2023年第33期 总394期

茶学研究专题

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1. 对病原菌抗性增强的植物及其提高植物病原菌抗性的方法

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学术文献

1. Alterations in the odor profile of plants in cultivar mixtures affect aphid host-location behavior（混合栽培植物的气味特征改变影响蚜虫的寄主定位行为）

简介：The effect of cultivar mixtures on aphid control is attributed to the masking or alteration of host-preferred cultivar odor cues. However, the underlying physiological mechanism remains unclear. This study assessed alterations in the volatile emissions of wheat cultivars grown together (Florence-Aurora and Forment; Florence-Aurora and Montcada) and the consequences for the olfactory preference of aphids. Volatile organic compounds were collected from wheat plants grown in a laboratory under mixed or monoculture conditions and subsequently analyzed. The odor profiles of Florence-Aurora and Montcada were indistinguishable from each other. However, the odors of Florence-Aurora and Forment grown in monocultures differed significantly from those emitted by their mixture. The Florence-Aurora and Forment mixture induced plant physiological responses that affected the emission of single volatile compounds and, consequently, altered volatile organic compound ratios. English grain aphids (*Sitobion avenae*) were less attracted to the odors of Florence-Aurora and Forment when grown as a mixture than the combination of the odors from Florence-Aurora and Forment monocultures. Moreover, aphids preferred clean air over the odor from the Florence-Aurora and Forment mixture but preferred the odor from the Florence-Aurora and Montcada mixture over clean air. This study highlights the beneficial effects of intraspecific plant diversity on aphid control by altering plant odors in response to plant-plant interactions. The emission of less attractive odor cues consequently affects plant-aphid interactions; hence, less attractive odors are likely to impair aphid host-locating behavior. This effect was exclusive to certain cultivar mixtures, which supports the “right neighbor” concept.

来源：Frontiers in Plant Science 期刊

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2. Volatile-mediated plant–plant communication and higher-level ecological dynamics（挥发物介导的植物间交流与更高层次的生态动力学）

简介：Volatile organic compounds (VOCs) in general and herbivory-induced plant volatiles (HIPVs) in particular are increasingly understood as major mediators of information transfer between plant tissues. Recent findings have moved the field of plant communication closer to a detailed understanding of how plants emit and perceive VOCs and seem to converge on a model that juxtaposes perception and emission mechanisms. These new mechanistic insights help to explain how plants can integrate different types of information and how environmental noise can affect the transmission of information. At the same time, ever-new functions of VOC-mediated plant-plant interactions are being revealed. Chemical information transfer between plants is now known to fundamentally affect plant organismal interactions and, additionally, population,

community, and ecosystem dynamics. One of the most exciting new developments places plant-plant interactions along a behavioral continuum with an eavesdropping strategy at one end and mutually beneficial information-sharing among plants within a population at the other. Most importantly and based on recent findings as well as theoretical models, plant populations can be predicted to evolve different communication strategies depending on their interaction environment. We use recent studies from ecological model systems to illustrate this context dependency of plant communication. Moreover, we review recent key findings about the mechanisms and functions of HIPV-mediated information transfer and suggest conceptual links, such as to information theory and behavioral game theory, as valuable tools for a deeper understanding of how plant-plant communication affects ecological and evolutionary dynamics.

来源：Current Biology 期刊

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3. Two-way communication: Volatile emission and uptake occur through the same barriers（双向交流：挥发物的排放和吸收通过相同的屏障发生）

简介：Volatile organic compounds (VOCs) are released from aboveground organs into the atmosphere and/or from roots into the soil, allowing plants to communicate and interact with their environment, including with each other. Plant-plant communication via VOCs includes intra- and inter-species signaling as well as within-plant self-signaling. In some recipient tissues, for example, VOC perception encompasses storing the modified VOC for direct defense against herbivores or increasing tolerance to abiotic stresses. In addition, or alternatively, perceived VOCs may initiate signaling cascades that prime plant defenses. In all cases, plant VOCs are first released into the environment before being taken up and perceived by the same or neighboring plants. While significant progress has been made over the last several years to elucidate how VOCs are released from plant cells, these studies have also revealed new questions about how communicated VOCs are imported across cellular barriers. Recent reviews and a special issue have proposed mechanisms for VOC perception and signaling. In this Opinion piece, we shed light on the gaps in knowledge about VOC import and offer perspectives for future research aiming at understanding the molecular mechanisms underlying VOC-mediated communication in plants.

来源：Molecular Plant 期刊

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4. Integration of two herbivore-induced plant volatiles results in synergistic effects on plant defence and resistance（两种草食动物诱导的植物挥发物混合导致植物防御和抗性的协同效应）

简介：Plants can use induced volatiles to detect herbivore- and pathogen-attacked neighbors and prime their defenses. Several individual volatile priming cues have been identified, but whether

plants are able to integrate multiple cues from stress-related volatile blends remains poorly understood. Here, we investigated how maize plants respond to two herbivore-induced volatile priming cues with complementary information content, the green leaf volatile (*Z*)-3-hexenyl acetate (HAC) and the aromatic volatile indole. In the absence of herbivory, HAC directly induced defence gene expression, whereas indole had no effect. Upon induction by simulated herbivory, both volatiles increased jasmonate signalling, defence gene expression, and defensive secondary metabolite production and increased plant resistance. Plant resistance to caterpillars was more strongly induced in dual volatile-exposed plants than plants exposed to single volatiles. Induced defence levels in dual volatile-exposed plants were significantly higher than predicted from the added effects of the individual volatiles, with the exception of induced plant volatile production, which showed no increase upon dual-exposure relative to single exposure. Thus, plants can integrate different volatile cues into strong and specific responses that promote herbivore defence induction and resistance. Integrating multiple volatiles may be beneficial, as volatile blends are more reliable indicators of future stress than single cues.

来源： Plant, Cell & Environment 期刊

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全文链接: http://agri.ckcest.cn/file1/M00/03/5C/Csgk0YkXMUiASP3lABWK40urblE075.pdf

会议论文

1．Antifungal Activity of Volatile Organic Compounds from *Trichoderma virens*（绿木霉挥发性有机化合物的抑菌活性）

简介： *Trichoderma* species have been widely used as biofungicides and biofertilizers to control many plant pathogens and to enhance plant growth and its resistance. The production of volatile organic compounds (VOCs) is one of the modes of actions of *Trichoderma* sp. to directly inhibit pathogenic fungi/bacteria and to induce systemic resistance of plants. Forty-three VOCs were identified from seven stains of *T. virens* which were analyzed using gas chromatography-mass spectrometry (GC-MS). Solid phase micro-extraction (SPME) was performed prior to sample injection. Most of the compounds were sesquiterpenes known as antifungal chemicals (i.e aromanderen, element, cadinene, and 2-Octanone), monoterpene (limonene and bisnorhopane), and fatty acids (oleic acid, and monopalmtin). Other VOCs were identified having antifungal activity and plant growth promoters such as caryophyllene and thojupsene. *In vitro* assay of antifungal activity showed that VOCs produced by *T.virens* inhibited the growth of *R.solani* up to 59.4% at 5 days after inoculation and influenced the morphological abnormalities of *R. solani* hypae. *T. virens* strain V3 (T.v3) and V4 (T.v4) showed the ability to reduce more than 50% of *R.solani* growth and were potential to be used as biocontrol agents.

来源： AIP Conference Proceedings

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全文链接: http://agri.ckcest.cn/file1/M00/10/2E/Csgk0GTDFqqAFOElAAnwJuTskQ0991.pdf

相关专利

1. Plants with increased resistance to plant pathogens and method for generating increased pathogen resistance in plants（对病原菌抗性增强的植物及其提高植物病原菌抗性的方法）

简介：本发明涉及对植物病原体抗性增强的植物，与野生型植物相比，植物细胞内焦磷酸肌醇InsP7和/或InsP8的浓度增加。尤其是该发明涉及至少一种参与肌醇焦磷酸盐InsP7和/或InsP8的合成蛋白质，例如蛋白质VIH2和VIH1的表达增加的植物。具有特别抗性的植物对以下植物病原体具有抗性：草食性昆虫，如农业相关害虫的幼虫；病原真菌，例如necrotrophic真菌，biotrophic病原体。此外，还涉及提高植物对植物病原体抗性的方法。

来源：德国专利

发布日期:2016-09-29

全文链接:http://agri.ckcest.cn/file1/M00/10/2F/Csgk0GTDKkWAKd2IAAjBIakH2d8445.pdf