

## Effect of osmotic potential on germination of tomato seed

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### Abstract

Seeds of Tomato (*Lycopersicon esculentum* Mill.) have demanded high quality because of their high cost of seed. The optimization of the seed priming techniques that have positive effect on fast and uniform germination becomes important at the commercial level. Several factors such as solution composition, osmotic potential, and treatment duration affect seed priming response. In this study, osmotic potentials of priming solution and germination characteristics of primed seed were investigated to clarify the effects different inorganic salt types and the duration. Tomato seeds were primed in osmotic solutions that were osmotic potential ranged -1.54 to -0.45 MPa in an aerated solution of PEG 8000 (17%, 22%, 27%), and inorganic salt solution of KNO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub>, and K<sub>2</sub>SO<sub>4</sub> (100, 200, 300mM). The seeds were treated at 20 °C for 2, 4, and 6 days. After each treatment, the seeds were dried to moisture content ranged 5-8% at 25 °C. Four replications of 25 seeds per each treatments were placed in 10-cm petri dishes containing two filter papers and 3 ml of dH<sub>2</sub>O and incubated at 20°C/30°C and 15°C and seedlings evaluated for abnormality after 14 days of incubation. Seed water potential ( $\Psi$ ) was correlated with water potential of priming solution ( $r^2=0.86$ ). Seeds primed in 100mM KNO<sub>3</sub> resulted the highest germination rate (GR, 63.9 %·day<sup>-1</sup>) and lowest mean germination time (MGT, 2.0 days) comparing to untreated control (23.9 %·day<sup>-1</sup> of germination rate and 4.1 days of MGT) at 20/30°C, even though 96% of germination percentage were not different. Seeds primed in 100mM KNO<sub>3</sub> ( $\Psi = -0.45$ MPa) for 4 days showed  $\Psi = -0.38$ MPa. Priming in Na<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>SO<sub>4</sub>, and PEG solution for 6 days improved MGT and GR, but not significantly than 4 days of treatment. Additionally, stepwise osmotic solution treatment with 100mM and 300mM concentration for 6 day did not showed differences with single treatment. In relation to osmotic potentials, identical osmotic potential in different inorganic salt solution showed different effect on germination characteristics.

Keywords: *Lycopersicon esculentum*, seed treatment, osmopriming

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