Abstract

Lilium ledebourii Bioss is a wild species of *Lilium*, which grows naturally in some provinces of Iran. In this study, Four tests Molecular, phytochemical, propagation and hair roots induction were done .For callus initiation, 2,4-D and kinetin hormones were used in five and four levels, respectively, as auxin and cytokinin. Results showed that the highest percentage of the callus was found in 3 µM of 2,4-D and 0.5 µM of kinetin. In terms of callus wet weight, the highest amount was found in 3 µM of 2,4-D and 0.5 µM of kinetin. In addition, in terms of diameter, the highest amount was found in 3 µM of 2,4-D, and 0.5 µM of kinetin. In summary, the 2,4-D hormone had a major impact on the percentage of regeneration increase so that the best response was related to the composition of 3 µM of 2,4-D, and 0.1 µM of kinetin. In this study, phytochemical compounds were measured quantitatively and qualitatively. Results showed the existence of secondary metabolites in the regenerated plants. Phenolic content was 5.198±0.17 mg in each extract. Radical trapping of the diphenyl-picryl hydrazyl test was 3.24±0.52 $mg.ml^{-1}$. Antioxidant activity based on reduced iron was 25.88±1.47 mmol $fe^{+2}.g^{-1}$DW. Flavonoid content of *L. ledebourii* Bioss was 0.78±0.07 $mgRE.G^{-1}$. Peroxidase and superoxide dismutase's enzymes activity in *L. ledebourii* was low. Also, in this study, the combination of saponin, cardiac glycosides, Steroids, Alkaloids and Terpenoid was seen qualitative in the *L. ledebourii*. In order to study the diversity between lilium masses, ITS regions were used to design the marker. The results showed that the guanine base is the most abundant nucleotide. Relatively high conservation was observed in the ITS regions of the populations (0.653). Phylogenetic analysis showed that sargentiae and hybrid varieties are older than other varieties of the *Lilium* family. Also, the location of *L. ledebourii* varieties (Damash and Namin) was identified in a phylogenetic tree using the ITS marker. Overall, the present research showed that ITS molecular markers are very suitable for phylogenetic studies in the *Lilium* family.
Key words: Hormone, *Lilium ledeboorii*, Peroxidase, Phylogeny

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