

## 硝态氮对盐胁迫下囊果碱蓬幼苗根系生长和耐盐性的影响

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Effects of nitrate on the root growth and salt tolerance of *Suaeda physophora* seedlings under NaCl stressYUAN Jun-feng<sup>1,2</sup>, TIAN Chang-yan<sup>1\*</sup>, FENG Gu<sup>3</sup>, MA Hai-yan<sup>1,2\*</sup>

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## 摘要

在溶液培养条件下, 设计了4个盐分(1, 150, 300或450 mmol/L NaCl)和3个氮素(0.05, 5或10 mmol/L NO<sub>3</sub><sup>-</sup>-N)水平, 研究了盐、氮及其互作对囊果碱蓬(*Suaeda physophora* Pall.) 幼苗的离子吸收、氮营养状况、根系形态特征及耐盐性的影响。结果表明, 与低盐或低氮相比, 增加盐分或氮水平显著增加了囊果碱蓬根部的干重、根系的侧根长、表面积、总吸收面积和活跃吸收面积; 且这些根系的形态指标与地上部的离子及氮的累积存在显著的正相关。高盐胁迫下增加氮营养, 显著增加了地上部Na<sup>+</sup>、NO<sub>3</sub><sup>-</sup>、有机氮的含量和硝酸还原酶的活性; 降低了Cl<sup>-</sup>和K<sup>+</sup>的含量。高盐胁迫下, 硝态氮的增加促进了囊果碱蓬幼苗根系的生长, 增加了地上部有机氮、NO<sub>3</sub><sup>-</sup>和Na<sup>+</sup>的累积, 改善了植株的营养状况和渗透调节, 从而提高了囊果碱蓬的耐盐能力。

**关键词:** 盐生植物 囊果碱蓬 根系形态 NaCl NO<sub>3</sub><sup>-</sup> 盐生植物 囊果碱蓬 根系形态 NaCl NO<sub>3</sub><sup>-</sup>

## Abstract:

Effects of NaCl and nitrate on the root morphologic characteristics and nitrogen accumulation in the shoot of *Suaeda physophora* seedlings were investigated in order to elucidate the relationship between nitrogen and salt tolerance. *S. physophora* seedlings were grown under four NaCl levels (1, 150, 300 or 450 mmol/L) and three NO<sub>3</sub><sup>-</sup>-N levels (0.05, 5 or 10 mmol/L) making twelve combination treatments. The results showed that the dry weight, lateral root length, surface area, absorbing area and active absorbing area of root of *S. physophora* seedlings increased with an increase in salinity or nitrate level. Meanwhile, ions and nitrogen accumulation in shoot had significantly positive correlations with those root morphologic characteristics. Increasing of nitrate levels in the high NaCl solution increased the Na<sup>+</sup>, NO<sub>3</sub><sup>-</sup>, organic nitrogen concentrations and nitrate reductase activities, while decreased Cl<sup>-</sup> and K<sup>+</sup> concentrations. Positive response of *S. physophora* seedlings under high NaCl stress could be attributed to N application which increased root growth and improved Na<sup>+</sup> and nitrogen accumulation in the shoot of seedlings. Contribution of nitrate and Na<sup>+</sup> to osmotic adjustment increased and nitrogen nutrient deficiency was ameliorated, and hence the tolerance to high NaCl was enhanced.

## Keywords:

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