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液相色谱/元素分析-同位素比值质谱联用法鉴定蜂蜜掺假

费晓庆*, 吴斌, 沈崇钰, 丁涛, 李丽花, 路颖

江苏出入境检验检疫局食品实验室, 江苏 南京 210001

Honey adulteration detection using liquid chromatography/elemental analysis-isotope ratio mass spectrometry

FEI Xiaoqing*, WU Bin, SEHN Chongyu, DING Tao, LI Lihua, LU Ying

Laboratory of Food, Jiangsu Entry-Exit Inspection and Quarantine Bureau, Nanjing 210001, China

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摘要 采用液相色谱/元素分析-同位素比值质谱联用法(LC/EA-IRMS)对国内蜂蜜掺假情况进行了研究。基于测定得到的38个纯正蜂蜜样品的碳同位素δ13C值数据,提出了纯正蜂蜜样品的δ13C值要求: 蛋白质和蜂蜜的δ13C差值(Δδ13CP-H)≥~0.95‰,果糖和葡萄糖的δ13C差值(Δδ13CF-G)在~0.64‰至0.53‰范围内,各个组分间的δ13C最大差值(Δδ13Cmax)＜2.09‰。对150个日常检测样品、蜂农和蜂蜜供应商的蜂蜜样品分别采用本文建立的LC/EA-IRMS和国家标准方法(EA-IRMS)进行鉴定,LC/EA-IRMS方法检出58个掺有C3或C4植物糖浆的阳性样品,而EA-IRMS方法仅检出7个掺有C4植物糖浆的阳性样品,可见新方法大大提高了对蜂蜜掺假的鉴别能力。

关键词： 液相色谱 元素分析 同位素比值质谱 掺假 ;蜂蜜

Abstract： A new method for honey adulteration detection using liquid chromatography/elemental analysis-isotope ratio mass spectrometry (LC/EA-IRMS) was developed. Based on the individual δ13C values detected for 38 authentic honey samples, the limits for the authentic honey samples were proposed: the δ13C difference between protein and honey (Δδ13CP-H) should be higher or equal to than ~0.95‰, the δ13C difference between fructose and glucose (Δδ13CF-G) should be from ~0.64‰ to 0.53‰, and the maximum difference of δ13C values between all the components (Δδ13Cmax) should be lower than 2.09‰. Based on the above criteria, the 58 positive samples spiked with C4 or C3 plant sugar syrup were confirmed by LC/EA-IRMS method from 150 commercial honey samples, while only 7 samples spiked with C4 plant sugar syrup were confirmed by the official EA-IRMS method. The proposed method represents a significant improvement in comparing with the official EA-IRMS method.

Keywords： liquid chromatography (LC) elemental analysis (EA) isotope ratio mass spectrometry (IRMS) adulteration honey

Corresponding Authors: 费晓庆,硕士,工程师,研究方向为食品检测和食品掺假鉴定研究. Tel: (025)52345193, E-mail: dii01208@163.com.　　Email: dii01208@163.com

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