11th GERMPLASM & BREEDING

8th MOLECULAR BIOLOGY

ISSCT WORKSHOP

Saint-Gilles Réunion Island / 1–5 June 2015

« Pushing the frontiers of sugarcane improvement »

ABSTRACT

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ORGANIZATION

11ᵗʰ GERMPLASM & BREEDING   *8ᵗʰ MOLECULAR BIOLOGY WORKSHOP*

SUMMARY

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DEVELOPMENT OF NIRS METHOD FOR ROUTINE ASSESSMENT OF SUGARCANE QUALITY IN REUNION ISLAND

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In a joint project with Cirad, eRcane laboratory facilities have been equipped with a semi-automatic Near Infra-Red Spectroscopy (NIRS) device (a Bruker Matrix-F and linked CPS conveyor) dedicated to fresh cane analysis. The breeding programme at eRcane requires analysis of 8,000 sugar cane samples per year. Conventional methods to determine cane quality at eRcane consist of shredding stalk cane samples, pressing the resulting pulp in a hydraulic press and collecting plug and juice obtained. The plug is then weighed for determination of fibre content (fibre% cane) while juice is filtered for determination of brix% and pol%. Extracted Sugar (ES% cane) is computed using the data collected. Currently, the characterisation of 8,000 sugarcane varieties requires the mobilisation of five workers simultaneously, two days and a half per week, during five months. An experiment was conducted to evaluate if NIRS could be a feasible alternative for an easier and more rapid assessment of cane varieties quality.

After a period of first handling, the semi-automatic system proved to be able to handle higher work rate than the conventional method, with only 2 operators. A preliminary calibration was developed using a 200 samples dataset. 75% of the dataset was used for calibration and 25% for validation. The prediction of Brix% juice, Pol% juice and of ES% cane exhibited reliable results, since the coefficients of determination (r^2) of regressions between predicted and observed values exceeded 0.9 for these three traits and Ratio Performance to Deviation (RPD=Standard deviation/standard deviation of residuals) was higher than 3. The calibration has already reached interesting accuracies statistics for fibre% cane (r²>0.7, RPD >2). Prediction of Juice purity (Pol% juice / Brix% juice) showed very poor accuracy so far (r²<0.5, RPD<1.5). Juice purity prediction will not be sought further. Standard Error of Laboratory (SEL) was calculated and it turns out that it was really low: 0.01 for Brix% juice and Pol% juice; 0.03 for ES% cane and 0.15 for fibre% cane. Hence, Standard Error of Prediction (SEP) although rather acceptable compared to bibliography, was higher than SEL: 0.62 for Brix% juice, 0.61 for Pol% juice; 0.56 for ES% cane and 1.85 for fibre% cane. Improvement of NIRS prediction equations will be sought in order to have a completely automated tool, able to accurately predict simultaneously all quality parameters required for variety comparisons.