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茶学研究专题

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1．爱沙木挥发性植物次生代谢物及其对动物觅食偏好的影响

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前沿资讯

1. Why is the price of tea going up?（为什么茶叶的价格在上涨?）

简介：茶是世界上仅次于水的第二大消费饮料，每天有数十亿人消费。它确实是一种全球性商品。然而，茶的世界并不是一切都好。像许多其他商品一样，近期茶叶价格一直在大幅度上涨。根据Trading Economics的数据，2024年3月30日为每公斤茶叶109.35印度卢比（1.21欧元），5月4日为每公斤茶叶192.85印度卢比（2.14欧元）。国际出口与贸易研究所(IE&IT)所长Marco Forgeone表示，地缘政治不稳定加上环境压力是造成茶叶价格上涨的原因。

来源：FoodNavigator 网站

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全文链接:http://agri.nais.net.cn/file1/M00/03/6E/Csgk0WZEfnGAfIjqAAPW-YrTnVY443.pdf

学术文献

1. Detecting Pathogenic *Phytophthora* Species Using Volatile Organic Compounds（利用挥发性有机化合物检测致病性疫霉菌）

简介：There are several highly damaging *Phytophthora* species pathogenic to forest trees, many of which have been spread beyond their native range by the international trade of live plants and infested materials. Such introductions can be reduced through the development of better tools capable of the early, rapid, and high-throughput detection of contaminated plants. This study utilized a volatilomics approach (solid-phase microextraction coupled to gas chromatography–mass spectrometry) to differentiate between several *Phytophthora* species in culture and discriminate between healthy and *Phytophthora*-inoculated European beech and pedunculate oak trees. We tentatively identified 14 compounds that could differentiate eight *Phytophthora* species from each other in vitro. All of the *Phytophthora* species examined, except *Phytophthora cambivora*, uniquely produced at least one compound not observed in the other species; however, most detected compounds were shared between multiple species. *Phytophthora polonica* had the most unique compounds and was the least similar of all the species examined. The inoculated seedlings had qualitatively different volatile profiles and could be distinguished from the healthy controls by the presence of isokaurene, anisole, and a mix of three unknown compounds. This study supports the notion that volatiles are suitable for screening plant material, detecting tree pathogens, and differentiating between healthy and diseased material.

来源：Molecules 期刊

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全文链接:http://agri.nais.net.cn/file1/M00/03/6E/Csgk0WZEW-GAAxxmABLDRSrQGFQ383.pdf

2. Robotic Volatile Sampling for Early Detection of Plant Stress: Precision Agriculture Beyond Visual Remote Sensing（用于植物胁迫早期检测的机器人挥发物采样：超越视觉遥感的精准农业）

简介：Global agriculture is challenged to provide food for a human population that is larger than ever before and still increasing. This is accompanied by the need to reduce the large global impacts of agriculture while increasing yields. Early identification of plant stress enables fast intervention to

limit crop losses and optimized application of pesticides and fertilizer to reduce environmental impacts. Current image-based approaches identify plant stress responses hours or days after the stress event, usually only after substantial damage has occurred and visual cues become apparent. In contrast, plant volatiles are released seconds to hours after stress events and can quickly indicate both the type and severity of stress. An automatable and nondisruptive sampling method is needed to enable the use of plant volatiles for monitoring plant stress in precision agriculture. In this work, we detail the development of a plant volatile sampler that can be deployed and collected with an uncrewed aerial vehicle (UAV). The effect of sampling flow rate, horizontal distance to volatile source, and overhead downwash on collected volatiles is investigated, along with the deployment accuracy and retrieval successes with manual flight. Finally, volatile sampling is validated in outdoor tests. The possibility of robotic collection of plant volatiles is a first and important step toward the use of chemical signals for early stress detection and opens up new avenues for precision agriculture beyond visual remote sensing.

来源：IEEE Robotics & Automation Magazine 期刊

发布日期:2023-10-17

全文链接:http://agri.nais.net.cn/file1/M00/10/40/Csgk0EHtsNmAFE5DADHhcLEAV3U578.pdf

3. Development of a widely targeted volatilomics method for profiling volatilomes in plants（一种广泛靶向的植物挥发物分析方法的发展）

简介：Volatile organic compounds play essential roles in plant environment interactions as well as determining the fragrance of plants. Although gas chromatography-mass spectrometry-based untargeted metabolomics is commonly used to assess plant volatiles, it suffers from high spectral convolution, low detection sensitivity, a limited number of annotated metabolites, and relatively poor reproducibility. Here, we report a widely targeted volatilomics (WTV) method that involves using a “targeted spectra extraction” algorithm to address spectral convolution, constructing a high-coverage MS^2 spectral tag library to expand volatile annotation, adapting a multiple reaction monitoring mode to improve sensitivity, and using regression models to adjust for signal drift. The newly developed method was used to profile the volatilome of rice grains. Compared with the untargeted method, the newly developed WTV method shows higher sensitivity (for example, the signal-to-noise ratio of guaicol increased from 4.1 to 18.8), high annotation coverage (the number of annotated volatiles increased from 43 to 132), and better reproducibility (the number of volatiles in quality control samples with relative standard deviation value below 30.0% increased from 14 to 92 after normalization). Using the WTV method, we studied the metabolic responses of tomato to environmental stimuli and profiled the volatilomes of different rice accessions. The results identified benzothiazole as a potential airborne signal priming tomato plants for enhanced defense and 2-nonanone and 2-heptanone as novel aromatic compounds contributing to rice fragrance. These case studies suggest that the widely targeted volatilomics method is more efficient than those currently used and may considerably promote plant volatilomics studies.

来源：Molecular Plant 期刊

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全文链接:http://agri.nais.net.cn/file1/M00/03/6E/Csgk0WZEZjqACwzoABYc-BGmIOs049.pdf

4．Touch and plant defence: volatile communication with neighbours（触摸和植物防御：与邻近植物的挥发物交流）

简介：Plants use many cues to get the latest news on their environment, from different parts of the light spectrum predicting future shading by neighbours, to volatiles released by insect-infested plants preparing neighbouring plants for future attack, or touch providing information about impending mechanical stress or herbivore attacks. Markovic et al. (2019) have now shown that gentle touching of leaves leads to emission of volatiles that can activate the same set of defence genes in neighbouring plants as were up-regulated in the touched plant.

来源：Journal of Experimental Botany 期刊

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全文链接:http://agri.nais.net.cn/file1/M00/10/40/Csgk0EHtc8iAEMiEAARzvXONdRw908.pdf

会议论文

1．Volatile plant secondary metabolites in *Eremophila glabra* and their influence on animal foraging preference（爱沙木挥发性植物次生代谢物及其对动物觅食偏好的影响）

简介：One response to global climate change effects on Australia is to investigate the use in sustainable farming systems of native plants, which have evolved to cope in their harsh environment (Monjardino 2009). The Enrich~(TM) project has screened many Australian native plants for their potential use as methane reducers in ruminants, as anthelmintics, and as nutrition sources systems (Revell 2010). *Eremophila glabra* is one plant that shows promise in this regard, but first the foraging animal must want to eat it. This decision is assisted by the animal's assessment of the emitted volatile plant secondary metabolites (PSM) (Provenza 2007).In this paper we investigate the relationship between volatile PSM in leaf material and animal preference for a number of *E. glabra* accessions.

来源：Proceedings of the 22nd International Grassland Congress

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全文链接:http://agri.nais.net.cn/file1/M00/10/40/Csgk0EHtuYWAYVtIAADt8UMc8Vc312.pdf