Identification of differentially expressed drought-responsive transcripts in Egyptian cotton

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ABSTRACT

There is no enough information available on drought-modulated gene(s), which can be a valuable gene pool for improving modern cotton cultivars. The major objective of current study was to identify the responsive transcripts in two elite Egyptian cotton varieties (Giza 88 and Giza 90) under drought stress. To accomplish this, 17% PEG6000 drought stress was applied to seedlings of both cultivars under greenhouse conditions. RNA isolation, differential display (DD) PCR, silver staining gels, purification of DD fragments, and sequencing approaches were applied. A total of 13 out of 27 DD fragments were sequenced and 12 fragments were found with high homology to drought responsive gene families such as peroxidase, oxidoreductase, and kinases. Our study is considered as an addition to the global GenBank database of functional drought responsive transcripts in Egyptian cotton. Moreover, the 12 identified transcripts in our study can be used in multiple bioinformatics and transcriptomics cotton research.

Keywords: *Drought stress, DD- PCR, Gossypium barbadense , cDNA Transcripts, GenBank Database.*

INTRODUCTION

Cotton is one of the leading fiber crops for textile industries especially for the elite Egyptian characteristics. The genus *Gossypium* includes more than 50 diverse species. The four cultivated species include the two tetraploid [*G. hirsutum* L. and *G. barbadense* L. (2n = 4x = 52)] and the two diploid species [*G. arboreum* L. and *G. herbaceum* L. (2n = 2x = 26)] (Triverdi *et al.*, 2012 and Zhao *et al.*, 2013). Egyptian cotton (*G. barbadense* L.) is considered one of the most important cash crops. Egypt is the top producer country of Egyptian Long Stable (ELS) cotton. Due to the increased population, there is a need for a massive increase in high quality cotton production for either local utilization or exportation.

Drought is the most important environmental stress influencing cotton production during its long growing season (eight months). At the morphological level, drought may lower the rate of seed germination (Fernandez-Conde *et al.*, 1998), delay development; decrease both leaf area and leaf number (Pace *et al.*, 1999) reduce root growth, development and distribution of flowers and pods (Malik *et al.*, 1979 and Pace *et al.*, 1999). Drought may also cause small bolls and finally leads to yield loss and poor fiber quality (McWilliams, 2003). At the physiological and biochemical level, water-deficiency is associated with decreased