植物学通报 ISSN: 1003-2266 CN:11-1945/Q 2008; 25 (06) :707-713

实验简报

雷公藤次生代谢产物雷公藤红素含量与环境因子相关性分析

杜玮炜1 3 黄宏文 1 2

1 中国科学院武汉植物园, 武汉 430074 2 中国科学院华南植物园, 广州 510650 3 中国科学院研究生院, 北京 100049

收稿日期 2007-11-9 修回日期 2008-4-1

摘要 采用多元逐步回归分析对分布于浙江、福建、湖南、湖北和贵州5个省内6类不同居群药用植物雷公藤(Tripterygium wi lfordi i)的160株个体进行了雷公藤红素含量和环境因子的相关性分析。结果表明, 在空间分布上, 各居群间的雷公藤红素含量差异较大, 其中湖南黄岩居群雷公藤红素含量最高, 为1.058 5×10-2g.g-1, 贵州雷山和福建泰宁居群最低,分别为4.988 9×10-3g.g-1和4.988 7×10-3g.g-1; 而在居群内的雷公藤红素含量相对一致, 基本呈正态分布。实验结果表明, 雷公藤中雷公藤红素的积累在很大程度上受环境因子的影响。进一步利用SPSS软件对各个环境因子作逐步回归分析, 表明年均日照时长(X1)、年均降雨量(X2)和土壤含氮量(X5)是影响雷公藤中雷公藤红素含量(Y)的主导因子, 且各因素均与雷公藤红素含量呈负相关。经检验, 回归方程为Y=19.308-0.01 X1-0.02 X2-0.062 X5, R值达到0.917, F检验回归方程的线性关系显著。研究结果表明,环境因子, 特别是日照、水分和土壤含氮量能够影响雷公藤中雷公藤红素的含量。该文还对提高雷公藤中药用成分雷公藤红素含量的研究策略进行了讨论。

关键词 雷公藤红素 环境因子 回归分析 次生代谢

Correlation Analysis of Secondary Metabolites and Environmental Factors in Tripterygium wilfordii

Weiwei Du1, 3, Hongwen Huang1, 2

1Wuhan Botanical Garden, Chinese Academy of Sciences, Wuhan 430074, China 2South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, China 3Graduate School of Chinese Academy of Sciences, Beijing 100049, China

Abstract The plant Tripterygium wilfordii (Thunder of God Vine) is the basis for a traditional Chinese medicine and is found in Zhejiang, Fujian, Hunan,Hubei and Guiz hou provinces, along the Yangtze River. We analyzed the correlation between the content of the secondary metabolite celastrol and environmental factors among 160 individuals of six populations of the plant. The difference in celastrol content was relatively high among populations (max. 1.058 5×10-2g.g-1 in Huangyan,Hunan Province; min.4.988 7×10-3 g.g-1 in Taining, Fujian Province) and relatively low within populations, which indicates that environmental conditions greatly influenced the content of celastrol in T. wilfordii. Regression analysis further revealed a significant negative correlation between celastrol content (Y) and annual sun shine duration (X1), annual rainfall (X2) and N content in soil (X5) (Y=19.308-0.01X1-0.02X2-0.062X5, R=0.917, F=276.561), which indicates the influence of these environmental factors on the content of celastrol in the plant. A strategy to maximize celastrol content is recommended.

Keywords celastrol environmental factors regression analysis secondary metabolism

通讯作者 黄宏文 huanghw@mail.scbg.ac.cn