

CU IN THE WOODS

THE DAUNTING LIFE OF AN OAK SEEDLING

By Stephen Peairs

The life of the oak is filled with woe as it must constantly battle for survival. Difficulty first presents itself to the oak as a young acorn. Few acorns produced during a mast crop will germinate and form a seedling. Though acorns have a high germinative capacity between 75 and 95 percent, each must become situated in a favorable microenvironment to begin formation into a seedling. If the acorn is not able to situate itself below the litter layer and contact mineral soil, it is doubtful a seedling will begin to form. Those select few acorns that do indeed germinate must then avoid several dangers including changes in the environment and impacts from grazing by insects and animals. Seed desiccation, the loss of seed moisture content, that occurs in the winter dormant season is yet another major cause of seed loss. Research has shown that only 18% of white oak acorns studied were sound enough to germinate and approximately 6% of these seedlings had a fair chance to survive. If the acorn successfully germinated and the oak seedling has formed, then first life hurdle has been cleared.

For those acorns that do survive, adequate light must be available for the seedling to grow and become an overstory tree. An oak's ability to become established is not solely related to environmental conditions, but more to their ability to persist. Oak seedlings can exist, but not grow, in the understory with lesser light conditions for a couple of decades while waiting on changes in light penetration to occur. In such sunlight limited situations, a seedling will go through a continuous cycle of sprouting and the ensuing experience of top dieback due to lack of photosynthesis. If our oak cannot advance and grow in size, the probability that it will not survive increases. Eventually, the seedling will deplete its carbohydrate reserves and mortality ensues.

Without some type of disturbance (extreme weather, logging, insect outbreak, etc.) in this stage of our seedling's life, light conditions will only change when a larger tree dies creating a canopy gap. However, if larger shade-tolerant trees surround the seedling, the oak will become overtopped and remain stunted due to conservative growth rates of oaks. Slow growth rates also hinder an oak's ability to compete against faster-growing species, such as yellow-poplar, to capture available growing space. Thus, the oak must also prevail over its competing neighboring tree species. Hang in there little oak for only the strong will survive.

Human activity through forest management can help our oak. Introducing a process of disturbance via silviculture methods that mimic those that resulted in oak-dominant stands will assist our oak with maintaining a competitive nature. If the oak seedling can show early dominance in its local environment, odds dramatically improve for it to survive and establish a place of prominence in the upper crown classes. We can implement different timber harvesting methods to stimulate the prominence of our oaks, but in many cases, the oak will need further assistance. An example of when one might use an additional method is after a clearcut harvest. Through oak reproduction, recruitment is often elevated following a clearcut harvest. Since these seedlings and sprouts have slow growth rates, they are rapidly overtopped by pioneer tree species and herbaceous vegetation. Therefore, herbicide treatments can be implemented to eliminate plant competition.

If we can help the stem to remain competitive and establish itself in a more superior crown classification, the tree may exist for hundreds of years until it experiences mortality from natural causes. In the case of

northern red oak, longevity can be up to 500 years while white oak has an average life span of 200–300 years. It is in the early stage of the oak's life that we must apply what we have learned to promote development. Proper use of fire, herbicide applications, and the creation of oak shelterwoods are a few methods that can help our oaks win the war on the ground.

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