

## 化学元素用于识别褐飞虱不同地理种群的可行性研究

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### Feasibility of recognizing different geographic populations of the brown planthopper, *Nilaparvata lugens* (Hemiptera: Delphacidae), using chemical elements

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**摘要** 研究褐飞虱 *Nilaparvata lugens* (Stal) 不同地理种群成虫体内化学元素组成特点, 筛选出可用于褐飞虱不同地理种群识别的化学元素种类。应用电感耦合等离子体质谱 (ICP-MS) 半定量分析检测存在于褐飞虱体内的化学元素, 对各元素进行巢式设计方差分析, 初步筛选出地理种群间具有显著差异的元素; 然后对这些元素采用 ICP-MS 全定量分析, 进一步筛选、验证地区间差异显著而年份间差异不显著的元素。结果表明, 褐飞虱体内存在 57 种化学元素, 巢式设计方差分析筛选出了地区间具有显著性差异的 27 种元素。随后的 ICP-MS 全定量分析及统计检验, 筛选出各地理种群都存在而含量不同的 Ce, Nd, Pr, Sm, Gd, Th, V, Ti, Mo, Cs, Fe 和 Mn 12 种元素。不同地理种群褐飞虱成虫体内的一些化学元素含量存在着显著差异, 有助于褐飞虱远距离迁入虫源地的识别研究, 可为追溯褐飞虱地理来源提供新的方法。

**关键词:** 褐飞虱; 地理种群; 化学元素; 半定量分析 全定量分析

**Abstract:** The objective of this research was to study the composition of chemical elements and screen out the kinds of chemical elements with geographical characteristics in the body of adults of the brown planthopper (BPH), *Nilaparvata lugens* (Stal), in different geographic populations. Semi-quantitative analysis of inductively coupled plasma mass spectrometry (ICP-MS) was employed to determine the content of chemical elements existing in the body of adult BPH, and the differences in content of chemical elements among geographical populations were tested by means of analysis of variance (ANOVA) with nested design. Furthermore, full-quantitative analysis of ICP-MS and ANOVA with nested design was utilized to screen and verify the chemical elements which had significant differences among geographical populations but had no significant difference between years. The results showed that there were 57 chemical elements in body of adult BPH, and 27 kinds of chemical elements were filtered out by nested design ANOVA. Twelve elements (Ce, Nd, Pr, Sm, Gd, Th, V, Ti, Mo, Cs, Fe and Mn), which can be used to discriminate geographical origins of BPH, were screened out by means of ICP-MS full-quantitative detection analysis and nested design ANOVA. There are significant differences in content of some chemical elements among different geographical populations of BPH, which would contribute to recognizing the origin of long-distance immigration of BPH, and providing probably a new way to trace back geographic origins of BPH.

**Key words:** *Nilaparvata lugens* geographical population chemical element semi-quantitative analysis full quantitative analysis

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