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会议专栏

大豆 1-氨基环丙烷-1-羧酸合酶顺式天然反义转录物的分析鉴定

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摘　要: 1-氨基环丙烷-1-羧酸合酶(1-aminocyclopropane-1-carboxylate synthase, ACS)是植物乙烯生物合成途径中的关键酶, 催化了乙烯生物合成中由 S-腺苷蛋氨酸(S-adenosyl-L-methionine, SAM)转化为 1-氨基环丙烷-1-羧酸(1-aminocyclopropane-1-carboxylate, ACC)这一限速步骤。ACC 合酶由多基因家族编码, 在转录及转录后水平上受到多种生物和非生物因素的差异调节, 其表达调节机制复杂, 尚未完全清楚。最近的研究揭示, 在植物中发现的一些天然反义转录物(Natural antisense transcripts, NATs)在基因表达调节机制中发挥了不可忽视的作用, 因而天然反义转录物的研究受到了广泛的关注。本研究利用 RT-PCR 法在 6 种中国东北大豆中克隆出一种 ACC 合酶基因天然反义转录物, 序列测定结果表明这是一种顺式天然反义转录物(*cis*-NAT), 命名为 *ASACS2*。实时定量 RT-PCR(Real-time RT-PCR)测定结果表明, *ASACS2* 与其高丰度表达的正义转录物 *SACS2* 伴随表达, 并且在营养生长期得到了积累。令人感兴趣的是, 6 个大豆品种中 *ASACS2* 和 *SACS2* 的表达量保持一定比例, 且表现出品种特异性。目前的研究工作揭示了一种新的 NATs 可能参与的乙烯生物合成的调控机制, 为转基因育种和植物发育调控研究提供了新的思路。

关键词: 1-氨基环丙烷-1-羧酸(ACC)合酶, 天然反义转录物, 大豆, 实时定量 RT-PCR

Identification of a *cis*-natural Antisense Transcript of 1-aminocyclopropane -1- carboxylate Synthase in Soybean [*Glycine max* (L.) merr]

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Abstract: 1-aminocyclopropane-1-carboxylate (ACC) synthase is the rate-limiting enzyme in ethylene biosynthesis pathway in plants, which catalyzes the conversion from S-adenosylmethionine (SAM) to 1-aminocyclopropane-1-carboxylate (ACC). The ACC synthase (ACS) is encoded by a multiple gene family and its expression is differentially regulated by a complicated network composed of biotic and abiotic signals responding to both internal and external stimuli under the translational and posttranslational levels. However, its expression regulatory mechanism now still remains incompletely clear. Recent years, several researches showed that the Natural Antisense Transcripts (NATs) played a critical role in gene expression regulation in eukaryotic organism, which

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attracted increasing attentions. Recently, a putative ACC synthase *cis*–NAT was predicted in *Arabidopisis* by the genomic-wide scanning technique. In this study, a *cis*-natural antisense transcript (*cis*-NATs) of ACC synthase gene, named *ASACS2*, was identified from six northeastern soybean cultivars of China by RT-PCR and bidirectional sequencing. Further investigation by Real-time RT-PCR showed that during the vegetative growth stage *ASACS2* co-existed with its higher-abundant sense counterparts, *SACS2*. Interestingly, Real-time RT-PCR also showed that the ratio between *ASACS2* and *SACS2* remain constant in each cultivar, but varied among six cultivars, suggesting the cultivar specificity. This study indicates that *ASACS2* might be a potential regulatory actor in ethylene metabolism pathway. The further knowledge of this actor would facilitate us to better understand the gene regulation machinery in plants and the application in transgenic research.

Keywords: 1-aminocyclopropane-1-carboxylate (ACC) synthase, natural antisense transcripts (NATs), soybean, Real-time RT-PCR

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