

THE INFLUENCE OF SHADE ON NORTHERN RED OAK SEEDLINGS GROWTH AND CARBON BALANCE

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Abstract: One management problem of the Southern Appalachian mixed hardwood forest is the lack of development of northern red oak (*Quercus rubra* L.) seedlings on high quality sites. Regeneration of red oak is not the problem. Following the removal of a stand, a combination of new seedlings, advanced reproduction and stump sprouts ensure red oak's initial presence. However, seedlings and sprouts cannot compete with other hardwoods, specifically yellow-poplar (*Liriodendron tulipifera* L.). Advance reproduction is the exception-if present before harvest, it will usually be present in the new stand. A modified shelterwood cut, in which the understory is removed from below, has been shown to assure the development of this advance reproduction.

Light quantity is thought to be a major factor inhibiting the rapid development of northern red oak. Changes in light intensity will affect biomass partitioning and physiological parameters such as photosynthesis and respiration. To test this hypothesis, seedlings located in the Pisgah National Forest were shaded at 95%, 90%, 60% and 0% full sunlight. Height, diameter and photosynthesis readings were taken throughout the growing season. Seedlings were then destructively sampled and the oven dry weight was found for the leaves, stems and roots of all seedlings. Preliminary data suggest that seedlings shaded at 60% full sun have an increased growth response.

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