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ASSESSMENT OF FREEZING TOLERANCE IN CUMIN (*CUMINUM CYMINUM*) UNDER CONTROLLED CONDITION

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Cold tolerance of cumin ecotypes was investigated under controlled condition. Following three weeks acclimation in controlled conditions, six cumin ecotypes (India Rajestan and five Iranian: Ghoochan, Sabzevar, Khaf, Ghayen and Torbate Heydarieh) were subjected to six cold temperatures (0, -3, -6, -9, -12 and -15°C). Electrolyte leakage (EL) and lethal temperature 50 according to electrolyte leakage (LT_{50el}) were determined after freezing. For recovery, plants transferred to the glasshouse and after three weeks, plant survival (PS), lethal temperature 50 according to the plant survival (LT_{50su}), plant height, leaf area and dry matter were determined. EL% increased significantly at temperatures lower than -9°C, where at -12 and -15°C the EL% were 2.8 and 4.2 times more than controlled plants (0°C). Decreasing the freezing temperature reduced PS and all plants killed in -15°C. Ghoochan and Ghayen ecotypes had the lowest LT_{50su} with -11.8°C and -10.7°C, respectively. Plant height decreased significantly under lower temperatures and greater plant height observed in Iranian ecotypes. Plant dry matter and leaf area decreased about 90% and 86% at -12°C, respectively, as compare as nonfrozen plants. However, there were no significant differences among cumin ecotypes for dry matter and leaf area. There was a positive and significant correlation between LT_{50el} and LT_{50su} ($r = 0.63^{**}$). Thus, EL could be an easy and efficient method to evaluating the freezing tolerance of cumin ecotypes.

Keywords: Acclimation, electrolyte leakage, lethal temperature, plant survival