



IRRIGATION RESEARCH & EXTENSION COMMITTEE

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FOR IRRIGATION CROPPERS

**No till – does it fit in irrigated
farming systems?**

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No till farming has been commonly practised in NSW for over 30 years. Adoption in dryland farming systems is very high, whilst under irrigation adoption is minimal, for valid reasons.

Recent developments in technology such as auto guidance steering, sowing equipment that handles larger stubble loads, tram tracking and larger and more modern spraying equipment and herbicide chemistry have helped overcome many of the physical challenges that were once used to put no till in the 'too hard' basket.

Some of the benefits achieved from dryland systems have made no till an attractive option for irrigation, so long as the hurdles along the way can be managed.

This paper uses research performed under dryland systems to link practical experiences and opportunities for irrigated farming systems. There is very little research in no till under irrigated systems.

Why would an irrigated farmer want to use no till as part of their farming system?

The main reason many dryland producers switched to no till was to maximise moisture conservation and water use efficiency (WUE), as moisture is commonly the most limiting factor to higher yields. Whilst WUE is extremely important on irrigation, it probably wouldn't be counted as the limiting factor to yield, so what is the attraction towards no till?

Following experiences from dryland systems, we quickly identified that there were a complex list of advantages that followed the switch to no till, in addition to better moisture conservation.

1. Increasing soil health: Soil health is a term which has been widely used in the past few years, but in no till the general functionality of your soil will increase. In no till you are leaving the soil uncultivated, which leaves many of the channels produced by insects and microbes undisturbed. By not breaking the soil by cultivation, you are also promoting beneficial fungal networks such as mycorrhiza, which are useful for providing nutrients and moisture to plant roots. Also, ideally you are returning the majority of stubble back into the soil, which feeds the microbes, and allows for better soil structure.

Something as simple as leaving your stubble standing under centre pivot irrigators can increase your water infiltration (especially on the outside spans) by as much as 50%, because it reduces raindrop impact, holds the water where it falls, and therefore reduces runoff. Standing stubble has also been found to reduce evaporation.

Over time, your soil will be softer, show less crusting, have better water infiltration, and be more fertile for your crops. This is all backed by good research and experience from dryland systems.

An example that is very common under irrigation highlighting poor soil health is hard setting or crusting of the soil surface. As an irrigator, you have probably followed a recipe on how to make a house brick in your farming system, ie remove all debris from the soil, fluff the soil up by cultivation, saturate with water, then bake in the sun. This "brick" then forms your seedbed which is expected to host an emerging seedling, supplying nutrients, moisture and anchorage throughout the growing season. Then when it dries and cracks, more water is added and it is expected to go through the whole process again. By looking after your soil (ie minimising cultivation and compaction and maintaining standing stubble), you will find your soil will look after your crops.....food for thought!!

2. Reduced labour and production costs: It is well known that it is much cheaper and more time efficient to use herbicides for weed control over cultivation. Ground preparation by cultivation often results in at least three passes, whereas if your sowing gear can handle stubble as in a no till setup, the only seedbed preparation costs are weed control (as well as stubble management such as baling if your seeder cannot handle the stubble load).

3. Weed control becomes more effective: Research has shown that if we leave weed seeds on the surface of the ground un-buried during the summer, up to 80% death can occur in the first year (especially in weeds such as annual ryegrass). This is through bird and insect consumption, and

environmental stresses on the seed. In addition, in no till you can also maximise herbicide efficacy while providing greater crop safety. This is because you can apply herbicides before sowing and incorporate the herbicide during the sowing process. Using the correct sowing implement at the right speed results in a layer of soil being thrown in between the plant rows, forming a hot chemical band on the inter row, and no herbicide in the seed furrow, ie herbicide where you need it and none where you don't.

As a negative, in no till you have a greater reliance on herbicides for weed control, so management to offset herbicide resistance and also reduction of drift in usually highly populated irrigation areas is essential.

So what are the challenges that irrigators will face if you move to no till?

1. How to minimise soil disturbance: On irrigation, especially flood, it is just about impossible not to have some sort of soil movement or cultivation in your system. This soil movement is usually associated with procedures that aid in irrigation management such as lasering, reforming hills or beds, and preparing a seedbed that will foster an even and efficient irrigation and/or plant establishment. It can also be an essential part of an insect resistance management strategy such as pupae busting in genetically modified cotton.

There are times however, that the paddock doesn't essentially require cultivating, and sowing into an undisturbed seedbed is possible. This is much easier and more common under overhead irrigation systems such as laterals and centre pivots. The longer your paddock can go without cultivation, the more benefit you observe from no till.

2. Dealing with heavy stubble loads: Heavy stubbles produced on irrigation do pose a problem for some sowing machines to get through. There are however many ways to overcome this problem, such as cutting stubbles for hay at harvest, ensuring proper spreaders are on your harvester, or as a last resort burning.

Many farmers and contractors have turned to disc machines for sowing, as they are able to sow very effectively and efficiently into large stubble loads, especially if sowing using GPS inter row on wider row spacing. Many farmers on irrigation are on 25cm row spacings, which is wide enough for a disc or tined seeder to get between the rows in the following season, but narrow enough not to impact on yield potential.

3. Plant diseases: In a stubble retention system, diseases have to be managed properly to ensure that plant health is maintained. As a general rule, some leaf diseases such as yellow spot in wheat and scald and blotches in barley can be worse in no till. Root diseases such as rhizoctonia and take all can also present themselves more so in this system. In order for these to be managed appropriately, a good rotation needs to be employed. In general, on irrigation it is probably not ideal to sow a crop into the stubble from the same crop type, ie not cereal on cereal, and not broadleaf on broadleaf. This is the case in both cultivated and no till systems.

Summary

Under irrigated farming systems there is no doubt that no till has its limitations, mostly due to the need for soil movement such as lasering and bed forming to aid in even and efficient irrigation. There are however some very substantial advantages that can be obtained by adopting the system, which have been proven on dryland systems for many years, and are starting to be proven under irrigation in the local region. As growers gain more confidence in the system, I am sure we will see many more success stories as more adoption takes place.

No till research is locally performed at the Merriwagga Central West Farming Systems site, which is funded by NSW DPI, GRDC and many local sponsors.

Further information can be found on our website: www.cwfs.org.au then regional sites, then Merriwagga.