

Kongake Siringam 2011: *In Vitro* Rice (*Oryza sativa* L. subsp. *indica*) Responses to Salt Stress under Iso-osmotic Condition. Doctor of Philosophy (Botany), Major Field: Botany, Department of Botany. Thesis Advisor: Associate Professor Niran Juntawong, Dr.nat.tech. 147 pages.

Salt stress affects the plant physiological responses by disturbing metabolic processes which result in the reduction of plant growth and development. However, previous studies did not explain clearly about ionic effects on plant physiological responses under salt stress. This study aims to investigate the ionic effect of NaCl on osmotic potential, photosynthetic pigment concentrations, photosynthetic performances and growth in salt-tolerant (Homjan; HJ) and salt-sensitive (Pathumthani1; PT1) rice varieties under iso-osmotic condition. Without the osmotic control, the osmotic potential, photosynthetic pigment concentrations, photosynthetic performances and growth in salt-sensitive PT1 seedlings were severely reduced more than those in salt-tolerant HJ seedlings with the increasing of NaCl concentration and salt exposure time. Under the iso-osmotic condition, sodium ion (Na^+), $\text{Na}^+:\text{K}^+$ ratio, root electrolyte leakage (EL_{root}), glucose, fructose, sucrose, raffinose and stachyose in PT1 salt-stressed seedlings were higher than those in HJ salt-stressed seedlings, while potassium ion (K^+) in PT1 seedlings was lower than that in HJ seedlings. The reduction of the physiological responses in PT1 seedlings exposed to salt stress under iso-osmotic condition was similar to the non-osmotic control condition. An exogenous application of KNO_3 and sucrose in the culture medium could increase the salt tolerance ability. These results indicated that there was no difference of the physiological responses in salt-stressed seedlings between the iso-osmotic control and non-osmotic control conditions.

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