ABSTRACT

For their sustainable utilization, seeds of *Zygophyllum coccineum* L. and *Peganum harmala* were collected from their natural habitats and their response to salinity was investigated through modulations of gene expression, four, six and eight days recording of seed germination, quantitative estimation of proteins, antioxidant enzymes and protein and isozymes electrophoresis after treatment with 0, 150 and 200 mM NaCl, and expression profiling using RT-PCR. Salinity reduced the percentage of germination, increased the amount of proteins. The differences in the final germination percentage among the two species were greater in the presence of salinity for *P. harmala* than *Z. coccineum* in comparison to the absence of salinity. The increasing in protein content was during germination of both species. The SDS-PAGE revealed specific bands in response to salinity for example (30.2 or 21.9 KD and 57.5 KD) of *P. harmala* might be interpreted as osmotin-like protein and catalase-like protein respectively. The plant diverted most of the synthesized protein from a state of growth to a state of osmoregulation (survival). Since the time required for the synthesis of stress-related proteins has been estimated, the present study offers a starting point for further analysis of newly synthesized proteins, e.g their amino acid sequence, their corresponding mRNA and even their coding sequence.

However, the activities of the antioxidant enzymes (superoxide dismutase - catalase) in exposed to the high salt stress for 6 or 8 days were significantly increased, while peroxidase was decreased as compared with those of the control plants. The differential expression (up and down-regulation) of catalase genes in seedlings under stress might be related to the synthesis of CAT isoforms less sensitive to oxidation, which would prevent enzyme inactivation and H$_2$O$_2$ accumulation. Peroxidases have been used as biochemical markers for various types of biotic and abiotic stresses due to their role in very important physiological processes. The upregulation of SODs is implicated in combating oxidative stress caused due to abiotic stress and have a critical role in the survival of plants. All three isozymes of superoxide dismutase catalyze the same dismutation reaction. These results indicate both the stress down- and up-regulated catalase gene expression. Osmotic stress with NaCl activated the expression of osmotin transcripts. Certain genes may be stress-inducible and expressed only under salt-stress conditions.