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您当前所在的位置: 首页 > 科学研究 > 科技成果 > 科技成果

经作所蔬菜团队在国际学术期刊《International Journal of Molecular Sciences》上发表辣椒叶片发育研究文章

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3月3日, 经作所蔬菜团队在国际学术期刊《International Journal of Molecular Sciences》(JCR一区, IF=6.208)在线发表题为“Silencing of pepper *CaFtsH1* or *CaFtsH8* genes alters normal leaf development”的研究论文。

*FtsH*是一种蛋白水解酶, 在植物光形态发生和抗逆性中发挥重要作用。该研究通过对辣椒*FtsH*基因家族的全基因组鉴定、比较进化与组织表达分析, 发现*CaFtsH1*和*CaFtsH8*基因对辣椒叶绿体发育和正常存活至关重要, 在对两个基因进行VIGS功能验证后, 利用亚细胞定位、透射电镜、转录组、酵母双杂交对其分子机理解析。本研究丰富了辣椒叶绿体发育和光合作用调控网络, 为提升辣椒光合效率奠定理论基础。

徐凯助理研究员为论文第一作者, 姚明华研究员和王飞研究员为通讯作者, 省农科院经作所为通讯单位。该论文获国家重点研发计划项目(2021YFD1600300), 现代农业技术体系建设专项资金项目(CARS-23-G28), 湖北省重点研发计划(2022BBA0066), 湖北省自然科学基金项目(2022CFC055)以及省农科院青年科学基金项目(2023NKYJJ09)的支持。



Article

Silencing of Pepper *CaFtsH1* or *CaFtsH8* Genes Alters Normal Leaf Development

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Abstract: Filamentation temperature-sensitive H (*FtsH*) is a proteolytic enzyme that plays an important role in plant photomorphogenesis and stress resistance. However, information regarding the *FtsH* family genes in pepper is limited. In our research, through genome-wide identification, 18 members of the pepper *FtsH* family (including five *FtsHi* members) were identified and renamed based on phylogenetic analysis. *CaFtsH1* and *CaFtsH8* were found to be essential for pepper chloroplast development and photosynthesis because *FtsH5* and *FtsH2* were lost in Solanaceae diploids. We found that the *CaFtsH1* and *CaFtsH8* proteins were located in the chloroplasts and specifically expressed in pepper green tissues. Meanwhile, *CaFtsH1* and *CaFtsH8*-silenced plants created by virus-induced gene silencing exhibited albino leaf phenotypes. In addition, *CaFtsH1*-silenced plants were observed to contain very few dysplastic chloroplasts and lost the capacity for photoautotrophic growth. Transcriptome analysis revealed that the expression of chloroplast-related genes such as those coding the photosynthesis-antenna protein and structural proteins was downregulated in *CaFtsH1*-silenced plants, resulting in the inability to form normal chloroplasts. This study improves our understanding of pepper chloroplast formation and photosynthesis through the identification and functional study of *CaFtsH* genes.

Keywords: pepper; *CaFtsH1*; *CaFtsH8*; chloroplast development; virus-induced gene silencing

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