



Photo: Emma Leonard, AgriKnowHow.



# Annual ryegrass

(*Lolium rigidum*)

## Key facts

- Annual ryegrass has been the most widespread and costly grass weed of annual cropping systems across much of southern Australia for the past 30 years.
- Its success as a weed species is due to its ability to rapidly develop resistance to a wide range of herbicides.
- Low-cost pre-emergent herbicides are now ineffective on many farms in low-rainfall areas — an integrated weed management (IWM) strategy is the best control option available.
- If seed set is prevented, annual ryegrass seed reserves can be almost exhausted within 3–5 years.

*Annual ryegrass (*Lolium rigidum*) is the most widespread and costly grass weed of annual cropping systems across much of southern Australia. The grass weed was originally introduced as a pasture species across many districts during the early 1900s. Annual ryegrass is well adapted to most soil types, and thrives in areas of paddocks where there is a lack of crop or pasture competition (e.g. waterlogging-prone areas).*

**Dense populations of annual ryegrass** (>50 plants/m<sup>2</sup>) can produce 10,000–45,000 seeds/m<sup>2</sup>, which result in a significant seedbank if left uncontrolled. Reduced crop yield, grain contamination, and annual ryegrass toxicity (ARGT) are common impacts of annual ryegrass infestation.

The preferred seed depth for successful germination of ryegrass is 20mm, which is similar to the depth most growers aim to sow their cereal crops (20–25mm).

Annual ryegrass has a variable pattern of emergence, and can germinate from late autumn through to late spring, however most ryegrass (up to 80 per cent) emerges after the 'break of season' during autumn through to early winter. Higher populations of later-germinating ryegrass occur where cropping frequency has been greater, largely because herbicide control measures (knockdown, pre-emergent) are mostly targeted at early-germinating ryegrass.

### Annual ryegrass and herbicide resistance

By far the most significant attribute of ryegrass is its ability to develop resistance to commonly-used herbicides. Annual ryegrass has known resistance to groups A, B, C, D, L and M herbicides, and many populations have multiple resistance to several of these groups. This presents a real challenge for managing annual ryegrass in annual cropping systems. However, with a combination of chemical and non-chemical control measures, the ryegrass seedbank can be depleted in 3–5 years.

### Control options for annual ryegrass

There is a range of control options for annual ryegrass — both chemical and non-chemical (Table 7).



*PREVIOUS PAGE: Preventing seed set for 3–5 years can exhaust annual ryegrass seed reserves.*

*LEFT: Dense populations of annual ryegrass can produce 10,000–45,000 seeds/m<sup>2</sup>.*

*Photos: Andrew Storrie, Agronomo Consulting.*

### Managing herbicides for annual ryegrass control

No-till cropping relies heavily on pre-emergent herbicides. Trifluralin (group D) and triasulfuron (group B) herbicides have provided an effective low-cost pre-emergent ryegrass control option for cereal crops in low-rainfall areas for many years, although their frequency of use has led to widespread resistance. Random paddock surveys indicate up to 70 per cent of paddocks in low-rainfall cropping regions contain ryegrass that is resistant to these two herbicides.

Selective post-emergent herbicide options for ryegrass are also being depleted in low-rainfall regions as resistance levels increase. These herbicides will be preserved for a longer period of time if more non-chemical control options are adopted. Of particular concern is the development of glyphosate (group M) resistance during recent years. Resistant populations most frequently occur near fencelines, which can then spread into the paddock. Pay careful attention to fenceline spraying operations, and rotate herbicide groups to prevent incursions of group M-resistant ryegrass. Using non-selective alternatives to glyphosate wherever possible in both cropping and pasture paddocks will help delay resistance.

**Table 7. Expected results of various annual ryegrass control strategies**

Control strategy	Control of annual ryegrass weed seeds or plants (%)	
	Most likely	Range
<b>Non-chemical</b>		
Weed-free crop seed	85	50–99
Crop competition	50	20–80
Stubble burning (>4t/ha stubble load)	50	0–90
Hay production	80	70–95
Grazing	50	20–80
Seed collection at harvest	65	40–80
<b>Chemical</b>		
Knockdown before sowing	80	30–95
Double-knock before sowing	95	80–99
Pre-emergent herbicides	70	50–90
Selective post-emergent herbicides	85	20–95
Pasture spray-topping	80	30–99
Crop-topping	70	50–90
Chemical fallow	85	75–95

Source: IWM Hub GRDC, expert opinion and grower experience

## Non-chemical control options

### ■ Weed-free seed

Sowing weed-free seed reduces the risk of introducing resistant annual ryegrass to the paddock with crop seed. A professional seed cleaner is a worthwhile investment.

### ■ Hay production

Cutting paddocks for hay is most commonly used in low-rainfall regions where there is a problem paddock of resistant annual ryegrass. Following up with herbicides or grazing after hay is removed to control regrowth ensures 95 per cent weed control.

### ■ Harvest weed seed management

Collecting annual ryegrass seed at harvest is rapidly gaining popularity among growers as an effective non-chemical control measure. Of all the grass weeds, ryegrass is the most suited to this technique because of its maturity time and seed retention. Collected seed can be destroyed by burning (narrow windrow, chaff pile) or a seed destruction device (e.g. Harrington Seed Destructor). Narrow windrow burning is particularly well suited to low-rainfall cropping systems primarily because cereal stubbles are often less than 4t/ha. The internet is a great source of information for growers interested in narrow windrow burning.

Non-chemical control

Herbicide efficacy depends heavily on the susceptibility of the weed population. Herbicide resistance testing is recommended for problem paddocks with suspected resistance. Alternative chemistry is available for annual ryegrass control (pyroxasulfone, prosulfocarb+S-metolachlor, propyzamide), but these products are more expensive and their effective life will be short-lived if growers rely on them as the sole control strategy. The sole reliance on herbicides will lead to resistance — it's only a matter of time.

### Further information

- Integrated Weed Management Hub annual ryegrass profile: <http://www.grdc.com.au/Resources/IWMhub/Section-8-Profiles-of-common-weeds-of-cropping/Annual-ryegrass>
- Tactics for integrated annual ryegrass control (DAFWA): <https://www.agric.wa.gov.au/grains-research-development/annual-ryegrass?page=0%2C1>
- Narrow windrow burning (Grassroots Agronomy): <http://www.grassrootsag.com.au/assets/nwb2.pdf>
- Ryegrass Integrated Management (RIM) online decision support tool: <http://ahri.uwa.edu.au/research/rim/>