The fungus can travel through these root graphs and spread up to 100 feet per year. Chemical root barriers can be installed in trenches to control fungal spread through root graphs.

In extremely rare occasions, the oak wilt fungi generates fungal mats on infected live oaks. Insects (i.e. Nitidulide beetles) feed upon these mats on warm Spring days and then move to other trees and initiate infection. Wounds from logging, pruning, galls, bark borers, or other types of bark damaging events can draw many insects and be the initiation site for new oak wilt infections in live oaks. Pruning wounds covered with wound paint interferes with insect colonization and feeding, minimizing infections. Wood dead less than one year can still harbor living fungi capable of infecting new trees. Fire wood should not be moved from infection sites.

Live oak symptoms of oak wilt infection include stunted leaves on trunk sprouts, leaves wilting in late spring, veinal death in leaves, and massive twig dieback progressively spreading throughout the crown. The most susceptible trees usually die in 4 - 6 months, others survive for several years. Approximately 10% of the stricken trees survive the infection altogether with only major crown loss. This survivability suggests a form of native resistance is present within the live oaks. Oak wilt is heavy in Texas live oak (*Q. fusiformis*) of Central Texas, moderate in Texas live oak / live oak (*Q. fusiform* / *Q. virginiana*) hybrids, and lighter in typical live oak (*Q. virginiana*). Live oak as a species is only now being challenged. Over time oak wilt should continue to expand its range throughout the live oak range.



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## Conclusions

As in all other tree species, the abiotic features of the environment conspire to damage and kill live oak. Site resource enrichment (like over-fertilization) can accentuate tree stress. Here have been listed those biological systems (biotics) which survive by taking resources away from live oaks abused by the environment. Although these pests have primarily secondary and tertiary roles, they deserve managerial notice and treatment within a professional tree health care program.

(Note for further information on live oaks please see the other publications in this series which cover – scientific naming, growth features, and management, identification and biological characteristics, genetic variability and varieties, and a bibliography of important information.)

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Table 1: Live oak pests and general importance of impact ranking value. Note importance is not based upon the frequency of which a pest is found, but represents the impact on long term tree health and structure across live oak's range. High potential pest impacts on tree health or structure would receive a high ranking. Some pests have small impacts and would receive a low ranking. Pest impact importance rankings are: A = most impact on tree health; B = moderate impact on tree health; and, C = small impact on tree health.

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scientific name of pest	common name of pest	impact rating	simple description
<b>Insects &amp; Mites:</b>			
<i>Andricus kingi</i>	cynipid gall wasp	C	general gall former
<i>Andricus laniger</i>	live oak wooly leaf gall	C	general gall former
<i>Anomoea laticlavata</i>	locust leaf beetle	B	both adults and larvae feed on live oak leaves
<i>Archodontes melanopus</i>	live oak stump borer	B	eggs are laid just below the soil surface at tree base with larvae eating into stump base and major roots causing a large gall to form and stump sprouts to form – a big larva up to 3.5 inches long
<i>Argyrotaenia quercifoliana</i>	oak leaf roller moth	B	defoliates trees as a light green caterpillar (<1 inch long) with amber yellow head
<i>Arnoldiola atra</i>	gall midge	C	attacks buds of live oak

scientific name of pest	common name of pest	impact rating	simple description
<b>Insects &amp; Mites (continued):</b>			
<i>Brachys tessellatus</i>	scrub oak leaf miner	B	adults and larvae feed on leaves
<i>Callirhytis cornigera</i>	horned oak gall	B	gall formed on twigs
<i>Callirhytis operator</i>	wooly flower gall	B	causes galls on male catkins and then emerge to infest current acorn crop
<i>Cameraria</i> spp.	oak leaf miner	B	moth larvae leaving spotted bleached foliage similar to some leaf necrosis diseases in appearance -- rake up and discard fallen leaves
<i>Cinncinnus melsheimeri</i>	Melsheimer's sack bearer	C	larvae makes leaf shelter for itself and moves it as it feeds on leaves
<i>Curculio</i> spp.	Acorn weevils	A	most of acorns are lost – larvae are off-white, fat and roll into a cupped shape.
<i>Disholcaspis cinerosa</i>	gall wasp	C	gall forming wasp whose generations alternate between branch galls and leaf galls
<i>Enaphalodes rufulus</i>	red oak borer	B	bark borer damaging trees larger than 2 inches in caliper and doubling attack for every inch larger tree grows in size
<i>Johnella virginiana</i>	vagrant eriophyid mite	C	initiates leaf curl but no gall
<i>Mesolecanium nigrofasciatum</i>	terrapin scale or black-banded scale	B	crawlers in early Spring moving to main leaf veins and then in late Summer scales move to twigs – adults dark orange in color with radiating black lines
<i>Odontocynips nebulosa</i>	root gall wasp	B	subterranean wasp initiating large galls on absorbing roots
<i>Oiketicus abbotii</i>	bagworm	B	relatively large bag (2-3 inches long) with twig pieces attached around the exterior
<i>Orgyia leucostigma</i>	white-marked tussock moth	B	in late Spring eggs on old grey cocoons hatch and larvae skeletonize leaves then later move to eating entire leaf blade – orange head with yellow body and tufts of hairs

scientific name of pest	common name of pest	impact rating	simple description
<b>Insects &amp; Mites (continued):</b>			
<i>Paleacrita vernata</i>	Spring cankerworm	C	larvae dark colored with two yellow stripes skeletonizing leaves at branch tips
<i>Parallelodiplosis florida</i>	Florida gall midge	C	causes elongated swellings (galls) on leaf veins
<i>Platycotis vittata</i>	oak treehopper	C	sucking insect but worst damage is the female cutting open slits in twigs to lay eggs - slits callous over leaving scars
<i>Prionoxystus robiniae</i>	carpenterworm	B	wood boring insect with a long life cycle in live oak – large larvae is hairy and dark pink hatching on bark surface and boring into the tree – mature larva is greenish white with a dark brown head – starts life in sapwood then expands late in larval life to heartwood, always keeping an open tunnel entrance free from callous growth
<i>Stilbosis quadricustatella</i>	leaf miner	B	skeltonizes live oak leaves

### **Diseases & Higher Plants:**

<i>Armillaria mellea</i>	shoe string root rot	B	golden honey-colored mushrooms at the tree base and dark brown “shoe-string-like” bands of hyphae under bark
<i>Apiognomonium quercina</i> <i>Discula quercina</i>	anthracnose	B	wet weather in Spring generates large irregular dead areas on leaves – begins on low shady branches and causes leaf defoliation and some blade distortion, with occasional shoot dieback
<i>Botryosphaeria quercuum</i>	oak bot canker	B	bark lesions in Summer cause twig flagging, wilting and browning of leaves, and dieback – an usual bark resident
<i>Botryosphaeria rhodina</i>	common bot canker	B	takes advantage of oak wilt damage, pruning wounds, and stress in trees to cause bark lesions or cankers -- an usual bark resident

scientific name of pest	common name of pest	impact rating	simple description
<b>Diseases &amp; Higher Plants (continued):</b>			
<i>Cassytha filiformis</i>	cassytha plant	C	parasitic vine (higher plant) on harsh sites -- vine is orange-brown in color with a tangle of long runners twinning counter clockwise around host tissue
<i>Ceratocystis fagacearum</i>	oak wilt	A+	systemic vascular disease which causes tree wilting with leaf bronzing and discoloration eventually leading to dead leaf tips, twig dieback, and tree defoliation -- death can take from 4 months to several seasons -- dieback is progressive through crown
<i>Clitocybe tabescens</i>	mushroom root rot	B	far Southern version of <i>Armillaria mellea</i> root rot
<i>Coryneum japonicum</i>	Coryneum twig canker	B	twig and branch dieback, distortion of the leaves, and premature leaf drop
<i>Cryphonectria parasitica</i> <i>Endothium parasitica</i>	Chestnut blight	A	trunk and branch cankers under bark and hard to see until the bark falls off – causes crown decline and chlorotic leaves
<i>Dendrothele acerina</i> <i>Hyphoderma baculorubrense</i>	smooth patch	C	rots off outer bark areas which fall off leaving smooth looking bark patches
<i>Endothia gyrosa</i>	Endothia canker	B	started by wounds on limbs, trunks and exposed roots, and by drought stress – sunken, slightly orange canker with small bumps on its surface
<i>Hypoxylon atropunctatum</i>	Hypoxylon canker	A	irregular canker which invades weakened trunks and branches producing thin, light brown to grey fungal mats exposed as bark falls away
<i>Monochaetia desmazierii</i>	late leaf spot	C	large brown spots on leaves in late Summer
<i>Perenniporia phloiophila</i>	bark rot	C	decays outer bark without leaving smooth patches on large limbs and trunks – pore surface is cream color to pale brown – flat fungal mats grow between bark ridges

scientific name of pest	common name of pest	impact rating	simple description
<b>Diseases &amp; Higher Plants (continued):</b>			
Phoradendron serotinum	American mistletoe	B	parasitic plant spread by birds and successful on stressed, slow growing trees
Phytophthora cactorum	bleeding canker	A	a root collar rot which destroy living cell connections in the tree causing leaf yellowing, premature leaf drop, leaf stunting , twig dieback, and oozing liquids from lesions
Polyporus dryophylus	heartwood rot	C	heartwood decay organism weakens wood
Tillandsia usneoides	Spanish moss	C	epiphyte (higher plant) which, in great abundance, shades out live oak foliage
Xylella fastidiosa	bacterial leaf scorch	B	tree defoliation, flushes of distorted leaves with dead margins and tips, and twig dieback
(many causes)	oak decline syndrome	A	no one organism is key but many organisms and stress factors combine to make the tree less effective and efficient in gathering resources to the point of twig and branch death, slow growth, and stunted chlorotic leaves -- poor reactions to wounds, soil compaction, poor soil drainage, summer drought, and constant stress year after year cause loss of resource space and lack of internal controls for growth and defense

Table 2: Pest list categorized by live oak health and structure impact rank.

scientific name of pest	common name of pest	impact rank
<i>Ceratocystis fagacearum</i>	oak wilt	A+
<i>Cryphonectria parasitica</i>	Chestnut blight	A
<i>Curculio</i> spp.	acorn weevils	A
<i>Hypoxylon atropunctatum</i>	Hypoxylon canker	A
<i>Phytophthora cactorum</i> (many causes)	bleeding canker oak decline syndrome	A A
<i>Apiognomonina quercina</i>	anthracnose	B
<i>Discula quercina</i>	anthracnose	B
<i>Armillaria mellea</i>	shoe string root rot	B
<i>Anomoea laticlavata</i>	locust leaf beetle	B
<i>Archodontes melanopus</i>	live oak stump borer	B
<i>Argyrotaenia quercifoliana</i>	oak leaf roller moth	B
<i>Botryosphaeria quercuum</i>	oak bot canker	B
<i>Botryosphaeria rhodina</i>	common bot canker	B
<i>Brachys tessellatus</i>	scrub oak leaf miner	B
<i>Callirhytis cornigera</i>	horned oak gall	B
<i>Callirhytis operator</i>	wooly flower gall	B
<i>Cameraria</i> spp.	oak leaf miner	B
<i>Clitocybe tabescens</i>	mushroom root rot	B
<i>Coryneum japonicum</i>	Coryneum twig canker	B
<i>Enaphalodes rufulus</i>	red oak borer	B
<i>Endothia gyrosa</i>	Endothia canker	B
<i>Mesolecanium nigrofasciatum</i>	terrapin scale or black-banded scale	B B
<i>Odontocynips nebulosa</i>	root gall wasp	B
<i>Oiketicus abbotii</i>	bagworm	B
<i>Orgyia leucostigma</i>	white-marked tussock moth	B
<i>Phoradendron serotinum</i>	mistletoe	B
<i>Prionoxystus robiniae</i>	carpenterworm	B
<i>Stilbosis quadricustatella</i>	leaf miner	B
<i>Xyletta fastidiosa</i>	bacterial leaf scorch	B
<i>Andricus kingi</i>	cynipid gall wasp	C
<i>Andricus laniger</i>	live oak wooly leaf gall	C
<i>Arnoldiola atra</i>	gall midge	C
<i>Cassytha filiformis</i>	cassytha plant	C
<i>Cincinnus melsheimeri</i>	Melsheimer's sack bearer	C
<i>Dendrothele acerina</i>	smooth patch	C
<i>Disholcaspis cinerosa</i>	gall wasp	C
<i>Hyphoderma baculorubrense</i>	smooth patch	C
<i>Johnella virginiana</i>	vagrant eriophyid mite	C
<i>Monochaetia desmazierii</i>	late leaf spot	C
<i>Paleacrita vernata</i>	Spring cankerworm	C
<i>Parallelodiplois florida</i>	Florida gall midge	C
<i>Perenniporia phloiophila</i>	bark rot	C
<i>Platycotis vittata</i>	oak treehopper	C
<i>Polyporus dryophylus</i>	heartwood rot	C
<i>Tillandsia usneoides</i>	Spanish moss	C