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Paxillus involutus forms an ectomycorrhizal symbiosis and enhances survival of PtCOMT-modified *Betula pendula in vitro*

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The ability of the PtCOMT (caffeate/5-hydroxyferulate O-methyltransferase from Populus tremuloides L.) – modified Betula pendula Roth. lines to form symbiosis with an ectomycorrhizal (ECM) fungus Paxillus involutus Batsch Fr. was studied in vitro. Lignin precursor gene PtCOMT was introduced into two B. pendula clones under the control of the cauliflower mosaic virus 35S promoter or the promoter of the sunflower polyubiquitin gene UbB1. Of the four transgenic lines, one 35S-PtCOMT line (23) had a decreased syringyl/guaiacyl (S/G) ratio of root lignin, and two UbB1-PtCOMT lines (110 and 130) retarded root growth compared to the control clone. Both control clones and all transgenic lines were able to form ECMs with P. involutus, but the transgenic lines differed from the controls in the characteristics of the ECMs. The number of lateral roots covered with fungal hyphae and/or development of a Hartig net (HN) were reduced in line 23 with a decreased S/G ratio, and in lines 110 and 130 with slower root formation and changed root morphology, respectively. However, line 23 benefited more from the inoculation in lateral root formation than the control, and in lines 110 and 130 the percentage of viable plants increased most due to inoculation. The results show that B. pendula plants genetically transformed with the lignin gene PtCOMT could form mycorrhizal symbiosis regardless of changes in either the root S/G ratio or development. The benefits of the symbiosis were variable even in the closed in vitro system, and dependent on the clone or transgenic line and the ECM fungal symbiont.

Key words: Betula pendula, COMT, ecological impacts of gm-trees, ectomycorrhiza, lignin modification, Paxillus involutus.