

(Below left) Chris Norris, Norris ECT, during one of the trials in late 2019 in the Condong mill area.
 (Below middle) Chris assessing stool damage after the modified harvester has been over the top.
 (Below right) Modified position of the knockdown roller on a John Deere 3520.

OPTIMISING THE FRONT END FOR BETTER HARVESTING

NORRIS ECT HAS BEEN INVESTIGATING THE POTENTIAL FOR MODIFYING THE FRONT-END COMPONENTS OF SUGARCANE HARVESTERS TO UNDERSTAND OPPORTUNITIES FOR IMPROVEMENT AND EFFICIENCY. BY BRAD PFEFFER



To see a video of this project in the field, hover your smartphone's camera over the QR code.

The spindles on a cotton picker are matched to groundspeed. The reel on a grain header is also matched to groundspeed.

In the sugarcane industry, however, it is a different story, with the front-end components not matched to the speed of the harvester as it moves along the row.

However, in recent years, research led by Norris ECT has conducted trials with harvesters where spiral and basecutter speed has been matched to groundspeed, in order to help the industry understand the potential efficiencies that could be gained.

This work has occurred with five modified harvesters that have operated in regions from NSW to Far North Queensland over several seasons. The trials have assessed a range of issues and have had a strong focus on yield in subsequent ratoons and ratoon length.

"We discovered from our first series of trials that between 80 and 95 percent of the cane stools were severely damaged after a conventional harvesting operation," Chris Norris, Norris ECT, explained.

"We also saw there was lower shoot emergence and lower yield the following year. We are also collecting more precise information on the impact on yield for subsequent crops and what aspects of the gathering and feeding process were causing this damage."

In addition to trials that have matched front-end component speed to ground

speed, the Norris team has also looked at other modifications to front-end components.

Before that occurred, though, an important part of this process was understanding the baseline of the damage from the basecutters. To do this, the research team needed a trial that understood the true impact of the spirals and the knockdown and fin roller.

With that in mind, in the 2018 season, the Norris ECT team cut cane by hand at about 20cm above the ground and then harvested it with a conventional harvester.

This meant that the cane passing through the harvester never touched the forward-feeding components. This allowed Norris ECT to understand how much of the damage to the stool was occurring before the cane reached the basecutters. By assessing each stool, and comparing it to conventionally harvested cane, this gave the Norris ECT team information on the relationship between the spirals and knockdown and fin roller on stool damage.

"In 2019 we went in again with a conventional harvester into the plots that were hand cut in 2018," Chris explained. "From that, our yields were between 7 percent and 25 percent higher in those sections compared to the section beside that had been treated conventionally.

"This trial took out the gathering and knockdown effect. When we did the post-harvest analysis we saw that the damage to the stool was about halved."

With that baseline information, Norris ECT understood that there was an opportunity for the industry to regain value.

Their next step was to investigate modifications to the harvester that would improve the feeding of the cane and therefore result in less damage to the stool. This included an assessment of a new positioning of the knockdown roller so that the cane was more erect as it entered the harvester.

When CaneConnection caught up with Norris ECT recently, they were harvesting a trial at Condong on the Tweed Valley in the final days of the 2019 crush.

This trial included an assessment looking at a modified positioning of the knockdown roller on a John Deere 3520 owned by Citifarm, whose manager is Dave Bartlett. The roller is positioned so that the cane reaches the basecutters at a more erect position.

On the day of this trial, the machine was harvesting a crop of about 110 tonnes per hectare and Chris said it appeared to be feeding well at a groundspeed of 6km per hour.

"We are trying to prove that if we don't knock the cane down as hard then there will be a lot less damage. We are also observing how the cane is feeding into the machine, including through GoPro cameras attached to the harvester."

This work builds on research from the early 2000s by Sander Kroes, particularly around the determination of how far cane can bend before it reaches an angle where it breaks.

"We are hoping to see a lot less stalk snapping below the surface and a lot less shattering. In a standard system there is a lot of pressure on the stalk prior to cutting, which results in deep shatters and snapping. The result we hope is an improvement in ratooning and better crop growth and therefore an improvement in yields the following year."

Norris ECT are also collaborating with researchers at the Queensland University of Technology on this project, who are using computer modelling to simulate the breaking point of cane and the impact on billets. ■



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For more information contact Chris Norris on
 E chris@norrisect.com
 M 0400 203 106.

