

OC2. Interactive effects of salinity and salt stress duration on leaf proline accumulation of rice plants

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Objectives

Proline accumulation has been well known as a defensive mechanism against salt stress in various plants. This experiment was conducted to clarify whether proline accumulation depends on salinity factor or on stress duration factor, as well as to clarify the relationship between proline accumulation and salt-affected growth reduction of rice plants.

Materials and Methods

- Plant material: hydroponically cultured rice (cv. Chuchongbyeon) at seedling and tillering stages
- Salinity: 0, 30, 60, 90, 120, 150 and 180 mM NaCl
- Salt stress duration: up to 14 days at seedling stage and 20 days at tillering stage
- Range of Salt Stress Unit (SSU = salinity x stress duration): 0 to 1800 mM NaCl · day for tillering stage, and 0 to 1260 mM NaCl · day for young seedling stage.
- Proline analysis: ninhydrin-spectrophotometric method

Results and Discussion

- Shoot dry weight (%) relative to control decreased in proportion to SSU.
- Leaf proline increased only under high salinity (over 120 mM NaCl) conditions, indicating the dependency of proline accumulation on salinity more than on salt stress duration.
- Rice plants which accumulated proline under high salinity conditions showed no differences in salt-affected growth reduction, indicating salinity-dependent proline accumulation may not play an important role in neutralizing salt-affected growth reduction of rice plants.

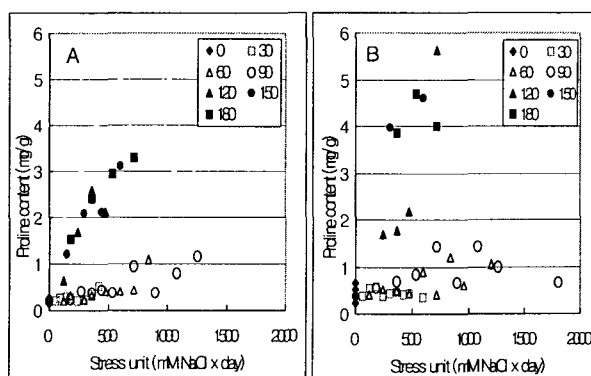


Fig. 1. Leaf proline concentration of rice plants at young seedling (A) and tillering (B) stages as affected by different levels of salinity for different durations. Data were plotted and interpreted by using salt stress unit.

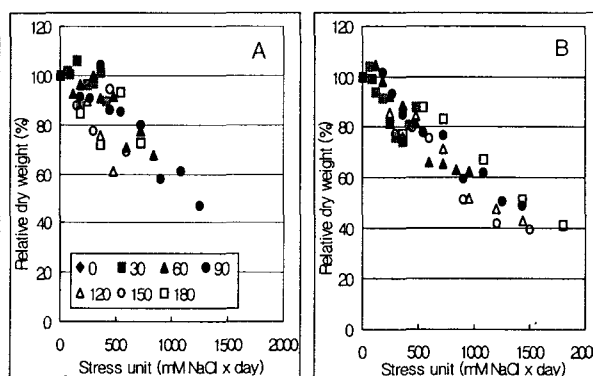


Fig. 2. Changes in relative shoot dry weight of rice plants at young seedling (A) and tillering (B) stages as affected by various magnitude of salt stress induced by combination of different levels of salinity and stress duration.

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