

EFFECTS OF SEASONAL PRESCRIBED FIRES ON HARDWOOD

ADVANCE REGENERATION IN SHELTERWOOD STANDS

Patrick Brose and David Van Lear¹

Abstract: Shelterwood harvesting of mature oak (*Quercus* spp. L.) stands on productive sites often fails because fast-growing intolerant and already established tolerant species outcompete oak reproduction for dominance of the advance regeneration pool. We hypothesized that prescribe fire would improve the competitive position of oak in the advance regeneration pool of shelterwood stands because of different growth strategies among species.

Three mature mixed oak stands on productive sites were partially harvested using the shelterwood system. Two to 4 years later, each stand was divided into spring burn, summer burn, winter burn, and control treatments. All treatments were systematically inventoried for advance regeneration using permanent plots before and after burning. Variables measured were density, form, growth rate, height, and mortality rate of hardwood advance regeneration. Prescribe fires top-killed hardwood regeneration, forcing the stems to resprout. Fire intensity was monitored with heat-sensitive paints and by estimating woody fuel consumption.

Oak density was not reduced by any prescribe fire and produced straight vigorous new stems that showed accelerated growth for 2 years. Hickory (*Carya* spp. Nuttall) responded to burning similarly to oak. Yellow-poplar (*Liriodendron tulipifera* L.) density was reduced by all burning treatments and resprouting stems exhibited accelerated growth for only 1 year. Red maple (*Acer rubrum* L.) density was significantly decreased by moderate to high intensity growing-season fires and it also displayed accelerated growth for only 1 year. Overstory damage and mortality was minimal, restricted to thin-bark species and trees with slash at their bases. All prescribe fires improved the competitive position of oak reproduction in the advance regeneration pool with spring fires providing the best blend of competition control, oak stem form improvement, and growth acceleration. These results indicate that prescribe burning as a follow-up treatment to shelterwood harvesting is a promising approach to regenerating oak stands on productive sites.

¹ Graduate Research Assistant and Bowen Professor of Forestry, respectively, Department of Forest Resources, Clemson University, 261 Lehotsky Hall, Clemson, SC 29634.