共轭二烯性信息素成分在聚乙烯管载体和复合橡胶载体上的释放速率和异构化效果研究*

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摘　要：为了开发释放速率稳定、持效期长的仿生诱芯，有必要评价性信息素成分在两种最常用的释放载体（聚乙烯管和复合橡胶）上的释放速率和异构化效果。本研究在风洞条件下采用吸附剂 Porapak Q 收集 6 种共轭二烯性信息素成分在两种载体上不同时间的释放量，正己烷洗脱后进行气相色谱定量分析。发现 6 种性信息素成分在聚乙烯管载体上初始释放速率较低，从第 16 天开始迅速上升，在第 29-43 天内达到最大释放值，随后释放速率逐步降低到低释放状态。6 种性信息素成分在复合橡胶载体上从点样起释放速率最高，15 天后显著下降，第 29 天后释放速率一直处于较低的释放水平。在聚乙烯管载体上 E5,Z7 构型的十二碳二烯醛、醇和乙酸酯的释放速率大于相应的 Z5,E7 构型的释放速率，且醛和醇类性信息素释放速率大于酯类的释放速率。释放高峰期内聚乙烯管载体上性信息素成分（除顺 5,反 7-十二碳二烯醇外）的释放速率高于复合橡胶载体上的释放速率，差异显著。复合橡胶载体上的性信息素残留量显著大于聚乙烯管载体；两种释放载体对共轭二烯性信息素成分的异构化率也有显著差异。性信息素成分在两种载体上的比例变化可能解释了松毛虫林间诱蛾效果的差异。最后，对聚乙烯管载体和复合橡胶载体上性信息素成分的释放速率和异构化效果方面进行了讨论。

关键词：性信息素；异构化；释放速率；聚乙烯管载体；复合橡胶载体

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Determination of the absolute configuration of an EAG active component in the sex pheromone gland of *Semiothisa cinerearia*

Bremer et Grey

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Abstract: The Chinese scholar tree looper, *Semiothisa cinerearia* Bremer *et* Grey (Lepidoptera: Geometridae), is the major defoliator of the Chinese scholar tree *Sophora japonica* L. in China. The elucidation of the absolute chemical structure of the sex pheromone component of *S. cinerearia* may provide a potential chemical for the pest control against the *S. cinerearia* infestations in the urban area. In this study, two sex pheromone gland compounds, *i.e*., (6*Z*,9*Z*)-6,9-*cis*-3,4-epoxy-heptadecadiene (6*Z*,9*Z*-*cis*-3,4-epoxy-17:H) and (3*Z*,6*Z*,9*Z*)-3,6,9-heptadecatriene (3*Z*,6*Z*,9*Z*-17:H) were detected in a 100:4.8±1.3 ratio (*N*=12) during analyses of solvent extracts from virgin female *S. cinerearia* (2-3 d old) by comparison of their gas chromatography (GC) retention time and mass spectra (MS) with those of synthetic standards. Furthermore, the absolute configuration of 6*Z*,9*Z*-*cis*-3,4-epoxy-17:H in the sex pheromone gland of *S. cinerearia* was determined as (6*Z*,9*Z*)-3*R*,4*S*-epoxy-heptadecadiene by using a chiral capillary column (CycloSil-B, 30 m × 0.25 mm × 0.25 μm film) GC under optimized oven temperature program. The mixture of the two synthetic enantiomers of 6*Z*,9*Z*-3*R*,4*S*-epoxy-17:H and 6*Z*,9*Z*-3*S*,4*R*-epoxy-17:H in a ratio of 1.28:1 was injected into the female extracts, the ratio changed to 1.55:1. Based on this analysis, the absolute configuration of the gland component 6*Z*,9*Z*-*cis*-3,4-epoxy-17:H was further confirmed as 3*R*,4*S*. It is anticipated that control of *S. cinerearia* infestation with enantiomerically pure materials will be much more effective.

Key words: *Semiothisa cinerearia*; Geometridae; sex pheromone; (6*Z*,9*Z*)-3*R*,4*S*-epoxy-heptadecadiene; absolute configuration; GC-MS; chiral separation

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