

**EFFETS OF FREEZING STRESS ON MORPHO-PHYSIOLOGICAL INDICES AND CHLOROPHYLL FLUORESCENCE OF SALVIA LERIFOLIA BENTH. SEEDLINGS**

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An experiment was carried to evaluate the physiological and morphological traits and photochemical efficiency of photosystem II of *Salvia leriifolia* under freezing stress in controlled condition as a factorial experiment based on completely randomized design with three replications in Ferdowsi University of Mashhad. The plants exposed to twelve freezing temperatures (0, -2, -4, -6, -8, -10, -12, -14, -16, -18, -20 and -22 °C) in seedling stage. Leaf area and dry weight, root length and dry weight, electrolyte leakage (EL), survival percentage after three weeks and chlorophyll fluorescence parameters in recovery periods (0, 6, 12, 24 and 72 hr. after stress) were studied. Results showed that effect of freezing temperatures on all traits were significant ( $P \leq 0.001$ ). EL increased significantly with decreasing temperature and reached the maximum 83% at -20 °C. Although plant survival percentage did not affect until -14 °C, all seedlings were died in -22°C. Lethal temperature based on survival ( $LT_{50su}$ ) and electrolyte leakage ( $LT_{50el}$ ) were -17.0 and -11.8. Results also indicated that Reduced Dry Matter Temperature 50% ( $RDMT_{50}$ ) was -16.5 °C. Photochemical efficiency of photosystem II ( $F'_v / F'_m$ ) was not affected up to -6 °C, but it decreased by 70% with decreasing temperature to -22 °C.  $F'_v / F'_m$  decreased by 40% during 24 hours after recovery compared to control, but it increased when recovery continued to 72 hr. Results also indicated that EL had negative correlation with survival percent ( $r = -0.82^{***}$ ) and  $F'_v / F'_m$  ( $-0.95^{***}$ ).