Survey of current management practices of barley grass in low rainfall zone farming systems

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Key messages

- **The survey received 224 responses from growers aligned with the different farming systems groups participating in this project.**
- **39% of the grower respondents identified barley grass as having a medium to high impact on their cropping systems.**
- **40% of the grower respondents feel that barley grass emergence patterns have changed over the last 10 years and that it now emerges later in the season.**
- **51% of growers thought barley grass had become more common in their cropping paddocks. Some of the factors responsible for the increase in barley grass include delayed emergence and early seed-set, low efficacy of pre-emergence herbicides, particularly during dry starts to seasons, resistance to group A herbicides, continuous cereals in the system and wide crop row spacing.**

Why do the survey?

Barley grass is now one of the top 10 weeds of Australian cropping in terms of area infested, crop yield loss and revenue loss (Llewellyn et al. 2016). Barley grass has several biological traits that make it difficult for growers to manage it in the low rainfall zone, so it is not surprising that it is becoming more prevalent in field crops in SA and WA.

Through recent GRDC investment, the research project 'Demonstrating and validating the implementation of integrated weed management strategies to control barley grass in the low rainfall zone farming systems' (hereby referred to as GRDC Low Rainfall Barley Grass) has commenced. An initial grower survey of current practice and attitudes towards barley grass was undertaken in 2019 to be used as the baseline to assess changes in grower attitudes and any change in practices after the completion of the three-year project.

How was it done?

An electronic survey was developed by Amanda Cook, Naomi Scholz, Gurjeet Gill and Catherine Borger using Survey Monkey and distributed via email to the grower members of different farming systems groups collaborating in the GRDC Low Rainfall Barley Grass project. The survey was used to collect information on grower current management practices and attitudes towards barley grass.

The survey link was sent to grower groups on 4 July 2019 and closed on 20 September, giving farming systems groups 10 weeks to promote the survey to growers. The survey closed before the start of field days and crop walks, and before discussing the project and any outcomes from the 2019 GRDC Low Rainfall Barley Grass project.

What happened?

There were 224 grower respondents to the initial GRDC Low Rainfall Barley Grass survey through the farming systems grower groups across the southern and western cropping regions. The first survey question asked respondents which Farming Systems group they most commonly associated with. Respondents identified Birchip Cropping Group (BCG) 3%, Central West Farming Systems (CWFS) 4%, Eyre Peninsula Agricultural Research Foundation (EPARF) 27%, Grain Orana Alliance Inc (GOA) 8%, Kellerberrin Demonstration Group 4%, Lakes Information and Farming Technology 2%, Mallee Sustainable Farming Systems Group (MSF) 8%, Mingenew Irwin Group (MIG) 1%, South East Premium Wheat Growers Association (SEPWA) 4%, Upper North Farming Systems Group (UNFS) 11%, WA No-till Farmers Association (WANTFA) 10%, and 'other' 19%. Of the 'other' groups, 13% were Western Australian growers.

The second survey question asked growers how big an impact barley grass had in the cropping and pasture phase of the farming system. 10% of responses indicated barley grass had a high impact as a weed within their crop and 11% within the pasture phase (Figure 1). 29% indicated barley grass had a medium impact as a weed within their cropping phase, and 17% within the pasture phase. 17% indicated barley grass had a low impact as a weed within their cropping phase, and 8% within the pasture phase, and 8% indicated it was not an issue.

The third survey question asked growers about barley grass management strategies, and the level of effectiveness of current management strategies (low, moderate, high or don't use). The highest rating for effectiveness of management strategies for barley grass were rotation/break crops, two-year breaks, pasture or crop topping, spraying grasses out of crop and cereal choice e.g. barley. The management strategies for barley grass management which were not used were burning, narrower row spacing, harvest weed seed control or hay cutting. Other management strategies which may have been used (as a medium strategy) were crop competition by increasing seeding rate, sowing later or sowing early.

The fourth survey question asked growers about the level of effectiveness of current herbicides for barley grass management. Grass selective herbicides in pastures and other break crops had the highest level of effectiveness of current herbicides, followed by prosulfocarb (Sakura).

The fifth survey question asked if growers thought the barley grass germination pattern had changed over the last 10 years. 40% of growers thought barley grass now germinates later in crop, 19% thought the germination pattern was unchanged, 15% thought barley grass now germinated earlier in their farming systems and 26% were unsure.

The next question asked if barley grass had become more common in cropping paddocks. 51% of growers thought barley grass had become more common in their cropping paddocks, 43% said it was not more common, and 6% were unsure.

The next survey question asked if growers thought they may have herbicide resistance issues in barley grass. 23% of growers thought they may have herbicide resistance issues in barley grass, 53% thought they didn't have herbicide resistance issues, and 24% were unsure. Of the 23% of growers that thought they may have herbicide resistance issues, most were concerned about Group (Gp) A resistance, mostly fop's but also some dim's. Other herbicides growers were concerned about were Gp B (including IMI), Gp L (paraquat), Gp M (glyphosate) and Gp D (trifluralin).

The eighth question asked growers about their current row spacing and seeding system. Current row spacings for cropping ranged from 15-70 cm (6"-19.5") with 43% having 30 cm (12") wide rows, 23% having 25 cm (10") and 20% having 22.5 cm (9") row spacing. 88% of growers used direct drill knife point systems, and 9% used disc seeding systems, with 3% using conventional cultivation systems. Of the direct drill systems, five growers were using paired row or splitter systems to increase seedbed utilisation.

The final survey question asked growers the current wheat and barley seeding rates used. Wheat seeding rates ranged from 27 kg/ha to 120 kg/ha with 47% falling in the 60-70 kg/ha seeding rate range (60 kg/ha 18%, 65 kg/ha 12%, 70 kg/ha 17%). Barley seeding rates ranged from 34 kg/ha to 120 kg/ha again, with 47% falling in the 60-70 kg/ha seeding rate range (60 kg/ha 18%, 65 kg/ha 13%, 70 kg/ha 16%).

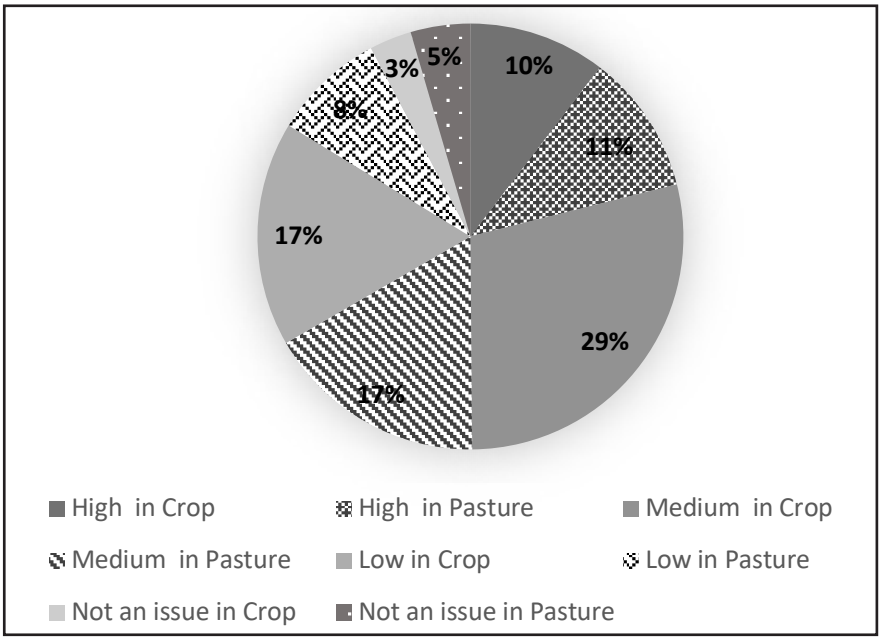

Figure 1. Growers response to the impact of barley grass as a weed within the crop or pasture phase.

The final question gave growers the opportunity to suggest possible contributing factors to the increase in barley grass on farms in the regions. Some of these responses have been presented below with the number of other similar responses indicted in brackets (number of growers):

- Pre-emergent chemical effectiveness and herbicide efficacy is limited in dry conditions (11 growers) and low rainfall starts presents a challenge to grass control in the cropping cycle. A pre-emergent chemical with good activity on barley grass in wheat and barley is needed.
- The diverse nature of its ability to set seed and its time of germination are making it hard to manage (4). There are many factors with non-wetting sand (4) that make this worse due to varied germinations (8) and lack of pre-emergent activation.
- Seems to be mostly a problem when sheep and pasture is in the rotation (7). Spray topping is not as effective (7), even with two applications, need a pre-emergent in wheat that is good on barley grass. Sakura is a costly option (4).
- Resistance to group A chemistry has developed from a year in year out pasture-wheat rotation (4).
- Failure from grass sprays in pasture phases are becoming more common in rotations, one year in one year out (4).
- Slowly turning into a major problem. Using double pasture breaks (3), canola and brown manure vetch (3) to get higher success in control. Requires vigilance and fussiness which includes at this stage spot-spraying resistant (tested and verified) patches as well as paddock hygiene.
- Easy to control with rotation or IMI system/Clearfield varieties (10), but developing IMI herbicide resistance will be an issue (3). We choose rotation because the IMI system reduces crop rotation options. Barley grass soon becomes a problem in continuous cereals. In dry seasons Clearfield varieties are a game changer.
- We have found patches of barley grass less tolerant to some knockdowns i.e. need more robust rates to achieve a good kill.
- It is persisting longer in the seed bank and coming up later than normal (4), this change has been quite quick over the last 5-7 years.
- Some newer barley varieties e.g. LaTrobe, Spartacus have more upright early growth, seem less competitive and have low early vigour - not as good for competing with weeds. Need wheat and barley varieties with good early vigour, and prostrate growth up to mid tillering.
- Weed seed collection not an option because it sheds seed too early, hay might be option or silage. Later germination hard because pre-ems not working, Sakura and Avadex too high a cost.
- Pre-ems are the only effective option where Group A has failed. Sets seed too early for anything else.
- Disc and wide rows results in more staggered germination of barley grass in season and following crops. Same method results in less early crop competition (2). Non wetting sands storing seed banks (4) especially through a run of dry seasons. Dry sowing has denied a pre-emergent knockdown (8).
- Without Sakura we would have real problems. But it will only work so long. Would like to be able to terminate pastures earlier but can't because need livestock feed.
- Have only had problems recently due to dry sowing (8) most of the crop. In years where there is early rain, have no issues with barley grass. Also hay freeze pastures before barley grass seed set so have driven down numbers for a long time now. They are only creeping in from the edges when dry sowing.

What does this mean?

The initial grower survey of current practice and attitudes towards barley grass across the southern and western low rainfall zones was undertaken as the baseline to assess changes in grower attitudes, and any change in practices after the completion of the GRDC 'Demonstrating and validating the implementation of integrated weed management strategies to control barley grass in the low rainfall zone farming systems' project. Some of the major factors responsible for the increase in barley grass identified by the growers include: delayed emergence and early seed-set, low efficacy of pre-emergence herbicides particularly during dry starts to seasons and, resistance to group A herbicides, continuous cereals in the system and wide crop row spacing.

Each region has developed a three-year management plan for a farm based replicated demonstration to implement current strategies to manage barley grass in the local area. The outcomes from the research will be extended over the course of the project. A barley grass survey for herbicide resistance and germination patterns will also be undertaken within the project. Growers can contact their local farming systems group (listed above) if they have suspected barley grass resistance which they would like tested.

References

Llewellyn, *et al* (2016) Impact of weeds on Australian grain production.

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