

Nongluk Teinseree 2007: AFLP Marker Linked to the Ability to Maintain Total Leaf Water Potential and Osmotic Potential in Sugarcane. Doctor of Philosophy (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Sontichai Chanprame, Ph.D. 94 pages. ISBN 974-16-2757-2

The sugarcane water stress responses were investigated to evaluate methodologies and parameters suitable for water stress tolerant screening. The experiments were conducted on seedlings of two clones, 'KPS 94-13', a water stress tolerant clone and '93-1-25', a sensitive clone. Two methods generating the water stress were compared between the reduction in watering with soil water stress measurement and the PEG gradient solutions of 0, 10, 20, 30 and 40% at each five days. Changes in the total leaf water potential (Ψ_t), the osmotic potential (Ψ_p) and the pressure potential (Ψ_p) were monitored during the experiment. The 'KPS 94-13' showed significantly less declines in the total leaf water potential, the osmotic potential and the pressure potential than '93-1-25' and remained its total leaf water potential and the osmotic potential levels. These sugarcane water stress responses were also observed in Hoagland solution culture at 30% PEG.

The analysis of molecular markers linked to traits of the ability to maintain high total leaf water potential and osmotic potential was investigated in the 90 segregating population (F2) seedlings grown in Hoagland solution culture with PEG up to 30%. By parameters as total leaf water potential and osmotic potential, the distributions of the F2 population showed very high variation from -517 to -4,123 and -882 to -4,044 kPa, respectively. Four DNA groups were pooled as a group that could maintain high level of total leaf water potential, low level of total leaf water potential, high level of osmotic potential and low level of osmotic potential. DNA bulked segregant analysis and selective genotyping were subjected to AFLP analysis. Two AFLP markers, AGG/CTC and AGG/ACG, were apparently linked to ability to maintain high total leaf water potential and can be explained 13% of the variation of this trait. Three AFLP markers, CAG/CTC, AAG/ACA and GCA/CAG, were found to link to maintain high osmotic potential and explained total of 15.1% of the variation.

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Student's signature



Thesis Advisor's signature

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