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BIOBARRIER®

1996-1997 Evaluation of Biobarrier for Tree Root Inhibition

The Davey Tree Expert Company
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The root growth or re-growth of cut root system presents a serious problem around building foundations, sidewalks, driveways and construction areas. Also while dealing with oak wilt and Dutch elm diseases, root graft transmission of disease agents from a disease tree to a healthy tree is a major concern. In the past a Vapam soil sterilant treatment has been recommended to kill roots in a defined area. The use of Vapam is questionable in future years because of its potential health risks. As an alternative to Vapam, trenching may result in root re-growth and subsequent root transmission of pathogens. In these situations a physical barrier of some sort or a barrier containing herbicides such as Biobarrier manufactured by Reemay Inc. would be a valuable tool.

This study was initiated to determine the benefit of using Biobarrier fabric for preventing root growth in a trenching operation. The two variables considered in this test were tree species and the distance from the tree that the roots were cut. This study was conducted at the Davey Research station in Shalersville, Ohio on June 10, 1996 with the cooperation of Reemay Inc.

Materials and Methods

On June 10, 1996 the root systems of 30 Pin Oak (*Quercus palustris*) trees and 30 Sweetgum (*Liquidamber styraciflua*) trees planted in 1972 were cut to determine the effectiveness of 4 different barrier materials in preventing the root systems of mature trees from returning to their original growing space once cut. The trees were growing in Ravenna silt loam soil. The root systems of the trees were cut with a Ditch Witch capable of cutting a trench 8 inches wide and 20 inches deep. Each barrier material was cut 15 feet long by 20 inches deep and was placed on both sides of the trench. By positioning the trench between two parallel rows of trees an 8-inch wide root free zone was created to evaluate the root systems of both rows of trees.

The trenches were positioned to allow the barriers placed on one side of the trench to be approximately 5 foot from the trunks of the trees in one row. The barriers placed on the opposite side of the trench were approximately 10 foot from the trunks of the trees in the other row. The treatments consisted of: 1) Landscape Fabric; 2) Biobarrier; 3) Number 4 two-inch size limestone; 4) Black Plastic 9 mil.; and 5) Untreated Control. Each of the Treatments was replicated 3 times for both tree species at 5 feet and 10 feet away from the tree trunks. After installing the treatments the root biomass from the soil was sifted and discarded. Then the root free soil was replaced in trenches in between the barrier products. In the Gravel treatment the limestone was placed in the 8-inch wide trench and the top was covered with 2 inches of soil. For the Untreated Control the removed soil was replaced without any physical barrier materials. Evaluations were conducted five and seventeen months after the barriers were installed. The first rating was conducted to determine the efficacy of the barrier materials and the second evaluation focused on tree and root health.

1996 Results and Observations
The treatment response was evaluated on November 13, 1996 by removing a 4 inch diameter core from the center of 15 ft. long trenches with a post hole digger. This was followed by hand digging an 8-inch x 8-inch evaluation area. Soil from this area was carefully removed and root re-growth through the barriers was evaluated at 0-6, 6- 12, 12-18, and 18-24 inches depth.

Barrier Materials

Control
In all of the control treatments regardless of the tree species or the distance the trees were located from the trench the root systems of the trees were growing into the trenches. All of these roots that were growing through the soil in the trench were located in the top 12 inches of soil in the Sweetgum trees and within the top 18 inches in the Pin Oak trees.

Gravel
All of the Gravel treatments also had roots growing into the trench from both the trees located 5 feet and 10 feet from the trench. All of these roots that were growing through the gravel in the trenches were located in the top 12 inches of soil in the Pin Oak trees and within the top 18 inches in the Sweetgum trees. This is the opposite of what was found in the Untreated Control.

Landscape Fabric
In the Landscape Fabric treatments all of the Oak roots invaded the trenches through the fabric. Also all of the sweet gum tree roots except one replication located ten feet from the barrier had roots growing through the fabric. All of these roots that were growing through the barriers were located in the top 12 inches of soil in the Oak trees and within the top 18 inches in the Sweetgum trees.

Black Plastic and Biobarrier
In the Black Plastic and the Biobarrier treatments no roots were found to penetrate the barriers on either side of the eight-inch wide trench. The difference between the Black Plastic and the Biobarrier treatments was the growth of the roots outside of the trench on the tree side of the barriers. In Biobarrier treatment no roots were in contact with the barrier. In the Black Plastic treatment there were numerous roots within the top 12 inches of soil in contact with and growing parallel to the plastic.

Summary
The Untreated Control, Gravel and Landscape Fabric treatments failed to keep roots out of the eight-inch wide trench. Roots invaded from both the trees located ten feet and five feet from the trench. The Black Plastic treatment successfully kept the roots out of the trenched area over a five-month period. However based on the high number of roots in contact with the plastic, it may not be successful in deterring roots in the future. Only the Biobarrier treatment was successful in keeping roots out of the trench and away from the barrier.

1997 Results and Observations
The treatment response was again evaluated on Nov. 11, 1997 by removing a 4 inch diameter core three foot East of the center of 15 ft. long trenches with a post hole digger. This was followed by hand digging an 8-inch x 8-inch evaluation area. Soil from this area was carefully removed and root re-growth through the barriers were evaluated at 0-6, 6-12, 12-18, 18-24 inches depth. The number of roots growing through the barriers into the trenches was recorded at this time.

Barrier Efficacy

Only the Biobarrier and the Black Plastic materials were successful in keeping roots from growing into the root free evaluation area. The roots that were severed along the Black Plastic treatment were matting, thickening and elongating against the barrier parallel to the trench. The root systems of the trees along the Biobarrier treatment were arrested approximately one-quarter inch from the barrier.

Depth of the Root Systems

Regardless of the tree species (Pin Oak, Sweet Gum) or the distance the barriers were placed away from the trunks of the trees (5 foot, 10 foot) the majority of the root re-growth through the barrier materials was observed in the top 12 inches of soil. In the Pin Oak study only the root systems of the trees located 5 feet from the Gravel treatment had any root growth below 12 inches. The root systems of the Sweet Gum trees also penetrated the Control and the Gravel treatments in the 12-18 inch depth range from the trees located at both distances from the trench. No root re-growth was found below the 18-inch depth.

Tree Health

No injury symptoms were noted in the canopy of the trees during the 17 months following the trenching operation. The health of the root systems was evaluated by observing the amount of fine root growth and mycorrhizae development on the tree side of the trenches. In all of the treatments root growth was stimulated at the point where the roots were cut during the trenching operation. In all of the treatments except the Biobarrier, newly formed roots were either growing into the soil or gravel or growing against the barriers. In the Biobarrier treatment root growth had been arrested although the fine roots and micorrhizal growth were abundant as close as one-quarter inch from the barrier.

Summary

As in the 1996 evaluations the Untreated Control, Gravel and Landscape Fabric treatments failed to keep roots out of the eight-inch wide trench. Roots invaded from both the trees located ten feet and five feet from the trench. The root systems in contact with the Black Plastic barrier were continuing to thicken and elongate in all directions. Only the Biobarrier treatment was successful in keeping roots out of the trench and away the barrier.

Conclusion

In situations where it is necessary to cut the root systems of trees in order to repair, replace or protect structures or other plant material, Biobarrier is an effective solution to prevent roots from growing back into the original growing spaces. The Untreated Control, Gravel and Landscape Fabric treatments failed to prevent root re-growth into the trenches. Roots invaded the root free evaluation area from both the trees located ten feet and five feet from the trench. The Black Plastic treatment apparently provided optimum air and moisture conditions along the barrier for root growth that may continue to grow over, under or through the barrier in the future. We greatly appreciate the cooperation and support provided by Harry Barnes of Reemay Corporation throughout the entire project and Mr. Richard Rathjens from The Davey Tree Expert Company for assistance during evaluations.

Editor's Note: The original printed report included several photographs which illustrated the materials used in this evaluation shown in the test environment. The report also included two appendices, labelled Appendix A and B, which provided details of the precipitation and temperature ranges in the Akron, Ohio area during the test period. The photos and graphs contained in the appendices are not included here, because they did not reproduce with sufficient clarity for use on the website. If you would like a printed copy of the the Davey Tree evaluation, please contact us.