UNDERPLANTING SHORTLEAF PINE AT COLDWATER CONSERVATION AREA IN MISSOURI

Jason Jensen and David Gwaze[1]

EXTENDED ABSTRACT

Restoring shortleaf pine throughout its native range in the Ozark Highlands is a high priority in Missouri. Restoring shortleaf pine on former pine and oak-pine sites is a long-term strategy for mitigating chronic oak decline (Law et al. 2004). Underplanting or preharvest planting is one method that has potential for restoring shortleaf pine. Conceptually, underplanting will result in vigorous root systems that will provide the growth potential for seedlings when the mature trees are removed (Johnson 1993). Underplanting allows the control of the potential growth surge of competing hardwoods and allows removal of the overstory when the pine is established. It is also easier, and hence cheaper, to hand plant before harvest because of lack of physical barriers at planting. One of the potential advantages of underplanting is that release herbicide may not be needed. Success of underplanting is not well known, and could be limited by shortleaf pine's requirement for abundant light for rapid growth. The objectives of the study were (1) to compare survival and growth of shortleaf pine seedlings planted underneath various overstory densities; (2) to compare survival and growth of shortleaf pine seedlings planted before and after clearcutting; and (3) to evaluate the influence of hardwood competition on growth and survival of planted shortleaf pine.

The study was located on the Coldwater Conservation Area of the Missouri Department of Conservation and on the adjacent property owned by the Williams Family Limited Partnership. The three treatments applied after underplanting shortleaf pine seedlings underneath a mature overstory in March 2002 were clearcut, uneven-aged with group selection (UAM), and shelterwood. The fourth treatment consisted of planting shortleaf pine seedlings in March 2002 after clearcut. In April 2006, we assessed the study. In each treatment, we established six plots along one or more transects. Each plot was 60 ft x 40 ft and was meant to include 20 planted shortleaf pine seedlings. Survival and height of each planted shortleaf pine seedling was assessed.

Four years after treatments, shortleaf pine seedlings planted in clearcuts had moderate survival and the best growth (Figs. 1 and 2). Seedlings planted before and after clearcutting were not significantly different in both survival and growth. Seedlings underplanted in the shelterwood treatment had the poorest survival and growth. Seedlings planted in shelterwood treatment were 84 percent shorter than those planted in clearcuts. Seedlings underplanted in the UAM treatment had the best survival but had poor growth. Within the UAM treatment, group openings behaved like small clearcuts. Height of seedlings in group openings (4.43 ft) was as good as that in clearcuts, and height in single tree selection (2.27 ft) was as low as that in shelterwood treatment. The basal area was least in the clearcut treatments (3 to 8 ft^2/ac), and highest in the UAM (23 ft^2/ac) and the shelterwood treatment (28 ft^2/ac).

Results from this study suggest that clearcutting is the best method to regenerate shortleaf pine, and planting before or after clearcutting does not affect survival or growth of planted shortleaf pine seedlings. However, planting after harvest is more difficult than planting before harvest because of planting in and around logging debris. Thus, planting before harvest and clearcutting the overstory in the same year the shortleaf seedlings are planted appear to be a good regeneration strategy for shortleaf pine.

LITERATURE CITED

Law, J.R.; Melick, R.; Studyvin, C.; Steinman, J.R. 2004. Oak decline in Missouri: history revisited. In: Spetich, M.A., ed. 2004. Upland oak ecology symposium: history, current conditions, and sustainability. Gen. Tech. Rep. SRS-73. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 257-258.

Johnson, P. 1993. Sources of oak reproduction. In: Loftis, D.L.; McGee, C.E., eds. Proceedings, oak regeneration: serious problems, practical recommendations; 1992 Sept. 8-10; Knoxville, TN. Gen. Tech. Rep. SE-84. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 112-131.

[1]Resource Forester (JJ), Missouri Department of Conservation, RR 4 Box 1002, Piedmont, MO 63957; Resource Scientist (DG), Missouri Department of Conservation, 1110 S. College Avenue, Columbia, MO 65201; JJ is corresponding author: to contact call (573)223-4525 or email at Jason.Jensen@mdc.mo.gov

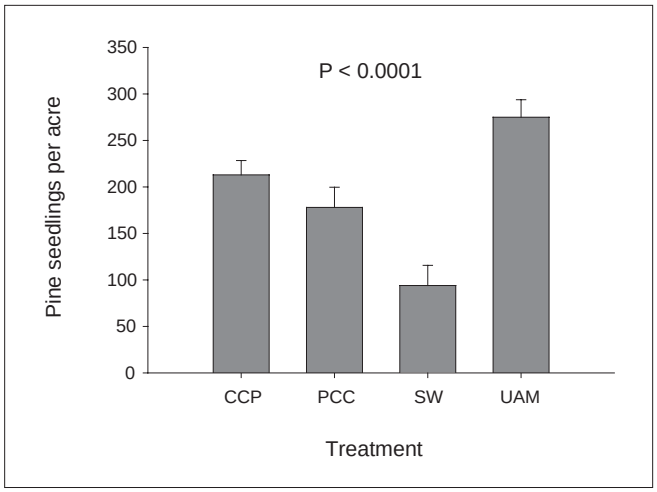

Figure 1.—Stocking of planted shortleaf pine seedlings 5 years after establishment. CCP = clearcut and plant; PCC = plant and clearcut; SW = shelterwood; UAM = uneven-aged management. Error bars are standard errors of the mean.

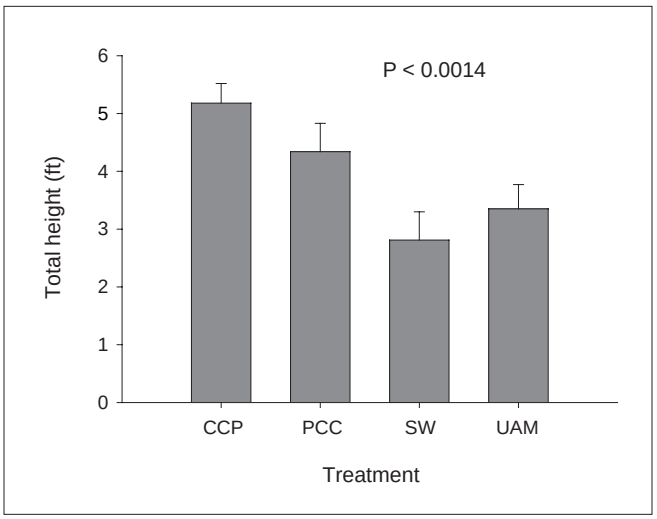

Figure 2.—Total height of shortleaf pine trees 5 years after establishment. CCP = clearcut and plant; PCC = plant and clearcut; SW = shelterwood; UAM = uneven-aged management. Error bars are standard errors of the mean.