ESTs analysis of the sugar beet (*Beta vulgaris* L.) responsive transcripts under salt stress

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ABSTRACT

Differential Display Reverse Transcriptase (DDRT-PCR) technique was used to analyze differentially expressed genes in sugar beet (Beta vulgaris L.*) under salt stress. Three weeks old seedlings were exposed to salt stress with 100mM and 300mM NaCl, and untreated seedlings were used as control. Thirty-three differentially expressed fragments were identified and characterized. The fragments were classified according to their time of expression after the drought stress. The significance of the function of the identified differentially expressed genes was discussed in relation to their possible roles as stress genes. Seven fragments showed no significant homology with any database sequences in the GenBank. Results of the database sequence alignment identified four fragments (Bv-1=506bp, Bv19=521bp, Bv26=899bp, and Bv-31=550bp) revealing significant homology with Expressed Sequence Tags(ESTs) from salt stressed sugar beet; twenty-one fragments showed significant sequence homology with drought and cold stress- responsive genes, as well as acetyl-CoA carboxylase and glycosyltransferases. These results implicate that several pathways are involved in the plant's response to drought stress which still needs to be elucidated further.*

Key Words: *Salinity stress, Differential Display Reverse Transcriptase (DDRT-PCR), EST, Gene expression, Beta vulgaris.*

INTRODUCTION

Sugar beet (*Beta vulgaris* L.), a species of *Chenopodiaceae* family, is one of the most important viable crops that supplies approximately 35% of the world's sugar (Liu *et al*., 2008). It is not only used in the food industry but also as a source of the clean energy *via* production of hydrogen gas and bioethanol (Dhar *et al.,* 2015). It contains a large amount of betaine and betalain metabolites. Betaine has a role in plant stress tolerance (Catusse *et al*., 2008**)**. Betalains are natural pigments that have prospective health benefits (anticarcinogenic and antioxidative). Red beet root (*Beta vulgaris* L.) is considered a cheap and rich source of betalains and is very attractive to the pharmaceutical and food industries (Wybraniec, 2005; Wybraniec *et al*., 2011 and 2013). Sugar beet needs careful agronomical practices and breeding for adaptation to biotic and abiotic stresses. It is cultivated in different ambience in Europe, North America, and increasingly in Asia, South America and lately in North Africa. Sugar beet is a biennial crop which grows a sugar-rich tap root in the first year (the vegetative stage) and a flowering seed stalk in