



2023年第46期 总407期

茶学研究专题

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► 学术文献

1. Disrupting pest reproduction techniques can replace pesticides in vineyards. A review (破坏害虫繁殖的技术可以取代葡萄园中的杀虫剂: 综述)

简介: Today, we are faced with an increase in the impact of pesticides on the environment, which is becoming a real concern for most agricultural production systems, including vineyards, for a number of reasons, such as the resistance of pest populations to pesticides, the lethal and sublethal effects of pesticides on non-target species, the increase in new invasive pests, the extension of the geographical range of pests due to climate change, and, finally, human health problems. Against this backdrop, the adoption of solutions based on the reproductive behavioral ecology of pests is a subject of prominent (major) interest for the coming decades. Crop pests and, more specifically, disease vectors use sensory cues throughout their life cycle for many fundamental behaviors and in particular for mating, the critical step in population growth. In particular, a large proportion of arthropod crop pests rely on chemical and/or vibroacoustic communication to mate. Several thousand sex pheromones have been identified in insects, most of which can be used either as synthetic baits to trap pests or as behavioral modifiers (e.g., pheromone-mediated mating disruption). Applied biotremology is also emerging as a new discipline for sustainable pest control. Field experiments on vibratotional mating disruption against grapevine leafhoppers are currently ongoing, with promising results. Here we present mating disruption strategies that can be implemented in crop protection, in particular against the main pests and vectors present/occurring in grape production.

来源: Agronomy for Sustainable Development 期刊

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全文链接: <http://agri.nais.net.cn/file1/M00/10/33/Csgk0GVISruAeSR6ABRgajLuq68024.pdf>

2. Isolation of a highly virulent *Metarhizium* strain targeting the tea pest, *Ectropis obliqua* (一株靶向茶害虫茶尺蠖的高毒力绿僵菌菌株的分离)

简介: Methods: To identify novel *E. obliqua* biological control agents, soil and insect cadaver samples were collected from tea growing regions in the Fujian province, China. Isolates were analyzed morphologically and via molecular characterization to identify them at the species level. Laboratory and greenhouse insect bioassays were used to determine the effectiveness of the isolates for *E. obliqua* control.

Results: Eleven isolates corresponding to ten different species of *Metarhizium* were identified according to morphological and molecular analyses from soil and/or insect cadavers found on tea plants and/or in the surrounding soil sampled from eight different regions within the Fujian province, China. Four species of *Metarhizium* including *M. clavatum*, *M. indigoticum*, *M. pempighi*, and *M. phasmatodeae* were documented for the first time in China, and the other species were identified as *M. anisopliae*, *M. brunneum*, *M. lepidiotae*, *M. majus*, *M. pinghaense*, and *M. robertsii*. Insect bioassays of the eleven isolates of *Metarhizium* revealed significant variation in the efficacy of each isolate to infect and kill *E. obliqua*. *Metarhizium pingshaense* (MaFZ-13) showed the highest virulence reaching a host target mortality rate of 93%

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in laboratory bioassays. The median lethal concentration (LC₅₀) and median lethal time (LT₅₀) values of *M. pingshaense* MaFZ-13 were 9.6×10^4 conidia/mL and 4.8 days, respectively. Greenhouse experiments and a time-dose-mortality (TDM) models were used to further evaluate and confirm the fungal pathogenic potential of *M. pingshaense* MaFZ-13 against *E. obliqua* larvae.

Discussion: Isolation of indigenous microbial biological control agents targeting specific pests is an effective approach for collecting resources that can be exploited for pest control with lowered obstacles to approval and commercialization. Our data show the presence of four different previously unreported *Metarhizium* species in China. Bioassays of the eleven different *Metarhizium* strains isolated revealed that each could infect and kill *E. obliqua* to different degrees with the newly isolated *M. pingshaense* MaFZ-13 strain representing a particularly highly virulent isolate potentially applicable for the control of *E. obliqua* larvae.

来源: Frontiers in Microbiology 期刊

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3. Functional disparity of four pheromone-binding proteins from the plum fruit moth *Grapholita funebrana* Treitscheke in detection of sex pheromone components (李小食心虫4种信息素结合蛋白在性信息素成分检测中的功能差异)

简介: *Grapholita funebrana*, also known as the plum fruit moth, is an oligophagous pest species that causes enormous economic losses of the fruits of Rosaceae. An eco-friendly method for the control of *G. funebrana* besides chemical control has not yet been developed. The sex pheromone communication system plays an important role in moth courtship and mating, in which pheromone-binding proteins (PBPs) are critical. In this research, we identified four PBPs, namely, *GfunPBP1.1*, *GfunPBP1.2*, *GfunPBP2*, and *GfunPBP3*, from the antennae of *G. funebrana*. The results of real-time quantitative PCR (RT-qPCR) showed that all four *GfunPBPs* were overwhelmingly expressed in the antennae and that *GfunPBP1.2* and *GfunPBP2* showed male-biased expression patterns, whereas *GfunPBP1.1* and *GfunPBP3* were equally expressed between sexes. The results of ligand-binding assays illustrated that although all four recombinant *GfunPBPs* (r*GfunPBPs*) had binding activity with the tested sex pheromone compounds, their preferred ligands were significantly different. r*GfunPBP2* had the strongest binding affinity to Z8-12:Ac and Z8-12:OH; r*GfunPBP1.1* preferred to bind Z8-14:Ac, Z10-14:Ac, and 12:OH more than to the other three *GfunPBPs*; and r*GfunPBP1.2* exhibited stronger binding affinity to E8-12:Ac than to the other r*GfunPBPs*. Molecular docking results demonstrated that hydrophobic forces, especially van der Waals forces and hydrogen bonds, were the most important forces that maintained *GfunPBP*-pheromone ligand complexes. This study will improve our understanding of the sex pheromone recognition mechanisms of *G. funebrana* and promote the development of novel strategies for controlling *G. funebrana*.

来源: International Journal of Biological Macromolecules 期刊

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4. Functional differentiation of three pheromone binding proteins in *Orthaga achatina* using mixed-type sex pheromones (利用混合型性信息素研究樟巢螟三种信息素结合蛋白的功能分化)

简介: *Orthaga achatina*, a serious pest of camphor trees, uses a mixture of three Type I (Z11-16:OAc, Z11-16:OH and Z11-16:Ald) and one Type II (Z3,Z6,Z9,Z12,Z15-23:H) sex pheromone components in its sex communication, in which Z11-16:OAc is the major component and others are minor components. In this study, we for the first time demonstrated that the three PBPs differentiated in recognition among pheromone components in a moth using mixed-type sex pheromones. First, tissue expression study showed that all three PBPs of *O. achatina* were expressed only in antennae and highly male-biased, suggesting their involvement in perception of the sex pheromones. Second, the three PBPs were expressed in *Escherichia coli* and the binding affinities of PBPs to four sex pheromone components and some pheromone analogs were determined by the fluorescence competition binding assays. The results showed that OachPBP1 bound all four sex pheromone components with high binding affinity, while OachPBP2 had high or moderate binding affinity only to three Type I components, and OachPBP3 had high binding affinity only to three minor pheromone components. Furthermore, key amino acid residues that bind to sex pheromone components were identified in three PBPs by 3-D structure modeling and ligand molecular docking, predicting the interactions between PBPs and pheromone components. Our study provides a fundamental insight into the olfactory mechanism in moths that use mixed-type sex pheromones.

来源: Pesticide Biochemistry and Physiology 期刊

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全文链接: http://agri.nais.net.cn/file1/M00/10/33/Csgk0GVlh_SALzRJACnJguEpcWM964.pdf

➤ 科技图书

1. Extended Biocontrol (扩展生物防治)

简介: 本书详尽介绍了生物防治在农业中的理论基础和实际应用。它包括各种基于自然的作物保护方法: 引入和保护天敌, 释放不育昆虫, 增强植物防御, 使用微生物、生物杀虫剂和信息化学物质。人口生物学、微生物生态学、流行病学和化学生态学的前沿知识以通俗易懂的语言呈现。从实际方面以及社会经济制约因素讨论了大田应用的潜力。这62位作者是来自理论生物学到社会科学等众多学科的研究人员。

来源: SpringerLink 网站

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➤ 专业会议

1. 12th North American Tea Conference Makes Waves in Miami, Names

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Award Winners (第十二届北美茶叶大会在迈阿密举行, 宣布获奖者)

简介: The 12th North American Tea Conference – produced by the Tea Association of the U.S.A. Inc. and the Tea & Herbal Association of Canada – took place in Miami at the Kimpton EPIC Hotel, Oct. 4-6. Both organizations support initiatives and practices which, together, ensure an optimal economic, social and ecological environment for the tea industry. The two groups noted that each of these pillars is inextricably linked to the economic health of the industry, welfare of its participants, and the maintenance of the environment where tea is grown and consumed. During the event, the Gold Medal Tea and Sustainability Awards winners for 2023 were announced. For the Gold Medal Tea awards, more than 70 teas were submitted and tasted by the judging panel. For the Annual Sustainability Awards, the program recognizes the tea industry's global efforts surrounding the goals of sustainability.

来源: World Tea News 网站

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