Effect of Soil on the Development of Hardwood Understories in Pine Stands of the Piedmont Plateau

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A problem of great importance to foresters concerned with the natural regeneration of loblolly pine (Pinus taeda L.) and shortleaf pine (P. echinata L.) stands in the Piedmont Plateau Region is the occurrence of hardwood understories at the time reproduction cuttings are made. Ordinarily, final or reproduction cuttings in even-aged pine stands are made when they are 60 to 80 years of age. At this time the average pine stand is characterized by a relatively dense understory of hardwoods such as dogwood (Cornus florida L.), red maple (Acer rubrum L.), and redgum (Liquidambar styraciflua L.), as well as many species of the oaks and hickories which are the principal members of the climax oak-hickory forest. Advanced reproduction of pine is essentially absent from the understory; and, the reproduction layer, trees under 3 feet in height, is composed of a vast variety of hardwoods and redcedar (Juniperus virginiana L.) and a few 1- and 2-year old pine seedlings. When such pine stands are cut under any conventional silvicultural system, advanced and subsequent pine reproduction is unable to compete with the existing hardwood understory which is already well established. After cutting, such areas revert from pine, which is of relatively high value and rapid-growing, to a mixture of hardwoods of poor quality, slow growth, and low value.

The purpose of this study was to determine the relationship between soil features and the species composition and density of hardwood understories. The practical usefulness of such a study can be demonstrated. For example, if it were possible to classify, on the basis of comparable soil features, present or potential stands into three broad categories of hardwood potential—(1) low, (2) medium, and (3) high potential—understory density, the forester could better plan methods to reproduce pine economically. Areas of low potential should require little or no special effort or cost in order to obtain pine reproduction; areas of high hardwood potential might better be allowed to revert to hardwoods because of the high costs of necessary to obtain pine reproduction; and, areas of intermediate potential might better be the subject of well-designed studies to determine the efficacy and economic feasibility of the use of fire, herbicides, or soil treatments to decrease hardwood competition.