

植物生产层

荒漠植物红砂响应高浓度NaCl的生理机制

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摘要:

本研究以泌盐型荒漠植物红砂(*Reaumuria soongorica*)为材料,探讨了150 mmol·L⁻¹ NaCl对其生长、盐腺泌盐以及整株Na⁺分配格局的影响。结果显示,7周龄的红砂经150 mmol·L⁻¹ NaCl处理7 d后,地上部鲜质量和干质量分别比对照增加了14%和18%,而组织含水量则与对照相当;根系Na⁺净吸收速率显著增加了44倍,植株地上部Na⁺分泌量和积累量也相应增多,分别为对照的25倍和2.1倍;整株Na⁺分配格局发生了显著变化,通过盐腺分泌的Na⁺比例由对照的4.3%增至35%,而积累在地上部的Na⁺比例也高达43%。上述结果表明,在高盐条件下,红砂能够吸收大量Na⁺并将其绝大部分通过盐腺排出体外或积累在地上部中,从而减轻Na⁺毒害、维持植株水分状况,促进植株生长。

关键词: 红砂 泌盐 盐生-旱生植物

The physiological mechanisms underlying how eremophyte *Reaumuria soongorica* responses to severe NaCl stress

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Abstract:

In this study, we investigated the effects of 150 mmol·L⁻¹ NaCl on the growth, salt secretion, and the Na⁺ distribution pattern of *Reaumuria soongorica*. The results showed that 150 mmol·L⁻¹ NaCl has a positive effect on the growth of *R. soongorica*, the fresh weight and dry weight indicated significant enhancement by 14% and 18%, respectively. However, any significant changes of the tissue water content were not observed in *R. soongorica* treated with 150 mmol·L⁻¹ NaCl for 7 days. When exposed to high concentration NaCl condition, the net Na⁺ uptake rate in root significantly increased for 44 times as that of control; correspondingly, the Na⁺ secretion and accumulation in shoots of *R. soongorica* exhibited significant enhancement which was 25 times and 2.1 time than that of control, respectively. Further analysis showed that the percentage of Na⁺ secretion increased from 4.3% in the control to 35%, and the percentage of Na⁺ accumulation in shoots also was 43%. These findings suggest that, under saline environment, *R. soongorica* is able to absorb large quantity Na⁺, most of which where Na⁺ were secreted through salt gland or accumulated in shoots, thus to alleviate the toxic effects of Na⁺ and maintain water status in plant, which contribute to stimulate the growth of plant.

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扩展功能

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