

## 水稻叶片对镉胁迫响应的蛋白质差异表达

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## 摘要

为揭示水稻镉抗性的分子机理,以抗镉水稻品种PI312777和镉敏感水稻品种IR24为材料,在镉离子浓度为0(对照)、50和100  $\mu\text{mol} \cdot \text{L}^{-1}$ 条件下水培处理7 d,应用蛋白质组学方法分析了2种水稻叶片对镉胁迫响应的蛋白质差异表达.结果表明:镉胁迫下水稻PI312777叶片中共检测到差异表达蛋白质点31个,通过MALDI-TOF/MS分析,鉴定了其中的24个蛋白质(包括20个不同蛋白质,4个重复检出蛋白质);IR24叶片中共检测到差异表达蛋白质点19个,其中15个蛋白质得到鉴定.PI312777叶片鉴定出的20个蛋白质覆盖了IR24叶片鉴定的15个蛋白质,前者有4个与光合作用相关,11个与细胞防御代谢相关,3个与其他代谢相关,2个为功能未知蛋白.与对照相比,不同浓度镉胁迫下,抗镉水稻PI312777叶片中热激蛋白、谷胱甘肽还原酶、蛋白酶体 $\alpha$ 亚基6型、果糖1,6-二磷酸醛缩酶、硫氧还蛋白和DNA重组修复蛋白均上调表达;镉敏感水稻IR24叶片中热激蛋白、谷胱甘肽还原酶、蛋白酶体 $\alpha$ 亚基6型的表达无显著差异,果糖1,6-二磷酸醛缩酶和硫氧还蛋白则下调表达.此外,DNA重组修复蛋白仅在镉胁迫的PI312777叶片中表达.水稻PI312777比IR24具有更强的镉抗性与这些差异表达的蛋白质密切相关.

关键词: 水稻 镉 蛋白质组学 胁迫反应 双向电泳

## Abstract:

In order to explore the cadmium (Cd)-tolerance mechanism of rice (*Oryza sativa*), a hydroponic experiment with Cd-tolerant rice cultivar PI312777 and Cd-sensitive rice cultivar IR24 was conducted. The cultivars were treated with 0 (control), 50, and 100  $\mu\text{mol} \cdot \text{L}^{-1}$  of  $\text{Cd}^{2+}$  for 7 days, and the differential expression of proteins in their leaves were analyzed by two-dimensional electrophoresis and MALDI-TOF/MS approach. Under Cd stress, 31 protein spots in PI312777 leaves and 19 protein spots in IR24 leaves had significantly different expression, compared with the control. In PI312777 leaves, the 24 of 31 proteins had 4 proteins related to photosynthesis, 11 proteins related to cell metabolism and defense, 3 proteins related to other metabolism pathway, and 2 proteins were unknown proteins; in IR24 leaves, the 15 of 19 proteins were identified. Under Cd- stress, the heat shock protein, glutathione-diulfide reductase, poteasome subunit alpha type-6, 1,6-bisphosphate aldolase, thioredoxin, and DNA repair-recombination protein in PI312777 leaves were up-regulated expressed, while these proteins in IR24 were not significantly changed except the down-regulation of 1,6-bisphosphate aldolase and thioredoxin. The higher Cd-tolerance of PI312777 could have close relations with the differentially expressed proteins.

Key words: *Oryza sativa* cadmium proteomics stress response two-dimensional electrophoresis

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