Proteomic and Metabolomic Analysis of Soybean: Molecular Aspects of Drought Tolerance in Transgenic Plants Expressing BiP.

Coutinho, F.S.[1]; Lima, L.L.[1], Vital, C.E.[1], Santos, L.A. [1], Pimenta, M.[1], Oliveira, M.G.A.[1], Fontes, E.P.B., Ramos[1], H.J.O.[1]

[1]Department of Biochemistry and Molecular, UFV, Laboratory of Molecular Biology, BIOAGRO/INCT-IPP, Viçosa-MG, Brazil.

INTRODUCTION: Among the environmental factors, drought is one of major cause in limiting agricultural production. Some factors, such as the expansion of the acreage and climate changes, highlight the need to develop more tolerant genotypes. Our research group at the Federal University of Viçosa (UFV) has observed that the molecular chaperone BiP acts in response to stress in the endoplasmic reticulum (ER) and osmotic stress and confers drought tolerance. **OBJECTIVE:** Characterize the protein and metabolic profiles of transgenic soybean plants overexpressing BiP and its isoline. **MATERIAL AND METHODS:** Proteins and metabolites were extracted from soybean leaves and analyzed by electrophoresis 2DE/LC-MS e GC-MS, respectively. The differentially expressed proteins were identified by *de novo sequence tag* using the PEAKS 7 algorithm against *Phytozome* Soybean database. The metabolites were identified using the Golm GC library and analyzed by MetaboAnalyst 3.0 software. **RESULTS AND DISCUSSION:** Transgenic plants showed a higher abundance of proteins related to photosynthesis, which supports the hypothesis that these plants are genetically and physiologically predisposed to withstand periods of drought. Unlike the wild genotype, transgenic plants showed no significant changes in proteins related to glycolysis, respiration and oxidative stress. That indicates a lower perception of the stress by the engineered genotype. The metabolic profiles indicated that the intracellular accumulation of osmotically active solutes might be an important adjustment mechanism adopted by transgenic plants. In these plants, the amino acid accumulation might be the mechanism responsible for the maintenance of cellular turgor. **CONCLUSION:** Together these results show that protective mechanism may allow photosynthesis and other physiological activities to be more active in drought conditions in transgenic plants.

Keywords: soybean, transgenic, BIP, proteomic, metabolomic.

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