

W16

Improved growth and development in *Suaeda glauca* through exogenous treatment with indole-3-carboxylic acid

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Abstract

Mechanistic studies of halophytes are urgent areas of agricultural research due to the increase in saline-contaminated and irrigated land worldwide. The halophyte *Suaeda glauca* (*S. glauca*) has advantages in terms of biomass and saline elimination due to its large mass and well-developed phenotype on seashores, although its mechanistic features and growing specificities still require systematic investigation. In this study, *S. glauca* was cultivated under various saline concentrations (0–400 mM) in Hoagland's solution in the absence or presence of indole derivatives to elucidate physiological features. The results confirmed the optimal growth and development of *S. glauca* in 50 mM NaCl, and morphologies such as the number of branches, shoot length, and fresh and dry weights were improved by indole-3-carboxylic acid (ICA) treatment. The cation concentrations in roots, shoots and leaves were investigated to examine the ionic imbalances in response to saline treatment, and the results demonstrated that sodium ions accumulated to high concentrations in leaves. The levels of calcium and potassium ions in roots were maintained or slightly decreased in the presence of 50 mM NaCl and proline concentration was increased significantly in roots at optimal concentrations. These results demonstrate that the concentrations of ions and metabolites are key regulators of optimal growth by regulating the physiology of halophytes.

Keywords: Halophytes, *Suaeda glauca*, Halophytic metabolome, Indole 3-carboxylic acid, Salt resistance

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