Fibre Quality Measurement gets a 30-year review

A RECENT INDUSTRY WORKSHOP, COMPLEMENTED BY RESEARCH INVESTMENT, HAS LOOKED AT A RANGE OF ISSUES AROUND FIBRE QUALITY AND MEASUREMENT, TO HELP CONTINUE TO DELIVER OPTIMUM VARIETIES FOR THE INDUSTRY.

The Australian sugar industry relies on the performance of its cane varieties to sustain profitable businesses throughout the value chain.

SRA's variety development program targets key attributes important to achieving industry expectations for both agronomic performance and milling performance. The key "millability" characteristics of these varieties are defined principally by the percentage of fibre in the cane, and the particular characteristics of that fibre as determined by a set of standardised Fibre Quality Measurements (FQM) which include impact resistance, shear strength and the percentage of short fibres.

These measurements were established in the mid 1980s, and allowed varieties to be assessed with regard to suitability for milling. Varieties showing FQM characteristics outside a "normal" range were generally classified as "hard" or "soft" canes as a generalisation of their physical response during milling.

Soft canes generally had FQM attributes which included low fibre content and hard canes had high fibre content.

In recent years, a small number of varieties have been released with low fibre, such as SRA1ᵠ and SRA4ᵠ, which exhibited characteristics attributed to soft canes in the milling process. This presented particular challenges to achieving adequate factory performance.

To respond to this issue, SRA has invested in research to better understand these soft cane varieties, and capture more knowledge about the development history, FQM assessment and measurable variations in processing these varieties.

In addition, SRA has also responded by convening an industry workshop to discuss the path forward for fibre quality and what research is needed to provide improved variety outcomes.

The workshop was chaired by SRA Research Funding Panel (RFP) Chairman, Mr Gary Longden, and attended by representatives from SRA, CSIRO, QUT,

CANEGROWERS, the Australian Cane Farmers Association, milling organisations, the Australian Sugar Milling Council, and productivity services companies.

A key topic at the workshop was discussion on the current system for determining FQM in the breeding program and opportunities to measure fibre quality earlier in the variety development process. The current FQM system is not suitable for evaluating the large number of clones examined throughout the variety development program and is undertaken with only those clones within the final assessment trials (FATs).

The ability to identify at-risk varieties sooner could save significant effort in progressing preferred varieties through the breeding program, but comes with the challenge of implementing these measures against a greater number of clones.

The workshop also discussed adapting new technology for measuring fibre attributes, and methods of providing more information to regional variety

(Over page / Above) Work is underway to better understand fibre quality measures and variety performance.

committees (RVCs) so that this could better inform their discussions around future potential varieties.

The workshop reviewed preliminary investigations into adapting near infrared spectroscopy (NIR) systems currently used by SRA as a suitable means of large scale screening across multiple clones for FQM attributes.

There was general agreement that establishing suitable calibrations for FQM attributes using NIR analysis was possible, and investigations to achieve this should be given a high priority. This technology could inform earlier stage breeding decisions, and the current standardised testing methods would remain as a last stage evaluation and for ongoing calibration of the NIR based analysis system.

The workshop also identified future research investigations that could provide value to the industry, and considered that a standardised system for ongoing reporting of milling characteristics of varieties would be beneficial to an improved understanding of varietal characteristics and potential breeding applications.

In response, the SRA Board will invest in research to address the workshop outcomes, focusing on a project to develop and assess NIR calibrations for SpectraCane implementation to accelerate FQM data development and adaptation within the breeding program.

The workshop has been informed by several research projects within SRA's investment portfolio, including the most recent project led by Dr Geoff Kent at the Queensland University of Technology, with a project called Reviewing and extending knowledge of fibre quality assessment and effects of cane varieties.

This project had a number of objectives including re-evaluation of the "safe range" for existing FQM values as indicated by measured conditions within factory operations, and assessing factory operating performance for different varieties across multiple seasons. The work also identified several approaches for better presentation of fibre quality data to RVCs to aid in the selection of new varieties for release.

In addition, the project provided SRA with information on the cost of measuring fibre quality at an earlier stage in the breeding program, and the potential benefits if satisfactory SpectraCane calibrations for fibre quality could be made.

Dr Kent's research has also proposed further analysis of the effects of different varieties on factory operation and performance, with a view to gaining better information on the cost implications of varieties with extreme fibre quality and placing an economic value on fibre quality.

An alternative line of research to consider how to manage low fibre and soft canes to minimise the impact on factory processing is proposed, involving managing crop maturity and ripeness to elevate fibre content and controlling cane preparation to limit fibre quality impacts. ■