

Cellulose Enhancement in Wood Used in Pulp Production by Overexpression of Korrigan and Sucrose Synthase Genes

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Abstract : The wood of Eucalyptus, Populus and bamboos are some important species used as raw material for the manufacture of pulp. However, higher levels of lignin pose a problem during Kraft pulping and yield of pulp is also lower. In order to increase the yield of pulp per unit wood and reduce the use of chemicals during kraft pulping it is important to reduce the lignin content and/or increase cellulose content in wood. Cellulose biosynthesis in wood takes place by the coordinated action of many enzymes. The two important enzymes are KORRIGAN and SUCROSE SYNTHASE. KORRIGAN (Endo-1,4- β -glucanase) is implicated in the process of editing growing cellulose chains and improvement of the crystallinity of produced cellulose, whereas SUCROSE SYNTHASE is involved in providing substrate (UDP-glucose) for growing cellulose chains. The present study was aimed at the cloning, characterization and overexpression of these genes in Eucalyptus and Populus. An efficient shoot organogenesis protocol from leaf explants taken from micro shoots of the species has been developed. Agrobacterium mediated genetic transformation using Agrobacterium tumefaciens strain EHA105 and LBA4404 harboring binary vector pBI121 was achieved. Both the genes were cloned from cDNA library of Populus deltoides. These were subsequently characterized using various bioinformatics tools. The cloned genes were then inserted into pBI121 under the CaMV35S promoters replacing GUS gene. The constructs were then mobilized into above strains of Agrobacterium and used for the transformation work. Subsequently, genetic transformation of these clones with target genes following already developed protocol is in progress. Four transgenic lines of Eucalyptus tereticornis overexpressing Korrigan gene under the strong constitutive promoters CaMV35S have been developed, which are being further evaluated. Work on development of more transgenic lines overexpressing these genes in Populus and Eucalyptus is also in progress. This presentation will focus on important developments in this direction.

Keywords : Eucalyptus tereticornis, genetic transformation, Kraft pulping Populus deltoides

Conference Title : ICBB 2018 : International Conference on Biotechnology and Bioengineering

Conference Location : Bangkok, Thailand

Conference Dates : December 13-14, 2018