

IDENTIFICATION OF QUANTITATIVE TRAIT LOCI AFFECTING ROOTING IN LOBLOLLY PINE

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Abstract. Genetic control of rooting and root development is poorly-understood in conifers. This study was designed to identify quantitative trait loci (QTLs) affecting rooting of loblolly pine (*Pinus taeda* L.) stem cuttings. In each of four seasons (winter 1995, summer 1995, winter 1996 and summer 1996), sixteen cuttings were taken from each of 384 open-pollinated offspring of loblolly pine clone 9-1020, which were being maintained as hedges. Cuttings were rooted in greenhouse environments, and the rooting percentage and average number of new roots were recorded for each hedge. Megagametophyte DNA from each of the 384 offspring was scored for 73 RAPD markers.

Probable QTLs were detected at various significance levels on six linkage groups, each of which affected both rooting percentage and number of roots. Three of the QTLs affected rooting in both the winter and summer seasons, while two had effects only on winter rooting and one only on summer rooting. Individual QTLs explained estimated differences of 3 to 9 percent in rooting success and 0.1 to 0.2 roots per cutting. The occurrence of candidate QTLs with multiple tests and traits, and the consistency with which positive or negative effects were associated with particular marker combinations, are strongly suggestive of real effects. The detection of season-specific QTLs suggests the interaction of modifying developmental pathways with the root initiation genetic program. This information may help provide insight into the function of candidate genes.

Keywords: QTL mapping, rooting, loblolly pine, *Pinus taeda* L.