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Weeds

Swathing cereals for barley grass weed seed collection

RESEARCH

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Location
Minnipa
Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm

Key messages

- **In 2016 only 40% of the barley grass was greater than 17 cm tall and had the potential to be collected by early swathing, or 60% of the barley grass seed had already shed or was below harvest weed seed collection height.**
- **Sampling of the swathed paddock area showed slightly better barley grass weed seed collection using swathing than from the rest of the paddock which was harvested normally.**
- **Seed capture at both swathing and harvest is higher with annual ryegrass than with barley grass.**

Why do the demonstration?

Barley grass continues to be a major grass weed in cereal cropping regions on upper Eyre Peninsula. An integrated approach to weed management (IWM) is required to slow the development of herbicide resistance and aims to lower the weed seed bank with the use of non-chemical techniques such as harvest weed seed management including burning stubble, narrow windrows and chaff cart dumps. Swathing early then harvesting for weed seed collection may be another tool for IWM which needs further evaluation, especially for barley grass.

Just prior to harvest in 2016, Bruce Heddle swathed a cereal crop with grass weed issues early (between 20 and 40% grain moisture) for grass weed seed capture into windrows, which he followed with harvesting using a chaff cart. This SAGIT funded project has provided resources to assess barley grass weed seed capture by swathing and weed seed capture in chaff dumps after harvest, to determine how effective these practices can be in contributing towards an IWM program for barley grass on upper Eyre Peninsula.

How was it done?

At harvest in 2016, swathing was undertaken by Bruce Heddle in a Mace wheat crop sown at 50 kg/ha which was grazed early then allowed to recover for harvest. Samples were collected pre-harvest for weed assessment on 21 September 2016, and post-harvest soil and chaff samples were taken on 15 December 2016, to be assessed in weed seed trays. Due to the poor season and limited seed germination in 2017, the weed seed trays were also left during the 2018 season to further assess grass weed germination.

In-crop paddock monitoring for grass weed populations was undertaken and grass weeds were assessed at 10 GPS points along two transects for weed density, with six counts taken at each sample point.

Early harvest barley grass weed seed capture (at swathing)

Crop and weeds were cut at 15-17 cm height (header cutting height) from four quadrats at six GPS-located sampling points before swathing. Crop and grass weeds were separated to measure weight and weed seed head length and calculate weed seed capture/m^2.

The surface soil was also collected, and barley grass weed seeds were cleaned from the soil sample and weighed to calculate the weed seeds that had dropped before swathing.

Assessing weed seed capture in chaff dumps after harvesting

Chaff was collected from 14 chaff dumps (6 swathed, 6 with normal harvest and 2 in selected grass weed areas) with 10 samples per dump, taken approximately 40 cm into the dump (which were approximately 1 m high), to determine the weed seed species being collected at harvest. Fifty grams of chaff were added to each germination tray with three replications. Soil samples for weed seed bank were collected on 20 December 2016 near the chaff dumps sampled, taking ten soil cores at each location, which was evenly distributed into three soil trays to be germinated. The trays were assessed for weed germination approximately every four weeks. The counted weeds were removed from the trays.

What happened?

Transects conducted pre-harvest at 20 locations in the paddock, with four counts at each location, resulted in an average 115 Mace wheat plants/m^2, 7.9 barley grass plants/m^2 (but up to 47 barley grass plants/m^2 in weedier areas) and 2.8 ryegrass plants/m^2 (Table 1).

The pre-harvest weed counts showed that over 60% of the weed seed had already dropped by mid-September in 2016. Therefore less than 40% of the total barley grass seed was still in a position to be harvested using swathing (Table 2). In all of the chaff dumps ryegrass numbers are higher than barley grass indicating ryegrass retains its seed better and is able to be collected using harvest weed seed collection methods.

Table 1 Plant counts pre-harvest 2016 from Bruce Heddle's Hardy Hill paddock, Minnipa

	Wheat (plants/m^2)	Barley grass (plants/m^2)	Rye grass (plants/m^2)
Transect 1 (along fence line)	126	5	3
Transect 2 (through paddock)	105	11 (47 in weedy area)	3

Table 2 Weed seed counts from pre-harvest 2016 cuts from Bruce Heddle's Hardy Hill paddock, Minnipa

Average of four samples	Wheat (plants/m^2)	Wheat dry matter (t/ha)	Barley grass seed to be potentially captured above 17 cm (seeds/m^2)	Ryegrass seed to be potentially captured above 17 cm (seeds/m^2)	Barley grass seed already dropped, in soil sample (seeds/m^2)	Barley grass seed dropped or below 17 cm (%)
Point 7	107.3	5.6	767	419	1331	63
Point 8	94.5	5.1	801	659	1372	63
Point 9	105.3	6.4	287	391	619	68

Table 3 Weed seed counts in 2017 weed seed trays from chaff dumps and soil collected at harvest 2016 from Bruce Heddle's Hardy Hill paddock, Minnipa

	Barley grass (plants/50 g chaff or soil)	Rye grass (plants/50 g chaff or soil)	Self-sown cereal (plants/50 g chaff or soil)
Chaff dumps			
Normal harvest dumps	0.4	20.8	1.5
Swathed dumps	4.4	77.5	52.7
Fence line transect dumps	2.4	3.0	0
Weedy area dumps (2)	1.1	46.8	0.9
Soil			
Soil normal harvest area of paddock	22.5	0.4	0
Soil swathed area of paddock	7.2	1.8	0
Soil fence line transect	2.4	3.0	0

The weed seed germination tray data collected in 2017 (Table 3) shows the greatest number of seeds for both weeds and cereal was collected in the swathed dumps compared to harvesting at normal time. The weedy area dumps showed lower barley grass weed seed collection than the swathed area despite having greater barley grass weeds present in this area.

The soil collected near the dumps after harvest also shows the swathed area had lower barley grass weeds than the normal harvested area. The fence line transect had lower initial grass weed numbers than the paddock transect, which is reflected in the weed seed data (Table 3). The cereal seed numbers were higher in the chaff dump in the swathed crop than at normal harvest timing.

What does this mean?

In weed counts pre-harvest 2016, only 40% of the barley grass seed was greater than 17 cm height or hadn't already shed so had the potential to be collected by early swathing. Swathing the wheat has resulted in greater numbers of barley grass in the swathed dumps and lower numbers in the soil compared to leaving the crop until normal harvest timing. The results reflect that annual ryegrass is easier to collect using harvest weed seed collection methods both at normal harvest, and using swathing. Cereal losses in the chaff dumps were higher in the swathed crop than normal harvest timing but was still a very low overall loss of less than 2% in a 3 t/ha crop. Further evaluation of swathing for grass weed seed collection and cereal grain losses need to be undertaken. Swathing will not become a commonly used practice but if barley grass resistance to herbicides becomes a bigger issue in the future it may be an additive tool to potentially increase the amount of seed contained to within the chaff dumps and chaff rows.

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