# Barley grass in a retained stubble system - farm demonstrations

RESEARCH

**Amanda Cook[1], Mark Klante[1], Andy Bates[2], Bruce Heddle[3], Wade Shepperd[1], Ian Richter[1], Brett McEvoy[1] and John Kelsh[1]**

[1]SARDI, Minnipa Agricultural Centre, [2]Bates Agricultural Consulting, [3]Minnipa farmer


**Location:**
Minnipa Agricultural Centre
**Rainfall**
Av. Annual: 325 mm
Av. GSR: 241 mm
2014 Total: 407 mm
2014 GSR: 290 mm
**Yield**
Potential: 4.0 t/ha (W)
Actual: 2.5 t/ha
**Soil Type**
Red loam

## Key messages

- **There were no differences in grass weed numbers in paddock N7/8 between cereal crop treatments imposed of Sakura, East West and North South sowing, cross sowing and '15 cm nudge'.**
- **Propyzamide was used as an alternative chemical option for grass control in pasture.**
- **Weed management of barley grass using narrow windrows implemented at harvest will be assessed in cereal paddocks in 2015.**

## Why do the trial?

The GRDC Stubble project aims to improve farm profitability while retaining stubble in farming systems on upper Eyre Peninsula (EP). Weed control in stubble retained systems is an issue with reduced herbicide efficacy due to higher stubble loads especially for pre-emergence herbicides. Current farming practices have also changed weed behaviour with later germinating barley grass genotypes now being present in many paddocks on Minnipa Agricultural Centre (MAC) (B Fleet, EPFS Summary 2011, p 177). As a part of the stubble project several MAC farm demonstrations were undertaken in 2014 to address barley grass weed issues including later germinating types and barley grass resistance to Group A herbicides within the farming system.

An integrated approach to weed management aimed at lowering the weed seed bank can make use of diverse techniques such as cultivation, stubble burning, in-crop competition using higher sowing rates and possibly row orientation. The seed bank of crop weeds can be reduced within the break phase by hay making, or green or brown manuring. Other techniques used effectively in WA with ryegrass and wild radish have been narrow windrows and chaff carts, however little research has been done on the effectiveness of these approaches with barley grass because of its early shedding of seeds before harvest.

## How was it done and what happened?

Four different broad acre management strategies for barley grass and other grass weeds were undertaken in 2014 in paddock N7/8 on MAC.

The paddock was sown on 16 May with Wyalkatchem wheat @ 60 kg/ha and 18:20:0:0 @ 60 kg/ha. The whole paddock was sprayed on 3 March with Roundup Attack @ 1 L/ha + Ester 680 @ 300 ml/ha + Striker @ 100 ml/ha. The whole paddock was sprayed again on 4 May with Roundup Powermax @ 1 L/ha + Ester 680 @ 350 ml/ha + Striker @ 100 ml/ha.

**Treatment 1** Sakura - sprayed 15 May with Sprayseed 250 @ 1 L/ha + Sakura @ 118 g/ha and incorporated as per label rate. Not prickle chained as per label.

**Treatment 2** East West – sown on 30 cm spacing. Sprayed 15 May with Sprayseed 250 @ 1 L/ha + Diuron 900df @0.28 kg/ha + Triflur X @1 L/ha. Prickle chained 21 May.

**Treatment 3** Cross sowing - sprayed 15 May with Sprayseed 250 @ 1 L/ha + Diuron 900df @ 0.28 kg/ha + Triflur X @ 1 L/ha Sown East West at 30 cm spacing with 30 kg/ha seed and 30 kg/ha fertilizer rate then sown North South at 30 kg/ha seed and 30 kg/ha fertilizer. Prickle chained 21 May.

**Treatment 4** 15 cm nudge - sprayed 15 May with Sprayseed 250 @ 1L/ha + Diuron 900df @ 0.28 kg/ha + Triflur X @ 1 L/ha. Sown North South at 30 kg/ha seed and 30 kg/ha fertilizer and then nudged 15 cm on guidance and sown again at 30 kg/ha seed and 30 kg/ha fertilizer. Prickle chained 21 May.

**Treatment 5** North South sowing - sprayed 15 May with Sprayseed 250 @ 1 L/ha + Diuron 900df @ 0.28 kg/ha + Triflur X @ 1 L/ha. Sown North South on 30 cm spacing. Prickle chained 21 May.

Issues encountered with the implementation of these treatments: 15 cm nudge treatment resulted in the machine tending to crab back into the row of the first pass because of hardness of inter row, and implementing treatments 3 and 4, the cross sowing and 15 cm nudge, were time consuming during seeding.

*Table 1 Weed counts (plants per m²) in weed management options, 2014*

| Treatment | Barley grass large | Barley grass small | Rye grass | Wild oats | Wild turnip |
|---|---|---|---|---|---|
| Sakura | 0.4 | 0.2 | 0 | 0 | 0 |
| East West | 1.0 | 0.3 | 0 | 0 | 2.2 |
| Cross sown | 1.0 | 0.6 | 0 | 0.4 | 0.4 |
| 15 cm nudge | 3.6 | 1.1 | 0 | 0.3 | 3.2 |
| North South | 0.5 | 0.6 | 0 | 0 | 0.22 |

Grass weeds were assessed within the treatment areas in N7/8 before harvest in a transect across the paddock and counting weed numbers within a 1 m² area, with 10 counts per treatment. The 15 cm nudge area was smaller so the distance between counts was approximately 10 m rather than 20 m in the other treatment areas. There were very low weed numbers (Table 1) so the process was repeated across a different transect but with similar results.

N7/8 had lower grass weed numbers than expected in crop this season. This may have been due to the paddock being in pasture phase in 2013 which was spray topped, followed by later sowing in the 2014 program and the use of Diuron 900df with the other treatments imposed at sowing.

### *S4 Whole of paddock - Propyzamide in Pasture*

When spray topping grass weeds in pastures Targa is the commonly used chemical, but other chemical options may be needed to rotate chemical groups to avoid the development of herbicide resistance, so Propyzamide was tried as an alternative. The whole paddock was sprayed on 28 March with Roundup Attack 1 L/ha + Ester 680 @ 300 ml/ha + Striker @ 100 ml/ha for summer weed control, and was then sprayed on 14 July with Broadstrike @ 25g/ha + wetter.

The following treatments were applied on 18 July, a bit later than ideal due to delayed chemical delivery.

**Treatment 1** Propyzamide @ 600 g/ha

**Treatment 2** Clethodim @ 375 ml/ha + Hasten @ 500 ml/100L water

**Treatment 3** Unsprayed (3 m x 3 m area)

Both treatments 1 and 2 had reasonable control of barley grass except some small patches of barley grass which were not controlled. Samples from these uncontrolled barley grass areas have been collected and will be assessed for herbicide resistance. Weed numbers in the unsprayed section averaged 1872 barley grass plants/m² and 306 ryegrass plants/m².

### *S7 – Stubble harvest height with grazing and non-grazing systems*

S7 background data – In 2008 S7 was divided into 4 treatment areas with sections A & B being low input areas and C & D higher input areas. In 2014 the paddock was sown on 10 May with A & B receiving 50 kg/ha Mace wheat and 40 kg/ha 18:20:0:0 and higher inputs in C & D with 70 kg/ha of Mace wheat and 60 kg/ha 18:20:0:0. Chemical applications applied in this paddock were a summer knockdown on 14 March with Round up Attack @ 1 L/ha + Ester 680 @ 300 ml/ha + Striker @ 100 ml/ha. On 5 May a knockdown of Roundup Powermax Rup @ 1 L/ha + Ester 680 @ 350 ml/ha + Striker @ 100 ml/ha, and on 10 May at seeding Triflur X @ 1 L/ha. On 5 July the paddock was sprayed with Ester 680 @ 600 ml/ha + Zinc sulphate @ 1.5 kg/ha and on 16 August tebuconazole @ 0.29 L/ha.

In 2014 the paddock S7 was harvested at two different stubble heights, high and low in all 4 treatments to monitor in 2015 for any issues with sowing and plant establishment after grazing. This paddock will be monitored in the future to see if there are differences in barley grass and other grass weed seed germination (burial of seed bank), as well as summer weed populations and snails.

### *MAC Cereal Paddocks – Narrow wind rows - N1 and Bruce Heddle's*

The MAC 2366 header was fitted with a narrow windrow attachment made on farm from dimensions obtained from the GRDC website to divert chaff and straw into a 600 mm windrow. The straw chopper was disengaged. There were no issues with windrow attachment during harvest. The MAC farm paddock N1 was monitored this season for barley and rye grass numbers and in the 2015 season burning temperature, seed capture and seed viability will be monitored in the narrow windrows.

***Photo of the unsprayed area of MAC paddock S4 as an indication of the barley grass seed bank***

Bruce Heddle and Stuart and Yvonne Scholz jointly use a range of modifications to their 60 Series John Deere harvesters for weed seed capture and management.

- Windrow boards bolted into the choppers to create 600 mm wide rows of both rotor and chaffer output, or rotor output only as required.
- A Riteway 28 cubic metre cart can be attached either directly behind the harvester or offset to the left side as necessary with the use of different hitches.
- A discharge duct can be fitted to the choppers, delivering the output from both the rotor and chaffer to the cart, with the cart towing directly behind the machine. This option is used in light to average crops only – the cart fills too frequently in heavy crops. It has the advantage of maximising the captured stock feed for use in droughts, as well as collecting all weed and crop seeds that exit the harvester.
- A Riteway single chaff blower is fitted to the 9660 to deliver the output from the chaffer only to the cart, with the cart towed in the offset position. The rotor output is then either put through the chopper and distributed as evenly as possible across the paddock, or if weeds that will pass out through the rotor are present (or windrows need to be created to trap snails for burning), then the chopper is disengaged and the windrow boards attached to create narrow windrows.

The system chosen depends on both what is in the paddock on what needs to happen in the following season. One of the most important considerations is whether barley grass seed is present in meaningful amounts above cutter bar height. If there are, then the rotor discharge must be captured, because barley grass seeds (and maybe a proportion of brome grass seeds if present) will not exit the machine via the chaffer. In 2012 and 2014, barley grass was readily captured, while in 2013 it was easily captured in windrowed canola but not captured at all in wheat.

The paddock being monitored at Bruce Heddle's has a long history of snail problems as well as both ryegrass and barley grass, so this year it was sown on 170 mm row spacings with a 100 mm row spread to maximise crop competitiveness. This appeared to result in barley grass heads near to the top of the canopy and noticeable support to the heads, which hopefully reduced the shedding of individual seeds and enabled a greater proportion of heads to enter the harvester. The paddock was harvested as low as possible with the chaffer output being blown into the cart, the chopper disengaged and the windrow boards fitted to create narrow windrows to be burnt in autumn. The crop yielded about 3.5 t/ha and with almost no inter rows, the challenge will to be to hot burn the straw windrows and chaff piles neatly and effectively without burning the whole paddock.

The MAC N1 paddock (within previous high, medium and low production zones) and the paddock at Bruce Heddle's, which has windrows and chaff dumps, have been assessed for grass weed numbers in crop and in the soil bank. The effectiveness of windrowing, chaff dumping, burning temperatures and conditions will be assessed during the 2015 season.

One of the main barriers to barley grass weed seed collection at harvest is the early maturity of barley grass within crops and the shedding of seed before harvest, which will prevent the seed being placed into crop rows for burning. The late germination of seed and the size of these plants may also be an issue as they may avoid harvesting due to low height. A better understanding of temperatures and conditions needed to sterilize barley grass seed will also be researched in conjunction with the Adelaide University weed team.

## What does this mean?

The farm demonstrations established on MAC in the 2014 season will be monitored in the future to assess the impact of different management options on grass weed issues in stubble retained farming systems.




***Bruce Heddle's header and chaff cart and paddock rows and chaff dumps***