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➤ 学术文献

1. Plant volatiles and color compounds: From biosynthesis to function (植物挥发物和色素化合物：从生物合成到功能)

简介: Plants biosynthesize secondary metabolites that can be useful in various applications, including health promotion, thanks to their organoleptic properties and antioxidant activity. Moreover, pigments such as carotenoids, apocarotenoids, and polyphenols and volatiles such as fatty acid derivatives, terpenoids, and phenylpropanoids contribute to attracting pollinators to flowers and to facilitating seed dispersal by animals. Floral volatiles are complex, multifunctional signals that are often used by pollinators in combination with other signals, such as color. Floral visitors use floral scent to estimate the amount of reward present in flowers, to facilitate the identification of a specific host flower or as signals that chemically resemble those important for pollinator insects in other ecological contexts. Some plant volatiles also have defensive roles, for example, as repellent for pest insects, which impacts their interaction with their environment. There are good pieces of evidence that floral scent evolves under selection imposed by both mutualists and antagonists. Antagonists may often limit the amount of scent emitted by flowers, thus contributing to spatial population variation.

来源: *Physiologia Plantarum* 期刊

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全文链接: <http://agri.ckcest.cn/file1/M00/10/2F/Csgk0GToCvOABhHLAAT4BTg8F78977.pdf>

2. Tuning the Wavelength: Manipulation of Light Signaling to Control Plant Defense (调节波长：操纵光信号以控制植物防御)

简介: The growth-defense trade-off in plants is a phenomenon whereby plants must balance the allocation of their resources between developmental growth and defense against attack by pests and pathogens. Consequently, there are a series of points where growth signaling can negatively regulate defenses and where defense signaling can inhibit growth. Light perception by various photoreceptors has a major role in the control of growth and thus many points where it can influence defense. Plant pathogens secrete effector proteins to manipulate defense signaling in their hosts. Evidence is emerging that some of these effectors target light signaling pathways. Several effectors from different kingdoms of life have converged on key chloroplast processes to take advantage of regulatory crosstalk. Moreover, plant pathogens also perceive and react to light in complex ways to regulate their own growth, development, and virulence. Recent work has shown that varying light wavelengths may provide a novel way of controlling or preventing disease outbreaks in plants.

来源: *International Journal of Molecular Sciences* 期刊

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3. Green Leaf Volatile Function in Both the Natural Defense System of *Rumex confertus* and Associated Insects' Behavior (绿叶挥发物在糙叶

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酸模自然防御系统及伴生昆虫行为中的作用)

简介: The goals of this study are to (1) determine if the profile of green leaf volatiles (GLVs), which are organic compounds naturally produced by undamaged plants, is similar to that provoked by the chemical stimulants Z-jasmone (ZJA) and dihydrojasmone (DJA), (2) establish if the *Apion miniatum* beetle's reproductive choices are influenced by their sex and mating status, and (3) assess if chemically stimulated GLV emissions can be used as signals to attract pests to *R. confertus* for biological control purposes. Synthetic forms of naturally produced Z-jasmone (ZJA) and dihydrojasmone (DJA), which can act as either an attractant or a repellent of various species of insects, were used to treat *R. confertus*. In olfactory analysis, the behavioral responses of individual insects to mated and unmated insects and to two GLV blends were evaluated. It was found that unmated male insects were fairly equally divided between going for food (Y-tube olfactometer arm with a GLV blend) and opportunities for reproduction (Y-tube olfactometer arm with unmated females). However, an increase in the GLV blend concentration attracted the insects. Meanwhile, unmated females were definitely indifferent to food and, independent of the GLV blend dose, were more interested in reproduction. Mated males, even with weak feed stimuli, increased their reproduction activity, in opposition to mated females. We provide evidence that synthetic GLV blends can be used to attract predators, making their use an effective means to biologically control *R. confertus*. The idea of applying synthetic GLVs as a biological control is based on the insects' mutual relationships, which work as follows: (i) mated males fully invade the weed, (ii) reproduction-driven females follow the mated males to *R. confertus*, and (iii) the unmated males follow the females with the purpose to reproduce. Therefore, all insect groups (mated and unmated males and females) can be induced to invade the weed. Upon feeding, the insects will damage the generative organs of *R. confertus*. We propose that the use of chemical stimulants to increase GLV emissions can be effectively used for weed (here *R. confertus*) control by attracting a plant pest (here *A. miniatum*).

来源: Applied Sciences-Basel 期刊

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全文链接:<http://agri.ckcest.cn/file1/M00/03/5D/Csgk0Yk-xW2AU54tAAzuUA5fog8790.pdf>

4. Geraniol: A Potential Defense-Related Volatile in “Baiye No. 1” Induced by *Colletotrichum camelliae* (香叶醇: 茶褐枯病病原菌诱导“百叶1号”中潜在的防御相关挥发物)

简介: Plants produce and emit a large variety of volatiles that have multiple defense-related functions in response to abiotic or biotic stresses. In comparison with studies on plant volatile–herbivore interactions, little research has been carried out on plant volatile–microbe interactions. In the present paper, tea volatile–*Colletotrichum camelliae* interactions were studied. The results of emitted volatiles following infection with *C. camelliae* in “Baiye No. 1” showed that healthy tea plants contained 68 kinds of volatiles, while infected tea plants contained 76 kinds of volatiles. Five volatiles, namely, geraniol, linalool, methyl salicylate, (E)-3-hexen-1-ol, and α -farnesene, were found to have a relatively large content variation in infected tea plants, with increments of 7.903%, -2.247%, 2.770%, -6.728%, and 3.848%, respectively. The fungicidal activity results of the five volatiles against *C. camelliae* showed that

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geraniol had the best activity, with MIC and MBC values of 0.5 and 1 mg·mL⁻¹, respectively. Thus, geraniol was selected for subsequent studies. The effects of geraniol on the mycelia and cell structures of *C. camelliae* were investigated by scanning electron microscopy (SEM) and transmission electron microscope (TEM). The results showed that the mycelia were significantly disrupted, and the cell structures were damaged. The effects of geraniol on the related enzymes of *C. camelliae* were assessed. The results showed that cellulase activity increased, malondialdehyde content increased, and the activity of defense enzymes was inhibited, thereby inhibiting the growth of pathogens. This study provides the first evidence that geraniol is a defense-related function volatile of “Baiye No. 1” in response to *C. camelliae* stress. It also provides valuable information and enriches the chemical ecology of tea plant diseases for the research field on defensive substances of microbe-induced plant volatiles.

来源: Agriculture-Basel 期刊

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➤ 相关专利

1. RELEASE OF BIOACTIVE VOLATILE COMPOUNDS FOR USE IN INTEGRATED PEST MANAGEMENT (用于害虫综合治理的生物活性挥发性化合物的释放)

简介:一种用于综合害虫管理的生物活性挥发性化合物的释放器。果蝇是一种潜在的害虫,它会攻击各种各样的果园,而*Ceratitis capitata*是最多食性的物种之一,除了在世界各地造成卫生屏障之外,对各国造成了巨大的经济损失。为了防治这种害虫,已经在其传播的国家应用了杀虫剂、诱人诱饵和无菌昆虫技术的使用。为了减少杀虫剂对环境造成的负面影响,近几十年来已经开发了集中于使用信息化学物质作为更有效和健康的控制替代的研究,以及针对这些挥发性化合物的受控释放系统的研究。本专利提出了一种控释系统(装置+信息化学物质),其使用木质素作为合成混合物的生物聚合物基质载体,分别含有化合物(R)-(+)-柠檬烯、(S)-(-)-柠檬烯、 α -共聚烯、 ϵ -石竹烯、辛酸乙酯及其合成混合物。制备基于木质素(LP)的释放基质,并将对研究中的害虫有吸引力的挥发性化合物浸渍在其中。壳聚糖(Q)用作参比处理(白色)。所有底物都利用热重技术、红外光谱研究吸附剂潜力。为了了解这些系统的释放效率,用*C. capitata*雌性线虫进行行为测试,并显示纯化的木质素释放系统对单独的辛酸乙酯和五种化合物的混合物都引起了显著的吸引力反应。这些结果证明,基于木质素的生物聚合物基质可以作为果蝇的有吸引力的信息化学物质的载体。

来源: 巴西专利

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全文链接:http://agri.ckcest.cn/file1/M00/03/5D/Csgk0Yk_LZaABbenAAvgACbq4JM024.pdf

2. Nucleotide sequences coding for signal transduction components involved in plant pathogen defense (植物病原体防御中信号转导成分的核苷酸序列编码)

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简介: The invention relates to nucleotide sequences derived from a plant genome, encoding a polypeptide product which can be activated as a signaling molecule in the signal transduction pathway of resistance to a plant pathogen which resistance results from the interaction between polypeptide products encoded by a resistance gene and elicitors encoded by an avirulence gene in said soil plant pathogen, wherein the polypeptide product encoded by the nucleotide sequence interacts with a polypeptide product encoded by said resistance gene. The invention also relates to the use of these sequences in the establishment of durable and broad-range resistance strategies based on plant defence.

来源: 欧洲专利

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