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Les voies de synthèse des lignanes chez les linacées : quels gènes et quelles protéines pour quels lignanes ?
PAIRING PINORESINOL LARICIRESINOL REDUCTASES TO SPECIFIC LIGNAN BIOSYNTHESIS

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RÉSUMÉ

Linum usitatissimum (flax) is one of the richest sources of lignans. Main flax lignan is optically active secoisolariciresinol that is synthesized from pinoresinol via lariciresinol. Key enzymes involved in the synthesis of this lignans are two isoforms of pinoresinol-lariciresinol reductases with opposite enantiospecificity. The action of bifunctional reductase does not allow for an explanation for the accumulation of lariciresinol and its derivates in seeds, stem and cell suspension. To try and better understand complex lignan profile we report expression and activity of two new putative PLRs, LuPLR3 and LuPLR4. LuPLR4 in vitro acts only as pinoresinol reductase what has only been seen in Brassicaceae family until now. Lignans play a role in plant defense. All PLRs are upregulated following Fusarium oxysporum attack, a common flax pathogen. Promoter deletions and mutation evidenced region involved in regulation of LuPLR1 gene response to Fusarium. The region contains several W boxes, putative binding sites for WRKY transcription factors. WRKY transcription factors play a role in response to biotic and abiotic stress. We have isolated LuWRKY36 from two cell suspension treated with Fusarium oxysporum or abscisic acid. Gel-shift assay and DPI-ELISA showed binding of LuWRKY36 to W box present in the LuPLR1 gene promoter. This regulation was also confirmed in vivo. We also report the differential impact of F. oxysporum elicitation on LuWRKY36 and LuPLR1 gene expression and secoisolariciresinol production in flax cultivars Barbara (Fusarium sensitive) and Baikal (Fusarium tolerant). Many beneficial effects of secoisolariciresinol and other phenolic compounds found in flax require "green" extraction and sometimes targeted purification of a specific compound. We report here that natural deep eutectic solvents using ultrasound assisted extraction can extract phenolic compounds from flax seed coat and that results indicate that by tuning different parameters of extraction we can target purification of desired plant product.

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