

Cotton ratoon termination with AquaTill injecticide

□ By Greg Butler – R&D Manager, South Australian No-Till Farmers Association

A COTTON grower told me, “the two most difficult activities are crop establishment and ratoon control.” If this is true, then the innovative AquaTill technology could be transformation for the cotton industry.

AquaTill is a fine stream of liquid travelling at three times the speed of sound that can penetrate through living or decaying plant material

The high velocity cutting stream is positioned against the target using AquaTill engagement tools that track the ground.

AquaTill is powered by Flow Ultra-High-Pressure (UHP) pumps that operate in excess of 50,000 psi (3800 Bar).

The two AquaTill application scenarios relevant to cotton are:

Liquid coultter

The ‘Liquid coultter’ penetrates vertically downwards slicing through surface residue to allow clean access to the underlying soil for disc and tine seeders (Photo 1).

An independent assessment of the Liquid Coultter recently funded by GRDC and led by the Agriculture Machinery Research and Design Centre at the University of South Australia concluded; *“The AquaTill Liquid Coultter demonstrated a high potential for crop residue cutting and is confirmed to be a great technology fit for assisting residue handling in no-till planting applications, particularly in wet stubble and soft soil environments where traditional mechanical coultters fail”*.

Direct seeding of cotton through surface residues while ensuring good seed-soil contact opens up opportunities for no-till styled farming systems with full residue retention.

This could be particularly beneficial when the total disturbance

of soil can be avoided, such as dryland situations where in some circumstances, pupae may be managed without cultivation.

And even for irrigators with pivot or lateral overhead delivery, there is an opportunity to explore high residue systems that have historically proved problematic due to the residue handling capacity of traditional tine and disc seeders.

Injecticide

The ‘Injecticide’ operates horizontally rather than vertically and injects chemical directly into the translocating tissue of living plants (Photo 2).

The herbicide exits the nozzle at high velocity and slices its way through the bark and into the translocating tissue in the stem (Photo 3).



Photo 1: The South Australian NoTill Farmers Association conceived the AquaTill ‘Liquid Coultter’ as a means to slice cleanly through moist residue using aqueous liquid fertiliser. (SOURCE: Greg Butler 2016)



Photo 2: Testing the AquaTill ‘Injecticide’ on cotton ratoon using PTO driven FLOW Hyplex pump and the Injecticide engagement tool being developed by NDF. (SOURCE: Greg Butler 2018)



Photo 3: LEFT: A fine slice into the cotton ratoon delivers Fluroxypyr instantaneously into the translocating tissue near ground level. RIGHT: Pulling the stem back reveals the penetration of the razor-sharp jet-stream. (SOURCE: Greg Butler 2018)



Photo 4: AquaTill Injecticide appears to be exceptionally effective at controlling cotton ratoon regrowth. (SOURCE: Greg Butler 2017)

The outcome is very similar to the 'drill and fill' method for controlling invasive trees; whereby holes are drilled in the trunk and herbicide is syringed in. Except in the case of the Injecticide, there is no drill and no syringe, just water and herbicide molecules traveling near Mach 3.

A preliminary field evaluation of the Injecticide concept (CRDC DAQ 1703) was conducted at Keytah (Moree) in 2017.

The field evaluation report stated; "The use of AquaTill Injecticide showed excellent promise for further development as a bona fide end of season crop destruction tactic."

It is important to note that the AquaTill technology is still in its infancy and further advances are constantly being made. Even though there is a compelling proof of concept (Photo 4), the AquaTill system is so new that more work is required to ascertain the impact of many variables such as the stem penetration required for effective control, the herbicide rates, the water rates, the influence of travel speeds and the risk of herbicide drift.

Commercial development

The field evaluation concluded that a herbicide data package should be developed in conjunction with a chemical registrant so that the herbicide label could recognise this completely new method of herbicide application.



Photo 5: The Injecticide engagement tool by NDF could be a gamechanger. (SOURCE: Greg Butler 2018)

To that end, CRDC has recently supported two follow up trials at Narrabri during July 2018 in conjunction with the Dryland Cotton Research Association (DCRA).

In addition, Titan Ag have confirmed plans to expand their Fluroxypyr 400 product label to include AquaTill Injecticide as a new method for controlling cotton ratoon regrowth.

The field evaluation also recognised that the Injecticide application would require a specific agricultural engineering effort to ensure reliable and consistent engagement of the AquaTill nozzle with the ratoon stem while dealing with trash and uneven surfaces as the unit works across the field.

NDF Ag-Design, well known for their NDF Disc Planter range, is an Australian regional manufacturer located at Narromine that have announced themselves as the first company in world to embrace the AquaTill technology with plans to commercialise the cotton killing Injecticide unit and the Liquid Coulter for managing heavy stubble in front of a tine or disc

NDF intends to offer a full turn-key AquaTill enabled machine for the cotton industry next season and NDF is currently building a six row Injecticide unit and a 12 row Liquid Coulter unit for field demonstrations. (Photo 5).

Individual growers and contractors wanting to undertake a custom build of their own are also able to choose between two AquaTill retro-fit kits.

The first kit is a Flow Hyplex pump and UHP plumbing with a capacity range of two to six nozzles.

The second kit is a Flow Husky pump and UHP plumbing with a capacity range of eight to 24 nozzles.

Interest in custom builds has so far included fitting Injecticide directly into existing machines such as cotton pickers and stalk mulchers, or as a dedicated Injecticide machine on a three-point linkage with a PTO drive.

Other manufactures of farm equipment are also encouraged to embed AquaTill options into their product range and confidential enquiries can be made via www.aquatill.com

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