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研究论文

NAD-IDH亚基1基因在油菜花粉与种子发育过程中的表达规律

陈喜文,陈德富,陈海浪

南开大学生命科学学院，天津 300071

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摘要 以甘蓝型油菜不同发育时期的花粉与种子为材料，开展了有关NAD-IDH亚基1基因表达规律的研究。结果表明，不同发育时期花粉与种子的NAD-IDH比活力均比叶片的高。花粉与种子发育过程中NAD-IDH比活力均呈抛物线状变化，这与亚基1基因的RNA定量斑点杂交和定量RT-PCR揭示的花粉与种子发育过程中NAD-IDH亚基1基因mRNA量的变化规律完全一致，即油菜NAD-IDH亚基1基因的表达受mRNA水平调控。不同品种（系）间叶片NAD-IDH比活力研究发现，油菜品种（系）间存在显著差异，但这种差异不是由亚基1基因的mRNA量差异所致，而是受转录后水平调控。本文也对NAD-IDH亚基1基因异常转录与农艺特性之间的关系进行了讨论。

关键词 NAD+-依赖型异柠檬酸脱氢酶 酶比活力 基因异常转录 发育

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The Gene Expression Pattern of NAD-IDH Subunit 1 during the Development of Pollen and Seed in Brassica napus

CHEN Xi-Wen, CHEN De-Fu, CHEN Hai-Lang

College of Life Sciences, Nankai University, Tianjin 300071

Abstract NAD+-dependent isocitrate dehydrogenase is a nuclear-encoding enzyme residing in mitochondria. The enzyme in Brassica napus is composed of three subunits encoded by three genes designated as Bnidh0, Bnidh1 and Bnidh2. In the earlier work we have found that the sequence of Bnidh1 cloned from Shaan 2A and Shaan 2B is not completely homology. There was a deletion existing in 14%—33% of Bnidh1 clone. In order to further understand its function and its relation with the agronomical characters, RNAs at different developmental stages of pollens and seeds in Brassica napus were used to study the gene expression of NAD-IDH subunit 1. The results indicated that NAD-IDH specific activity both in pollens and seeds were higher than in leaves. The NAD-IDH specific activity showed a parabolic curve-like changing pattern during the process of pollen or seed development (Fig.1, Fig.2). That was completely coincident with the changing pattern of the expressed mRNA amount, which was detected by quantitative dot hybridization and quantitative RT-PCR (Fig.3, Fig.4). It suggested that the gene expression of NAD-IDH both in pollens and seeds was regulated by the level of mRNA. The significant difference of leaf NAD-IDH specific activities was occurred in different cultivars or lines. Topas had the highest specific activity with 1.22 U/mg protein, while Ken C1 had relatively lower specific activity with 0.96 U/mg protein and Shaan 2B had the lower specific activity with 0.57 U/mg protein and Shaan 2A had the lowest specific activity with 0.38 U/mg protein (Table 1). But the difference was not caused by the expressed mRNA amount (Fig.5). Thus the expression of NAD-IDH in leaf was regulated by posttranscriptional mechanism. The agronomical characters affected by NAD-IDH were also discussed in this paper.

Key words NAD+-isocitrate dehydrogenase (NAD-IDH) Enzymatic specific activity Abnormal transcription Development

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通讯作者 陈德富 chendefu@nankai.edu.cn