

Development of Reference Karyotypes for Longleaf and Shortleaf Pines using Fluorescence in situ Hybridization

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A reference karyotype (i.e., chromosome-specific description of the genome) is a pre-requisite for advanced genetic and genomic studies. A pilot project has been initiated at the Southern Institute of Forest Genetics' Forest Tree Molecular Cytogenetics Laboratory to develop reference karyotypes for each of the four major southern U.S. pine species— loblolly (*Pinus taeda* L.), slash (*P. elliottii* var. *elliottii*), shortleaf (*P. echinata*) and longleaf (*P. palustris*) — using 18S-28S rDNA, 5S rDNA and Arabidopsis-type telomere repeat sequence probes and AT-rich banding. Reference karyotypes for loblolly and slash pines have been completed. Preliminary results for the rDNA genes show that both shortleaf and longleaf pines contain seven major intercalary 18S-28S rDNA sites. Shortleaf pine showed as many as eight medium-to-minor centromeric 18S-28S rDNA sites, and longleaf pine showed two major and six medium-to-minor centromeric 18S-28S rDNA sites. Both species showed one major and one minor site for 5S rDNA,. Strong AT-rich bands are found to flank the centromeres of most of the chromosomes in both species. Complete karyotypes for each of shortleaf and longleaf pines are being developed for comparison to each other and to the loblolly and slash pine karyotypes.