Bottomland Oaks . . .

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Over the past several decades, federal incentive programs have encouraged the planting of bottomland oaks throughout the United States. Landowners are involved in these programs that are designed to protect water and soil resources, and play a major role in sequestering atmospheric carbon. Incentives such as the Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP) have been marginally successful in bottomlands because conventional tree planting procedures are often followed – procedures that prove problematic in wet soils.

High water tables, soil drainage and compaction, and regular flooding make selecting the right trees difficult. Even slight changes in topography (a foot or less) can have a dramatic effect on survival and growth of seedlings. Researchers at the University of Tennessee were curious to see if there is a soil property that can accurately predict which oaks would perform best on these sites. Specifically, we examined soil mottling.

What is soil mottling anyway?

Soil *mottling* occurs when soils are frequently wet for long periods of time. In water-logged soils, oxygen moves through too slowly to aerate the soil. This causes the natural red colors in soil to become gray spots (mottles). Gray spots are a good indicator of soil wetness. Foresters and soil scientists can use a soil probe to extract a plug of earth and evaluate the degree of mottling. The more mottling or graying in the soil, the wetter it will be. Sometimes mottling results from flooding, but more often, from a high water table (below the ground).

Extracted soil core

. . . Landowners Should Examine the Soil When Planting

Not all trees can tolerate wet soils

A variety of species can be planted in bottomlands. However, due to their economic and ecological values, most landowners focus on oaks. Some of the more common bottomland oaks that are native to the U.S. include:

Red Oaks
Water oak *(Quercus nigra)*
Willow oak *(Quercus phellos)*
Pin oak *(Quercus palustris)*
Nuttall oak *(Quercus texana)*
Shumard oak *(Quercus shumardii)*
Cherrybark oak *(Quercus pagoda)*
White Oaks
Overcup oak *(Quercus lyrata)*
Swamp chestnut oak *(Quercus michauxii)*
Swamp white oak *(Quercus bicolor)*
Bur oak *(Quercus macrocarpa)*

So which oaks do best?

At the end of six growing seasons, we found the ones that performed best on the water-logged soils include: Nuttall, overcup, and pin oak, followed closely by willow oak. The others were much more sensitive to wetness, and should only be planted as the soil drainage improves.

For most landowners, and under normally accepted practices, a variety of species is desired. Some oaks can tolerate poorly drained soils; others cannot. Diversity is easiest achieved on better drained soils. However, as the water table rises and gray mottling follows it toward the surface, diversity of oak species tolerant of such sites narrows.

When landowners are considering planting bottomland oaks, they should evaluate their soil to determine the degree of mottling. Because internal drainage so greatly affects tree survival and growth, the importance of matching species-to-site in bottomlands is paramount. The oaks examined here are not native throughout the entire U.S., but rather are more common in eastern and southeastern regions. Therefore, it is very important for landowners to seek localized knowledge of tree requirements for each species, long before planting begins. For that, first see a forester!

Editor's Note - For a copy of the study results, refer to:
https://utextension.tennessee.edu/publications/Documents/PB1800.pdf

This soil core is approximately 30% gray, indicating some drainage impairment.

These cores contrast poorly-drained soils (left, 95% gray) with well-drained (right, 0% gray).