

研究论文

小麦胚休眠中ABA信号转导的蛋白质组分析

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摘要 利用ABA处理休眠和不休眠小麦品种的胚, 并通过双向电泳-质谱技术, 比较其蛋白质表达情况。结果发现, 共有18个ABA反应型蛋白点的表达存在显著差异。经MALDI-TOF-MS检测及肽指纹图谱(PMF)分析, 其中16个蛋白点在有关数据库中得到了归属鉴定。进一步对这16个蛋白及其特性进行综合分析, 认为其涉及不同的反应途径, 如胁迫反应(冷调蛋白、热激蛋白和醛脱氢酶)、信号交互反应(生长素反应蛋白、乙烯感应因子、钙依赖的蛋白激酶CP4和乙烯反应蛋白), 以及种子的基本发育过程(LEA蛋白、Em蛋白、bZIP转录因子、锌指蛋白、myb家系转录因子、淀粉合成酶和纤维素酶等)。另外还有2个是功能未知的蛋白, 其中之一在已测序的水稻中具有全长的cDNA; 另一个经ESI-MS/MS检测, 认为是ABA信号转导系统中的一个新组分。对上述2个蛋白分别从籽粒发育不同阶段、不同浓度ABA处理, 以及休眠中和打破休眠后这2种状态下不同温育时间等方面来验证其表达与休眠性状之间的关系, 结果发现它们在籽粒发育中后期大量合成, 与胚休眠性获得的时间是一致的。用同样浓度的ABA处理, 这2个蛋白在休眠胚中更易于表达, 而在打破休眠的胚中需要5倍的ABA浓度才能得到相同的表达效果; 在用无菌水浸润期间, 休眠胚中该蛋白表达水平下降的速率迟于后熟胚中, 且随着休眠的打破, 该蛋白也消失了。推测其表达可能与休眠性的获得与解除有关。对控制该蛋白表达的基因进行克隆与功能鉴定可能为小麦抗穗发芽育种提供候选位点。

关键词 [小麦](#) [胚](#) [种子休眠性](#) [ABA信号转导](#) [蛋白质组](#)

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Proteomic Analysis on Abscisic Acid Signal Transduction in Embryo Dormancy of Wheat (*Triticum aestivum* L.)

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Abstract The embryos of dormant and non-dormant cultivars of wheat (*Triticum aestivum* L.) were treated with ABA and protein expression was compared on two-dimensional electrophoresis gels. The results showed that 18 ABA-responsive proteins were expressed differentially. Among them, 16 protein spots were identified using MALDI-TOF-MS analysis and database searching. According to their characters, they may participate in different reactions, such as cold regulated protein, heat shock protein HSP26, aldehyde dehydrogenase are involved in stress reaction; auxin-responsive-like protein, ethylene receptor, calcium dependent protein kinase CP4, putative ethylene-responsive protein refer to signal cross pathway; and LEA A B19.1, LEA 1, Em protein, bZIP transcription factor, zinc finger protein, myb family transcription factor, starch synthase, putative cellulase play certain roles in the seed development. One of two unknown protein was a gene product without significant homology to any protein but with full-length cDNA or EST homology, which covers almost the entire length of partial sequence of rice. Another was not identified using MALDI-TOF-MS or ESI-MS/MS analysis and suggested to be a new ABA-responsive protein in ABA signal transduction system. The protein patterns were studied in different development stages, ABA concentrations and imbibed courses in dormant and non-dormant states, so as to analyze the relationship between this protein level and dormancy trait. The results indicated that the two proteins were synthesized in middle or late-stage of seed development, which is consistent with the behavior of dormancy. The expression of the two proteins was easier in dormant embryos than in non-dormant embryos. At least 5-fold ABA concentration was required to produce similar results in non-dormant embryos. During imbibition, the expression of the two proteins in dormant embryos was prolonged and disappeared with breaking of dormancy. It is suggested that the expression level of the two proteins has relation to the maintenance of seed dormancy states. It is possible to clone the encoding gene and identify its function to provide candidate loci for sprouting resistance breeding in wheat.

Key words [Wheat](#); [Embryo](#); [Seed dormancy](#); [ABA signal transduction](#); [Proteome](#)

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