

19. Stubble Initiative Trial

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PROJECT DURATION: 2013-2018

KEY MESSAGES

- When dealing with annual ryegrass populations, it is a numbers game; the more you can control the better.
- Higher water rates in retained stubble resulted in increased efficacy of pre-emergent herbicides.
- Initial findings suggest that using speedtillers to retain stubble in the system does not result in any negative effects

Background

This project aims to maintain the profitability of stubble retained systems by identifying key issues that are affecting the level of profitability with growers, and then through utilising existing research and conducting locally specific trial and extension work assist growers to overcome these issues.

This project is being carried out over a five year period from 2012-2018, and is focusing on factors from desired stubble characteristics at harvest to make the system work, through to successful fallow management, all with a view to overcome issues at seeding, and throughout the growing period of the crop.

There has initially been a focus on weed management (particularly annual ryegrass); the effect of different application techniques (nozzle selection and water rates) on herbicide efficacy, and the effect of different stubble management on pre-emergent herbicide control has been an initial focus. With limited effective post-emergent herbicide options in cereal crops, maximising the efficacy of pre-emergent herbicides becomes even more important.

Through work being done as part of the crop sequencing project, the role of break crops in the system is being identified, and the effects of

different stubble management techniques to control snails will also be explored.

By the conclusion of the project, it is expected that farmers in the region will better understand the effects of retaining stubble on disease, pest and weed management, and the specific requirements needed to manage these things in the region. It is expected that they will understand and be able to address.



Figure 1. Stubble trial site at Frances.

Project Activities

In 2013; a farmer scale replicated trial was established at Frances into a wheat on wheat rotation. It was established to look at the effects of different harvest and fallow management options in controlling weeds (specifically annual ryegrass), their effect on disease and crop nutrition. Figure 1 shows a photo of the trial site with the burnt plot in the foreground going through to the disced treatment and then retained stubble treatments behind).

This site was continued in 2014, where the same stubble treatments were applied over the same plots and the effects of different stubble treatments on establishing canola explored. As a result of the initial work and findings from the weed control treatments in 2013, it was decided by the project committee that further work needed to be done to try and maximise the efficacy of herbicides (particularly newer chemistries). So in 2014, an additional trial was set up looking specifically at water rates of different chemistries within these systems. This trial was located at Sherwood, and again was focused on a wheat on wheat rotation in a paddock with a ryegrass burden.

In 2015, the project scope was further expanded based on grower feedback with the herbicide efficacy work expanded to look not only at water rates of different chemistries, but also the effects of groundspeed on herbicide efficacy. The level of interest in this work resulted in a spray workshop series being conducted across the region in February 2016 with Bill Campbell, Farmanco, WA coming and speaking to growers around contact and deposition of chemicals in retained stubble systems.

2015 also saw an increase in work around the use of Speedtillers (again based on grower feedback); speedtillers are becoming more common – particularly in the lower south-east as a tool to manage heavy stubble loads, and requests from growers looking for more information around the use and impacts of these technologies in their system resulted in a trial at Millicent and demonstration at Keith looking at the use of Speedtillers.

Results and Discussion:

Frances Site (2013 – ongoing) – various stubble treatments and effects on the system

In 2013, the site was sown down to wheat with various stubble treatments applied; the stubble treatments established, along with ryegrass populations across the site are shown in Table 1. In 2013, there was a significant difference between the level of weed control between stubble treatments; there were also variations in herbicide efficacy which resulted in strategic sites being established to investigate this issue further in 2014 and 2015.

Table 1. Ryegrass plant populations across stubble treatments

Stubble Treatment	Ryegrass plants/m ²
Burnt	16
Disc	46
High Cut	33
Low Cut	81

l. s. d. = 26

It can be seen that the burnt treatments had the greatest level of weed control; this is thought to be due to both the improved deposition of the herbicides, but also the additional weed control provided through the burning process (destruction of weed seeds). The low cut treatment was managed post-harvest, and slashed during the fallow period. The lack of weed control in these plots is thought to mainly be due to the trash still sitting on the surface (almost as a blanket) with the herbicides not achieving adequate soil contact. This is shown in Figure 2.



Figure 2: The low cut stubble treatment with trash laying across the surface

In 2014, the same stubble treatments were applied and the site sown down to canola; in 2014, the aim was to investigate the effects of stubble treatments on canola establishment. While there appeared to be a visual difference in the level of establishment (with the burnt, disc and standing stubble treatments looking much better), the results were not significant. This was also the case at harvest time, with the plants appearing to grow through the visual effects of the stubble treatments.

for ryegrass control. There are various models that can be utilised to estimate the dynamics of weed (ryegrass) populations (eg. RIM and LUSO), however they have not been validated in the higher rainfall zones; this validation will be conducted as part of the project. In 2015, the effects of the build-up of ryegrass in 2013 in the low-cut stubble sites are still evident, with the weed populations (expressed as a % of the site mean) shown in Figure 3.

In 2015, the site was sown down to wheat and the initial stubble treatments were monitored

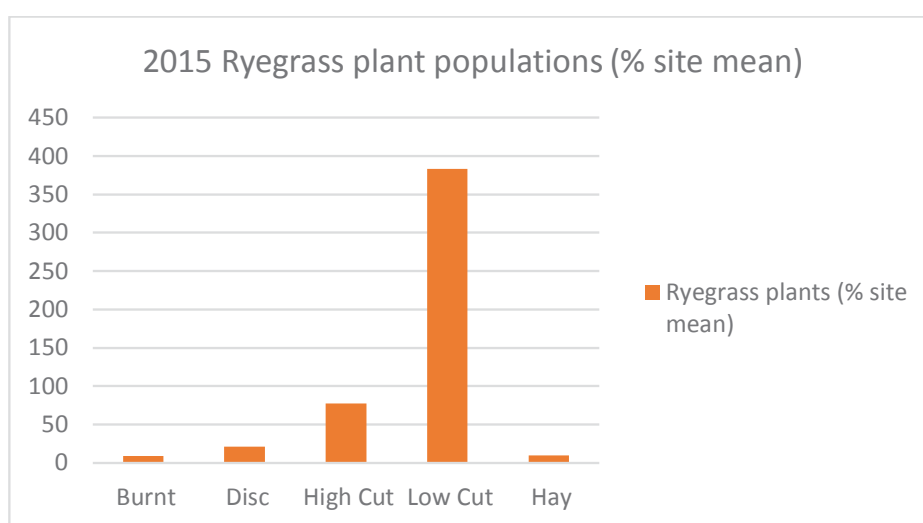


Figure 3. Frances weed control; effects of initial stubble treatments on ryegrass plant population (expressed as a % site mean)

Sherwood Site (2014) – Herbicide efficacy

Based on the initial weed control results at Frances, it was decided to further investigate weed control and to demonstrate the effects of water rate on the efficacy of three different pre-emergent herbicides in retained stubble systems.

Some information from Western Australia has suggested that increasing water rates (particularly with Sakura) improves efficacy greatly. The trial assessed the effects of four different water rates on three different pre-emergent herbicide regimes in a wheat on wheat rotation.

The herbicides were all applied with flat fan, low drift nozzles (not air induction). The water rate was varied through a change in ground speed and nozzle selection (pink nozzles for the low water rates, and orange for the higher water rates). These results are shown in Figure 4.

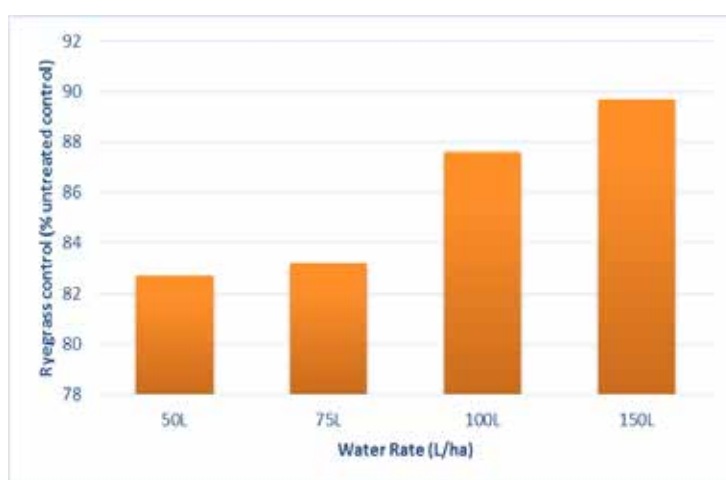


Figure 4. Effect of increasing water rate on %ryegrass control.

Wolseley Site (2015) – Herbicide efficacy

This trial was repeated and further expanded in 2015 at Wolseley based on grower feedback with the inclusion of a water rate x ground speed trial to assess impacts of retained stubble on deposition of the chemical within the rows. The weather conditions in 2015 were extremely dry, and it is thought that this may have impacted on the efficacy of the herbicides in this season. Figure 5 shows the ryegrass populations for the Sakura treatment as measured in September 2015. Similar results were achieved for other chemistries with the level of control varying slightly depending on

the chemistry used. A herbicide resistance test is currently being conducted through Plant Science Consulting on seed from this site to understand current resistance status.

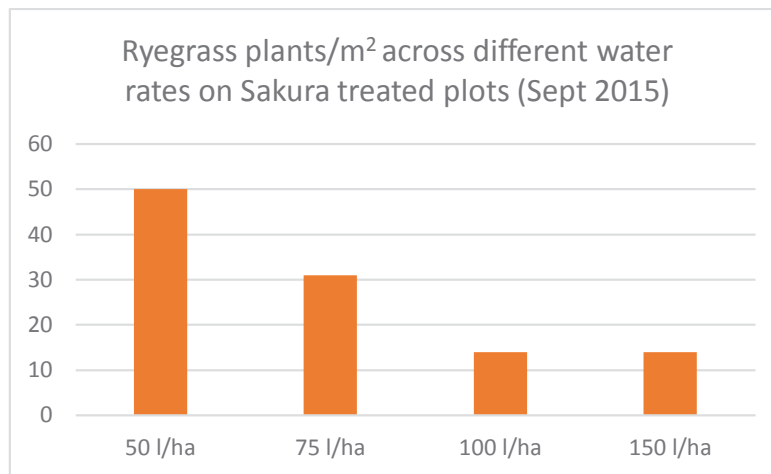


Figure 5: Ryegrass populations for Sakura treatment in September 2015 at varying water application rates.

In both 2014 and 2015 it can be seen that the effectiveness of increased with increasing water rates. The control of annual ryegrass is all about reducing the number of seeds per square metre; the more effective we can make every single management action on weed control, the more sustainable the system will become.

Results from the groundspeed x water rate trial were inconclusive, with no significant effect resulting in weed control by the end of the season.

At the recent workshop series held as part of the GRDC Stubble Initiative looking at herbicide efficacy in retained stubble systems, it was re-enforced that it is the level of deposition on the stubble that is critical in determining the effectiveness of pre-emergents, and that if the correct nozzle is being used for the application, then the speed will not be as critical.

Further information on this topic will be included in the Stubble Initiative guidelines currently being developed as part of this project.

Millicent (2015) – Speedtiller trial

A broadacre trial was established at Millicent in 2015 to look at the effects of incorporating a cereal stubble with a speedtiller (Horsch speedtiller) on soil water, soil nitrogen, weed control, canola establishment and pest control. The trial was established immediately post-harvest with the first treatments incorporated at this time, and additional treatments incorporated pre-seeding. The two timings of the stubble incorporation were compared to a nil incorporation (standing stubble, harvested high at 30cms).

Initial results from this trial suggest that there was no significant difference between treatments in soil moisture levels, soil nitrogen levels, or pest control (however snails and slugs were managed as per current farmer practice across all treatments to ensure no crop damage). Yield data is still being analysed, and results will feed into the regional guidelines currently being developed.



Figure 6. Horsch Speedtiller in action at Crop Walk in November 2014

Keith (2015) – Speedtiller demonstration

A demonstration of a K-Line speedtiller was conducted at Keith to complement the large-scale trial being conducted at Millicent; looking at the speedtiller in a different environment. Two sites were established, a wheat stubble was sown down to beans in one paddock and barley in another. The speedtiller (a K-line speed tiller working to a depth of 175mm) was compared to a burn treatment (cool burn in April), and a standing stubble (40cms high).

The sites were monitored for changes in soil moisture and soil nitrogen, level of weed and pest control, with yield data being collected from the farmer monitor at the time of harvest. There was no significant difference between any of the measurements taken across the site, although August weed numbers were higher in the retained stubble treatments (but may have occurred due to spatial variability).



Figure 7. K-Line Speedtiller demonstration machine at Keith in March 2015

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