



IRRIGATION RESEARCH & EXTENSION COMMITTEE

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FOR IRRIGATION CROPPERS

Managing & retaining large irrigation stubbles – survey 2009

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MANAGING & RETAINING LARGE IRRIGATION STUBBLES *SURVEY 2009*

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TAKE HOME MESSAGES

- Stubble retention benefits are worth overcoming barriers to adoption
- Straw spreading at harvest is crucial for effective management of stubble at the next sowing
- Microbial stubble digestors and the use of compost may have a place in our cropping system and need further investigation

Large cereal stubble loads can be a major problem that needs to be managed well by local irrigation farmers. Management options include burning, removal or retaining the stubble.

As shown in the IREC booklet Case studies in lifting Irrigation productivity, a number of growers are overcoming barriers to stubble retention and focusing on the soil health benefits of retaining stubbles. A number of these growers were surveyed and other comments were gathered from local irrigation farmers.

In some cases it may be better to remove stubble for sale and over the last few years there has been a market for cereal fodder. Another interesting approach is to remove stubbles and compost them and later return them to the paddock. Although this requires more work and handling it has the benefit of providing food for soil microbes and will lead to reduced fertiliser requirements in subsequent crops.

A CSIRO six year maize trial at Witton which finished in 2006 quantified some of the benefits of good stubble management by incorporation. The maize stubbles were large at 12 tonne of stubble per hectare. These large stubbles need to be incorporated correctly by thoroughly mixing the soil and plant matter by strategic mulching and ripping. Timing and direction of mulching the stubble are critical to get good breakdown. Correcting any nutrient deficiencies such as sulphur and nitrogen will also assist breakdown.

The incorporation of such large masses of stubble can also improve soil structure. Soil aggregation tests found that the soil structure improved during the trial which resulted in a decrease in soil strength compared with burnt stubbles. The tractor required 30 percent less power to rip the stubble incorporated beds than the stubble burnt beds. The trial also showed a yield increase of around 0.5 tonne/ha in four of the six years from the stubble incorporated beds. Stubble retention increases the water infiltration and water holding capacity of the soil.

Researchers also found that farms that use stubble incorporation emit 56% less greenhouse gases than farms where stubble are burnt. A total of 2.6 percent of the nitrogen fertiliser was lost as nitrous oxide from the burnt stubbles while the incorporated stubbles lost only 1.4 percent of applied fertiliser. This fact alone may have big implications for the proposed Carbon Pollution Reduction Scheme.

The results also demonstrated that stubble incorporation not only increased the volume of microbes in the soil but also increased the proportion of beneficial bacteria that enhance soil fertility.

We all know there are gains to be made by good stubble management. In many cases it could be just a mindset change to allow the on farm technical problems to be overcome.

Andrew Schipp and Kieran O’Keeffe interviewed a number of irrigation croppers that have made changes to the way they are handling stubbles to see if there are any common threads to successful stubble management.

GROWER: CRAIG AND HELEN REYNOLDS, CONGUPNA, VICTORIA

How are you retaining stubbles over 4t/ha?

- Stubble management commences with variety selection (in the case of winter cereals) with shorter varieties favoured. e.g. Baudin barley. For the same harvest height there is less stubble going through the harvester compared to some other varieties.
- Will harvest at lowest possible height but will not jeopardise grain retention i.e. will still strive for optimal harvest efficiency and not allow too much grain loss due to try to process too much straw through the machine.
- Harvests with a rotary machine (New Holland TR99). Originally fitted with an aggressive straw spinner but this proved inadequate, especially if the straw was damp and the machine now has a Canadian-built “Redekop” straw chopper fitted.
- Straw spreading is crucial to effective direct seeding into stubble. Trash rows can’t be present otherwise seeding will be compromised.
- Seeding is performed with a 6 metre wide machine that Craig has developed himself using home-made (tynes), DBS (seed placement) and Primary Sales (coulters) components. It is basically a tyned machine fitted with coulters. Craig believes the coulters are a very important component and complement the 2 cm “Autofarm” guidance system
- The Reynolds are developing a disc seeder unit (NDF discs) that will be used in future – specifically for crops such as maize and possibly soybeans.
- The guidance system allows inter-row sowing (10” row spacing) and Craig has found that the single row of front mounted coulters creates a groove that allows the rigid tynes to follow (path of least resistance), reducing the machines tendency to “crib” off-line. A rear wheel steering mechanism allows the machine to track around corners better allowing more efficient sowing of headlands.

Are you able to retain every stubble or are there some stubbles you still need to burn? If so why?

- All stubbles can be handled at this stage. Maize stubbles are treated (chopped) similarly to winter cereals. The unknown at this stage is how hard it will be to handle less brittle stubbles in wetter times.

What benefits have you found?

- Better moisture retention – to the point that some temporary waterlogging was evident at the first watering of a soybean crop direct drilled into 6 tonne barley stubble.
- Timeliness. Working stubbles in used to take a lot of time and energy.
- Increased soil carbon levels

What disadvantages have you found?

- None although requires a different mindset.

Are there some issues or barriers we still don’t have the answers to?

- Most answers are there already or can be worked out on farm.

Why aren’t other farmers adopting stubble retention?

- They have the wrong mind-set. They want paddocks to “look nice” before sowing.

GROWER: LINDSAY AND HELEN GRONOW, 115 YARAWALLA ROAD EAST, YARAWALLA VIC

How are you retaining stubbles over 4t/ha?

- Lindsay is retaining all stubbles and no longer needs to burn any prior to seeding. Lindsay treats his stubbles with commercially available microbial solutions that break down the crop residues and allow planting without seeders blocking up.
- The first step is to cut the crop (i.e. a winter cereal) fairly low at harvest. Most recently a John Deere rotary harvester fitted with a straw chopper has been used. Depending on how well this goes he may also need to mow the stubble. Lindsay's objective is to get the stubble laying flat on the ground.
- Stubbles are then sprayed with a microbial solution. Because Lindsay is not double cropping, the stubble has until the following autumn to decompose.
- Microbial solution is fermented in milk vats, strained and then sprayed with a conventional boomspray onto the standing stubble.
- A tyned seeder is used (Agrowdrill) to direct drill all crops. Despite being on 7" row spacings, Lindsay has little trouble with trash handling. On occasion he has used a set of Philips rotary harrows to break up stubble further, always with the intention of increasing stubble: soil contact.
- Lindsay has good anecdotal evidence that the system works. In one instance a tractor operator missed spraying an area with the microbial solution. During seeding, some months later, the only area where there was a combine blockage was in the unsprayed area.

Are you able to retain every stubble or are there some stubbles you still need to burn? If so why?

- All stubbles are retained however Lindsay is not double cropping and is mostly focussing on winter cereals. Hence there is a greater period for the crop residues to break down.

What benefits have you found?

- Better soil structure and improved moisture holding capacity – no need for cultivation anymore

What disadvantages have you found?

- None – although Lindsay acknowledges there is some farmer and agronomist scepticism of his system.

Are there some issues or barriers we still don't have the answers to?

- Lindsay believes that conventionally trained agronomists have barriers to appreciating the organic/microbial system.

Why aren't other farmers adopting stubble retention?

- To do with attitudes and aspirations rather than technical obstacles.

GROWER: TONY HAMILTON “WARILI” FORBES

How are you retaining stubbles over 4t/ha?

- Tony states that he is still learning to manage large stubble loads and recently changed to a Baldan double disc seeder. He is yet to fully test the seeder in heavy stubbles but feels it should work if the stubble is dry. He has widened out his row widths from 190 mm to 220 mm. This fits in with his bay widths but as a consequence does allow more stubble flow.

Are you able to retain every stubble or are there some stubbles you still need to burn? If so why?

- Tony will keep all dryland stubbles and on irrigation some years will keep stubbles and other years will bale if there is a market. The move to direct drill allows roots/ root channels to be retained anyway. He will still burn if needed to relaser bays, also burn to help reduce resistant ryegrass weed seed burden to some extent.

What benefits have you found?

- To early to tell yet. It is clear that stubbles need to be retained in dryland cropping for moisture retention reasons.

What disadvantages have you found?

- Hair pinning. Excessively wet under header trails and too dry in rest of area means compromise with sowing timeliness. This can be overcome however with even straw spreading at harvest.

Are there some issues or barriers we still don't have the answers to?

- Hair pinning.
- Also there could also be more disease potential if stubbles are retained in wetter winter seasons.

Why aren't other farmers adopting stubble retention?

- Lack of suitable machinery, not clearly demonstrated advantage in long term stubble retention. A clear economic advantage needs to be shown for increased adoption.

COMMENTS FROM OTHER FARMERS

How are you retaining stubbles over 4t/ha?

Harvest

- How stubble is handled during the previous harvest operation is one of the most major factors to successful direct seeding.
- Straw choppers are essential and often these are aftermarket machines that have improved chopping and spreading ability.
- Height of cutting at harvest needs to be balanced with harvest efficiency.

Stubble treatment

- Flattening with a knife roller in summer when stubble is brittle, making sure stubble is laying in the same direction of travel as the proposed sowing operation.

Sowing

- 30cm row spacings, even on irrigation.
- Double disc system – farm built with wheels spaced to suit tramlining.
- Previously inter-row sowed but have gone away from it. Inter-row sowing does not suit beds.

Irrigation

- Type of irrigation system can influence success. Sprinkler systems are much more flexible. With flood irrigation, more stubble means more moisture is held and so pre-irrigation needs to be earlier and watering-up runs more risk of waterlogging.

Are you able to retain every stubble or are there some stubbles you still need to burn? If so why?

- Do not need to burn any stubbles
- Can sow canola into a 10t durum stubble.
- Double cropping still relies on quick removal of stubble.

What benefits have you found?

- Better moisture retention.
- Better water infiltration.
- Increased Organic Matter levels (labile fraction)
- Achieving 2t wheat grain/megalitre of irrigation water

What disadvantages have you found?

- Different weed spectrum – more grass weeds such as brome grass
- Cost in \$ and time setting up and modifying machinery and learning a new system.
- If stubbles are removed, compaction issues can be a problem.

Are there some issues or barriers we still don't have the answers to?

- Main barrier to adoption is the farmer himself – lack of skills or lack of motivation to learn new skills,

Why aren't other farmers adopting stubble retention?

- Fear of change
- Fear of spending money