

Stubble

loads

How much can you handle?

- ▶ Farmers need to know how much stubble remains after harvest in the paddock and how much stubble their sowing equipment can handle
- ▶ Disc seeders handle greater stubble loads, need less horsepower than tined seeders and give less soil disturbance for fewer weed seed germination
- ▶ Tine seeders will give greater soil disturbance for better crop emergence and herbicide incorporation

FarmLink region growers learning about stubble loads and equipment limitations at a demonstration day at Temora Agricultural Innovation Centre



Assessment is key

Assessing stubble load in paddocks is an important consideration after harvest and during the fallow period leading up to sowing the next crop. There is a need to know how much stubble is likely to cause a problem at sowing so that actions can be put in place to deal with this in between harvest and sowing. The maximum benefit of stubble retention will be achieved when all the available stubble is left as ground cover but will not cause blockages of sowing equipment or crop establishment issues by the time the next crop is going into the ground. For many farmers in the region, stubbles will be grazed immediately after harvest, so being able to assess condition of the residues after stock are removed can help in deciding if other treatments such as mulching or burning is required.

Conservation farming technology has evolved, in general, as a result of the many advances in engineering with seeders. There have still been problems with establishing crops, but air seeders with discs or tines can give precise seed placement, good soil contact with seed and handle high levels of residues compared with the old combines. Sowing operations are faster and smoother with larger capacity machines and fewer blockages. The development of accurate GPS guidance systems has encouraged the adoption of zero till and use of inter-row sowing.

These guidelines give some insight into the different sowing systems and how crop stubble needs to be managed for each.

Tine seeders

For many farmers the move to direct drilling techniques came about by adapting the sowing equipment that they had on hand. In most cases that has involved converting old combines by replacing the wide tines with narrow points and increasing the spaces between them. For many farmers this has been a gradual process. As the conservation farming system proved viable on their farm, machinery has been updated to the latest technology.

Tine seeders have been the most popular choice because they are cost effective, have a greater range of design features to suit different soil types, give greater soil disturbance for disease control and seedling vigor, and better herbicide efficacy. Some problems such as increased soil throw from higher speed planting, and fertilizer toxicity from the higher rates in proximity to seed have had engineering solutions. Narrow point design has changed to separate seed and fertilizer and prevent excessive soil throw.

Photo 1 - Tine seeders have been modified to increase stubble handling capacity. Photo - Phil Bowden



Tine seeders are dragged through soil, so stubble residues will need to be in a condition that prevents straw being picked up on the shank. These include

- ▶ Short straw length
- ▶ Even spread to avoid clumps

To achieve this after harvest, stubble needs to be reduced or processed by one of the methods below

- ▶ Livestock grazing will reduce the quantity and trample some of the residue into contact with soil. Depending on the amount of stubble to start with, and the time that stock are grazed, this can leave uneven residues that some-

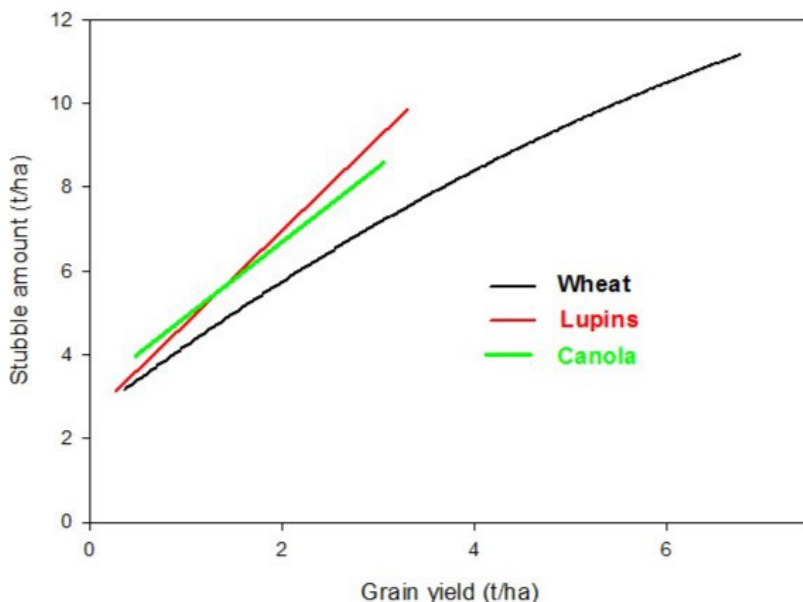
times require further conditioning by mulching or burning to prepare for sowing.

- ▶ Baling can be done to heavy stubbles so that residues can be removed. These can be sold in some areas if there is demand for straw.
- ▶ Mulching using various types of machinery from the aggressive Speedtiller ® and Kelly Disc Chain to the milder K-Line or finger harrow. This operation gives an even soil surface and can reduce the straw length by chopping or crimping the residue so that it's not a problem at sowing.

- ▶ Burning is often practiced as a part of an integrated weed management program for resistant weeds, to prevent diseases that carry over on stubble from one crop to the next (eg. Yellow Leaf Spot) or simply to reduce the volume in high yielding areas. To achieve a good burn the stubble needs to be dry, not covered in soil from grazing and relatively evenly spread. Done early in autumn it can achieve temperatures up to 600°C to give good weed seed destruction, or later in autumn as a "cool" burn (up to 300°C) where residues are reduced, but soils are not affected.

Table 1 - Assessing stubble loads

As a rule of thumb, stubble load will be around 1.5 times the grain yield based on the Harvest Index. An estimate of stubble load from 27 years (wheat and lupins) and 12 years (canola) trial data is shown



Disc seeders

There are various configurations of disc machines from single, double and triple discs. They have the advantage of being able to deal with higher stubble loads but have limitations in other ways. In general they are more expensive to buy, and servicing costs may be higher, but have lower operating costs as the draught requirement is less and they can operate at higher speeds.

Discs can give greater accuracy in seed placement, but will have problems with crop emergence if stubble is "hairpinned" causing poor soil contact with seed. In heavier soils the discs can smear when its wet and provide poor seed coverage as well. The use of a closer plate or press wheel ensures that seed is covered.

The adoption of zero till systems is rapidly increasing in some areas as it enables minimal soil disturbance and retention of stubble at narrow row spacings.

Disc seeders work well in standing stubble (inter-row sowing) or where residues have been spread evenly across the header width at harvest. Inter-row sowing is used to avoid contact with residues, but is not practical on many mixed farms where stubbles are grazed after harvest, as stubble needs to be kept standing. There have also been problems with this technique after wet summers and autumns where stub-



Photo 8 - Photo 18 Disc seeder with Aricks wheels to clear trash and prevent "hairpinning".

ble has rotted off at the base causing machinery to dislodge the straw and cause blockages as it is dragged along the row. However there are good results with crops grown in dedicated cropping paddocks with less soil disturbance and improved moisture retention.

The use of residue managers such as Aricks wheels or coulters in front of the disc, will help in clearing residue

from the path the seeder. These are another moving part that need regular maintenance so add to the cost of servicing.

Care also needs to be taken with use of pre-emergent herbicides as there is potential for crop damage from concentration of chemical in the row.

Continued over ...

Managing stubble to cope with seeding equipment limitations



Photo 15 Farmers discuss the use of GPS inter-row sowing techniques Photo Phil Bowden

Disc seeders

... from previous

Many pre-emergent chemical labels do not support use with disc seeders. With the different design characteristics of many seeders it is important that there is consistent closure of the seed slot without returning herbicide treated soil onto the seed. A press wheel or closing plate will achieve this. For cereals and canola crops the method of incorporating these herbicides is also an important consideration for crop safety. Incorporated by sowing (IBS) is preferred for disc seeders rather than post sowing pre-emergence (PSPE). This is discussed in detail in Guideline 6. Research does

show, however, that less soil disturbance with the discs will reduce weed seed survival, so is an important non chemical way of reducing weeds.

For best results with a disc seeder the following guidelines apply.

- ▶ Inter-row sowing will avoid contact with residues. Row spaces of 30cm and accurate GPS guidance (2cm) will be required
 - ▶ Cutting stubble high at harvest will give less residue on the ground. Some header fronts (eg. Honey Bee) make this easier.
 - ▶ Ensuring uniform straw spreading at harvest will reduce
- ▶ problems with discs. Adjusting rotor speed and vane settings will help give even spread. Some headers can be retro-fitted with MAV straw choppers or Powercast tailboards to improve distribution.
 - ▶ Ensure that the seed furrow is closed to avoid herbicide damage and good soil contact. Press wheels or closer plates are added to give slot closure and good seed contact with soil.
 - ▶ If sowing into grazed or heavy stubble loads, residue tools such as a coulter or "Aricks wheel" may be needed to prevent "hairpinning".

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