2024年第27期 总440期

茶学研究专题

本期导读

学术文献

1. 利用代谢组学研究植物对病虫害和病原体的防御反应
2. 利用真菌挥发性化合物缓解植物生长与抗逆性之间的权衡
3. 植物的系统气孔响应：在气候变化下协调发育、胁迫和病原体防御
4. 利用农业植物挥发性有机化合物提高作物的可持续防御策略和生产力

相关专利

1. 用于识别和确定植物在正常和胁迫条件下的独特挥发物通讯防御信号的过程及其方法
2. 在作物植物中增加的真菌抗性

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学术文献

1. Metabolomics-driven investigation of plant defense response against pest and pathogen attack（利用代谢组学研究植物对病虫害和病原体的防御反应）

简介： Plant metabolomics has opened a wide paradigm of opportunities for developing stress-tolerant plants, ensuring better food quality and quantity. However, despite advantageous methods and databases, the technique has a few limitations, such as ineffective 3D capturing of metabolites, low comprehensiveness, and lack of cell-based sampling. In the future, an expansion of plant-pathogen and plant-pest response towards the metabolite architecture is necessary to understand the intricacies of plant defence against invaders, elucidation of metabolic pathway operational during defence and developing a direct correlation between metabolites and biotic stresses. Our aim is to provide an overview of metabolomics and its utilities for the identification of biomarkers or key metabolites associated with biotic stress, devising improved diagnostic methods to efficiently assess pest and pathogen attack and generating improved crop varieties with the help of combined application of analytical and molecular tools.

来源： Physiologia Plantarum 期刊

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全文链接: http://agri.nais.net.cn/file1/M00/03/6F/Csgk0WZyN_SAGaaNAOCUC14PUpc638.pdf

2. Mitigating the Trade-Off between Growth and Stress Resistance in Plants by Fungal Volatile Compounds（利用真菌挥发性化合物缓解植物生长与抗逆性之间的权衡）

简介： Plants grow in association with diverse microorganisms. During communication between plants and microbes, beneficial and phytopathogenic bacteria and fungi emit various volatile compounds (VCs). These microbial VCs (mVCs) are typically small, odorous compounds with low-boiling point, high-vapor pressure and a lipophilic moiety (Schulz and Dickschat 2007). Based on recent studies, mVCs appear to regulate plant-nutrient acquisition, photosynthesis, phytohormone actions and metabolic processes, leading to an improvement in plant performance (Fincheira et al. 2021). Since mVCs can activate plant defenses and/or promote plant growth and development at low concentrations, their application in agriculture is attractive to efficiently grow crops and improve plant health in the absence of excess usage of chemical fertilizers and pesticides. To this end, mVCs have been used for integrated pest management (IPM) to enhance both crop defense and production in field conditions (Brilli et al. 2019). Understanding the molecular action of mVCs in plants will pave the way toward improved crop protection and ecosystem management.

来源： Plant and Cell Physiology 期刊

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全文链接: http://agri.nais.net.cn/file1/M00/10/42/Csgk0GZyOjqAFsPFAAR5pnr6Cm8366.pdf

3. Systemic stomatal responses in plants: Coordinating development, stress, and pathogen defense under a changing climate（植物的系统气孔

响应：在气候变化下协调发育、胁迫和病原体防御）

简介：To successfully survive, develop, grow and reproduce, multicellular organisms must coordinate their molecular, physiological, developmental and metabolic responses among their different cells and tissues. This process is mediated by cell-to-cell, vascular and/or volatile communication, and involves electric, chemical and/or hydraulic signals. Within this context, stomata serve a dual role by coordinating their responses to the environment with their neighbouring cells at the epidermis, but also with other stomata present on other parts of the plant. As stomata represent one of the most important conduits between the plant and its above-ground environment, as well as directly affect photosynthesis, respiration and the hydraulic status of the plant by controlling its gas and vapour exchange with the atmosphere, coordinating the overall response of stomata within and between different leaves and tissues plays a cardinal role in plant growth, development and reproduction. Here, we discuss different examples of local and systemic stomatal coordination, the different signalling pathways that mediate them, and the importance of systemic stomatal coordination to our food supply, ecosystems and weather patterns, under our changing climate. We further discuss the potential biotechnological implications of regulating systemic stomatal responses for enhancing agricultural productivity in a warmer and CO_2-rich environment.

来源：Plant, Cell & Environment 期刊

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4. Exploiting Plant Volatile Organic Compounds (VOCs) in Agriculture to Improve Sustainable Defense Strategies and Productivity of Crops （利用农业植物挥发性有机化合物提高作物的可持续防御策略和生产力）

简介：There is an urgent need for new sustainable solutions to support agriculture in facing current environmental challenges. In particular, intensification of productivity and food security needs require sustainable exploitation of natural resources and metabolites. Here, we bring the attention to the agronomic potential of volatile organic compounds (VOCs) emitted from leaves, as a natural and eco-friendly solution to defend plants from stresses and to enhance crop production. To date, application of VOCs is often limited to fight herbivores. Here we argue that potential applications of VOCs are much wider, as they can also protect from pathogens and environmental stresses. VOCs prime plant's defense mechanisms for an enhanced resistance/tolerance to the upcoming stress, quench reactive oxygen species (ROS), have potent antimicrobial as well as allelopathic effects, and might be important in regulating plant growth, development, and senescence through interactions with plant hormones. Current limits and drawbacks that may hamper the use of VOCs in open field are analyzed, and solutions for a better exploitation of VOCs in future sustainable agriculture are envisioned.

来源：Frontiers in Plant Science 期刊

发布日期:2019-03-19

全文链接:http://agri.nais.net.cn/file1/M00/03/6F/Csgk0WZyNTuAXB6GACojOj-cTxI544.pdf

相关专利

1. A process for identifying and determining the unique volatile communication defense signals from plants under normal and stress conditions and methods thereof（用于识别和确定植物在正常和胁迫条件下的独特挥发物通讯防御信号的过程及其方法）

简介：本发明提供一种用于检测和识别任何植物的挥发物特征/指纹的方法，用于物种间/物种内通讯。这种作物特异性指纹是根据特定植物（作物/非作物）在不同成熟度、气候条件和不同胁迫水平下收集的挥发物数据建立的。该过程用于识别和确定植物在正常和压力条件下的独特挥发物通讯防御信号，包括识别挥发性指纹、合并收获前和收获后产品的挥发物指纹、收集不同变量（如品种、腐败、地理位置等）的挥发物特征，以及通过Petrichorr等储存库识别植物的相应防御机制。使用分析色谱法（如GC和LC）与质谱检测器和/或通过不同（特异性和/或非特异性）的挥发物传感器来测定和量化挥发物指纹。对来自不同分析方法和传感器的挥发物图谱进行整合、表征和分析，以建立特定作物品种的挥发物指纹图谱。

来源：印度专利

发布日期:2024-01-05

全文链接:http://agri.nais.net.cn/file1/M00/10/42/Csgk0GZyREWAVip8ADs27btdOP4179.pdf

2. INCREASED FUNGAL RESISTANCE IN CROP PLANTS（在作物植物中增加的真菌抗性）

简介：The present invention relates to a nucleic acid molecule encoding a polypeptide conferring resistance to a plant against a fungal pathogen, such as *Helminthosporium turcicum*. The present invention further relates to a plant (or part thereof) comprising the nucleic acid molecule, and methods involving the nucleic acid molecule.

来源：西班牙专利

发布日期:2023-10-11

全文链接:http://agri.nais.net.cn/file1/M00/10/42/Csgk0GZyoWaAYysMAD5w_P-NwsY942.pdf