

AquaTill at farm scale controls cotton ratoon

■ By Greg Butler, R&D Manager, SA NoTill Farmers Association

COTTON growers Garry and Zena Ronnfeldt have taken on the challenge to build the world's first AquaTill farm-scale prototype machine for the control of cotton ratoon.

AquaTill "Jetacide" is a ultra-high-pressure (UHP) liquid system that operates at 50,000 psi, with the jets used to inject herbicide directly into the stem of cotton ratoon soon after picking.

Garry explained, "I'm aiming to eliminate unnecessary disturbance and keep permanent soil cover. AquaTill looks like it can help me achieve that by effectively terminating the standing cotton ratoon."

Promising trial results have facilitated an APVMA permit to expand testing. Independent trial work conducted in 2019 and 2020 by the Dryland Cotton Research Association (DCRA) with funding support from the CRDC has investigated post-picking ratoon control using the AquaTill Jetacide in standing and mulched cotton crops. (Figures 1a and 1b).

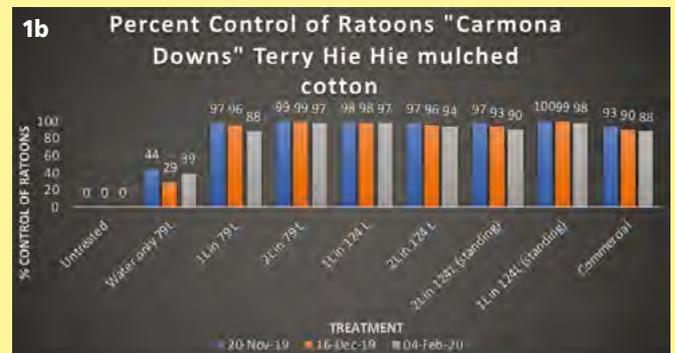
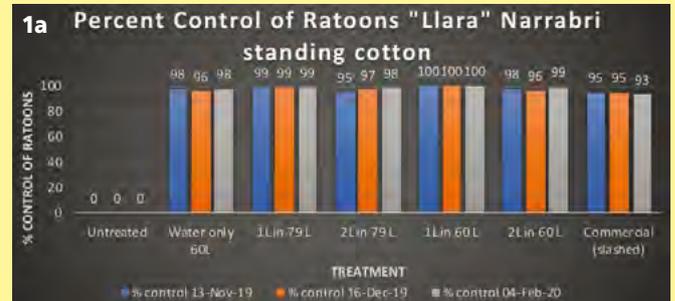
In both cases, the Jetacide method provided good control of the ratoon across a range of herbicide rates and water rates however, it appears the most favourable treatment is on standing ratoon before it is mulched.

Jetacide generally provided as good or marginally better cotton ratoon control than traditional commercial methods.

Using only water (no herbicide) through the 50,000 psi jets did provide some control, however it was not reliable at all sites and the addition of herbicide is recommended.

Other recommendations including applying Jetacide treatment as soon as possible after picking and preferably before frost damage.

FIGURES 1a and b



Upscaling new technology and deploying it into the field at farm scale for the first time requires good kit, good planning, and lots of know-how.

In early 2020 the Ronnfeldts hosted an operation, safety and maintenance workshop led by an experienced pump technician from Flow International, the world's leading supplier of UHP equipment and the company commercialising the AquaTill system (Photo 1).

"For us, it was important that we could maintain and service



Photo 1: Keith Loga from Georgia USA trains Garry Ronnfeldt and other participants at MacAlister on how to service and maintain the 50,000 psi Flow pump.



Photo 2: A PTO drive version of the 50HP 50,000 psi Flow pump deployed in sugarcane as a liquid couler.



Photo 3: UHP pump skid and engagement tooling, mounted on an upcycled cotton picker.



Photo 4: The engagement tool is designed to ensure that each ratoon along the row has good exposure to the Mach 3 jet-stream.

the AquaTill equipment ourselves because we are a long way from the traditional support network for water-jet customers," says Garry.

The integrated UHP pump skid is a standard Flow product that is used for other applications such as surface preparation at shipyards. It comprises a Flow pump integrated with a CAT engine. The skid is likely to be replaced with a 200 HP PTO driven AquaTill pump, currently under development by Flow.

The first 50 HP PTO driven AquaTill system is being used by Sugar Research Australia (SRA) on a smaller scale research machine that was deployed for the first time in early 2020. (Photo 2).

The small Flow pump on the SRA prototype can run 6 Jetacide nozzles. The larger Flow pump being used for the farm-scale cotton prototype is designed to run 12 Jetacide nozzles but will have the potential to run 24.

To accommodate the skid, a superseded cotton-picker was upcycled by removing the basket and attaching a tool bar to the front to mount engagement tools (Photo 3).

Engagement tools position the UHP nozzles, and this is critical to ensure accurate and consistent contact of the Jetacide stream with the ratoon.

Garry has been testing NDF and other prototypes, and the initial field results indicate good ratoon engagement over a wide range of speeds (Photo 4).

The trials in recent years show that cutting right through the ratoon can reduce effectiveness. When using the Jetacide method, a cut $\frac{1}{4}$ to $\frac{1}{2}$ into the stem is adequate (Photo 5).

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Photo 5: AquaTill is razor sharp and when deployed for Jetacide, it can cleanly slice into the ratoon, depositing herbicide directly into the translocating tissue. To maximise efficacy, it is important not to slice all the way through the ratoon.

