Protective Role in Acquired Thermotolerance of Developmentally Regulated Heat Shock Proteins in Cotton Seeds

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Pages: 174-183
Molecular Biology and Physiology

Full Text PDF (149K)

Cotton seeds planted under dryland conditions frequently experience periods of water-deficit stress and elevated temperatures during seedling establishment. The effect of water-deficit stress on the expression of acquired thermotolerance in cotton (*Gossypium hirsutum* L. 'Paymaster HS26') was evaluated. Germinating cotton seeds were water stressed in either polyethylene glycol solutions or vermiculite. Whether exposure to elevated temperatures induced thermotolerance was evaluated with the use of a chlorophyll accumulation assay. The results showed reduced seedling growth under water-deficit stress, yet acquired thermotolerance was not inhibited. Protein analysis at 5 d after planting showed that developmentally regulated heat shock proteins HSP101 and HSP17.6 were present in the cotyledons of water deficit–stressed cotton seedlings and that these proteins were absent in cotyledons from well-watered seedlings. The presence of these heat shock proteins in the water deficit–stressed seedlings failed to enhance their inherent or acquired thermotolerance, compared with that of well-watered seedlings. These results suggest that the developmentally regulated heat shock proteins are not metabolically available to assist in enhancing thermotolerance.

The Journal of Cotton Science is published four times a year by The Cotton Foundation.
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