2024年第25期 总438期

茶学研究专题

本期导读

学术文献

1．植物对昆虫、病毒等的空气防御

2．化学介导的植物-植物交互作用：化感作用和Allelobiosis

3．植物细胞中参与分子模式信号传导的绿叶挥发物选择蛋白

4．草食昆虫诱导的植物挥发物在邻近植物中诱导间接防御

相关专利

1．植物免疫激活蛋白pmscr1及其应用

2．一种具有双重防御机制的蛋白质基化合物，用于防治作物和仓储害虫

中国农业科学院农业信息研究所
联系人：王玉芹
联系电话：010-82109896
邮箱：agri@ckcest.cn
2024年06月17日

学术文献

1．Plant airborne defense against insects, viruses, and beyond（植物对昆虫、病毒等的空气防御）

简介：Plants emit volatiles as signals to trigger broad physiological responses, including airborne defense (AD). Gong et al. (Nature 2023; 622: 139145) recently reported the genetic framework of how plants use AD to combat aphids and viruses. The study elucidates the mutualistic relationships between aphids and the viruses they transmit, revealing the broad biological and ecological significance of AD.

来源：Trends in Plant Science 期刊

发布日期:2024-03-10

全文链接:http://agri.nais.net.cn/file1/M00/10/41/Csgk0GZhZdKADGC9AAdpOIgKB7w548.pdf

2．Chemically Mediated Plant-Plant Interactions: Allelopathy and Allelobiosis（化学介导的植物-植物交互作用：化感作用和Allelobiosis）

简介：Plant-plant interactions are a central driver for plant coexistence and community assembly. Chemically mediated plant-plant interactions are represented by allelopathy and allelobiosis. Both allelopathy and allelobiosis are achieved through specialized metabolites (allelochemicals or signaling chemicals) produced and released from neighboring plants. Allelopathy exerts mostly negative effects on the establishment and growth of neighboring plants by allelochemicals, while allelobiosis provides plant neighbor detection and identity recognition mediated by signaling chemicals. Therefore, plants can chemically affect the performance of neighboring plants through the allelopathy and allelobiosis that frequently occur in plant-plant intra-specific and inter-specific interactions. Allelopathy and allelobiosis are two probably inseparable processes that occur together in plant-plant chemical interactions. Here, we comprehensively review allelopathy and allelobiosis in plant-plant interactions, including allelopathy and allelochemicals and their application for sustainable agriculture and forestry, allelobiosis and plant identity recognition, chemically mediated root-soil interactions and plant-soil feedback, and biosynthesis and the molecular mechanisms of allelochemicals and signaling chemicals. Altogether, these efforts provide the recent advancements in the wide field of allelopathy and allelobiosis, and new insights into the chemically mediated plant-plant interactions.

来源：Plant-Basel 期刊

发布日期:2024-02-24

全文链接:http://agri.nais.net.cn/file1/M00/10/41/Csgk0GZhJGmAHYwuAByw1E5kh3o299.pdf

3．Green leaf volatiles co-opt proteins involved in molecular pattern signalling in plant cells（植物细胞中参与分子模式信号传导的绿叶挥发物选择蛋白）

简介：The green leaf volatiles (GLVs) Z-3-hexen-1-ol (Z3-HOL) and Z-3-hexenyl acetate (Z3-HAC) are airborne infochemicals released from damaged plant tissues that induce defenses and developmental responses in receiver plants, but little is known about their mechanism of action. We

found that Z3-HOL and Z3-HAC induce similar but distinctive physiological and signaling responses in tomato seedlings and cell cultures. In seedlings, Z3-HAC showed a stronger root growth inhibition effect than Z3-HOL. In cell cultures, the two GLVs induced distinct changes in MAP kinase (MAPK) activity and proton fluxes as well as rapid and massive changes in the phosphorylation status of proteins within 5 min. Many of these phosphoproteins are involved in reprogramming the proteome from cellular homoeostasis to stress and include pattern recognition receptors, a receptor-like cytoplasmic kinase, MAPK cascade components, calcium signaling proteins and transcriptional regulators. These are well-known components of damage-associated molecular pattern (DAMP) signaling pathways. These rapid changes in the phosphoproteome may underly the activation of defense and developmental responses to GLVs. Our data provide further evidence that GLVs function like DAMPs and indicate that GLVs coopt DAMP signaling pathways.

来源： Plant, Cell and Environment 期刊
发布日期: 2024-01-02
全文链接: http://agri.nais.net.cn/file1/M00/03/6F/Csgk0WZhKF6AaYr4AEdsK6Str6o984.pdf

4．Herbivore-induced plant volatiles induce an indirect defence in neighbouring plants（草食昆虫诱导的植物挥发物在邻近植物中诱导间接防御）

简介： 1 Many plant species respond to herbivory with increased emission of volatile organic compounds (VOCs): these attract carnivorous arthropods and thereby function as an indirect defence mechanism. Whether neighbouring plants can ‘eavesdrop’ on such airborne cues and tailor their defences accordingly, remains controversial.

2 We used Lima bean plants (Phaseolus lunatus) to investigate whether herbivore-induced VOCs induce another indirect defence strategy, i.e. the secretion of extrafloral nectar (EFN) in conspecific plant neighbours, and whether this enhances the defence status of the receiving plant under natural conditions.

3 EFN secretion was induced by VOCs released from herbivore-damaged bean tendrils as well as by a synthetic VOC mixture resembling the natural one. One constituent of the herbivore-induced blend─the green leaf volatile (3Z)-hex-3-enyl acetate─was sufficient to elicit the defence reaction.

4 A long-term experiment comparing the defensive effect of EFN alone with the VOC-mediated effect (EFN induction plus attraction of plant defenders) suggested that Lima bean benefits from both indirect defences. Repeated treatment of tendrils with either an artificial blend of VOCs or with EFN led to the attraction of a higher cumulative number of predatory and parasitoid insects (i.e. ants and wasps) as well as to less herbivore damage and an increased production of inflorescences and leaves.

5 Our results demonstrate that one indirect defence mechanism can induce another one in conspecific plants, and that Lima bean plants can benefit from this VOC-induced EFN secretion under natural conditions. Both extrafloral nectaries and the capability to release VOCs upon herbivory are present in many plant taxa and airborne signalling may thus represent a common mechanism for regulating the secretion of EFN in plant parts which face an increased risk of herbivory.

来源：Journal of Ecology 期刊
发布日期:2006-04-10
全文链接:http://agri.nais.net.cn/file1/M00/10/41/Csgk0GZhYTGAdQPZAAOJmSSNASA689.pdf

相关专利

1. Plant immunity activation protein pmscr1 and use thereof（植物免疫激活蛋白pmscr1及其应用）

简介：本发明提供一种植物免疫激活蛋白PmSCR1及其用途，涉及作物生物防治技术领域。从myriotylum中鉴定出一种新的植物免疫激活蛋白，命名为PmSCR1。植物免疫激活蛋白具有较强的活性，可诱导植物的防御反应，可应用于作物病害的防治，特别是对霉病、大豆疫霉和菌核菌引起的植物病害的防治。
来源：世界知识产权组织
发布日期:2024-02-22
全文链接:http://agri.nais.net.cn/file1/M00/03/6F/Csgk0WZibdiAF3o3AEBUMmQR7kc961.pdf

2. A protein based compound with dual action defense mechanism for controlling crop and storage pests（一种具有双重防御机制的蛋白质基化合物，用于防治作物和仓储害虫）

简介：Crop and grain feeding pests cause severe economical and social losses. A plant based defense mechanism of novel molecules present in few plant species could be the safe defense compound and impede the digestion process of different pests by inhibiting digestive enzyme to cause retard growth and lead to death. Accordingly an invention was carried out to screen the seeds of *Prosopis juliflora* a thorn less type xerophytic tree which never succumbs to pests damage because of presence of alpha-amylase and trypsin proteinase inhibitors. These inhibitors impede on the action of alpha-amylase enzyme so as to prevent digestion of carbohydrate and similarly on proteinase enzyme to prevent digestion of protein. Besides the seeds possess trypsin inhibitor activity with higher level on important pests. Both inhibitors would be useful in bringing defense mechanism in plants against insects since all kind of insects possess digestive enzymes for digesting carbohydrate and protein.
来源：印度专利
发布日期:2023-05-12
全文链接:http://agri.nais.net.cn/file1/M00/10/41/Csgk0GZic3CAIgZCABaaC87I26g699.pdf