## The 3 Ps of Oak Regeneration: Planning, Persistance, and Patience

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Oak regeneration research in the United States has been ongoing in earnest since the late 1950s. Most research has focused on specific silvicultural practices, regeneration processes, site characteristics, and local limiting factors such as deer browsing or interfering species. Research has evaluated the effects of thinning on regeneration development, methods for oak planting, post-harvest treatments to control competing vegetation, and many other aspects of oak silviculture. All of these have provided solutions to individual problems in oak regeneration for local to regional areas.

However, with all this research we still have difficulty regenerating oak forests. One question remains "How do we insure that oaks are present at desired levels in the next stand following harvest?" We believe the answer is more a managerial problem than biological. The long-term and more universal solution is based on the 3Ps of oak regeneration: **planning, persistence, and patience**. Because these three steps are not consistently followed nor their importance recognized, oak regeneration often fails.

Research and operational silviculture have been focused on the application of one or several treatments over a short period of years. Oak regeneration is **a long-term ecological process requiring long-term planning**. Two important questions that must be answered in the planning process are: when do you want to regenerate, and where or which stands do you want to regenerate to oak? It is necessary for oak advanced regeneration (OAR) to be present before harvest for oaks to have a chance of developing in the next stand (Sander and others 1976). OAR is increased through acorn germination. Unfortunately acorn crops are sporadic and unpredictable (Beck 1977). Planting can supplement OAR in order to decrease the time necessary to develop sufficient regeneration. Planting research has been completed across the entire eastern hardwood region (Weigel and Johnson 2000).

**Persistence in treatments is required both pre-harvest to enable oak regeneration to develop and post-harvest to keep oak regeneration competitive.** Repeated treatments may be required to maintain increased light levels in the lower canopy and shrub layer. These increased light levels will allow acorns to germinate and develop when an acorn crop does occur. The treatments can include the use of herbicide to control competition, mechanically controlling competition, and prescribed fire. Fire has been present on the landscape dating back to at least the 1600s (Guyette and others 2006). The use of prescribed fire has been shown to benefit oak regeneration (Brose and others 2006). Repeated post-harvest thinning and crop tree release are necessary to keep oak competitive (Perky and Wilkins 1993).

Because oak is a species physiologically **adapted to repeated disturbances over**

Planning, Persistence and Patience are required to create Oak Advanced Regeneration (OAR) that is large enough to survive once the canopy is removed.

**decades, patience in the regeneration process is necessary**. Oak's growth habit of favoring early root growth over shoot growth helps oaks persist through repeated disturbances better than competitors (Johnson and others 2009, fig. 10.1). But the limited shoot elongation puts it at a competitive disadvantage with other species in the absence of disturbances such as fire and drought.

By completing these three steps; **planning, persistence, and patience**, oak regeneration can be accomplished.

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