

自交不亲和甘蓝亲和花粉授粉早期差异蛋白质分析

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Differential Proteomic Analysis of Brassica oleracea Stigma and Pollen Proteins During the Early Stage of Compatible Pollination

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摘要 为从蛋白质的角度揭示自交不亲和甘蓝亲和授粉早期花粉与柱头相互作用, 将蛋白质组学方法应用于自交不亲和性甘蓝柱头与亲和花粉互作早期差异蛋白质的研究。结果表明, 亲和授粉后3 ~ 5 min与1 h对比, 有116个差异蛋白质点, 而授粉后1 h与2 h差异不显著。按照特异表达与变化量大的蛋白质点优先原则, 初步选取差异点中71个点做质谱分析, 鉴定出31个可信差异蛋白质。与亲和授粉后3 ~ 5 min组相比, 1 h组中特异表达蛋白质有19个, 上调表达9个, 下调表达3个。31种蛋白质的生物信息学分析表明, 有两种蛋白与前人发现的与花粉管在柱头中生长发育相关蛋白相同, 其他29种参与包括胁迫与防御应答在内多种生理过程。对早期差异蛋白中这种“既有促进花粉管发育的蛋白, 也有与防御相关蛋白”现象分析表明, 花粉管生长性侵入柱头的过程有可能伴随着柱头抗性的提高。

关键词: 甘蓝 授粉 花粉 — 柱头相互作用 蛋白质组学 双向电泳

Abstract: In order to study the early pollen-stigma interaction in Brassica oleracea through proteomics analysis, inbred line A₄ was pollinated with inbred line K₁₀₁. Total stigma/pollen proteins were extracted by TCA/acetone at 3 ~ 5 min, 1 h and 2 h after pollination, respectively. Total proteins were separated by two-dimensional gel electrophoresis and analyzed through MALDI-TOF-TOF-MS mass spectrometry. 116 proteins were differentially expressed contrasted the total stigma/pollen proteins of 1 h and 3 ~ 5 min after pollination, but only 7 proteins expressed differentially contrasted the total stigma/pollen proteins of 1 h and 2 h after pollination. 71 protein spots were analyzed through MALDI-TOF-TOF-MS mass spectrometry, and 31 proteins were identified homologous to known proteins by MASCOT analysis. Compared with total stigma/ pollen proteins of 3 ~ 5 min after pollination, 19 of 31 identified proteins were specifically expressed 1 h after pollination, 9 up-regulated and 3 down-regulated ones. The predicted functions of the 31 protein were related to pollen tube development, Ca²⁺ binding, biosynthetic process, ransmembrane transport, defense response, protein folding, carbohydrate and energy metabolism, regulation of translation and methylation. This study has documented the dynamics of protein expression during the early pollen-stigma interaction in Brassica oleracea and provides insights into the fundamental mechanisms involved in these processes.

Keywords: *Brassica oleracea* L., pollination, pollen-stigma interaction, proteomics, 2-DE

引用本文:

陈松, 曾静, 高启国等. 自交不亲和甘蓝亲和花粉授粉早期差异蛋白质分析[J] 园艺学报, 2013, V40(1): 69-78

CHEN Song, ZENG Jing, GAO Qi-Guo etc. Differential Proteomic Analysis of Brassica oleracea Stigma and Pollen Proteins During the Early Stage of Compatible Pollination[J] ACTA HORTICULTURAE SINICA, 2013, V40(1): 69-78

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