

P147

The effect of osmotic potentials on the temperature response for germination of pepper seed

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Abstract

Primed seeds germinate faster and uniformly, since these have already started imbibition and metabolism requiring to complete germination. Several factors such as solution composition, osmotic potential, and treatment duration affect seed priming response. Water potentials of priming solution and germination response of primed seed were investigated to clarify the effects different inorganic salt types and the duration. Pepper seeds were primed in osmotic solutions that were osmotic potential ranged -1.54 to -0.45 MPa in an aerated solution of polyethylene glycol 8000 (PEG; 17%, 22%, 27%), and inorganic salt solution of KNO₃, K₂SO₄, and Na₂SO₄ (100, 200, 300mM) in aerated condition. The seeds were treated at 20 °C for 4, 6 day (D) and stepwise duration combined concentration of 100mM (2 or 4 days) and 300mM(2 or 4days). After soaking treatment, seeds were washed with distilled water and then were dried to approximately 6% moisture content in dry chamber at 25 °C. The germination of seed was characterized by ISAT rules at 20 °C /30 °C and 15 °C. Total germination percentage (GP), mean germination time (MGT), germination uniformity (GU), germination rate (GR), and health seedling percent (HS) were calculated on the germinated seed in a 14-day period. Seed water potential (Ψ) was correlated with water potential of priming solution ($r^2=0.84$). The effect of seed priming on germination varies with inorganic salt and organic agents (PEG). Germination percentage (GP, 77 and 73%), GR (21.3 and 19.4 %·day⁻¹), and HS (58 and 52 %) was greatest and lowest MGT (4.2 and 4.8 day) when they were primed in 100mM K₂SO₄ ($\Psi =-0.45$ MPa), and 100mM KNO₃ ($\Psi =-0.52$ MPa) for 6 days compared to untreated control (67% GP, 19.7%·day⁻¹ GR, 18% HS, and 10.8 day MGT) in 15 °C chamber. Water potential less then -1.2MPa of osmotic solution resulted lower GP, GR and HS and in K₂SO₄ and KNO₃. However, stepwise treatment of water potential that changed solution as 100mM for 4 D + 300mM for 2 D or 300mM for 4 D + 100mM for 2 D) were not better than single concentration alone in germination characteristics.

Keywords: *Capsicum annuum*, seed treatment, osmopriming

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