第三届国际干旱大会
INTERDROUGHT-III

The 3rd International Conference on Integrated Approaches to Improve Crop Production Under Drought-Prone Environments (Oct. 11-16, 2009, Shanghai, China)

ABSTRACTS

Shanghai Academy of Agricultural Sciences
Shanghai Agrobiological Gene Center

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P 4.30 - Evaluation of the stress-inducible production of proline in transgenic sugarcane (*Saccharum* spp.): osmotic adjustment, chlorophyll fluorescence and oxidative stress

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Proline accumulates in a variety of plant species in response to stresses such as drought, salinity and extreme temperatures. Although its role in plant osmotolerance remains controversial, proline is thought to contribute to osmotic adjustment, detoxification of reactive oxygen species and protection of membrane integrity. In the present study we evaluated the effects of stress-inducible proline production on osmotic adjustment, chlorophyll fluorescence and oxidative stress protection in transgenic sugarcane transformed with a heterologous P5CS gene. In well-watered conditions, free proline, malondialdehyde levels, *Fv/Fm* ratios and chlorophyll contents in transgenic sugarcane were not statistically different from non -transformed control plants. After 9 days without irrigation, proline content in transgenic events were on the average 2.5-fold higher than in controls. However, no osmotic adjustment was observed in plants overproducing proline during the water deficit period. The photochemical efficiency of PS II observed was higher (65%) in the transgenic events at the end of the water deficit experiment. The effects of proline on lipid peroxidation as malondialdehyde (MDA) levels and on the decline of chlorophyll content in paraquat-treated leaf segments along the drought period suggest that proline protected the plants against the oxidative stress caused by the water deficit. The overall capacity of transgenic plants to tolerate water deficit stress could be assessed by the significantly higher biomass yields 12 days after withholding water. These studies suggest that stress-inducible proline accumulation in transgenic sugarcane plants under water deficit stress acts as a component of antioxidative defense system rather than as an osmotic adjustment mediator.

P 4.31 - Drought stress and photosynthesis in flag leaves of rice (*Oryza sativa*)

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Due to changes in global climate, crops are frequently getting exposed to several abiotic/biotic stresses. Thereby, affecting food supply and security. Among the abiotic stresses, drought has emerged as the major cause of rice yield instabilities across diverse crop-growing regions of Asia. Therefore, need of the hour is to develop drought tolerant rice genotypes. The worldwide water shortage and uneven distribution of rainfall makes the improvement of drought resistance especially important. Drought stress is one of the most important environmental factors inhibiting photosynthesis. In present study, Proteomic analysis on rapidly stressed flag leaves was conducted to identify proteins of different categories whose behaviour was adversely affected due to decline in the Relative water content (RWC) of flag leaves below threshold level. Here, we report about the proteins whose behaviour was affected under drought stress conditions in flag leaves of rice and were involved in photosynthetic process. Among the selected set of proteins, MALDI-TOF analysis identified five proteins involved in photosynthetic process. These proteins are: Rubisco Activase (RCA), Malate Dehydrogenase NADP chloroplast precursor (NADP-MDH) Ferredoxin Oxidoreductase (FNR), ATP-Synthetase and Thioredoxin-m. Out of these five proteins, three proteins viz., RCA, NADP-MDH and Trx-m, were found to be down regulated significantly in response to drought stress conditions. After one day of re-watering, these three protein spots were found to be reversible in their expression.