2024年第18期 总431期

茶学研究专题

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相关专利

1. 一种增强植物抗病性的小分子挥发物及其应用

科技图书

1. 植物抗病性的生物技术进展

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学术文献

1. Plant–plant communication in *Camellia japonica* and *C. rusticana* via volatiles（山茶和山茶植物间通过挥发物的交流）

简介：Plants emit volatile compounds when they are subjected to herbivorous, pathogenic, or artificial damages. Both the damaged plant and the neighboring intact plants induce resistance when they receive these volatiles, a phenomenon known as plant–plant communication. However, field observations of this phenomenon are limited. To understand the nature of plant–plant communication, we collected information about intra- and inter-plant signaling via volatiles in *Camellia japonica* and *C. rusticana* under natural conditions. We exposed intact branches of damaged plant (intra-plant) or neighboring plant (inter-plant) to artificially damaged plant volatiles (ADPVs). Leaf damage reduced in ADPVs-exposed branches in the neighboring plants compared to branches that were exposed to volatiles from intact leaves, thus, indicating that inter-plant signaling occur by the emission of volatiles from damaged leaves. We also conducted an air-transfer experiment wherein the headspace air of the damaged branch was transferred to the headspace of intact branches. Leaf damage reduced on the ADPVs-transferred branch compared to the control branch. The effect of volatiles on damage reduction lasted for three months. Our results indicate that ADPVs in *Camellia* species contain cues that induce resistance in neighboring plants. Our findings improve understanding of plant defense strategies that may be used in horticulture and agriculture.

来源：Scientific Reports 期刊

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全文链接:http://agri.nais.net.cn/file1/M00/03/6D/Csgk0WYSCTKAJXFUACLdK4w76vs599.pdf

2. Behavioral and molecular response of the insect parasitic nematode Steinernema carpocapsae to plant volatiles（昆虫寄生性小卷蛾斯氏线虫对植物挥发物的行为和分子反应）

简介：Entomopathogenic nematodes (EPNs) use the chemical cues emitted by insects and insect-damaged plants to locate their hosts. *Steinernema carpocapsae*, a species of EPN, is an established biocontrol agent used against insect pests. Despite its promising potential, the molecular mechanisms underlying its ability to detect plant volatiles remain poorly understood. In this study, we investigated the response of *S. carpocapsae* infective juveniles (IJs) to 8 different plant volatiles. Among these, carvone was found to be the most attractive volatile compound. To understand the molecular basis of the response of IJs to carvone, we used RNA-Seq technology to identify gene expression changes in response to carvone treatment. Transcriptome analysis revealed 721 differentially expressed genes (DEGs) between carvone-treated and control groups, with 403 genes being significantly upregulated and 318 genes downregulated. Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) analysis showed that the responsive DEGs to carvone attraction were mainly involved in locomotion, localization, behavior, response to stimulus, and olfactory transduction. We also identified four upregulated genes of chemoreceptor and response to stimulus that were involved in the response of IJs to carvone attraction. Our results provide insights into the potential transcriptional mechanisms underlying the response of *S.*

carpocapsae to carvone, which can be utilized to develop environmentally friendly strategies for attracting EPNs.

来源： Journal of Invertebrate Pathology 期刊

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3. High-resolution kinetics of herbivore-induced plant volatile transfer reveal clocked response patterns in neighboring plants（草食昆虫诱导植物挥发物转移的高分辨率动力学揭示了邻近植物的时钟响应模式）

简介： Volatiles emitted by herbivore-attacked plants (senders) can enhance defenses in neighboring plants (receivers), however, the temporal dynamics of this phenomenon remain poorly studied. Using a custom-built, high-throughput proton transfer reaction time-of-flight mass spectrometry (PTR-ToF-MS) system, we explored temporal patterns of volatile transfer and responses between herbivore-attacked and undamaged maize plants. We found that continuous exposure to natural blends of herbivore-induced volatiles results in clocked temporal response patterns in neighboring plants, characterized by an induced terpene burst at the onset of the second day of exposure. This delayed burst is not explained by terpene accumulation during the night, but coincides with delayed jasmonate accumulation in receiver plants. The delayed burst occurs independent of day:night light transitions and cannot be fully explained by sender volatile dynamics. Instead, it is the result of a stress memory from volatile exposure during the first day and secondary exposure to bioactive volatiles on the second day. Our study reveals that prolonged exposure to natural blends of stress-induced volatiles results in a response that integrates priming and direct induction into a distinct and predictable temporal response pattern. This provides an answer to the long-standing question of whether stress volatiles predominantly induce or prime plant defenses in neighboring plants, by revealing that they can do both in sequence.

来源： eLife 网站

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全文链接: http://agri.nais.net.cn/file1/M00/10/3F/Csgk0EG7tG-ALjRCADo8wQd70XI200.pdf

4. Sensing of Airborne Infochemicals for Green Pest Management: What Is the Challenge?（空气中信息化学物质的传感用于绿色有害生物管理：挑战是什么?）

简介： One of the biggest global challenges for our societies is to provide natural resources to the rapidly expanding population while maintaining sustainable and ecologically friendly products. The increasing public concern about toxic insecticides has resulted in the rapid development of alternative techniques based on natural infochemicals (ICs). ICs (e.g., pheromones, allelochemicals, volatile organic compounds) are secondary metabolites produced by plants and animals and used as information vectors governing their interactions. Such chemical language is the primary focus of chemical ecology, where behavior-modifying chemicals are used as tools for green pest management. The success of ecological programs highly depends on several factors, including the amount of ICs that enclose the crop, the range of their diffusion, and the uniformity of their

application, which makes precise detection and quantification of ICs essential for efficient and profitable pest control. However, the sensing of such molecules remains challenging, and the number of devices able to detect ICs in air is so far limited. In this review, we will present the advances in sensing of ICs including biochemical sensors mimicking the olfactory system, chemical sensors, and sensor arrays (e-noses). We will also present several mathematical models used in integrated pest management to describe how ICs diffuse in the ambient air and how the structure of the odor plume affects the pest dynamics.

来源：ACS Sensors 期刊

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全文链接:http://agri.nais.net.cn/file1/M00/03/6D/Csgk0WYTTXSAHTpKAE5zVf6xlqw584.pdf

相关专利

1．A small molecule volatile that enhances plant disease resistance and its application（一种增强植物抗病性的小分子挥发物及其应用）

简介：本发明涉及一种增强植物抗病性的小分子挥发物及其应用，具体地，本发明提供一种式I化合物或其药学上可接受的盐的用途，用于增强植物对病原菌的抗性；或制备组合物或制剂，所述制剂或组合物用于增强植物对病原菌的抗性。本发明还首次发现，式I化合物通过激活植物本身的免疫响应来增强植物对病原菌的抗性，对植物以及病原菌的正常生长无影响。

来源：中国专利

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全文链接:http://agri.nais.net.cn/file1/M00/03/6D/Csgk0WYTWuCAKqi9AAuxuNuEIVs102.PDF

科技图书

1．Biotechnological Advances for Disease Tolerance in Plants（植物抗病性的生物技术进展）

简介：This book covers the biotechnological advances being used for the understanding of plant diseases and the subsequent enhancement of disease resistance in crop plants. Chapters are focused on recent advances in sequencing technologies, computational resources and genomics tools useful for the identification of loci governing disease resistance. In addition, emphasis is given to novel approaches like genomic selection for achieving significant genetic gain for quantitative disease resistance. The book thoroughly describes sequencing-based approaches like whole genome sequencing, resequencing, and transcriptome profiling being explored for the understanding of disease resistance mechanisms. Finally, several chapters systematically describing the utilities and concerns of high-end technologies like genome-editing are provided. Simplified Illustrations are provided in every chapter to explain different biotechnological approaches and strategies.

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