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研究论文

干旱条件下臭柏的生理生态对策

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摘要 为了探讨臭柏（*Sabina vulgaris*）的耐旱生理生态适应对策，进行了长期的野外调查和室内模拟实验。野外调查是在毛乌素沙地的天然臭柏分布区内，设置固定样方，调查分析；室内实验是将臭柏插穗带往日本冈山大学，移植于砾耕栽培装置中，设置对照区，弱干旱胁迫区，强干旱胁迫区（培养液渗透势分别为0 MPa，-0．1 MPa和-0．3 MPa）3种处理进行长期的干旱胁迫室内模拟实验，研究各处理区臭柏的生理生态学特性，结果表明，在干旱胁迫条件下，臭柏表现出积极的生理生态适应对策：（1）在生长方面，通过降低密度、自然稀疏及下部枝叶干枯的方式，以牺牲局部，确保个体生存的生态策略，有效地利用资源，维持种群的生存。（2）在气体交换方面，气孔关闭，气体交换速率减缓，光合速率和蒸腾速率都下降，但是，与光合速率相比，由于蒸腾速率受到更强烈的抑制，水分利用率提高。（3）在吸水保水方面，通过渗透调节能力的增强，细胞壁弹性的降低，增强忍耐脱水能力和吸水能力；通过增加气孔密度，提高气孔调节的敏感性，增加角质层厚度，减少水分的散失；增强耐旱性。

关键词 干旱胁迫；臭柏；气体交换；渗透调节

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Ecophysiological strategy of *Sabina vulgaris* under drought stress

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Abstract

To understand ecophysiological adaptation of Sabina vulgaris under drought stress，the ecophysiological characteristics of this species were studied in the field and laboratory．Investigation in the field was done at Mowusu Sand Land in Inner Mongolia of China，and laboratory experiment was done at Okayama University of Japan．The lab experiment consisted of three treatments：control with 0 MPa，light drought stress with-0．1 MPa，and strong drought stress with-0．3 MPa in gravel culture box．The field and laboratory experiment results show that the efficiency of water utility is increased while increasing drought stress by the following aspect：（1）In growth．It increases the survival of individual by withering away the lower branches and leaves of the individual plant and increases the survival of population by thinning．（2）In gas exchange．The stomas closes，and all of the gas exchange rate，photosynthetic rate and transpiration rate decrease．The ratio of photosynthesis and water utility is increased under drought stress，since transpiration was inhibited more strongly than photosynthesis．（3）In water absorption and protection．The plant increases water absorption and dehydration capability by adjusting osmotic openings and decreasing the elasticity of cell walls；the adaptability to drought stress is also strengthened by increasing the density of stoma，increasing the sensitivity of stoma adjustment to dr

ought stress， and increasing the thickness of the cuticular layer and reducing transpiration．

Key words

Sabina vulgaris；drought stress；gas exchanges；osmotic adjustment

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