



## Plant & Animal Genomes XVI Conference

January 12-16, 2008  
Town & Country Convention Center  
San Diego, CA

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W243 : Intl. Consortium for Sugarcane Biotech. (ICSB)

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### Applications Of Advanced Cytogenetic Techniques In Sugarcane

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Cytogenetic techniques, GISH (Genomic In Situ Hybridisation) and FISH (Fluorescence In Situ Hybridisation), are essential tools to characterize the chromosome composition and the mode of chromosome transmission in complex polyploid interspecific hybrids such as sugarcane. Four examples will be presented. i) *Erianthus arundinaceus*, a related genus to *Saccharum* is considered as having a great potential as a germplasm source for better ratoonability, vigour, tolerance to environmental stresses, and disease resistance in sugarcane. Fertile clones from intergeneric crosses between *Saccharum officinarum* and *E. arundinaceus* and two backcross generations have been generated in China. GISH was used to characterise this material and revealed  $n+n$  transmission in the I1 and the second back-cross (I3) and  $2n+n$  transmission in the first back-cross (I2). No recombination events were observed between *Saccharum* and *E. arundinaceus* chromosomes in either I2 or I3 clones. ii) We analysed a few atypical *S. officinarum* clones with more than 80 chromosomes and demonstrated that they were derived from interspecific hybridization supporting classical cytogeneticist view that this species is characterized by  $2n=80$ . iii) We conducted GISH analysis of two progeny, from a cross between *S. officinarum* and a cultivar (Q165,) used to generate genetic maps and revealed the occurrence of  $2n+n$  transmission. iv) the basic number in *S. officinarum* and *S. spontaneum* is different with  $x=10$  and  $x=8$  respectively. We are currently mapping on the chromosomes, BAC clones anchored to the R570 genetic map, to investigate the structural difference between the chromosomes of these two species.

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