



Key Points:

- ⇒ Harvest methods impact on subsequent management
- ⇒ Seeding systems will determine harvest height
- ⇒ Harvest height is critical if trying to control weeds as part of the harvest process

Harvest Management in Retained Stubble Systems



Background

It all starts at harvest. Getting the harvest process right from a stubble perspective can set you up for the following summer fallow and subsequent crops. Making decisions about stubble management prior to harvest will help to produce stubble with the desired characteristics for your farming system. Stubble can also be managed during the summer fallow period¹ to produce desired stubble characteristics and address any issues that may impact on the sowing or establishment of the subsequent crop. In some situations harvest efficiency (getting the crop off quickly) can result in high stubble loads that then need to be managed during the fallow period¹.

The stubble generated and desired for seeding by each individual farming system varies greatly. It depends on a lot of factors, including; harvest and seeding equipment, crop rotation, soil type, presence or absence of livestock, weed, pest and disease burdens.

Ideally, stubble loads should be reduced to 3-5 t/ha by seeding to reduce the impact of stubble on the seeding process, as shown in Fig 1. This guideline highlights some of the key considerations that should be made prior to and during harvest to assist in managing stubble for the fallow period and subsequent crops.

Why retain stubble?

There are many benefits of retaining standing stubble. Benefits vary depending on soil type and environmental conditions. In some soils (particularly those found through

Introduction

This guideline has been developed for the MacKillop Farm Management Group (MFMG) as part of the project “Maintaining Profitable Farming Systems with Retained Stubble in the South-East and KI regions”, funded by the Grains Research and Development Corporation (GRDC) as part of the Stubble Initiative.

The Stubble Initiative involves farming systems groups in South Australia, Victoria, southern and central New South Wales and Tasmania, collaborating with research organisations and agribusiness to address challenges associated with stubble retention, including weeds, pests, disease, nutrition and the physical aspects of managing stubble.

the upper South-East), stubble will assist in reducing erosion and retaining soil moisture. In other instances (such as many of the soils across the South-East and Kangaroo Island regions), the presence of stubble will also increase water infiltration, assist in maintaining or improving soil structure and provide a source of feed for livestock.

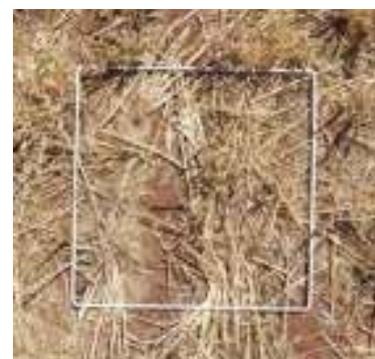


Figure 1. A 4 t/ha stubble load with 90 % groundcover (Source: MSF Stubble Management Guide²).





What stubble loads are we dealing with?

Knowing what stubble load is present at harvest will help with decision making. Presented in Fig. 2 is the relationship between cereal crop yield and stubble load at harvest from small plot trial data between 2008 – 2016. This provides an approximate insight into what stubble load is likely to be present at harvest based on grain yield. It is important to note that the data presented has been collated from small plot trials with sound agronomic practice and in the absence of disease and weed burdens, and with no frost impacting on the crop. These factors can have a large impact on the relationship, therefore the data presented should be used as a guide only.

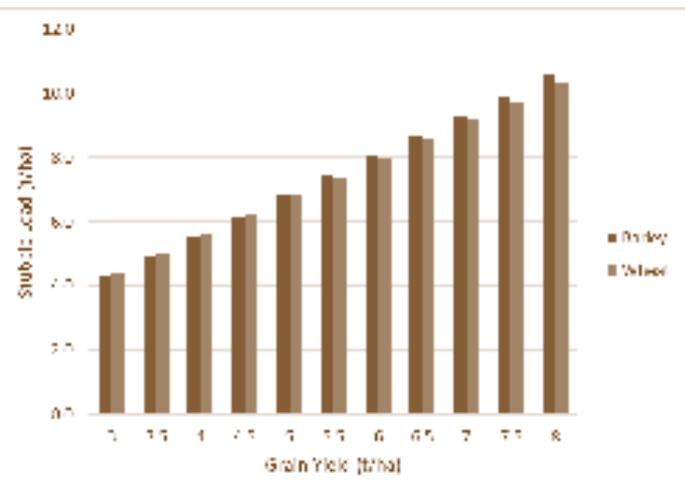


Figure 2. Relationship between cereal crop yield and stubble load at harvest from small plot trials in the South-East region.

Why is harvest height important?

Ease of seeding

Harvest height is a critical consideration in retained stubble systems. Harvest height will depend largely on your seeding system (i.e. disc or tyne, with disc seeders generally being able to get through taller stubble). It will also depend on the vertical tyne clearance on the seeder bar (see Seeding Systems Guideline³). Reducing harvest height can reduce the trash load at seeding. This is because the straw stubble is either chopped and spread across the paddock to break down, or it is retained in windrows to be managed during the fallow period¹ (see Fallow Management Guidelines).

Weed management

For harvest weed seed control where the aim is to use the harvester as part of the weed control process, it is essential that the harvester comb is set low enough to ensure weeds are captured and then processed by the desired management process. This can be achieved by the use of an integrated Harrington Seed Destructor (iHSD), narrow windrow burning¹ or chaff carts. When using an iHSD or chaff carts, harvester settings need to minimise the amount of weed seeds going into the straw and maximise the amount of weed seeds going onto the sieves⁴.

Work conducted by MFMG across the South-East in 2015 and 2017 has shown that lower harvest heights are required to maximise annual ryegrass (ARG) seed capture at harvest (Table 1). A greater percentage of ARG weed seeds can be

captured in the Medium Rainfall Zone (MRZ) with increased lodging and ARG seed shed occurring by harvest time in the High Rainfall Zone (HRZ). ARG weed seed capture is influenced by harvest timing, crop lodging and rain events after ARG maturity and prior to harvest. Like all weed management practices, HWSC should be part of an integrated systems approach to combat weed issues.

Table 1. Annual Ryegrass weed seeds captured at 15 cm and 30 cm harvest heights at Wolseley (MRZ) (2017) and Furrer (HRZ) (2015)⁵.

	Annual Rye Grass seed captured (%)	
	Wolseley (MRZ)	Furrer (HRZ)
Harvest Height		
15cm	62	52
30cm	24	31

Harvest efficiencies

Reducing harvest height can reduce harvest efficiency by decreasing harvest speed. In 2017 at Wolseley (MRZ) reducing the conventional harvest height (CH) from 30 cm to 15 cm resulted in a reduced harvest efficiency of nearly 1 ha/hr (13 %) in a 6 t/ha wheat crop (Fig. 3). Incorporating the use of an iHSD (on the same size harvester) resulted in a 36 % loss in efficiency in a 6 t/ha wheat crop (Fig. 3).



Harvest Management in Retained Stubble Systems

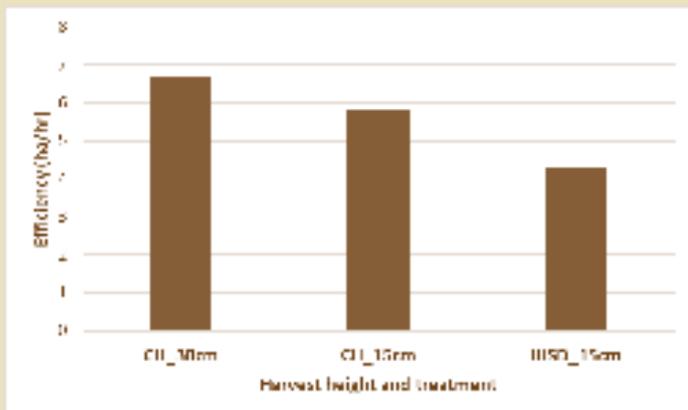


Figure 3. Harvest efficiency at Wolseley, 2017⁵.

There is a balance between achieving weed control and harvest efficiency and each farming enterprise needs to consider this balance in their farming system. If harvest efficiency is important and growers want to retain stubble, then fallow management becomes critical (refer to Fallow Management Guideline¹).

Trash management

Different harvest machines produce different trash to manage:

⇒ Narrow windrows

Narrow windrows can be either burnt or baled. To do this effectively, a windrow chute can be fitted (Fig. 4). This directs all chaff and straw into a narrow windrow that can then be either burnt or baled prior to seeding.



Figure 4. Narrow windrow chute fitted to harvester, Wolseley 2017

⇒ Chaff carts

Chaff carts can be effective to catch trash and place into a single 'chaff dump'. This chaff dump can provide a source of feed for livestock over the summer period while managing ARG weed seeds.

⇒ Chaff lining

Chaff lining involves collecting the chaff from the harvester and channelling it down into either a single chute that sits behind the harvester or alternatively a double shoot that places the trash behind the wheels of the harvester. The double chute method is being utilised in controlled traffic systems to help with trafficability on tramlines (Fig 5).



Figure 5. Chafflining setup on a harvester viewed on MFMG Study Tour to Western Australia (2017)

If a windrow isn't being created, ensuring that the trash is spread evenly across the harvester swath width will allow for a more even breakdown of trash prior to seeding. Chopper speed may be adjusted to improve the spread of trash. Alternatively, depending on the harvester, a residue management system may be installed.

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Mixed Farming Systems

Grazing stubbles provides both a feed source to livestock while assisting the removal and decomposition of stubble. Take care when introducing stock (particularly sheep) to stubbles, particularly if there is a large amount of grain on the ground. The split grain in cereal stubbles can cause acidosis and can result in livestock death. An acclimatisation

period may be required to get the rumen used to the starch. Where stock graze stubbles they knock much of the stubble onto the ground. This change in stubble characteristics can be challenging if a disc seeder is being used as it can increase the issues with hair pinning at seeding.

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- ⁵SFS00032 "Harvest weed seed capture in the HRZ" (2015-2018)

Further Information

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