茶学研究专题

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➤ 前沿资讯

1. Bottled Tea Market is Forecast to Grow Over Next 10 Years（瓶装茶市场预计将在未来10年增长)

简介：瓶装茶是商业上作为瓶装饮料出售的茶的总称。在食品和饮料行业，瓶装茶被称为即饮茶（RTD）。瓶装茶提供多种包装，包括罐头、玻璃瓶、塑料瓶等。该报告预测，从2023年到2033年，全球瓶装茶市场的复合年增长率（CAGR）将达到4.5%。该市场在2023年的价值为500亿美元，预计到2033年底将达到780亿美元。目前，北美占全球市场的60%。根据美国茶叶协会的数据，瓶装茶占北美茶叶消费量的近70%。由于其浓郁的风味以及抗氧化剂和多酚的健康特性，红茶目前占据了60%的市场份额。在日益繁忙的消费者群体中，RTD的便利因素有助于推动瓶装茶的需求。根据事实。瓶装茶相对于碳酸饮料的健康益处也推动了市场的发展。因此，该行业的优质品牌正在推出清洁标签，以茶为基础的天然低糖配方。

来源：World Tea News 网站

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全文链接：http://agri.nais.net.cn/file1/M00/10/3C/Csgk0EFoR-iALKOwAANxy6_H2Gs501.pdf

➤ 学术文献

1. Plasticity of aggregation pheromones in insects（昆虫聚集信息素的可塑性)

简介：Pheromone plasticity is widely observed in insects and enhances their survival, adaptation, and reproductive success. Aggregation pheromones, which cause notable individual aggregation and consequently impact agriculture and human life, are renowned for their special function. Here, we present a review of research progress regarding pheromone plasticity in three typical aggregative insects: locusts, bark beetles, and cockroaches. These insects are major pest species with considerable impacts on the social economy and public health. Numerous studies have demonstrated the plasticity of aggregation pheromones in different populations of these insect species. Although pheromone chemicals and compositions vary across the three groups, the plasticity of aggregation pheromones is significantly impacted by population density, location, food resources, and gut symbiotic microorganisms, indicating the complexity of pheromone plasticity regulated by multiple factors. Finally, we discuss the potential application of pheromone plasticity in basic research and pest management.

来源：Current Opinion in Insect Science 期刊

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2. Sex pheromone communication in an insect parasitoid, *Campoletis chlorideae* Uchida（昆虫寄生蜂棉铃虫齿唇姬蜂的性信息素通讯)

简介：Sex pheromones are pivotal for insect reproduction. However, the mechanism of sex pheromone communication remains enigmatic in hymenopteran parasitoids. Here we have

identified the sex pheromone and elucidated the olfactory basis of sex pheromone communication in *Campoletis chlorideae* (Ichneumonidae), a solitary larval endoparasitoid of over 30 lepidopteran pests. Using coupled gas chromatography-electroantennogram detection, we identified two female-derived pheromone components, tetradecanal (14:Ald) and 2-heptadecanone (2-Hep) (1:4.6), eliciting strong antennal responses from males but weak responses from females. We observed that males but not females were attracted to both single components and the blend. The hexane-washed female cadavers failed to arouse males, and replenishing 14:Ald and 2-Hep could partially restore the sexual attraction of males. We further expressed six *C. chlorideae* male-biased odorant receptors in *Drosophila* T1 neurons and found that CchlOR18 and CchlOR47 were selectively tuned to 14:Ald and 2-Hep, respectively. To verify the biological significance of this data, we knocked down CchlOR18 and CchlOR47 individually or together in vivo and show that the attraction of *C. chlorideae* to their respective ligands was abolished. Moreover, the parasitoids defective in either of the receptors were less likely to court and copulate. Finally, we show that the sex pheromone and (*Z*)-jasmone, a potent female attractant, can synergistically affect behaviors of virgin males and virgin females and ultimately increase the parasitic efficiency of *C. chlorideae*. Our study provides new insights into the molecular mechanism of sex pheromone communication in *C. chlorideae* that may permit manipulation of parasitoid behavior for pest control.

来源：PNAS 期刊

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3．Host-plant volatiles enhance the attraction of *Cnaphalocrocis medinalis* (Lepidoptera: Crambidae) to sex pheromone（寄主-植物挥发物增强了稻纵卷叶螟对性信息素的吸引力）

简介：*Cnaphalocrocis medinalis* Guenée (Lepidoptera: Pyralidae) is a notorious pest of rice, *Oryza sativa* L. (Poaceae). Sex pheromones and host-plant volatiles can trap *C. medinalis* separately. To improve the trap efficiency of synthetic sex pheromone blend, we first tested the synergistic effect of 8 host-plant volatiles, including 2-phenylethanol, 1-hexanol, 1-heptanol, (*Z*)-3-hexenal, (*E*)-2-hexenal, octanal, valeraldehyde, and methyl salicylate, on the attraction of *C. medinalis* to the female-produced sex pheromones in electroantennography. The addition of (*E*)-2-hexenal, methyl salicylate, valeraldehyde, and (*Z*)-3-hexenal increased electroantennogram response of *C. medinalis* to sex pheromones. Further behavioral testing in wind tunnel experiments indicated that additive (*E*)-2-hexenal or methyl salicylate stimulated the landing behaviors of both male and female *C. medinalis* compared with sex pheromones alone. Field evaluations showed that mixtures of sex pheromones and (*E*)-2-hexenal /methyl salicylate resulted in significantly higher catches to male moths than sex pheromones alone. Using 1:1 and 1:10 combinations of the sex pheromones and (*E*)-2-hexenal, the attraction of *C. medinalis* to mixtures showed a synergistic effect of 95% and 110%，respectively. Furthermore, 1:1 and 1:10 mixtures of the sex pheromones and methyl salicylate exhibited a synergistic effect of 69% and 146%，respectively. These results may provide the basis for developing efficient pest management strategies against *C. medinalis* using host-plant volatiles and insect sex pheromones.

来源：Chemoecology 期刊

4．Insect Pheromones Synthesized by Oxidative Transformations of Natural Monoterpenoids（天然单萜类化合物氧化转化合成昆虫信息素）

简介：The literature on oxidative transformations of natural monoterpenoids to synthesize insect pheromones was reviewed. The literature on pheromone chemistry is broad and reflects the consistent interest in this area over the last 20 years in the form of monographs and reviews. Insect pheromones known today are rather simple molecules (less than four asymmetric centers and four functional groups). Therefore, the "ideal" substrate (chiral or achiral) for most such structures is a moderately functionalized molecule, in particular, hydroxy- and amino-acids in addition to monoterpenoids. The last class of compounds is the most accessible for this series and is especially convenient for the synthesis of molecules with a branched C skeleton, primarily isoprenoid pheromones. Oxidative methods of transforming monoterpenoids are the most convenient and widely used methods for carrying out various transformations of starting molecules and introducing most known functional groups. Considering this aspect, articles on the synthesis of insect pheromones that for one reason or another did not appear in previous reviews are reviewed herein.

来源：Chemistry of Natural Compounds 期刊

会议论文

1．Vision based Automatic Inspection of Insects in Pheromone Traps（基于视觉的信息素诱捕器中昆虫的自动检测）

简介：Insects are one of the most important factors that threaten the yield efficiency in agricultural areas. Expenditures made for biological pesticides form a huge portion of the total expenses since insects massively reproduce. Observing the reproduction stages of the insects, more effective and smarter pesticizing scenarios can be achieved using biotechnical approaches such as pheromone traps rather than biological ones. Using pheromone traps, the massive reproduction is prevented since the male insects are attracted to the traps and cannot mate with the female ones. The most important disadvantage of the pheromone traps is the expensive labor cost due to the physical patrolling of the traps. Inspection of traps require expert staff who can recognize different kinds of insects. Besides the high labor costs, because of the human factor in the whole cycle, many problems occur such as errors made in counting and recording of the collected data. To overcome these problems, it is possible to integrate camera to the traps in order to lower the labor costs and assure more accurate record of the insect counts and types. Hence the visual data acquired through the traps can be inspected automatically using state of art computer vision techniques. The objective of this paper is to analyze and advance the methods that can discriminate and classify the insects in the traps under challenging illumination and environmental conditions using computer vision and machine learning algorithms. In this study, we use background subtraction and active

contour models successively to separate the insects from the background and extract the outer boundary of the insects. We extract features using Hu moments (Hu), Elliptic Fourier Descriptors (EFD), Radial Distance Functions (RDF) and Local Binary Patterns (LBP). LBP features seem to outperform the rest of the features in recognition rate based on the individual performance of each method. The results from the underlying features are then fused using weighted majority voting to obtain a decision.

来源：International Conference on Agro-Geoinformatics

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