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Chalcone synthase regulates flax metabolism and positively diversify linseed products

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The chalcone synthase (CHS) gene controls the first step in the flavonoid biosynthesis route, the metabolic pathway in which anthocyanins, phenolic acids, lignins, simply phenols were produced. The transgenic plants with overexpression of the heterological CHS gene were generated, leading to the increased synthesis of flavonoids, high antioxidant potential and improve the properties of products obtained such as flax fiber and oil. At the same time, repressing the endogenous CHS gene should verify the results of research on its overexpression and provide information on its potential role of CHS in the redistribution of substrates and diversification of metabolites within the phenylpropanoid pathway, especially in relation to lignins. In flax, CHS down-regulation resulted in tannin accumulation and reduction in lignin synthesis but plant growth was not affected. This suggests that lignin content and thus cell wall characteristics might be modulated through chalcone synthase gene activity. The important role of CHS gene is in regulation of cell wall sensing as well as polymer content and arrangement. CHS-reduced flax also showed significant changes in morphology and arrangement of the cell wall. The additional result of this work was indication of relationship between the expression of the CHS gene and the metabolism and stability of fatty acid in flax. Plant with reduction of CHS produced oil with ideal proportion of $\omega 6/\omega 3$ fatty acids. Summing up CHS modification induces signal transduction cascade that leads to modification of flax metabolism in a wide range and positively diversify its products.

Biography

Magdalena Zuk has completed her PhD from Wroclaw University in 2003 and worked on diversification of secondary metabolites in crop plants (flax, potato). She has published more than 35 papers in reputed journals and is a Member of Board of Linum Foundation, a non-profit organization promoting pro-health use of flax products.

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