

## EVALUATION OF FREEZING TOLERANCE OF THREE PERSIAN SHALLOT (ALLIUM ALTISSIMUM REGEL) ECOTYPES UNDER CONTROLLED CONDITION

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Persian shallot called as "Mooseer" in Iran belongs to Alliaceae family, is one of the important edible alliums in Iran. Mooseer grows as a wild plant in high elevations of different provinces of Iran with the climate of very cold to moderate cold. In order to evaluate freezing tolerance of three Mooseers' ecotypes (Shirvan, Kalat and Tandoureh), a factorial experiment based on completely randomized design with three replications was carried out under the controlled conditions in the Faculty of Agricultural, Ferdowsi University of Mashhad in 2009. Plants were grown in natural conditions, acclimated to the growth condition and then, in two growth stages (emergence and seedling stage), they transferred to the thermogradient freezer with 6 freezing temperatures (0, -4, -8, -12, -16, -20 °C). Cell membrane integrity was measured by electrolyte leakage (EL) index and the lethal temperature 50% samples (LT50) were determined according to the electrolyte leakage percentage. Survival percentage and regrowth of the plants after 3 weeks in cold frame were measured, by counting the number of plants and determining their proportional with the number of plants before freezing. The results showed that EL%, LT50<sub>e</sub> and survival percentage were significantly affected by experimental treatments. As temperature decreased, EL% in the leaf, bulb and root of all ecotypes was significantly increased. In all freezing temperatures, the highest and lowest EL% was observed in the root and leaf in the emergence stage. In both growth stages, Shirvan showed the highest root EL% and hence showed the lowest freezing tolerance in comparison with Kalat and Tandoureh ecotype. The lowest LT50<sub>e</sub> due to freezing observed in Kalat and Tandoureh ecotypes, while Shirvan ecotype, showed the highest LT50<sub>e</sub>. In seedling stage, Shirvan ecotype's root showed the highest LT50<sub>e</sub> and this organ was more sensitive to freezing temperatures in comparison with leaf and bulb. Decreasing the Survival percentage of Shirvan began at -12 °C in seedling stage while for Kalat and Tandoureh's survival percentage decreased at -16 °C. Among ecotypes, Kalat and Tandoureh ecotypes showed the lowest electrolyte leakage, highest LT50<sub>e</sub>, highest survival percentage and the most tolerant to the freezing stress.

**Key words:** Electrolyte leakage, growth stage, LT50, "Mooseer"