

Reduced Lignin Content and Altered Lignin Composition in Transgenic Tobacco Down-Regulated in Expression of L-Phenylalanine Ammonia-Lyase or Cinnamate 4-Hydroxylase

VJH. Sewalt, W. Ni, J. W. Blount, H. G. Jung, S. A. Masoud, P. A. Howles, C. Lamb and R. A. Dixon

We analyzed lignin content and composition in transgenic tobacco (*Nicotiana tabacum*) lines altered in the expression of the early phenylpropanoid biosynthetic enzymes L-phenylalanine ammonia-lyase and cinnamate 4-hydroxylase (C4H). The reduction of C4H activity by antisense expression or sense suppression resulted in reduced levels of Klason lignin, accompanied by a decreased syringyl/guaiacyl monomer ratio as determined by pyrolysis gas chromatography/mass spectrometry. Similar reduction of lignin levels by down-regulation of L-phenylalanine ammonia-lyase, the enzyme preceding C4H in the central phenylpropanoid pathway, did not result in a decreased syringyl/guaiacyl ratio. Rather, analysis of lignin methoxyl content and pyrolysis suggested an increased syringyl/guaiacyl ratio. One possible explanation of these results is that monolignol biosynthesis from L-phenylalanine might occur by more than one route, even at the early stages of the core phenylpropanoid pathway, prior to the formation of specific monolignol precursors.