高表达的 BZR 转录因子赋予棉花多重耐受性

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摘要:油菜素内酯(Brassinosteroids, BRs)是植物体内的一种类固醇激素,在植物生长发育、光形态发生以及对非生物胁迫的响应等诸多生物学过程中发挥着重要作用。BRASSINAZOLE-RESISTANT(BZR)转录因子是 BR 信号通路的核心组成部分,参与了许多植物的发育过程。为了探究 BZR 基因在棉花中的功能,对 BZR 基因家族进行了生物信息学分析。通过系统发育分析,将 67 个 BZR 基因划分为 3 个亚家族,并通过保守基序和保守结构域分析验证了这一划分。分析了 BZR 基因在冷、热、盐和干旱处理下的表达水平,以预测其在非生物胁迫下的功能。BZR 基因启动子分析表明,光信号可以增强 BZR 的转录活性。上述结果结合 GhBZR 蛋白相互作用网络,表明 GhBZR 与 PIF4 的相互作用可能在棉花应对非生物胁迫中发挥重要作用。还对 GhBZR 互作网络中的相关基因进行了分析讨论。这些发现为进一步了解 BZR 在棉花中的功能奠定了基础。

关键词:BZR 转录因子;棉花;非生物胁迫;基因网络;表达分析

Highly expressed BZR transcription factors confer multi-tolerances in cotton

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Abstract: Brassinosteroids (BRs), as a type of steroid hormone in plants, play an important role in many biological processes, such as plant growth and development, light morphogenesis, and the response to abiotic stress. The BRASSINAZOLE-RESISTANT (BZR) transcription factor is a core component of the BR signaling pathway and is involved in the development of many plant species. To explore the function of BZR genes in cotton, we performed a bioinformatics analysis of the BZR gene family. Sixty-seven BZR genes were identified and divided into three subfamilies through phylogenetic analysis, and this division was verified by the analysis of conserved motifs and conserved domains. The expression level of BZR under cold, heat, salt and drought treatments were also analyzed to predict function of BZR under abiotic stress. Promoter analysis of BZR genes showed that light signaling can enhance the BZR transcriptional activity. These results combined with the GhBZR protein interaction network, demonstrated that the interaction between GhBZR and PIF4 may play an important role in the response to abiotic stress. In this study, the related genes in the GhBZR interaction network were also discussed. These findings lay a foundation for further understanding the function of BZR in cotton.

Keywords: BZR transcription factors; cotton; abiotic stress; gene network; expression analysis

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