Pine Homologs Of Key Embryogenesis Genes From *Arabidopsis*

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A clear understanding of the molecular basis of embryogenesis is key to continue improvement in mass clonal propagation of loblolly pine, Pinus taeda. Little is known about the molecular events that take place during seed development in loblolly pine. However, several genes that regulate the transition from fertilization through germination have been well-studied in the model plant system arabidopsis, a member of the mustard family. Among the studied genes, Fertilization-independent endosperm (FIE), Leafy Cotyledon1 (LEC1), Abscisic acid-insensitive 3 (ABI3) and Pickle (PKL) play crucial roles during arabidopsis seed development. We identified and isolated homologs of these genes from loblolly pine named Pt-FIE-like, Pt-LEC1-like, Pt-ABI3-like and Pt-PKL-like and studied their expression throughout several stages of development.

Partial sequence data of the entire mRNA's was obtained by searching the Pine Gene Discovery Project database or by PCR amplification with degenerate primers. The sequence data was then used to design primers for 5' and 3' Rapid Amplification of cDNA ends (RACE) that allowed us to obtain complete cDNA's.

Sequence and phylogenetic analyses of the complete cDNA's revealed that the loblolly homologs encode proteins with very high sequence and structural similarity to the arabidopsis functional genes. The protein sequence encoded by Pt-FIE-like shares 70% identity, 83% similarity with the arabidopsis FIE gene. Likewise, Pt-LEC1-like shares 50% identity and 63% similarity with the arabidopsis LEC1 gene. Isolation of Pt-ABI3-like and Pt-PKL-like has not been completed; however, BLAST searches of the GenBank nonredundant database indicate that these genes share strong similarity with their arabidopsis homologs.

Expression analyses using northern blots probed with the four loblolly pine genes isolated have confirmed that these genes are actively expressed during several stages of somatic and zygotic embryo development. Present studies are focused at determining characteristic expression patterns throughout zygotic and somatic embryo development.

The comprehensive analysis done by our study suggests that the molecular mechanisms that regulate embryo development are conserved between angiosperms and gymnosperms. Further studies are being done to confirm whether these genes indeed share conservation of function with the arabidopsis homologs.