植物学报 » 2011, Vol. 46 » Issue (6) :675-687 DOI: 10.3724/SP.J.1259.2011.00675

研究报告

最新目录 | 下期目录 | 过刊浏览 | 高级检索 << Previous Articles | Next Articles >>

中国北方干湿气候区C_3草本植物$\delta^{13}C$值及其与湿润指数的关系

刘贤赵[1,2,3*], 李朝奎[1], 徐树建[3*], 王文文[2], 王国安[4], 赵丽丽[2*]

[1]湖南科技大学建筑与城乡规划学院, 湘潭 411201;
[2]鲁东大学地理与规划学院, 烟台 264025;
[3]临沂大学地理系, 临沂 264000
[4]中国农业大学资源与环境学院, 北京 100083

Carbon Isotope Composition of C_3 Herbaceous Plants and Its Relation to Humidity Index in Arid and Humid Climate Zones in Northern China

Xianzhao Liu[1,2,3*], Chaokui Li[1], Shujian Xu[3*], Wenwen Wang[2], Guoan Wang[4], Lili Zhao[2*]

[1]*College of Architecture and Urban Planning, Hunan University of Science and Technology, Xiangtan 411201, China*
[2]*College of Geography and Planning, Ludong University, Yantai 264025, China*
[3]*Department of Geography, University of Linyi, Linyi 264000, China*
[4]*College of Resources and Environmental Sciences, China Agricultural University, Beijing 100083, China*

摘要 | 参考文献 | 相关文章

Download: PDF (646KB) HTML 1KB **Export:** BibTeX or EndNote (RIS) **Supporting Info**

摘要 通过对中国北方C_3草本植物稳定性碳同位素的测定以及有关该区植被碳同位素资料的收集, 共获取了47个样点的地理位置、气候因子和325个植物样品的碳同位素数据; 计算了中国北方不同气候分区的湿润指数, 分析了C_3草本植物$\delta^{13}C$值的空间特征以及与湿润指数等环境因子之间的关系。在所调查的范围内, 中国北方地区C_3草本植物$\delta^{13}C$值的分布区间为 -29.9‰ - -25.4‰, 平均值为 -27.3‰。C_3草本植物$\delta^{13}C$的平均值从半湿润地区到半干旱地区再到干旱地区显著变重; 3个气候分区植物$\delta^{13}C$值的变化范围分别是 -29.9‰ - -26.7‰ (半湿润区)、-28.4‰ - -25.6‰ (半干旱区)和 -28.0‰ - -25.4‰ (干旱区)。一元回归分析表明, 各气候分区C_3草本植物$\delta^{13}C$值与湿润指数的关系存在差异, 在半干旱区、半湿润区和整个北方地区, C_3草本植物$\delta^{13}C$值与湿润指数均呈显著线性负相关($P<0.05$), 随着湿润指数的增加, C_3植物$\delta^{13}C$平均值均变轻, 但下降幅度不同。而在北方干旱气候区内, C_3草本植物$\delta^{13}C$与湿润指数呈显著正相关($P<0.05$), 湿润指数每升高0.1, 植物$\delta^{13}C$平均值增加1.3‰。年均温度可能是决定该区内各样点湿润指数和C_3植物对^{13}C分馏能力差别的主要原因。

关键词: 干旱气候区 碳同位素 C_3草本植物 湿润气候区 湿润指数 中国北方

Abstract: Data for geographic location, climatic conditions, and carbon isotope values of 325 C_3 herbaceous plant samples were obtained at 47 sampling sites through systematic investigation of a wide variety of natural habitats and $\delta^{13}C$ data from the published literature of C_3 herb species in northern China. We calculated the humidity indices for different climatic areas in northern China and compared the spatial characteristics of $\delta^{13}C$ composition and carbon isotope values for C_3 herbaceous plants with climatic environment factors (especially humidity index). The $\delta^{13}C$ values for C_3 plant species in northern China as a whole ranged from -29.9‰ to -25.4‰, with a mean of -27.3‰. From the sub-humid to semi-arid and arid areas, the mean $\delta^{13}C$ values of C_3 plants increased with decreasing mean annual precipitation. The variation in $\delta^{13}C$ values differed among the 3 climatic areas in northern China, namely -29.9‰ to -26.7‰ (sub-humid area), -28.4‰ to -25.6‰ (semi-arid area) and -28.0‰ to -25.4‰ (arid area). Single-element regression analysis revealed a difference in relationship between $\delta^{13}C$ values of C_3 herbaceous plants and humidity index among climatic areas. The $\delta^{13}C$ values of sampling sites in semi-arid area, semi-humid area and the whole northern China all were negatively related to humidity index ($P<0.05$), and the mean $\delta^{13}C$ values of plants decreased with increasing humidity index. In contrast, $\delta^{13}C$ values in the northern arid area was positively related with humidity index ($P<0.05$). A 0.1 increase in humidity index in the arid area would produce a 1.3‰ increase in $\delta^{13}C$, and annual mean temperature has an important role in differences in humidity index and isotope fractionation among sampling points in the arid area.

Keywords: arid climate zones carbon isotope C_3 herbaceous plant humid climate zone humidity index northern China

Received 2011-01-26; published 2011-11-17

Corresponding Authors: 刘贤赵,徐树建 **Email:** xianzhaoliu@sina.com; xushujian1967@163.com

引用本文:

刘贤赵, 李朝奎, 徐树建等.中国北方干湿气候区C_3草本植物$\delta^{13}C$值及其与湿润指数的关系[J] 植物学报, 2011,V46(6): 675-687

Xianzhao Liu, Chaokui Li, Shujian Xu etc.Carbon Isotope Composition of C_3 Herbaceous Plants and Its Relation to Humidity Index in Arid and Humid Climate Zones in Northern China[J] , 2011,V46(6): 675-687

链接本文:

http://www.chinbullbotany.com//CN/10.3724/SP.J.1259.2011.00675 或 http://www.chinbullbotany.com//CN/Y2011/V46/I6/675

Service

把本文推荐给朋友
加入我的书架
加入引用管理器
Email Alert
RSS

作者相关文章

刘贤赵
王文文
王庆
王国安
赵丽丽