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研究论文

内蒙古高原不同生境三种锦鸡儿属植物的水力结构特征及其对环境因子的响应

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摘要 以生长在内蒙古高原不同生境条件下的小叶锦鸡儿、中间锦鸡儿和柠条锦鸡儿为研究对象，通过定点观测1年生枝条水力结构特征在不同季节的日变化，结合气候因子的相关性分析，比较不同环境条件下3种锦鸡儿植物输水效率与调节能力的高低，进一步分析旱生植物如何通过调整水分传输来适应变化着的环境条件。结果表明，在一定范围内，3种供试植物的水力结构参数都与气温呈显著的线性负相关，与大气相对湿度呈线性正相关关系。同种锦鸡儿植物在不同季节的输水效率比较，总的趋势是夏季>春季>秋季；比较同一季节不同种锦鸡儿的输水效率，基本上是柠条锦鸡儿>中间锦鸡儿>小叶锦鸡儿；在比导率对环境因子的敏感度方面，季节之间的差异是夏季>春季>秋季，物种之间是柠条锦鸡儿>中间锦鸡儿>小叶锦鸡儿。一方面日变幅的差异可以体现敏感度的不同，另一方面比导率与大气温度、湿度线性回归方程的斜率也可以体现敏感度的相对高低。这些结果证实了栓塞引起的导水率的下降并不都产生负面影响，相反它具有限流节水的积极作用。

关键词 小叶锦鸡儿；中间锦鸡儿；柠条锦鸡儿；水力结构；日变化；气候因子

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The hydraulic architecture of three Caragana species and its relationship with environmental factors in different habitats of the Inner Mongolia Plateau

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Abstract We studied the diurnal dynamics of the hydraulic architecture parameters of Caragana microphylla Lam., C.davazamcii Sancz and C.korshinskii Kom., which grew in different habitats of the Inner Mongolia plateau, and their relationship with environmental factors affecting water relations. The research was conducted on 1-year-old twigs in situ in order to compare the hydraulic efficiency and regulating abilities of the three Caragana species. We also analyzed how plants, subjected to drought stress, regulated water transportation to cope with variable environments. The relationship between hydraulic architecture parameters and air temperature followed a linear function with negative slope, while the relationships between these parameters with atmospheric humidity were positive. Comparing the hydraulic efficiency among the three seasons, the descending order was summer>spring>autumn. In the same season, the hydraulic efficiency of C.korshinskii was higher than that of C. microphylla which was in turn higher than C. microphylla. It can be concluded from the range of Ks, and the slope of two linear functions, that there were significant differences in the sensitivity of specific conductivity to environmental factors, both among species and in different seasons, with the sensitivity order being summer>spring>autumn. In the same season, C.korshinskii was the most sensitive to the changes of environment, and the sensitivity of C.davazamcii was higher than C. microphylla. The results also supported the view that the reduction of hydraulic efficiency due to embolism in xylem could benefit the plants subjected to water deficit, by means of limiting water loss.

Key words *Caragana microphylla* _ *C. davazamcii* _ *C. korshinskii* _ hydrauli

c_ architecture_ _ diurnal_ variation_ _ climatic_ factor_

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