

Field testing of glyphosate-resistant awnless barnyard grass (*Echinochloa colona*) in northern NSW

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The Problem

Awnless barnyard grass (*Echinochloa colona* (L.) Link) is a major weed of cropping in summer-dominant rainfall areas of Australia. Barnyard grass is highly competitive with crops and can have up to seven emergence events per summer and have plant populations exceeding 1000 plants per m².



Grain sorghum crop infested with glyphosate resistant awnless barnyard grass, January 2007.



Seed produced by glyphosate resistant awnless barnyard grass in a sorghum crop.

In northern NSW one population was confirmed resistant to atrazine (Group C) in 2004. A risk assessment analysis in 2004 found this species to be at high risk of developing glyphosate (Group M) resistance.

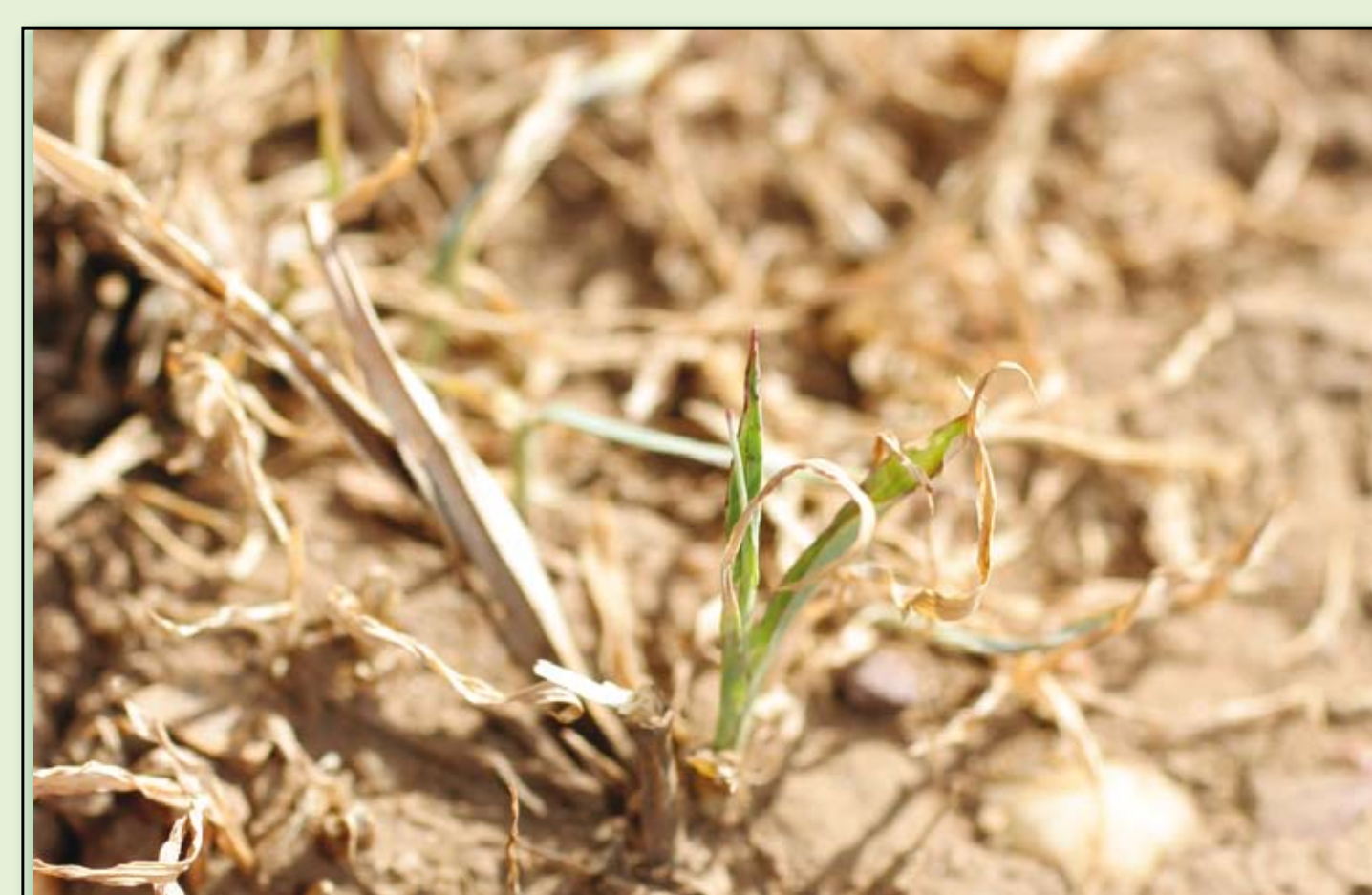
There are currently two separate populations of awnless barnyard grass confirmed resistant to glyphosate in northern NSW.

The Research

Three field experiments were established near Bellata, NSW in a fallow field infested with 300–3000 predominantly glyphosate-resistant *E. colona* plants per m² to determine the level of glyphosate resistance and which herbicides were still effective.

Experiment 1 Glyphosate rate response

Rates up to 4,500 g a.i. ha⁻¹ glyphosate were trialled.



Glyphosate resistant awnless barnyard grass seedling after application of 1800 g a.i. glyphosate ha⁻¹.

Experiment 2 Pre-emergent herbicides

Herbicides used were trifluralin (not incorporated due to rain), norflurazon, diuron, atrazine, s-metolachlor + prosulfocarb, s-metolachlor + atrazine, imazethapyr, imazapic and s-metolachlor.

Experiment 3 Post-emergent herbicides

A range of knockdown and grass selective herbicides were trialled. Double knock (consecutive knockdown herbicides) were tested with single applications of knockdowns and selective grass herbicides.

The Results

- There is **no significant improvement** in control above 1800 g a.i. ha⁻¹ glyphosate.
- All pre-emergent herbicides were effective on this barnyard grass population however no treatment gave 100% control.
- Water-soluble pre-emergent herbicides gave better results due to rainfall immediately after application
- The “double-knock”, two consecutive knockdown herbicides five days apart, gave 100% control.
- Single applications of bipyridil herbicides rarely gave 100% control.
- Single applications of selective post emergent herbicides gave 100% control, however these are all from mode-of-action groups A and B (high risk for developing resistance).



Pre-emergent herbicide experiment 20 days after treatment. Foreground—metolachlor + prosulfocarb (180 + 1200 g a.i. ha⁻¹); mid—metolachlor + prosulfocarb (420 + 2800 g a.i. ha⁻¹); background—imazapic (48 g a.i. ha⁻¹).



Pre-emergent herbicide experiment 20 days after treatment. Foreground—metolachlor (960 g a.i. ha⁻¹); mid—atrazine (1800 g a.i. ha⁻¹); background—metolachlor (1920 g a.i. ha⁻¹).

Recommendations

- Consecutive combinations of tactics and herbicides (“double knock”) are essential to obtain 100% seed set control to drive down the weed seed bank.
- Use soil-active pre-emergent herbicides to reduce the selection pressure on knockdown and selective post emergent herbicides.
- Use soil-active pre-emergent herbicides to reduce labour requirements and improve timeliness of weed control in the farming operation.
- Save selective post-emergent herbicides for in-crop weed control and don't waste them in fallows.
- Plan and execute a flexible rotation to prevent or manage glyphosate resistant awnless barnyard grass.



GRDC national panel inspects barnyard grass experiment near Bellata, NSW.



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