Molecular and structural characterization of expansins modulated by fungal endophytes in the Antarctic Colobanthus quitensis (Kunth) Bartl. Exposed to drought stress

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Abstract

Expansins are proteins involved in cell wall metabolism that play an important role in plant growth, development, fruit ripening and abiotic stress tolerance. In the present study, we analyzed putative expansins that respond to drought stress. Five expansin genes were identified in cDNA libraries isolated from Colobanthus quitensis gown either with or without endophytic fungi under hydric stress. A differential transcript abundance was observed by qPCR analysis upon drought stress. To compare these expansin genes, and to suggest a possible mechanism of action at the molecular level, the structural model of the deduced proteins was obtained by comparative modeling methodology. The structures showed two domains and an open groove on the surface of the proteins was observed in the five structural models. The proteins were evaluated in terms of their protein-ligand interactions using four different ligands. The results suggested differences in their mode of protein-ligand interaction, in particular concerning the residues involved in the protein-ligand interaction. The presented evidence supports the participation of some members of the expansin multiprotein family in the response to drought stress in C. quitensis and suggest that the response is modulated by endophytic fungi.

Author keywords

Cell wall; Climate change; Drought stress; Fungal endophytes; Molecular response