

عنوان مقاله:

Impacts of cold stress on some physio-biochemical characteristics of three lines/varieties of lentils

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خلاصه مقاله:

Lentil is one of the arctic legumes which can be damaged by the severe cold. In this regard, determination of the cold tolerance among different lentil lines or varieties has considerable importance. To evaluate Bilesovar and Precoz varieties and ILL-۲۵۸۰ line of lentils for cold tolerance and seed yield, a field experiment was carried out as a randomized complete block design with three replications. Also, to study the physiological and biochemical responses of the lentil plants to cold conditions, a factorial experiment was conducted in the greenhouse based on a completely randomized design. The factors were cold conditions and lentil genotypes. The results showed that the highest plant height, ۱۰۰-seed weight, seed yield, and the shoot dry and fresh weight were observed in the Bilesovar variety followed by Precoz. Also, the highest percentage of cold damage was observed in the ILL-۲۵۸۰ line. The cold damage was ۸۰% in ILL-۲۵۸۰ but it was about ۴۱ and ۳۲% for the Bilesovar and Precoz, respectively. The results also indicated that the chlorophyll index (SPAD) declined in Bilesovar and ILL-۲۵۸۰ under the cold stress conditions, whereas it enhanced in Precoz (۲۵۲% over the control). Moreover, the proline content was significantly increased by about ۳۰۰% in the cold-treated Precoz plants as compared to the control plants. The activity of the catalase, as an antioxidant enzyme, drastically increased in Precoz and Bilesavar under cold treatment (۲۰ and ۷۳%, respectively over the related controls). Bilesovar showed a significant increase in total flavonoids and anthocyanin content of the leaves at cold conditions. The results of SDS PAGE analysis showed that in Bilesavar and Precoz, some characteristic bands with molecular weights of ۳۰-۴۰ and ۸۰-۹۰ KD appeared in the cold-treated plants that were absent in the control plants. It can be concluded that the Bilesovar of lentils might be considered a cold-tolerant variety. On the other hand, Precoz and ILL-۲۵۸۰ can be regarded as semi-tolerant and cold-sensitive genotypes, respectively.

کلمات کلیدی:

Biochemical characteristics, Cold tolerance, Lentil, Physiology

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