

卷蛾分索赤眼蜂对十字花科蔬菜的行为反应

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Behavioral responses of *Trichogrammatoidea bactrae* Nagaraja (Hymenoptera: Trichogrammatidae) to cruciferous vegetables

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摘要

为了明确不同十字花科蔬菜挥发物对寄生蜂搜索寄主行为的影响, 在室内利用“Y”型嗅觉仪测定了卷蛾分索赤眼蜂 *Trichogrammatoidea bactrae* Nagaraja 对小菜蛾 *Plutella xylostella* L. 常见的6种寄主植物(甘蓝 *Brassica oleracea*、芥蓝 *Brassica alboglabra*、芥菜 *Brassica juncea*、菜心 *Brassica parachinensis*、萝卜 *Raphanus sativus* 和西洋菜 *Nasturtium officinale*) 及4个不同甘蓝品种的嗅觉行为反应, 并用GC-MS对6种健康寄主植物的挥发物进行了化学成分分析。结果表明, 卷蛾分索赤眼蜂的嗅觉反应不仅与十字花科蔬菜的种类有关, 而且与同一种蔬菜的不同品种有关。6种寄主植物的完整植株对卷蛾分索赤眼蜂雌蜂均具有显著的引诱作用 ($P<0.05$), 并且不同种类之间的引诱力大小存在着一定的差异, 其中西洋菜对卷蛾分索赤眼蜂的吸引力最强, 其次是甘蓝、菜心和芥菜, 萝卜和芥蓝的吸引力最差。在测试的4个甘蓝品种完整植株中, 雅实绿对卷蛾分索赤眼蜂的引诱力极显著强于日本春夏秋 ($P<0.01$)。GC-MS分析结果显示, 6种蔬菜的挥发物中绝大多数是烷烃类物质, 其次是烯烃类物质, 还有一些醛、醇、酯、酸、酮及噻唑类化合物。其中醛类是西洋菜挥发物中的特有成分, 包括5种(2,3-二甲基苯甲醛、辛醛、壬醛、十一醛、十二醛), 相对含量总计为4.90%, 并且其烷烃类(33种)和醇类(6种)的相对含量分别为47.42%和5.66%, 均高于其他几种蔬菜, 甘蓝中烯烃类(9种, 5.52%)和酸类(4种, 12.20%)的种类数和相对含量均为最高。本研究可为生产中蔬菜品种的合理布局和筛选寄生蜂的引诱剂提供理论依据。

关键词:

Abstract:

In order to clarify the effects of different volatiles of cruciferous vegetables on the host parasitoid searching behavior of *Trichogrammatoidea bactrae* Nagaraja, the olfactory behavioral responses of *T. bactrae* to six common species of host plants (*Brassica oleracea*, *Brassica alboglabra*, *Brassica juncea*, *Brassica parachinensis*, *Raphanus sativus* and *Nasturtium officinale*) of *Plutella xylostella* L. and four varieties of *Brassica oleracea* plants were investigated with Y-tube olfactometer in the laboratory, and the chemical compositions of six intact vegetable volatiles were analyzed by GC-MS. The results indicated that olfactory responses of *T. bactrae* were influenced not only by the species of cruciferous vegetables, but also by different varieties of the same vegetable. Female wasps were attracted to six intact plants, and the degree of attraction to different species of plants was significantly different ($P<0.05$). The female wasps showed the strongest attraction to *N. officinale*, less attraction to *B. oleracea*, *B. parachinensis* and *B. juncea*, and the least attraction to *R. sativus* and *B. alboglabra*. Attractiveness of the undamaged plants of Yashilü variety of *B. oleracea* to parasitoid was significantly stronger than that of Japan chunxiaqi variety ($P<0.01$). GC-MS results showed that the majority of the six plant volatiles were alkane compounds, the next were alkenes, and others included aldehydes, alcohols, esters, acids, ketones and thiazoles compounds. Five aldehydes compounds (2,3-dimethyl-benzaldehyde, octanal, nonanal, undecanal, and dodecanal) accounting for 4.90% of the total volatiles were the unique components from *N. officinale*. The contents of alkanes (33 kinds) and alcohols (6 kinds) in *N. officinale* were 47.42% and 5.66%, respectively, higher than those in other vegetables. Of the six species of vegetables, *B. oleracea* had the highest contents of alkenes (9 kinds, 5.52%) and acids (4 kinds, 12.20%). The research may provide a theoretical basis for the reasonable layout of vegetable varieties and screening attractants of parasitic wasps.

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出版日期: 2011-03-10

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引用本文:

. 卷蛾分索赤眼蜂对十字花科蔬菜的行为反应[J]. 昆虫学报, 2011, 54(2): 238-245.

. Behavioral responses of *Trichogrammatoidea bactrae* Nagaraja (Hymenoptera: Trichogrammatidae) to cruciferous vegetables[J]. ACTA ENTOMOLOGICA SINICA, 2011, 54(2): 238-245.

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