2022年第35期总358期

蔬菜育种专题

本期导读

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科技图书

1. 土壤和植物中的有害和微量物质的来源、影响和管理

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学术文献

1. Genome-wide identification of the pectin methylesterase inhibitor genes in Brassica napus and expression analysis of selected members(甘蓝型油菜果胶甲基酯酶抑制剂基因的全基因组鉴定及部分成员的表达分析)

简 介： Pectin methylesterase inhibitors (PMEIs) modulate the status of pectin methylesterification by inhibiting the activity of pectin methylesterase (PME). Recent advances indicate PMEIs play an important role in regulating plant cell wall properties and defense responses. In this study, a genome-wide analysis of PMEI gene family in Brassica napus (B. napus) was conducted and the expression patterns of PMEI genes in response to Sclerotinia sclerotiorum (S. sclerotiorum) was investigated. A total of 190 PMEI proteins were identified from the genome of B. napus. Chromosomal location, gene structure and properties of the PMEI family were analyzed, and these features were compared with Arabidopsis thaliana (A. thaliana). A total of 123 syntenic ortholog pairs were detected from BnPMEI family by synteny analysis. Results showed the expansion of BnPMEI genes was likely predominately from whole-genome duplication (WGD) or segmental duplications. Multiple cis-elements related to plant growth and development, environmental stress responses, hormone responses were detected in the promoters of BnPMEI genes, implying they were regulated by both internal and external factors. Furthermore, expression analysis of transcriptome data combined with quantitative RT-PCR (qRT-PCR) validation identified several candidates that were strongly responsive to S. sclerotiorum infection. These BnPMEI genes are candidates for manipulation to breed novel and improved genotypes that are more resistant to sclerotinia stem rot (SSR). Extensive interactions were detected among 30 BnPMEI proteins, forming complex protein-protein interaction networks. Besides, 48 BnPMEIs showed interactions with other proteins including a range of cell wall structure-related enzymes. This study provides new insights into the evolution and function of PMEIs in B. napus and lays a foundation for breeding novel genotypes for crop improvement.

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2. Biochar-Based Fertilizer Improved Crop Yields and N Utilization Efficiency in a Maize-Chinese Cabbage Rotation System(生物炭肥提高玉米-大白菜轮作系统作物产量和氮素利用率)

简介：Optimizing fertilization strategies is crucial for obtaining high crop yields and efficient N utilization. This study aimed to understand the potential increase in crop yield and the N utilization efficiency under biochar-based fertilizer (BF) in a maize-Chinese cabbage rotation system. Biochar-based slow-release fertilizer (BF) is an important nutrient-efficient

management strategy. The yields and growth-related traits of the crops, N utilization efficiency, quality, and dynamic changes in soil inorganic N in a maize-cabbage rotation system were investigated in a pot experiment under three N fertilizer application strategies in 2019-2020; the maize stage included (1) zero-N fertilizer, i.e., control (N 0 g pot^{-1}); (2) NPK (N 5.25 g pot^{-1}); and (3) BF (N 5.25 g pot^{-1}). The Chinese cabbage stage included (1) zero-N fertilizer, i.e., control (N 0 g pot^{-1}); (2) NPK (N 6.25 g pot^{-1}); and (3) BF (N 6.25 g pot^{-1}). Compared with the CK and NPK treatments, the BF treatment had the highest average maize and Chinese cabbage yields at 86.99 g $plant^{-1}$ and 498.88 g $plant^{-1}$, respectively. BF improved the plant height, stem diameter, and ear height of maize and the leaf length, leaf width, and leaf number of Chinese cabbage, as well as increased the N utilization efficiency of maize and cabbage. BF increased the starch content of maize grain and the amino acid, sugar, and vitamin C contents of cabbage. In the critical growth stages of maize and Chinese cabbage, BF application increased the content of soil inorganic N, which coincided with the nutrient requirements in the critical growth stages of the crops. Overall, BF is an effective method to improve crop yield and N utilization in the maize-Chinese cabbage rotation systems and is a fertilization strategy with broad applicability prospects.

来源： Agriculture

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http://agri.ckcest.cn/file1/M00/03/3C/CsgkOYdZ8b-AA2IIACRLvtlAxPQ499.pdf

3. Identification and Characterization of PTE-2, a Stowaway-like MITE Activated in Transgenic Chinese Cabbage Lines(转基因大白菜系中PTE-2的识别和表征)

简介： Transposable elements (TEs) are DNA fragments that can be replicated or transposed within a genome. TEs make up a high proportion of the plant genome and contribute to genetic diversity and evolution, affecting genome structure or gene activity. Miniature inverted-repeat transposable elements (MITEs) are short, non-autonomous class II DNA transposable elements. MITEs have specific sequences, target site duplications (TSDs), and terminal inverted repeats(TIRs), which are characteristics of the classification of MITE families. In this study, a Stowaway-like MITE, PTE-2, was activated in transgenic Chinese cabbage lines. PTE-2 was revealed by in silico analysis as the putative activated element in transgenic Chinese cabbage lines. To verify the in silico analysis data, MITE insertion polymorphism (MIP) PCR was conducted and PTE-2 was confirmed to be activated in transgenic Chinese cabbage lines. The activation tendency of the copy elements of PTE-2 at different loci was also analyzed and only one more element was activated in the transgenic Chinese cabbage lines. Analyzing the sequence of MIP PCR products, the TSD sequence and TIR motif of PTE-2 were identified and matched to the characteristics of the Stowaway-like MITE family. In addition, the flanking region of PTE-2 was modified when PTE-2 was activated.

来源： Genes

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全文链接:

http://agri.ckcest.cn/file1/M00/10/0E/CsgkOGMDQZSAHed4ADU3gpXGNrc108.pdf

4. Contrary to Red, Blue Monochromatic Light Improves the Bioactive Compound Content in Broccoli Sprouts（与红单色光相比，蓝单色光更能提高西兰花芽中活性化合物的含量）

简介：Broccoli sprouts are rich in health-promoting bioactive compounds. Their content depends on both cultivation light quality and temperature. However, these effects have been previously addressed in isolation. Here, the dual inputs of cultivation light quality [blue (B), red (R), mixture of R and B (R+B), mixture of R and UVA (R+UVA)] and air temperature (15, 19, and 23 ℃) on determining growth, external quality, and the cotyledon and hypocotyl content of five major bioactive compounds were investigated. The carbohydrate status at harvest and postharvest ratio of variable to maximum fluorescence (F_v/F_m) were also assessed. Hypocotyl length was generally enhanced under monochromatic light (R or B) and elevated temperature. Total phenolic, total flavonoid, and glucoraphanin contents were generally higher in cotyledon as compared to hypocotyl. Hypocotyl anthocyanin, total phenolic, total flavonoid, and ascorbic acid contents were generally enhanced by R+B, and were decreased by R. Cotyledon content in these metabolites was generally stimulated by B, and reduced under R or R+UVA. Temperature affected metabolite content depending on the metabolite, organ, and light quality. Lower temperatures, R (23 ℃) or R+UVA (15, 19, and 23 ℃) were associated with decreased postharvest F_v/F_m. In conclusion, low cultivation temperature (<23 ℃), as well as R or R+UVA ought to be avoided. Instead, B and R+B are suitable, with B being preferable, owing to better external quality and enhanced metabolite content in cotyledon which generally holds higher content than hypocotyl.

来源：Agronomy

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http://agri.ckcest.cn/file1/M00/03/3C/CsgkOYdZ8wCAOil7AClH6GkMck8538.pdf

科技图书

1. Hazardous and Trace Materials in Soil and Plants - Sources, Effects and Management（土壤和植物中的有害和微量物质的来源、影响和管理）

简介：Hazardous and Trace Materials in Soil and Plants: Sources, Effects and Management explores the latest advancements in reducing, avoiding and eliminating soil contaminants that challenge the health and safety of agricultural plants. With a focus on minimizing the production of those hazardous substances, controlling their distribution and ensuring safe utilization, the book explores each contributing area and provides insights toward improved, sustainable and secure production. This is an excellent reference resource on both current research and future directions from laboratory research to field applications. The combined impacts of climate change and industrialization have led to increased and diversified threats

to the health of the soil in which our food crops are grown, as well as in the plants themselves. This dual-hazard scenario is increasingly recognized as a threat to not just the environment, but to global food security as agricultural soils contaminated with pollutants alter plant metabolism, thus resulting in reduced crop quality and production quantity.

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http://agri.ckcest.cn/file1/M00/03/3C/CsgkOYdZ9DyAFEbLAAqgBRrDqD0941.pdf