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

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SUBSEQUENT TESTS OF TRENCH INSERTS AS BARRIERS TO ROOT TRANSMISSION FOR CONTROL OF OAR WILT IN TEXAS LIVE OARS, 1996: Second-year field evaluations of four trench insert materials, including water-permeable Typar® polypropylene spunbonded fabric, Biobarrier® or Typar® with trifluralin-impregnated nodules, and water-impermeable polyethylene Geomembrane liners of two thicknesses (20 and 30 mil), were conducted to further test the effectiveness of these physical and/or chemical barriers to root transmission for long-term 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 1-1.5 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 chain trencher 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 (untreated controls) through root transmission from the adjacent expanding infection center. Crown ratings, branch mortality, canopy density, and defoliation were recorded 3 Jun 1996 as indications of disease severity and disease progress, 2.5 yr after the trench treatments were applied and two-years following control inoculations. Disease severity ratings were compared using ANOVA (SAS PROC GLM) followed by protected LSD tests. Percentages were arcsin transformed prior to analysis.

Oak wilt disease severity ratings were more severe during the second-year posttreatment evaluation than in previous pretreatment (baseline) and first-year evaluations. This was clearly due to extended drought conditions that prevailed throughout the summer months during the second evaluation year and exacerbated disease development. Branch death usually follows defoliation gradually, but the drought appeared to accelerate this process, requiring that all four disease severity ratings be used in the evaluation of trench treatments. However, mean separations of disease severity ratings for trees in barrier treatments and control treatments were very similar to those observed in the first-year evaluation. Treatment effects on disease severity ratings were highly significant ($P < 0.0001$). Disease progress developed much more rapidly in inoculated and untreated controls during the second year as indicated by high levels of branch and tree mortality as well as heavy defoliation and reduced canopy density (greater light transmission). Much of the increased light transmission was attributed to smaller leaf size due to the drought. No significant differences in crown ratings, branch mortality, canopy density, and defoliation were observed between the four trench insert treatments and the trench alone treatment, with the exception of canopy density for Geomembrane 20. All four trench insert materials performed equally well, but not significantly better than trenches alone in protecting live oaks against oak wilt root transmission at 2.5 yr posttreatment. Breakouts of oak wilt infections beyond containment trenches appeared to be developing in several treatment segments that should distinguish barrier effectiveness in subsequent-year evaluations. Consequently, the third-year posttreatment evaluation is expected to provide definitive indications of whether trench inserts are effective in improving the protection provided by trenches beyond the current two-year period following trench installation when most breakouts occur.

Barrier treatments*	n	Disease Severity'			
		Crown Symptom Rating[3]	Branch Mortality (%)	Canopy Density (% light transm.)	Defoliation (%)
Typar	34	3.8 ab	0.1 c	21.2 d	5.8 cd
Biobarrier	37	3.9 a	0.1 c	24.7 d	2.6 cd
Geomembrane 20 mil	32	3.6 b	6.4 c	35.2 b	13.3 c
Geomembrane 30 mil	33	4.0 a	0.2 c	25.7 cd	1.3 d
Trench alone	47	3.9 a	0.2 c	22.4 cd	3.4 cd
Untreated Control	15	2.9 c	27.4 b	36.6 b	38.3 b
Inoculated Control	42	1.7 d	61.9 a	56.4 a	78.6 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.