FIFTY YEARS OF OBSERVATIONS ON OAK (*QUERCUS*) TREE IMPROVEMENT AND ARTIFICIAL REGENERATION PROGRAMS IN EASTERN NORTH AMERICA

Scott E. Schlarbaum

PURPOSE AND SCOPE

The author reflects on his personal experience in oak tree improvement research and artificial regeneration in eastern North America, starting in 1974 and continuing to the present day. Exposure to various tree improvement programs, evolution in technology, growing and establishing bare-root seedlings, and establishment and management of oak seed orchards are discussed. Biological and programmatic challenges to oak tree improvement programs and successful artificial regeneration on different sites are identified.

METHODS AND APPROACH

Pedigreed studies of different oak species range from genetic diversity tests, such as provenance and open-pollinated progeny tests, to performance tests in bare-root seedling nurseries and field plantings. Genetic variation in growth, reproductive maturation and capacity, seedling and acorn characteristics, form, seedling quality, acorn production, flood tolerance, and other traits have been detected, and selections for these traits can be made. Different approaches to creating seed orchards have been used, depending on the desired outcome.

FINDINGS AND IMPLICATIONS

Oak improvement programs encounter a plethora of biological variability that can impede progress. Two significant problems are variability in reproductive maturation and reproductive capacity. Moreover, there appear to be different reproductive patterns among oak species. Nonpruned nursery-grown oak seedlings show family differences and within family, can exhibit a five-fold difference in height and overall quality, which significantly impacts initial survival in field plantings. Seedling variability has spawned different statistical approaches to experimental design and analyses of field studies. Oak seed orchards are expensive to create and can require decades of investment before enough acorns are produced to make collection worthwhile for nursery production. Adding to the expense, is the necessity of creating duplicate orchards at remote locations in case of destruction by disease, fire, or weather events. The most significant problem oak improvement programs face is continuity of effort

Scott E. Schlarbaum, Professor, School of Natural Resources, The University of Tennessee, Knoxville, Knoxville, TN 37996, USA

over time. Genetic testing leading to the development of mature seed orchards often exceeds the career of their originator(s) and may be discontinued. Changes in laws governing Federal and State programs need to be enacted to ensure continuity of applied oak improvement programs over generations.