

(Below) UNE Professor Andrew Robson says new yield-forecasting technology offers significant potential for the Australian sugar industry. (Over page) HCPSSL collecting in-field measurements as part of the project.

VIEW FROM ABOVE HELPS WITH YIELD FORECASTS

The Australian sugarcane industry is used to wild variations in the weather.

This year alone has seen seasonal conditions swing from severe drought in some regions to flooding.

Such climatic variation is not new to the Australian sugar industry, but it is becoming increasingly common – and the cost can be profound.

Unpredictable weather not only hampers growth and management, it also complicates mill planning for how much cane is available to be harvested and crushed. The logistics of scheduling rolling stock and labour to support processing – and the finalisation of sales, pricing and marketing strategies – can be a major challenge for the industry.

But there's light on the horizon.

Funded by Sugar Research Australia, the Applied Agricultural Remote Sensing Centre (AARSC) at the University of New England (UNE) has joined forces with UNE's Computation Analytics Software Informatics to develop an innovative tool for forecasting sugar yields and crop health.

The SugarMaps platform builds on a decade of research and extensive industry testing. It uses satellite images dating back 15 years as well as corresponding productivity information.

After analysing how crops performed under a variety of conditions, the AARSC team developed an algorithm for each growing region that correlates annual crop growth patterns with yield. Best of all, it has been shown to be highly accurate, even during fluctuating seasons.

"Extreme weather events are occurring with greater frequency across Australia, and the yield forecasting methodology we have developed offers a degree of certainty that has been shown to exceed the accuracies of traditional methods," says AARSC founder and director Professor Andrew Robson.

"Last season, extreme drought conditions impacted many of the sugar growing regions, yet we were still able to predict sugarcane production four months before harvesting commenced, achieving an average of 93 percent accuracy across 12 regions.

"As well as providing regional yield forecasts, SugarMaps provides a standalone platform that delivers crop health and derived yield maps for tens of thousands of sugarcane crops. Forecasts can be immediately updated following natural disasters, and SugarMaps enables growers to make more informed on-farm decisions about the planting of different varieties, as well as how they might tackle problems like water-logging, drought, nutrient deficiency and disease."

Professor Robson's team of international experts has validated the technology with sugarcane growers and mills in all major sugarcane growing regions, spanning up to 100,000 individual crops. He said the ongoing support and engagement from industry is a clear demonstration that the outcomes and accuracies are hitting the mark.

Third-generation sugarcane grower Brian Dore, who supplies the Tully mill, has used satellite imagery provided by the AARSC team to "get a handle on the variables" so he can address them.

"No two years are the same, and having the science to back up our decision-making is very important, rather than shooting from the hip," he said. "Variations in yield of 10-15 percent might not sound like a lot, but when you are working on slim margins, 10-15 percent can add up to a lot of tonnage. Accurate data is vital, so you know what's coming, and SugarMaps will be a great tool to have in our toolbox."

From a mill perspective, SugarMaps provides crucial benchmarks.

"We can have a difference in rainfall of a metre from one end of our growing region



to the other, which makes advising the mill challenging," said Greg Shannon, cane productivity manager with Tully Sugar, which has contracts with 220 sugarcane growers across 34,000 hectares and operates one of the largest single train sugar mills in the country.

"I've combined AARSC forecasts with my physical assessments of crop growth, so it's not just me running around a paddock with a cane knife and scales. It's the most accurate data we've ever had and gives me a great deal of confidence in recommendations. I think it will be of real interest to corporate sugar producers and growers all over the world."

At Bundaberg Sugar, the responsive capabilities of SugarMaps has similarly impressed cane supply manager Rob Powell.

"We use the SugarMaps data to validate our crop estimate (currently generated by our field officers and growers) and to consistently monitor the crop and guide re-forecasting throughout the harvest season," he said.

"SugarMaps will enable us to better understand what's currently out there and monitor the vigour of the crop, which helps to streamline our operations and maintain efficiencies. Some growers are using the platform to achieve greater consistency across their paddocks – using it to monitor crop yield variations across their farm and provide real feedback on nutrient application, water logging, and sub-surface drainage.

"In the future, I can see us using the satellite imagery to monitor crop development, growth, yield and crop estimates, to determine what cane is yet to be harvested throughout the crushing period."

With the lion's share of Australia's sugar exported, accurate yield data is vital for mills to budget, price and market their raw sugar.

"The cost of not meeting contractual forward-selling obligations can be

great," Professor Robson said. "In 2010, when wet weather prevented a number of growing regions from completing their harvest, Queensland Sugar Limited reported that 5.5 million tonnes of cane was left in the paddock. This cost the industry \$105.5 million.

"We've developed a means of accurately predicting sugar yield in Australia's changing climate. This is fundamental to every agricultural and horticultural industry, not just sugar. We've also produced yield mapping for macadamias, avocados, mangoes, carrots and peanuts. It enables growers to improve management of their assets, respond to natural disasters and even combat biosecurity threats.

"The world is seeing an explosion in agricultural technology. SugarMaps is distinctive in that it has been developed with direct industry engagement and data support from the start. It includes years of calibration and validation research and a strong understanding of the industry and the technologies being used. It's not just another platform offering free 'pretty pictures'; it gives growers and mills access to the exact outputs they want, in the format they have helped design ... and it's accurate."

SugarMaps has been validated in partnership with sugarcane millers, productivity services staff, consultants and sugarcane growers under real farming conditions. Industry partners are now reviewing a prototype of the platform, ahead of its formal commercialisation later this year. ■

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