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Poster Abstract - D.20

QUALITATIVE PROPERTIES OF BOUND WATER ARE ASSOCIATED WITH BETTER WATER STATUS OF DURUM WHEAT LEAVES

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Much is known of the Bound Water (BW) role in desiccation tolerance of seeds, by contrast little is known of BW role in drought tolerance of vegetative tissues. Results of physiologic studies performed to investigate the adaptive value of BW in tolerance to moderate dehydration stress are shown in this poster. Leaf samples showing large variation for BW content were obtained using three durum wheat (Triticum durum Desf.) cultivars: Capeiti 8, Creso, Trinakria and three mutants (108, 364, 290) that differ for tissue affinity for water. By construction of adsorption Isotherm (AI) curves, we analysed the qualitative and quantitative properties of water that is bound with different strength to ionic, polar or hydrophobic sites of macromolecules. Three parameters related to the amounts of the weakly and strongly-bound water (quantitative BW properties) and five parameters related to tissues-binding strength for the same water fractions (qualitative BW properties) were determined . Pressure-Volume curves were also constructed on fresh tissues to determine the amount of the non-osmotic BW fraction, free water Relative Water Content at turgor loss point and osmotic potential at full turgor. Leaves with high quantity of strongly BW had also great content of weakly BW, but not necessarily large affinities for the same water fractions, suggesting that the quantitative and qualitative BW properties are probably affected on different factors. Qualitative properties of bound water are related to the water status of living leaves, in fact the higher the affinity of leaves for BW, the lower the tissue water content at turgor loss point and the larger the quantities of free water. These results support the idea that exists a continuum transition among the different tissue water fractions and suggest that the state of BW is an important adaptive mechanism not only for tissues that withstand extreme desiccation, but also for vegetative tissues exposed to drought stress.