

# Emerging Weeds in a Changing Farming System: Barley Grass

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## Key messages:

- Barley grass is becoming more prevalent in many cropping districts
- The ecology of barley grass has changed making it more problematic in crops
- Herbicides trialled provided various levels of control, with Sakura providing the highest and most consistent control

## Aims:

- To understand why barley grass is becoming more problematic in many cropping districts.
- To understand barley grass ecology and to develop management strategies to control it in cereal crops.

## Background:

Barley Grass has historically been a problematic weed in pastures or where cereal crops were sown dry without an effective knockdown. However, some growers are now finding barley grass in their crops. This was supported by recent grower surveys where growers ranked their most problematic weeds currently, compared with 5 years ago. The reasons behind this increase in barley grass were unknown. This could be due to a run of dry seasons where growers have increasingly used dry and early sowing, resulting in no or ineffective herbicide knockdown. Alternatively behaviour of barley grass may have changed in response to crop management practices.

## About the trial:

Barley grass seed was collected, just prior to harvest in 2008, from a number of cropping paddocks across Eyre Peninsula, Lower North and Yorke Peninsula. The seed ecology was studied in laboratory tests. Also three field sites were set up across the Eyre Peninsula (EP); at Buckleboo, Lock & Minnipa. These sites all investigated herbicide efficacy, at two times of sowing for Buckleboo and Minnipa, and also a seeding system comparison at Minnipa. Studies into barley grass soil seed-bank have been established to determine the number of years required to exhaust barley grass seed-bank.

### **Assessments:**

The collection of data at each trial site included:

- Germination % in lab tests
- Barley grass plant density by two timings
- Crop density
- Barley grass seed head density
- Barley grass seed production
- Grain yield and quality

### **Results:**

Dormancy studies showed that many barley grass populations had high levels of seed dormancy at maturity and in some populations dormancy persisted for many months (Figure 1). Populations ranged anywhere from 80% germination (Yaninee) in March, as would normally be expected for barley grass, to populations such as that from Minnipa that did not germinate in the lab tests even though all populations had highly viable seeds. This finding explains why barley grass is becoming a greater problem in cereal crops, as these populations avoid knockdown herbicides with their prolonged dormancy and then germinate in crop where control options are far more limited.

The effect of various factors such as light, seed husk and cold requirement (chilling) on seed dormancy has been investigated. The chilling effect (Figure 2.) seemed to be the most influential in the highly dormant populations. This means that the dormant barley grass requires not only moisture, but a period of colder temperatures to germinate. This is also evident when comparing barley grass plant numbers at Buckleboo between the first time of sowing 376 plants/m<sup>2</sup> and the second 95 plants/m<sup>2</sup>. This is a large reduction in barley grass due to about three weeks of cooler moist conditions in late autumn-early winter encouraging a break in dormancy and allowing better control of barley grass with knock down herbicide before seeding.

Barley grass control from herbicide treatments at each field site is shown in Table 1. Barley grass control has been reported as seed set reduction from the control treatment. This has been used to demonstrate reduction in the paddocks barley grass seed bank, and also future barley grass infestations. At all sites, knockdown herbicide alone provided unacceptable barley grass control as shown by seed set/m<sup>2</sup> in brackets. For the post emergent treatments, Monza provided higher and more consistent control compared to Atlantis. This may have been due to Monza's longer soil activity which enabled it to have activity on even the later cohorts of barley grass. Out of the lower cost pre-emergent treatments, metribuzin, diuron & Logran mix seemed to give the most consistent control. Sakura provided the highest and most consistent control of all the herbicides trialled. Sakura has not been released onto the market yet, but is expected to be available from Bayer in 2011.

The Minnipa TOS-2 trial had both herbicide treatments and seeding system treatments. The disc (K-Hart) had 16 % more barley grass plants than the knife point (DBS) and resulted in more barley grass seed production as shown in figure 3. These results indicate that unlike annual ryegrass, barley grass is not disadvantaged by the disc seeding system. Reasons for this are likely to be related to the nature of the barley grass seed. The sterile florets and thick husk would increase the surface area of the seed for water absorption and could protect the seed from fluctuations in moisture. The ability of the seed to self-bury would also make it well adapted to seeding systems that keep seed on the soil surface.

Barley grass is now a problematic cereal crop weed for many growers. This appears to be due to high levels of seed dormancy in many paddock populations. High dormancy and chilling requirement in barley grass would enable these populations to avoid knockdown herbicides and germinate in crop where control options are far more limited. Herbicides trialled showed variable levels of control, with Sakura providing the highest and most consistent control.

Recommendations from work done in 2009 include:

- Take barley grass seriously as a cereal crop weed
- Be sure to achieve maximum control at every opportunity, particularly in pasture phases and break crops where high levels of control can be achieved. Consider barley grass control when deciding on herbicides in cereal crops.
- Assess barley grass escapes in spring and undertake seeding in problem barley grass paddocks right at the end of your seeding program. This approach will not delay overall seeding time for the farm, but gives barley grass longer exposure to chilling conditions, thereby achieving higher germination which can be controlled by knock-down herbicide before seeding.

#### **Who's Involved:**

The trial is supported by;

- GRDC
- Michael Bennet, SARDI & SANTFA, Minnipa Ag Centre
- Michael Schaefer, Buckleboo
- Andrew Polkinghorne, Lock
- Mark Klante, Minnipa Ag Centre
- Bayer Crop Science, supply Sakura
- EP farming systems group

**Activities, Events and Industry Participation:**

- Minnipa crop walks August 2009
- Lock / Darke Peake crop walks August 2009
- Minnipa Ag. Centre Open day September 2009
- Buckleboo crop walks September 2009
- Crop Science Society of SA newsletter September 2009
- Private consultants meeting Adelaide October 2009
- EP farming systems report 2010
- MSF report 2010
- GRDC advisor updates 2010 SA & Vic

**Future Directions:**

- Further work into understanding barley grass ecology and soil seed-bank persistence.
- Similar field trials as 2009 into control methods for barley grass.

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**For more information, please contact**

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