LIVE OAK (*Quercus virginiana*)
Oak Wilt; ***Ceratocystis fagacearum***

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ASSESSMENT OF TRENCH INSERTS AS BARRIERS TO ROOT TRANSMISSION FOR CONTROL OF OAK WILT IN TEXAS LIVE OAKS, 1995: Four trench insert materials, including water-permeable **Typar®** polyethylene spunbonded fabric, **Biobarrier®** or **Typar®** with trifluralin-impregnated nodules, and water-impermeable polyethylene Geomembrane liners of two thicknesses (20 and 30 **mil),** were tested for effectiveness in improving trenches as physical barriers to root transmission for control of oak wilt. Research plots were selected in a mature natural stand of live oaks growing within a residential development site on a predominantly rocky, sandy clay-loam soil type near Austin, Texas. Soil depth to bedrock ranged from l-l.5 m at the test site. Test trees were selected approximately 23-30 m beyond the expanding edge of a large oak wilt infection center. A roughly linear trench was cut with a rock saw approximately 2 km long and 1.5 m deep immediately adjacent to the test trees and between the infection center and the test plots. The plots, established 27 **July** 93, ***consisted*** of 18 subplots of 12-18 trees along the trench. Six treatments were' applied to separate subplots on 13-17 December 1993 in a completely randomized design along the full length of the trench with 3 replications (subplots) per treatment. The treatments included one of the four trench inserts, no insert (trench alone), or no trench for the untreated controls. Inoculated controls were located approximately halfway between the trench and the infection center. Inoculated control trees were cut with an axe into the **sapwood** on one side of the tree on 5 May 1994. The wound was filled with a l-2 ml aliquot of a mixed mycelial-conidial inoculum suspension prepared from colonies of ***Ceratocystis fagacearum*** growing for one week ***on*** 0.5% Neopeptone-glucose broth. All other treatments were challenged by natural inoculum through root transmission from the adjacent expanding infection center. Crown ratings, branch mortality, canopy density, and defoliation were recorded 23 Jun 1995 as indications of disease severity and disease progress, 1.5 years after the trench treatments were applied and one-year following control inoculations.

Symptoms of oak wilt were observed in untreated and inoculated controls 18 mo following installation of treatments. Nontreated controls showed a continuous gradual decline as inoculum from infected trees in the adjacent infection center began moving through root grafts and common root systems. However, inoculated controls developed oak wilt symptoms much more rapidly with higher disease incidence and severity within a year after inoculation. This was apparently due to more effective disease development resulting from introduction of high inoculum levels compared with natural inoculation through root transmission. Many inoculated trees rapidly defoliated and appeared dead with higher branch mortality and defoliation, although some apparently dead trees still had small amounts of living foliage. Crown symptom rating was the most reliable indicator of infection status and disease development since diagnostic symptoms were included in this measure of disease severity. Branch mortality as an indicator of disease severity developed more slowly that other symptoms. Branch death generally follows defoliation by several years. Light transmission through the canopy as an indicator of canopy density was significantly greater in symptomatic control trees than healthy trees. Canopy density paralleled defoliation, but did not distinguish infection status as well as defoliation due to the tendency of dead leaves to remain attached to the limbs of dying trees for prolonged periods. Treatment effects on disease severity were highly significant ($P<0.0001$). All four trench insert materials provided significant protection to live oaks against the oak wilt pathogen at 1.5 years post-treatment, but did not appear to provide significantly improved protection against root transmission compared to the trench alone. However, a longer observation period will be required to determine whether trench inserts are effective in improving the protection provided by trenches for long-term control of oak wilt.

		Disease Severity'			
Barrier treatments[2]	n	Crown Symptom Rating[3]	Branch Mortality (%)	Canopy Density (% light transm.)	Defoliation (%)
Typar	34	4.0 a	0.0 c	16.7 bc	0.9 c
Biobarrier	37	4.0 a	0.9 c	10.6 cd	0.7 c
Geomembrane 20 mil	30	4.0 a	3.5 bc	7.4 d	2.8 c
Geomembrane 30 mil	34	4.0 a	0.6 c	16.1 bc	0.2 c
Trench alone	59	3.9 a	0.6 c	18.6 b	5.4 c
Untreated Control	16	3.0 b	13.9 b	24.7 b	33.1 b
Inoculated Control	58	2.4 c	30.0 a	38.0 a	49.7 a

1 Percentage values were **arcsin** transformed prior to analysis, although values presented represent actual percentages. Means in each column followed by the same letter were not significantly different according to protected LSD tests ($P=0.05$).

2 Trench inserts were mounted with aluminum pins to the wall of the trench on the side closest to the infection center and were supported by backfilling the trench with soil removed during construction of the trench.

3 Crown symptom rating scale: 1 = crown dead, totally defoliated, or with only necrotic leaves attached, 2 = thinning crown with leaves having diagnostic oak wilt symptoms, including **veinal** chlorosis or **veinal** necrosis, 3 = crowns containing foliage with chlorosis or reduced leaf size, but lacking diagnostic symptoms of oak wilt, and 4 = full, healthy crown with no apparent foliar symptoms.