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不同浓度外源IAA处理对杉木茎部基因表达的影响

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摘要 为了揭示吲哚-3-乙酸(Indole-3-acetic acid, IAA)参与杉木木材发育调控的遗传机制, 文章分别以0、3 mg.IAA/g.lanolin处理不同阶段的杉木截顶茎秆作为驱动方(Driver)和测试方(Tester), 利用抑制消减杂交技术(Suppression substractive hybridization, SSH), 对其中差异表达的目的基因进行了分离和克隆。共获得332个Unigenes, 其潜在的功能分别涉及到细胞组织和生物合成、发育进程调控、电子传递、逆境应答以及信号传导等方面; 进一步地表达鉴定发现*ClHIRA*、*ClPGY1*和*ClARF4*等集中于茎部近轴区域表达的基因, 能够积极地响应外源IAA刺激的维管形成层分裂和管胞分化活动; 而*ClSMP1*、*ClTCTP1*和*ClTRN2*等集中于茎部远轴区域表达的基因, 则在转录水平上对外源IAA的处理水平及近轴次生维管的发育变化表现出负相关的关系。这一结果表明特异性定位的发育基因对木材形成组织中内源IAA水平变化的差异性识别和响应很可能是生长素参与林木维管形成层次生发育调节的重要分子机制。

关键词: 外源IAA 杉木 茎部 差异表达基因的克隆 表达分析

Abstract: To reveal the potential genetic mechanisms of indole-3-acetic acid (IAA) that regulate Chinese fir wood formation, cloned the differentially expressed genes via suppress subtractive hybridization (SSH) using the truncated stems treated by 0 and 3 mg IAA/g lanolin as the driver and tester, respectively. A total of 332 unigenes that were involved in cell organization and biosynthesis, developmental processes control, electron transport, stress response, and signal transduction. To further test the results from SSH, we selected those unigenes, whose putative encoding proteins showed significantly homologous with HIRA, PGY1, SMP1, TCT, TRN2, and ARF4, and analyzed their expressed specificity in the wood formative tissues and their response to the secondary developmental changes of vascular cambium stimulated by 0, 1, and 3 mg.IAA/g.lanolin treatment. The results showed that *ClHIRA, ClPGY1*, and *ClARF4*, which were specifically expressed in the adaxial zone of stem, were positively response to the activities of cell division and tracheid differentiation stimulated by exogenous IAA treatment. However, *ClSMP1, ClTCTP1*, and *ClTRN2*, which were mainly expressed in the abaxial zones of stems, showed negative correlation with the treated levels of exogenous IAA and activities of vascular cambium secondary development at the transcriptional level. This result showed that the differential response of develop-mental regulatory genes located in different vascular tissues to the level changes of edogenous IAA in stems is likely to be an important molecular mechanism of auxin regulating wood formation.

Keywords: exogenous IAA, *Cunninghamia lanceolata* (Lamb.) Hook, stems, the cloning of differentially ex-pressed genes, expression analysis

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