Serious economic loss for growers and millers

Phil Patane

Development Officer – Harvesting

Professional Extension and Communication Unit

A prototype infield sucrose loss measurement system (ISMS) developed by the SRA engineering team has been successfully tested over the past four harvesting seasons from Mareeba down to NSW.

This season MAPS are using their own ISMS built to SRA's design, to work with local growers and harvesting contractors to identify where losses occur and to suggest changes to reduce these losses.

The development of the ISMS

For harvest loss trials in the past, the biggest problem was the lack of an accurate cane loss measurement technique. The traditional 'blue tarp method' of measuring cane loss and mass balance cane loss were two key measurement techniques. A more accurate method that could provide rapid feedback to growers and operators was developed and is known as the ISMS.

Harvesting losses are a major cost to the sugar industry; in particular, the loss of millable cane via the cleaning system during green cane harvesting. Losses as high as 20 per cent have been recorded, but 5–15 per cent is more common.

The ISMS prototype has measured losses of $200/ha to more than $1500/ha.

The field trial data in **Table 1** shows the percentage loss at different fanspeeds as well as the financial cost of losses for a 1000-hectare harvesting group. For example, at a 90 t/ha average yield, this would represent a 90 000 tonne harvesting group.

Measuring harvest loss in the field with the ISMS

Field residue (trash blanket) is collected either directly from the harvester or from a measured area (quadrat) and weighed to measure total tonnes per hectare of trash blanket. The trash contains shattered billets and lost juice.

The field residue is mulched and mixed to provide a representative sub-sample which is then washed/blended and a liquid extract obtained in a juice press. This liquid contains sucrose/glucose/fructose resulting from shattered billets and juice in the field residue.

During the development of the prototype, hundreds of samples were analysed using a handheld digital brix refractometer in parallel with the highly accurate high performance liquid chromatography (HPLC) machine at the SRA Indooroopilly laboratory.

The strong correlation between the brix and the total sugar content of the samples (as shown in **Figure 1** on the next page) provided an important link in developing the mobile system.

Fanspeed rpm	% loss	$ loss/1000 ha
950	7.1	475 000
1050	16.0	1 080 000
720	3.6	210 000
900	9.6	560 000
760Primary	3.4	220 000
760Primary and secondary*	10.5	680 000

Table 1 (left): Percentage cane loss and financial loss at different fanspeeds. Note: Some losses are unavoidable. On average, the process of cutting cane (basecutters and chopper knives) results in losses of three to five per cent.

* Bigger secondary blades can cause excess cane loss.

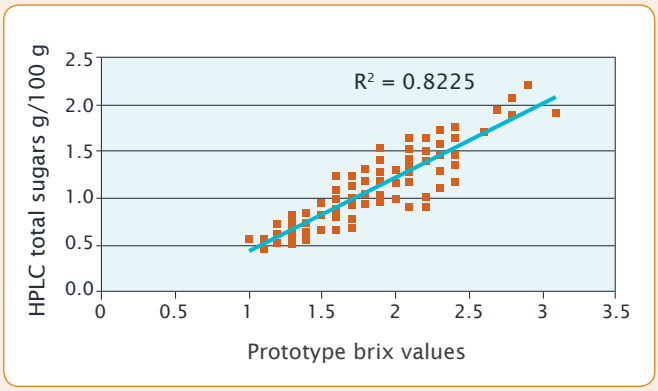

Figure 1: Prototype brix versus HPLC total sugars.

The outcome of this project is a fully functional sugar loss measurement tool which is being used by researchers to boost awareness of harvesting losses. In addition, data on harvester performance has been generated to provide guidelines for the industry to reduce harvesting losses.

Sweet success

With the knowledge MAPS gained through being involved with the ISMS over a number of seasons, they recently purchased their own ISMS and are currently running trials in the Mackay and Plane Creek areas.

Initial 2014 field assessments in Mackay show losses of 0.25–2.5 tonne of sugar per hectare equivalent to $200–$1000/ha loss to the industry. Currently, 12 contracting groups have been assessed.

The Tully and Herbert industries are also interested in and want to be more actively involved in harvest performance monitoring. The SRA engineering team has provided equipment details and protocols to their local productivity services so they can collect and process harvest residue samples themselves after some training from SRA staff.