

## GENERAL OAK WILT INFORMATION

Oak Wilt was first detected in Texas in the late 1950's. Oak Wilt has been detected in 54 counties with primary problem areas occurring in Central Texas. In recent years the disease has been located in far west Texas as well as near Houston for reasons to be discussed shortly.

First we need to define some terminology. Oak Wilt and Oak Decline are not the same thing although the terms have been used interchangeably for many years. Oak Wilt is a fungus which clogs the living tissue of the tree preventing the movement of water and nutrients from the roots to the foliage. In affect the tree literally starves to death. This process may occur fairly rapidly in some cases; taking several weeks, or it may take several months for a tree to start showing symptoms after contracting the fungus. Oak Decline is the gradual deterioration in the general health of the tree. This conditions is usually brought on by environmental factors such as, droughts, sever flooding, grade changes in the soil, and construction near the tree. Oak Decline does not actually kill the tree but weakens it making the tree more susceptible to other pests.

Another point to take into consideration is that some species of oaks are more susceptible to Oak Wilt than others. Live Oak (Quercus virginiana), Texas Red Oak (Quercus texana) (also referred to as Spanish Oaks), and Blackjack Oak (Quercus marilandica) are the oak species most susceptible to the disease; Post Oaks (Quercus stellata) are considered less susceptible. Oak Decline can affect all species of oaks.

Oak Wilt is usually identified by the presence of symptomatic leaves and a distinctive pattern of mortality. The best place to look for these symptoms is on the ground underneath the tree. Several leaf patterns may indicated the presence of the fungus. The leaf pattern we look for is venial necrosis; the veins will appear discolored, yellow/brown while the rest of the leaf will remain green. Oak Wilt is only pest which will cause this symptom. During periods of extreme heat and drought the tree often does not produce these symptoms, it will turn brown relatively quickly and usually hold on the its leaves. Should this occur it is best to contact either the Extension Agent or the Texas Forest Service for disease confirmation. Refer to the enclosed brochure for a picture of symptomatic leaves.

For Oak Wilt to be introduced into an area several factors must exist; there must have been an infected Red Oak in the area (either in the form of a standing tree or firewood) this red oak must have produced the fruiting body of the fungus (spores). A nitidulid beetle must land and feed on these spores then fly to a nearby tree which has a fresh wound. Once the beetle lands on the wound the spores are implanted and the disease will move through a system of connective roots from one Live Oak to another until the disease runs out of living tissue. The wounds must be fresh; after the first 36 hours the danger is minimized due to the trees natural healing process. Since the disease moves through connective roots once it is introduced into a live oak, there is a good possibility that you will be able to see the disease move towards your property by the increasing number of dead trees. The disease moves approximately 100' a year.

Once Oak Wilt becomes established on your property there are several options available to the landowner.

1. Let nature run its course. Do nothing and hope that some of the trees survive.
2. Attempt to sever the connective root systems between sick trees and healthy trees. This involves the creation of a trench at least 3' deep; we are encouraging a depth of 4-5' if possible. This trench will be placed a minimum of 100' out from the last symptomatic tree in every direction; totally enclosing the infection area.
3. Inject surrounding trees with a fungicide. This treatment will not stop the movement of the disease; however, it will help the tree survive the fungus when it does contract the disease.
4. Use a combination of 2 and 3.

Further information on option 2 and 3.

2. There is currently cost shares funds available to landowners who wish assistance in installing a suppression trench. The USDA Forest Service will provide funds to cover 50% of the cost of trenching. This program is administered through the Texas Forest Service; our office should be contacted to assist the landowner in planning the trench location and making the application for funds. It is possible that we will exhaust all of our available funds by mid summer and it is highly questionable whether the financial assistance will be available in future years due to federal budget reductions, spending cuts. TFS personnel are available year round for technical assistance.

Trenches are installed with a variety of equipment usually dependent on location i.e. next to structures or out in the pasture. In the pasture we typically use a bulldozer with a ripper shank capable of reaching a depth of at least 3-4'. This method is perhaps the cheapest with cost averaging \$700 a day; however, this is also the more unsightly method in that when rocks are encountered often several remain exposed. Belt trenchers, backhoes or rocksaw are also used; primarily around structures. These types of equipment leave a cleaner site however the cost is often prohibitive; the average cost is @ \$2.00 a linear foot. These are average costs and fail to take into consideration possible cost share assistance.

3. The treatment with fungicide of currently infected trees is discouraged unless the tree is identified early in the development of symptomatic leases. If more the 30% of the tree is currently showing signs we discourage its treatment. The fungicide treatment is not always a one time treatment; should a treated tree begin showing venial chlorosis the following year - an additional injection is recommended.

ALAMO is the only legal fungicide available for the treatment of Oak Wilt. The active ingredient in Alamo is Propiconazole. The chemical is produced by CIBA. The label allows for the treatment of all oak species having Oak Wilt with the following rates

Preventive Rate: 6ml of chemical: 1 liter of water : per inch in diameter.

Therapeutic Rate: 10ml of chemical : 1 liter of water : per inch in diameter.

{To determine the trees diameter; measure around the trunk at 4.5' above the ground @ chest height. Measure the circumference of the trunk using a measuring tape and divide by 3.14. The resulting number will be the diameter of the tree or the DBH (Diameter at Breast Height)}

Alamo is sold in 4oz , quart and gallon containers.

4oz bottle costs @ \$80 and will treat 19" at a preventative rate and 13" at a therapeutic rate.

1qt bottle costs @ \$300 and will treat 76" at a preventative rate and 52" at a therapeutic rate.

Please refer to the enclosed information " Injections for trees with Oak Wilt" for further details on injections.

### PREVENTATIVE MEASURES

1. Avoid wounding the oaks (including pruning) between February and June. Beetle populations are at their highest and fungal spores are available.
2. Paint any and all wounds with pruning paint, if pruning paint is unavailable you can use any type of paint including spray or latex paint. Even Elmer glue has been used. Anything that will cover and seal the wound within the first 36 hours.
3. Cover your oak firewood with a clear plastic cover for at least one season. Burning firewood killed by oak wilt is not the problem ;it is the storage of the firewood. Often red oak wood is mixed in with live oak which is the source of the problem, this red oak may still have viable spores. The spores can not be spread through the smoke of a fireplace; once the spores are exposed to > 85 degrees they die.
4. Beware of your neighbors trees, watch them for possible signs of problems.

The disease oak wilt has devastated many parts of Central Texas. This disease is caused by a fungus (Ceratocystis fagacearum) which inhabits a tree's vascular system, thus preventing the tree from absorbing water properly. In effect, the tree dies of thirst.

Oak wilt is most active in the spring and fall and affects all species of oaks. Some oak species, however, are more susceptible than others. Members of the red oak family (e.g. Spanish, Shumard, and blackjack oaks) are the most susceptible, whereas members of the white oak family (e.g. post, bur, and chinquapin oaks) are the least susceptible. Live oak falls somewhere in between the two groups.

In Texas, two avenues of oak wilt transmission occur. In live oaks, oak wilt will spread from infected trees into adjacent healthy ones through interconnecting roots. Since live oaks generally reproduce themselves through root sprouts rather than from acorns, one tree may share a common root system with many others. Once a live oak becomes infected with oak wilt, it almost always passes the disease on to its neighbors.

Oak wilt is also transmitted from tree to tree by nitidulid or "sap" beetles. These beetles are attracted to sweet odors such as ripe fruit, fresh sap, and oak wilt fungal mats. A beetle will collect fungal spores on its body while visiting a fungal mat and then transmit the disease when it feeds on fresh wounds. Fortunately, only red oaks produce the sweet-smelling fungal mats which attract insect vectors. These beetles probably account for most single tree infections in live oak which later develop into large disease centers via root connections.

Although no cure for oak wilt exists at the present time, a landowner may take certain steps which will prevent an infection center from developing or which will limit the spread of an existing one. The following procedures are suggested to prevent or suppress oak wilt:

1. Avoid all wounds on oak trees!!
2. Avoid pruning or wounding oaks especially during February 1 to June 1 in areas where oak wilt is present. Tree susceptibility, fungal mat production, and insect activity all reach a peak during this period. If pruning cannot be postponed, then a wound dressing is mandatory.
3. Destroy all infected red oaks. This will prevent fungal mats from developing and reduce the chances for insect transmission. Infected red oaks that cannot be promptly destroyed should be girdled at the base and treated with herbicide to prevent fungal mat formation.
4. Trench around live oak infection centers to prevent the disease from spreading through roots. A 3-foot deep trench should be dug far enough in advance of the infection front to include trees which have the disease but do not exhibit symptoms (100 feet is recommended).
5. Avoid moving oak wilt-infected firewood to areas not known to have oak wilt. Cut firewood in the summer since high temperatures kill the oak wilt fungus. Avoid having oak wilt-infected firewood around for more than one heating season.
6. The fungicide propiconazole (Alamo™) can be injected into uninfected live oaks to prevent oak wilt infection, but it is not effective for saving diseased trees and will not stop the spread of oak wilt to adjacent trees.

FOR MORE INFORMATION CONCERNING OAK WILT, CONTACT THE TEXAS FOREST SERVICE, TEXAS EXTENSION FORESTER AT TEXAS A&M UNIVERSITY, OR YOUR LOCAL COUNTY AGENT.

## Reducing Losses To Oak Wilt

Disease management can prevent large scale oak losses to the oak wilt fungus. Property owners no longer have to watch their prize oak tree die. A program, called the "Eight Step Oak Wilt Management Program", was developed at Texas A & M University and can save valuable trees when properly implemented.

### Eight Step Oak Wilt Management Program

#### Step 1. IDENTIFY THE PROBLEM

Diagnosis can be done by leaf symptoms, pattern of spread, rate of tree death, and/or tissue sampling (instructions given for sampling at end of pamphlet).

On infected live oaks, the foliage often exhibits a distinct chlorosis (yellowing) and necrosis (browning) of the veins. This symptom is characteristic, but it may not always appear on the tree. Diseased Spanish oaks or blackjack oaks have bronze colored foliage.

Live oaks take 3-6 months to die, whereas Spanish or blackjack oaks die within 3-5 weeks. In a population of trees, oak wilt forms discrete, rapidly expanding "centers". Dead and dying trees occur in the middle of the center and recently infected trees occur on the perimeter.

#### Step 2. CREATE A BUFFER ZONE

Major losses result from spread by the fungus through common or grafted roots between trees of like species. A buffer zone is created to stop this spread by digging a trench 100 ft. from the last tree that is symptomatic of oak wilt. Roots should be cut to at least a depth of

36 inches. The trench may be immediately backfilled. An alternative is to kill or remove all of the trees in the 100 ft. zone. Tree removal must include stumps in order to destroy roots.

#### Step 3. SANITATION

Dead or severely diseased trees in the affected area should be removed and destroyed by burning or burying. If left they can serve as a source of fungus inoculum for spread to nearby healthy trees, especially if Spanish, Shumard or Blackjack oaks are in the diseased area. Fungal mats form on these oaks once they become diseased. Mats are most frequently formed on trees that are infected in late fall. These mats are where sap feeding beetles come in contact with spores of the fungus. Spores stick to the beetles and are carried to freshly injured areas on nearby trees.

#### Step 4. PRUNING

Plant sap formed on the surface of pruning cuts or wounds attract the beetles. During feeding, spores are dislodged on the wound surface where infections can occur. To prevent this, prune only diseased, damaged or hazardous limbs. If pruning is necessary, the best times are from January 1 to February 15 or during July, August and September.

#### Step 5. WOUND PAINTS

These are normally asphalt or latex based paints that are used to paint wounds or pruning cuts. A protective barrier is formed between the cut or wound surface and fungus-carrying beetles when paints are applied immediately after wounding.

#### Step 6. FIREWOOD

Wood cut from diseased trees on which

mats have formed can spread to fungus. Wood from diseased Spanish Shumard and Blackjack oaks should be used with caution. Diseased firewood has accounted for fungus spread in areas that are several miles from recognized oak wilt centers. Cover the wood pile with a clear plastic sheet if there is a possibility that the wood is diseased. This will prevent beetles from leaving the fungal mats on the diseased logs and spreading the pathogen to nearby healthy trees. All firewood should be burned in the season it is acquired.

#### Step 7. TREE INJECTION WITH SYSTEMIC FUNGICIDE

Trees within the buffer zone, in diseased area or near an oak wilt center can be injected with the systemic fungicide Alamo to prevent tree loss. Diseased trees can also be injected as a therapeutic treatment. This treatment must be applied before symptoms are observed on more than 30% of the tree's canopy.

The fungicide is applied at the rate of 2 to 3 ml/liter of water/ inch of trunk diameter by injection at low pressure (app. 20 psi) into the root flares. The lower rate is used as a preventive treatment and the higher rate for trees symptomatic of wilt or next to diseased trees.

Holes are drilled into the lower trunk and root flares approximately 3-4 inches apart and to a depth of 0.5 to 1.0 inches deep. The holes must be drilled with a power drill using a 5/16 inch bit. A 3-4 gallon pressure sprayer is most often used as a reservoir for the fungicide solution. The reservoir is connected to the tree with plastic tubing and specially designed injection ports. Trees can be treated anytime that they will take up the material.

## Step 8. REPLANTING

live oaks, Spanish oaks, and Shumard oaks can be replanted in areas where oak wilt has been a problem or is a potential problem. Special precautions should be taken to prevent infection. These include avoiding wounds or pruning except at the proper time of the year. Apply wound paint immediately after a tree is wounded or pruned.

Members of the white oak family are resistant to the fungus and should be included as part of the landscape design where oak wilt is a potential problem. Bur, Post and Overcup oaks are examples of white oaks.

It is best to plant a mixture of trees rather than large groups of one species.

## SOURCES OF ADDITIONAL INFORMATION

Major Oak Diseases and Their Control. Texas Agricultural Extension Service B-1478.

Strategies for Controlling Oak Wilt in Texas. Texas Agricultural Extension Service D-1286.

Texas Plant Disease Handbook. Texas Agricultural Extension Service B-1140.

Oak Wilt Identification and Control (80 min. video tape). Available for viewing at County Extension Offices.

How to Identify and Manage Oak Wilt in Texas. USDA Forest Service.

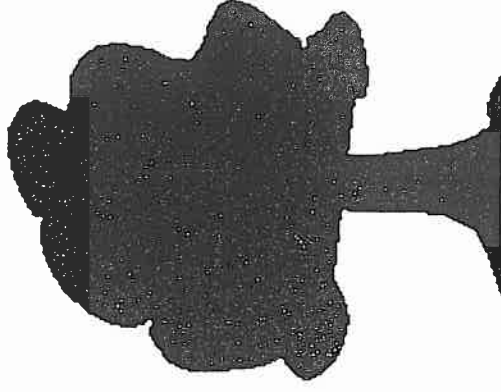
## SAMPLES FOR OAK WILT DIAGNOSIS

1. Select limbs from trees which have oak wilt symptoms.
2. Limbs should not be dead or in an advanced state of decline.
3. Branch samples should be 1.5-2 inches in diameter and 6 inches long.
4. Keep samples cool during sampling and shipping.
5. Ship samples in sealed plastic bags. Do not add water or wet paper towels.
6. Ship in ice chest with frozen freezer block.
7. Ship by bus or deliver in person to:

Texas Plant Disease Diagnostic Lab  
L. F. Peterson Bldg., Rm. 101  
Texas A&M University  
College Station, TX 77843-2132

Contact your County Extension Agent for more information on oak wilt control.

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, handicap or national origin. The Texas A&M University System, U.S. Department of Agriculture, and the County Commissioners Courts of Texas Cooperating



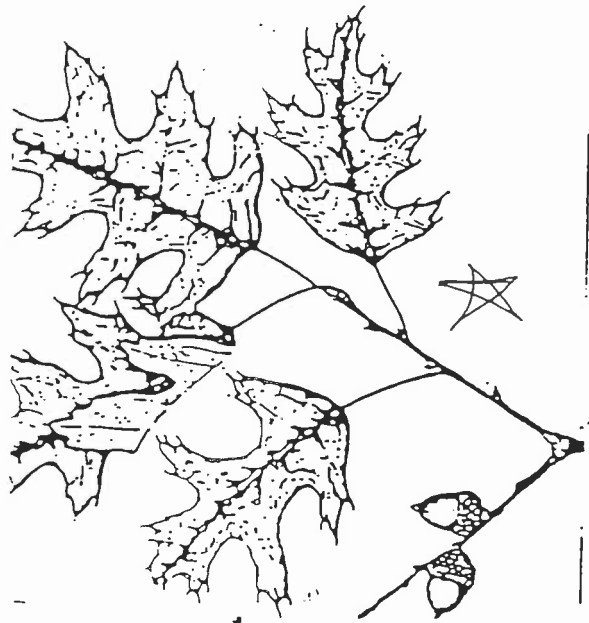
## STAMP OUT OAK WILT

A management plan for reducing losses to oak wilt

Prepared by

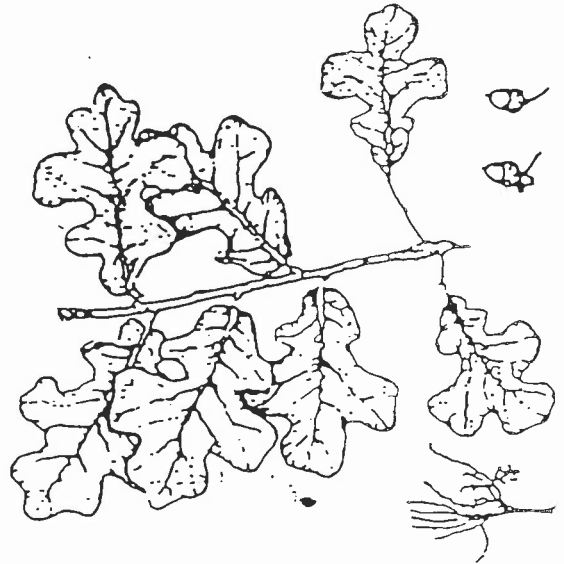
Jerral D. Johnson and David N. Appel, Plant Pathologist and Associate Professor, Department of Plant Pathology and Microbiology, Texas A&M University

Live Oak Quercus virginiana

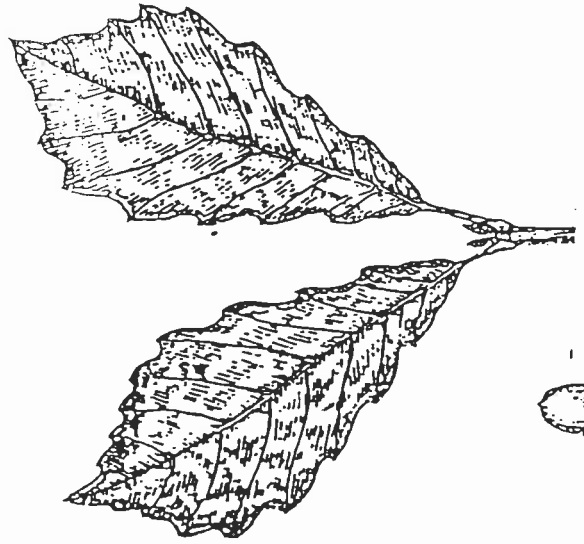


Texas "Spanish" Oak Quercus texana

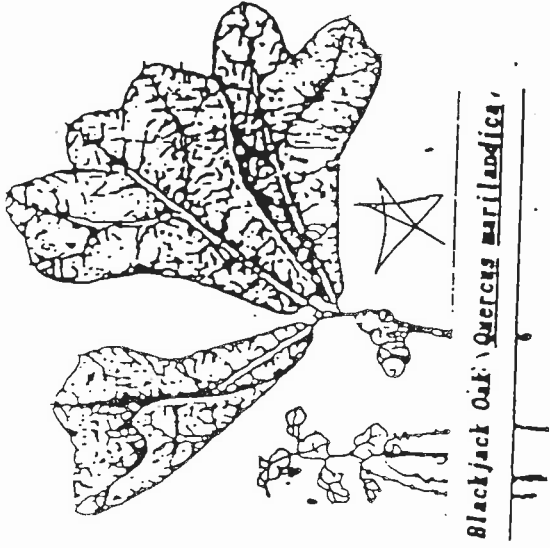
★ more susceptible species



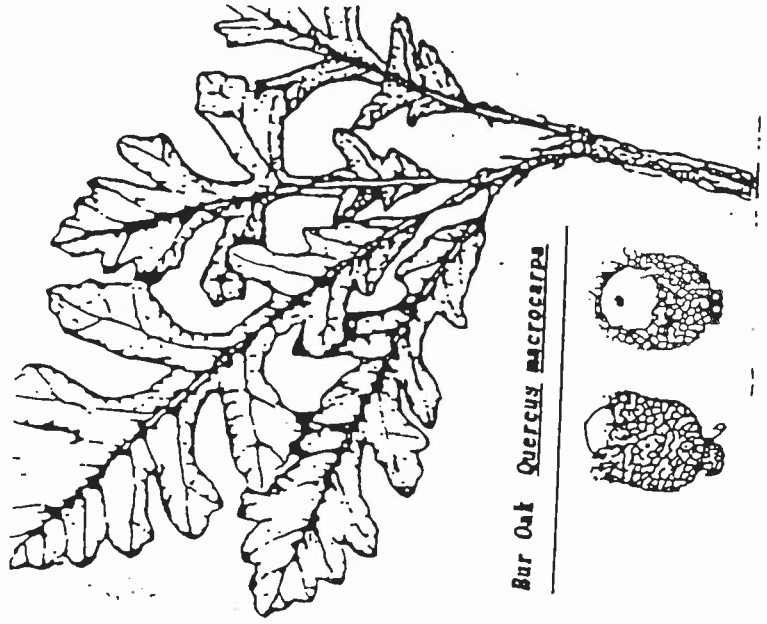
Post Oak Quercus stellata



Chinquapin Oak Quercus muhlenbergii



Blackjack Oak Quercus marilandica



Bur Oak Quercus macrocarpa

