DEVELOPMENT OF NORTHERN RED OAK ROOTED CUTTING AND ENRICHMENT PLANTING SYSTEMS

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Enrichment planting may provide an efficient means to establish elite northern red oak (*Quercus rubra* L.) genotypes in recently harvested natural forests. However, planting northern red oak (NRO) seedlings into natural stands has proven difficult in the past, especially when competition and other stress factors are not controlled. Likewise, genetic improvement of oak for timber production has been limited due to relatively long periods of juvenility, episodic seed production, and slow growth resulting in long progeny testing times. Two areas of research have, therefore, been initiated by the North Carolina State University Hardwood Research Co-operative to identify successful enrichment planting techniques capable of deploying elite genotypes: 1) vegetative propagation techniques for NRO stem cuttings, and 2) establishment techniques for NRO seedlings within emerging natural regeneration. Developing successful techniques for both would allow for the substitution of seedlings with rooted cuttings. Though vegetative propagation of elite NRO individuals does not represent population genetic improvement (as in the case of a breeding program), it is an extremely efficient means to capture high quality genotypes and, through deployment, establish higher quality - faster growing trees. Such an approach can be readily linked to existing genetic improvement programs as well.

Of several successful vegetative propagation techniques reported in the literature, rooting juvenile softwood stem cuttings that are collected from pruned stock plants under conditions of high humidity offer the greatest potential for producing a large number of high quality NRO reforestation stock. Adopting this strategy for coppice sprouts obtained from recently felled trees of high phenotypic value could further accelerate the deployment of elite NRO individuals. Because maturation, pruning location, rooting environment, collection time, and hormone treatment affect rooting success, we are continuing studies initiated in 2001 to develop an efficient rooted cutting production system. Attention has also been placed on post-rooting cultural practices for rooted cuttings and on pruning treatments of stock plants designed to optimize shoot production.

Enrichment planting trials have been established in the North Carolina mountains on recently harvested sites with natural regeneration emerging in clearcut and shelterwood systems. NRO 1-0 bareroot seedlings were planted in 2001 in two clearcuts and two shelterwood cuts using weed mats and glyphosate to control competition and pelletized fertilizers to enhance fertility. The plantings have been monitored yearly.

A successful post-harvest enrichment planting system would facilitate the enhancement of preferred species on sites with limited oak regeneration. It would also be an effective means to deploy vegetatively propagated elite genotypes without the use of challenging clean plantation culture.