



# TRASH CHOICES



**MECHANICAL STUBBLE  
AND CROP RESIDUE  
MANAGEMENT OPTIONS**





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**FURTHER READING**

Stubble Management Fact Sheet (GRDC, March 2011)

Managing heavy stubble loads and crop residue, Southern Farming Systems

GRDC Stubble Initiative: [www.grdc.com.au/research/trials,-programs-and-initiatives/stubble-initiative](http://www.grdc.com.au/research/trials,-programs-and-initiatives/stubble-initiative)



## INTRODUCTION

**Integrating stubble and crop residues into the soil profile between harvest and seeding is one technique that has gained traction. But the question is – when is tillage in a “no till” farming system useful?**

Demonstration sites run by the South East Premium Wheat Growers' Association (SEPWA) between 2016 and 2019 tested various techniques being used by medium to high rainfall zone grain growers who are looking for options to manage increased stubble loads.

The demonstration sites tested soil (nutrition and composition), and grain harvested (quality and yield) based on various new mechanical options now available. Unfortunately, the three year's results were hampered by floods (2017), drought (2018) and frost (2019).

As no-till grain growers strive to increase yields in the higher rainfall regions of Western Australia, they are also learning how to sustainably manage increased stubble and residue loads. In the Esperance Port Zone (EPZ) region, many businesses have taken livestock out of their farming system to increase profitability and reduce soil erosion. Some have even removed fences to enable easier access for machinery which uses satellite technology to autosteer and map inputs and outputs to use variable rate technology across varying soil profiles.

Decisions around machinery, varieties, time of sowing, weed control and soil moisture all have a bearing on what integrated farming system growers undertake from one season to the next. Dealing with stubble and crop residue are management decisions that can be viewed as an opportunity to increase organic carbon and improve soil health.

Depending on soil type; residue incorporation, especially in the long term, can increase nutrients to have a positive impact on soil health and profitability if managed correctly.

Poor residue management can reduce crop performance (particularly when stubble load is greater than four tonnes per hectare of dry matter) through such issues as: blockages in seeders; poor establishment; uneven nutrient availability and uneven weed control; ultimately leading to yield losses. High and/or thick stubbles can also cause difficulties in the following passes.



## Seasonal management decision making

Stubble management can be complex and varies from season to season. A dry summer can slow the decomposition down resulting in unexpected stubble and residue burdens, but a wet summer can result in increased pest and weed burdens harboured in crop residues. Increasing standing stubble biomass can also increase the severity and duration of frost events in lower lying areas more prone to sub-zero temperatures.

But in the long term there is no doubt that the benefits of increased organic matter outweigh the problems and result in improved soil health through such things as: improved soil structure; improved water infiltration and water holding ability; carbon storage and increased biological activity and nutrient availability.



## Key decision times

Harvest, post-harvest and seeding are key stages that require stubble management decisions and each step has a bearing on the next in the annual cropping cycle.

Decisions at harvest are often made based on weather and the current crop but thinking about the following crop (canola and pulse stubbles are easier to sow into) and the likely pest and weed issues can have a bearing on stubble length. The main management decisions at harvest are the header cutting height and the spread pattern of the stubble. If using tramlines and inter-row sowing, standing stubble will make sowing easier.

If inter-row sowing is not used, the cutting height is determined by the sowing machinery used, the amount of residue the machinery can handle and the available options for stubble management before sowing.

Management after harvest can vary depending on how much summer rainfall has occurred and what stubble and trash load remains in paddocks that could cause seeding issues.

Burning of chaff in less fragile paddocks is still carried out on occasion particularly if there is a high weed seed or vertebrate burden in chaff lines. But burning is increasingly not recommended now.

Summer rainfall can rapidly increase stubble decomposition and the type of stubble also has a major bearing on the amount of stubble residue still present at seeding. Residue with a lower carbon to nitrogen ratio (pulses and canola) breaks down faster than cereal residue.

Chaff dumps from chaff carts has become less common, particularly in regions around WA's south coast that have wet springs. The carts (used for collecting weed seed burdens) can make harvest very slow and they have become out of favour in more recent years.

There are several tillage machines that can now be purchased to incorporate stubbles and mulch. Incorporation is particularly beneficial for handling large cereal loads prior to sowing canola.

The design basis and timing of use of these machines is important. If they result in too much tillage or are used too close to harvest, then the soil moisture conservation and wind erosion benefits of stubble and residue retention are lost.

Growers can also choose to graze the stubble with livestock, slash, mulch, harrow or strategically burn it.

At seeding, wider row spacings and inter-row sowing are options, depending on rainfall and yield potential. Wider rows will bring a yield penalty in cereal crops but improves sowing establishment. But narrower row spacings reduces weed burdens.

Initial research into inter-row sowing for those growers working with GPS accuracy has found little change to yields, but easier sowing and stubble flow with reduced seeder blockages. A further benefit can be reduced soil-borne disease levels in inter-row compared with on-row.

# CURRENT STUBBLE MANAGEMENT OPTIONS IN HIGHER YIELDING CROPS

**Table 1.** Some of the available stubble management options to consider

OPTIONS	MAIN STRENGTHS	MAIN ISSUES
Harvest low (Draper front) and retain stubbles	<ul style="list-style-type: none"> <li>→ Good mulching ensuring better soil moisture, weed choking and reduced soil erosion – especially average to lower yielding crops</li> <li>→ Good for tyne seeding</li> </ul>	<ul style="list-style-type: none"> <li>→ Seeding issues with hair-pinning and narrow row spacing in higher yielding crops</li> <li>→ Poor establishment</li> <li>→ Increased pest, weed and disease issues</li> </ul>
Harvest high (Stripper front) and retain stubbles	<ul style="list-style-type: none"> <li>→ More even spread of residue</li> <li>→ More efficient harvest (fuel, etc)</li> <li>→ Good seedling protection</li> <li>→ Reduced hair-pinning</li> </ul>	<ul style="list-style-type: none"> <li>→ Greater risk of stubble catching at seeding</li> <li>→ Decreased herbicide efficiency</li> <li>→ Decreased solar radiation for establishing following crop</li> </ul>
Inter-row sow from retained stubbles	<ul style="list-style-type: none"> <li>→ Minimize tyne or disc opener and residue interaction</li> <li>→ Better nutrition and chemical access to seedling</li> <li>→ Good for legumes and canola establishment</li> </ul>	<ul style="list-style-type: none"> <li>→ Requires investment in PA machinery</li> <li>→ Need row spacings greater than 22cm</li> </ul>
Harvesting at angle to seeding rows	<ul style="list-style-type: none"> <li>→ Staggers residue pressure to improve stubble flow</li> </ul>	<ul style="list-style-type: none"> <li>→ Increases soil compaction</li> <li>→ Can't work in controlled traffic</li> </ul>
Adding a second cutter bar to harvester	<ul style="list-style-type: none"> <li>→ Reduces chopped straw length (less hair pinning issues at seeding)</li> </ul>	<ul style="list-style-type: none"> <li>→ Uneven spread of chaff</li> <li>→ Blockages at harvest</li> </ul>
Slashing stubbles	<ul style="list-style-type: none"> <li>→ Good in hot dry conditions</li> <li>→ Can be slashed at height to match capacity of tyne seeder</li> </ul>	<ul style="list-style-type: none"> <li>→ Increased soil compaction and costs</li> </ul>
Integrating crop residues prior to sowing (harrows, disc chains, trash cutters, off-set discs, prickle chains, etc)	<ul style="list-style-type: none"> <li>→ Depending on soil type and conditions; faster decomposition of residues and reduced stubble height</li> <li>→ Improved weed management</li> </ul>	<ul style="list-style-type: none"> <li>→ Increased risk of soil erosion</li> <li>→ Increased evaporation of stored soil moisture</li> </ul>
Change from tyne to disc seeders	<ul style="list-style-type: none"> <li>→ Better seed placement on heavier stubble loads</li> </ul>	<ul style="list-style-type: none"> <li>→ More expensive</li> <li>→ Hair pinning causing irregular germination</li> </ul>
Burn (windrows)	<ul style="list-style-type: none"> <li>→ Removes weed seeds and some pests while retaining standing stubbles</li> <li>→ Quick, simple and cheap</li> </ul>	<ul style="list-style-type: none"> <li>→ Environmental issues</li> <li>→ Safety issues</li> <li>→ Loss of available soil nutrients to the atmosphere</li> </ul>
Graze stubbles	<ul style="list-style-type: none"> <li>→ Can be profitable in the right season with the right stubbles on heavier soils and supplementary feeding</li> </ul>	<ul style="list-style-type: none"> <li>→ Little nutrient value in many stubbles</li> <li>→ Causes stubble to be trampled = more issues with sowing</li> <li>→ Increased soil erosion if overstocked</li> </ul>
Chaff Cart, baler, Harrington Seed Destructor	<ul style="list-style-type: none"> <li>→ Reduces weed burdens without the use of chemicals</li> <li>→ Retains stubbles and limits trash flow and weed seed issues</li> </ul>	<ul style="list-style-type: none"> <li>→ Loss of nutrients (removal of chaff from paddock)</li> <li>→ Slows down harvest especially in high yielding crops</li> </ul>

Five stubble management machines were tested to better understand their in-field functionality and overall effect of their use on the ability of a seeding machine to pass crop residue through the seeding tines (trash flow) when compared to the harvest management practice of cutting low (ie. to 150mm). The machines included in the trials are: Speedtiller, Trashcutter, Swifter Disc, Top Down and Joker.



### Speedtiller

The Speedtiller, manufactured by K-Line Agriculture, is a high-speed disc-tilling machine that cuts, sizes and incorporates crop residue and then levels the paddock to leave an even surface for seeding.

It is available in models with working widths ranging from 1.75 metres to 12.5m. Linkage units are available up to 5.5m and hydraulic fold models can achieve 12.5m.

The machine's design is based around two rows of scalloped edged discs, 560 millimetres or 610mm in diameter, followed by a crumble, spring or rubber tyre roller.

The Speedtiller can cultivate to a depth of 100mm and reach ground speeds up to 18 kilometres per hour, although 15km/hr is more usual.

Each disc tine is mounted to the frame by four pieces of rubber to provide shock absorption and to help soil penetration of the disc by creating vibrations. The design also features quick adjust lateral disc gang positioning and disc bearings are sealed with the seal entry point located behind the disc blade, out of soil flow.



### Trashcutter

K-Line Agriculture also manufacture the Trashcutter. This machine is designed to lay the stubble to one side using a patented Lay-bar System, with crowns remaining in the soil, and then slice the stubble into short lengths with a series of in-line, self-sharpening discs spaced 130mm apart. Both the disc angle and down pressure are adjustable. Alteration of the disc angle influences whether minimum or shallow tillage is achieved. Tillage to depth is not an option with this machine.

The Trashcutter comes in two models, one with a cutting width of 12.2m, 98 discs and a transport width of 3.5m, the other with a cutting width of 18.2m, 143 discs and a transport width of 3.7m.

While dependent on soil conditions and operating speed, the Trashcutter is relatively easy to pull, requiring either 200-260 horsepower for the smaller model or 250-350Hp for the larger one.



### Swifterdisc

The Bednar Swifterdisc is a short disc cultivator which was developed for uniform shallow cultivation, from 20 to 120mm depth, to intensively mix soil and crop plant residue at operating speeds of 15km/hr or more.

Three series of the Swifterdisc are available, the XN, XO\_F and XE. Tractor size and desired operating width determine series selection. The XN series is designed for 85 to 220Hp tractors. Machines are mounted, have operating widths ranging from 3m to 6m and can be rigid or fold upwards with two side frames. The XO\_F series is suitable for 120 to 320Hp, tractors are semi-mounted with operating widths of 4m to 7.5m and fold upwards having two side frames. The XE series is suitable for 300-450Hp tractors. Machines are trailed, have an operating width of 10m or 12m and fold forwards along a drawbar.

The machine's design is based around two rows of serrated discs or aggressively profiled A-discs 520x5mm in size placed on flexible rubber segments followed by various types of packers and crumbling rollers. Consideration has been placed on axle location and design to try and maximise operational stability and disc bearings are maintenance free. A front hydraulic paddle levelling bar, called a Crushbar, can be fitted to level out soil as can side shields to prevent the formation of ridges around the edges of the machine.

## TILLAGE OPTIONS



### Top Down

The Vaderstad TopDown 300-900 is a multipurpose cultivator that combines a disc cultivator with a three axle tine cultivator in the same machine. Conical-shaped, scalloped edged discs either 450mm or 470mm in diameter, spaced at 12.5 centimetres, on rubberised individually suspended disc arms create fine tilth by cutting and mixing the top soil. Tines spaced at 27cm then loosen and mix soil and crop residues down to 30cm working depth. Finally a leveller and packer follow to even and reconsolidate the soil surface.

Deep loosening points can also be added to increase the working depth to 40cm as can a wide range of point and shin options. Each tine is constructed as a modular system, enabling quick change and high versatility.

All Vaderstad tine cultivators are equipped with the MixIn shin as standard. The MixIn shin throws the material forward instead of the more usual upwards direction. As such material passes the tine twice, doubling the mixing intensity and thereby allowing the working depth to be reduced without compromising the result.

Sealed bearings mean that the levelling discs are maintenance free.

Effective working widths range across the six models available from 2.65m to 9.0m. The machines all hydraulically fold; the first five models in the range to a transport width of 3m while the largest model folds to 5m. Tractor Hp requirements to pull the machine at working speeds between 8 and 12km/hr vary from 150Hp for the smallest model to 400Hp to pull the largest.



### Joker

The Joker, manufactured by Horsch, is a disc harrow ideally suited to shallow stubble cultivation, mixing in crop residues and seedbed preparation. Of the models available globally the Joker RT is the most common model in Western Australia.

The Joker RT is a trailed machine whose design is based on two rows of 500mm notched discs, rubber mounted in pairs, followed by a Roll-flex finishing system to level the soil ready for seeding. Various working widths are available ranging from 5.5m, which Horsch suggests it requires 230-300Hp to pull it up to 12.0m, which requires 500+Hp to pull it.

The Joker RT cultivates to a working depth of 25-125mm and reaches ground speeds up to 20km/hr, depending on soil types and working depth.

Disc bearings are oil filled and low maintenance.



GEORGE CARMODY WITH THE FAMILY'S DRAPER FRONT HEADER

# TOM, ANDREA & GEORGE CARMODY

CLARE DOWNS, CASCADE

## Operation at a glance:

3m Controlled Traffic Farming, cereal / cereal / canola, some winter fodder cut for feedlot, some summer crop trials, some winter legume areas

## Annual Rainfall:

360 – 600mm (spread Cascade, East Munglinup, Coomalbidgup)

## Soil Types:

Loam, clay, sand over gravel

## Farm area:

3400 hectares

## Topography:

Undulating

## Average wheat yield:

3t/ha

## Why are you looking to manage your stubbles?

“Stubble is one of the building blocks of good soil.”

## Systems trialed on the property to date:

- Burning; worked to get the SeedHawk through, but not a great long-term solution
- Trash cutting
- High speed tillage (SpeedTiller and Joker)
- Cut low; reduces header throughput but did enable good trash flow at seeding
- Inter – row sowing; still get stubble blockages at seeding
- Maintain standing stubble but sowing on five degrees and 90° to working; helped a bit
- Disc seeding; 2019 was first season sown all disc seeder

## Strip and Disc system:

The stubble management trial investigated the Strip and Disc system. The Carmody's borrowed a Sherbourne stripper front and harvested areas alongside draper front harvested areas – they then disc seeded for season 2019 with RootBoot disc modules.

Interesting points to note during the growing season were noticeable differences in plant vigour; less plant vigour in the stripper front harvested areas early on, but as the crop matured, it evened out and both sites were the same. This was not a surprise, but it can be more difficult to target weeds during the growing season in the strip areas and there is more of a risk in tall standing stubble.

Some questions arising from the trial include the potential nutrient tie up; how much in the first few years of the maximum stubble retention? Will carbon be released into the soil or air?

## Future plans:

The Carmody's plan to continue working with the disc seeder into the future for reduced stubble disturbance and maximum stubble retention and they will try to reduce the amount of rocks coming up in the rocky river country at home. They will also continue to harvest relatively high to maintain harvester throughput and will not be purchasing a stripper front just yet. They will prove up the disc seeder use first. Cutting high with a draper front still allows the system to be tested adequately.

## Key Messages:

“Still to be proven in our environment, this is a work in progress. Still lots of unanswered questions about the system.”



“... NICE TO  
RETAIN THE  
STUBBLE ON THE  
PADDOCKS...”

# GREG & DONNA CURNOW

GRODON DOWNS

**Operation at a glance:** Faba beans, wheat, canola, barley

**Annual Rainfall:** 425mm

**Soil Types:** Predominately sandy gravel over clay

**Farm area:** 4800ha

**Topography:** Undulating

**Average wheat yield:** 3.5t/ha



## Why are you looking to manage your stubbles?

“To be able to seed through them”

## Systems trialled on the property to date:

- ➔ Slashing
- ➔ Burning
- ➔ Cut low, chop fine
- ➔ Coulters on DBS wide row seeder

Greg says that all techniques have worked to different degrees and it comes down to what compromises you are willing to make. “Are you willing to compromise and do another pass post-harvest with a slasher, or compromise on harvest efficiency and cut the stubble low and chop the trash fine? Burning has been used in the past, but not for a few years now,” he said.

“It’s nice to retain the stubble on the paddocks, too higher risk for wind erosion on a burnt paddock.”

## Future plans:

Continue to cut low and chop fine with the harvesters.

## Key Messages:

Greg says stubble management needs to be approached as a holistic view for the entire farming operation and machinery was still very important for managing stubble and needed to be purchased with this in mind.

Seeder and other tillage machinery purchases need to be made with trash flow in mind. Harvester purchases also need to be considered with stubble management in mind; what matters in a harvester is the front and the back, not what is in the middle. The front needs to be able to cut stubble at a low height to ensure good trash flow at seeding time, and the back needs to be able to chop the material fine and spread in a thin, consistent pattern to ensure it breaks down before seeding time.

# ASHLEY & MEGAN REICHSTEIN

**LAURINA FARMS, WITTENOOM HILLS**

## Operation at a glance:

Wheat, barley, canola, lupins, pulses, sheep (1100 ewes)

## Annual rainfall:

425 – 500mm

## Soil types:

Sandplain, transitional mallee, duplex gravel, circle valley loam

## Farm area:

5300ha

## Topography:

Undulating

## Average wheat yield:

3.5t/ha

## Why are you looking to manage your stubbles?

“We have tried different things such as deep ripping and burning and using our Top Down machine to get deeper healthier soils”.

Ashley and Megan Reichstein purchased their TopDown in 2014 and first used it in the summer of 2014/15 following a wet harvest to manage soil constraints on their Wittenoom Hills property 50km north east of Esperance.

Historically, they had major non-wetting problems, particularly on sandy ridges combined with soil compaction issues at 20-40cm. Their no-till operation was also leading to a build-up of organic material up to 10cm thick just beneath the soil surface that was impeding seed-soil contact at seeding time.

They have found the Top Down has provided good responses to these issues, particularly when it is used in combination with their deep ripping program down to around 50cm.

“We have tried to merge the depth of topsoil organic layer down to around 20cm to enable deeper, healthier soils”, Ashley said.



“The biggest improvements have been on our home farm where we have a lot of gravel soils 20–30cm deep.”

The root growth they saw in the first year after the Top Down had been over the paddock compared to a control was impressive.

In addition to chopping up and incorporating crop residues and bringing up clay to help alleviate non-wetting issues, the Top Down mixing action has also influenced surface soil pH. Soil from 200mm depth that had a pH of 5.5 has been mixed with surface soil that has a pH of 4.2–4.3 resulting in an overall surface pH increase to around 5.0. (Two tonnes of lime was spread in the paddocks in 2012).

Ashley values the cost effective, multipurpose design of the Top Down which allows just the discs working, just the tines working or both. In one pass the machine can chop up residue and mix it in with the surface 10cm of soil as well as bringing up fresh soil from down around 30cm, bringing shallow clay to the surface and breaking up the hard pan layer that sits at 20–40cm.

Ashley has found that the TopDown does make the soil surface soft to work on, so use of this machine is more practical if paddock operations are conducted on tramlines. “The soil is looking healthier and I think we had underestimated just how much we can improve our sands.”

For optimum results, the soil should be moist. Soil types on his Wittenoom Hills property include shallow sandy gravel over clay and Circle Valley sandy loam over clay so working when it’s dry and hard was inefficient.

The Reichstein’s prefer to use the TopDown straight after harvest in December, January or at the latest February to give the organic matter time to break down. If they have a wet harvest, they get someone in their team

going on the TopDown which helps to maximise labour efficiency.

The paddocks they’ve used the TopDown in have never blown. They’re getting 40% of the stubble residue still laying on the surface after use and this is enough to hold the paddock through summer and autumn.

They have found the machine to be robust and reasonably low maintenance. Their TopDown is 5.8m wide and requires 475Hp on tracks to pull it at about 9km/hour. The points in the gravelly soils last from 50–75ha while in sandy loam soils they will last 200ha.

Even after four years, they were still seeing increased yields even in the lower rainfall years, with yields on sandplain soils of around 2.5t/ha for lupins; 4.5-5t/ha for barley and around 2.4t/ha for canola.

“Non wetting is no longer a problem and we have been incorporating lime and gypsum with the TopDown to reset the soils that had compacted with gravel in them.

“Even after four years, the paddocks still feel soft and can retain moisture, even though we have been consistently having drier seasons,” Ashley said.

They harvest with a 12m front and stubble is at ankle height after chaff decks have distributed it. This year they will go back to on-row seeding to chase the moisture and nutrients. In wetter years they swap from a single to paired row.

## Lessons learnt:

Slow down and take all the straw at harvest to distribute.

Don’t harvest barley with any moisture as the straw will not be chopped as well as during the heat of the day and will form a matt on the surface which will cause stubble blockages when trying to seed the following year.

BRAD CAMPBELL HAS BEEN USING A DISC SEEDER AND STRIPPER FRONT ON SELECTED AREAS OF THE FAMILY'S SCADDAN FARM.



# BRAD & GREG CAMPBELL

**KARINGAL & KARANGA, SCADDAN**

**Operation at a glance:**  
Wheat, barley, break crop

**Annual Rainfall:**  
450mm at Scaddan, 450mm Karanga

**Soil Types:**  
Sand, sand over gravel, river loam, grey clay

**Farm area:**  
10,500ha

**Topography:**  
Flat and undulating

**Average wheat yield:**  
3.5 – 4t/ha

### Why are you looking to manage your stubbles?

We have seen improvements in moisture conservation with ground cover on our soils during vetch phases and brown manuring, so always curious about what we can do better; are stubbles as good as these break phases? Managing stubbles is always important come seeding time to reduce seeder blockages.

### What have you tried? What has worked and hasn't?

- ➔ Kelly chain – didn't work how we wanted it to
- ➔ Chaff decks – works for weed seed management
- ➔ Trash cutter – works well but requires an extra pass
- ➔ Wide row sowing – has some good points, but also some bad
- ➔ Swifta disc / Joker – too much tillage and moisture is required for organic matter digestion
- ➔ Shelbourne Stripper front – using on selected areas. We believe this could be a good fit to our system

“...SEEN IMPROVEMENTS IN MOISTURE CONSERVATION...”

### What will you do in the future?

Planning on continuing using the disc seeder & Shelbourne stripper front on selected areas, tyne on others, conscious that hectares need to be covered in a timely manner, hence we are using both seeding systems.

# CON MURPHY

WARAKIRRI, CONDINGUP

**Enterprises:**

Wheat, barley, canola

**Location:**

Condingup (100 km east of Esperance)

**Rainfall:**

550 – 600 mm

**Area cropped:**

12,800 ha

**Soil types:**

Deep sand, gravel sands over clay & loamy clay

Dealing with stubble load and trash flow issues is now an annual seeding challenge for Warakirri farm manager Con Murphy. A push for higher cropping yield averages has resulted in higher stubble burdens on the Condingup property.

Various strategies have been attempted over the years, such as removing every second tine on the seeder bar while sowing canola at 600mm spacings and using a Horsch Joker high speed disc cultivator on all cereal stubbles (wheat and barley), while being careful to travel in the same direction as the seeder would be travelling when sowing the next crop.

For the most part, while using tactics of this nature, blockages became less frequent, and stoppages were reduced. The Warakirri-owned Equalizer seeders have worked well on canola stubbles and lighter cereal crops (around the 3t/ha) and even on heavy stubble load when the straw is dry and brittle. Under damp conditions, the straw posed difficulties with feeding through the seeders, despite having disc coulters in front of each seeding tine.

The issues are mostly on soils that have been ameliorated as part of a major renovation program underway. General soil structure is very soft with deep ripping, spading and CTF programs and with the moisture in the straw the disc coulters push the straw into the soil, without cutting it and the tines pull that straw out again and block up the bar. They have tried setting the disc coulters to go deeper than the tines, but the seeding boots still pull the straw out and block the bar.

To get on top of this, the Joker is used to break up the stubbles. Unlike 2017, which had a wet start to the growing season, the 2018 growing season had an extremely dry start and the disturbance by the Joker dried out the soil and caused uneven and poor canola establishment in particular. A single pass on very heavy stubble areas was not enough to get the seeders through and required a second pass in denser stubble areas. The paddocks treated in the summer of 2018 have also been susceptible to wind damage.

In order to get the seeder through the stubble, a 12m Gason slasher (2014 model) was hired, which costs about \$14/ha plus the tractor and labour. This was combined with an older model Howard slasher at a contract slashing rate of approximately \$20/ha. In this scenario, the seeder still had issues where the 1980s model Howard slasher was used, but no issues with the Gason slashed areas. Germination was also improved where the Gason slasher was used.

Ideally the best option would be for harvesters to harvest lower, taking more straw and processing it. Average harvest conditions in the area are normally not ideally suited to high straw loads running through the header. Optimum speed of harvest and maintenance of grain quality are the main priorities. Slashing directly after harvest provides the best chance for stubble break down, and ensures the job is completed well before the following year's seeding program.

“SLASHING DIRECTLY AFTER HARVEST PROVIDES THE BEST...”

