LEADA

# Stubble Guidelines

## Managing Annual Ryegrass in Stubble Retained Systems on Lower Eyre Peninsula

Local Management Guideline for the GRDC Stubble Initiative Project (LEA0002)

Annual ryegrass *(Lolium rigidum)* is one of the most serious and costly weeds of annual cropping systems on Lower Eyre Peninsula.

Dense stands (>100 plants/m$^2$) can produce up to 45,000 seeds per square metre under ideal conditions.

Many populations of annual ryegrass have developed resistance to both selective and non¬-selective herbicides. Repeated use of herbicides from the same mode-of-action group (particularly the high-risk Groups A and B) have led to herbicide-resistant individuals.

| Herbicide | 2009 | 2014 |
|---|---|---|
| Trifluralin | 10% | 51% |
| Propyzanide | - | 0 |
| Sakura® | - | 0 |
| Avadex®Xtra | - | 3% |
| Boxer Gold | - | 1% |
| Diclofop-methyl | 66% | 73% |
| Axial® | - | 32% |
| Clethodim | 25% | 7% |
| Chlorsulfuron | 87% | 85% |
| Intervix® | - | 53% |
| Glyphosate | - | 1% |

***Table 1: Annual ryegrass populations resistant to herbicides for Lower Eyre Peninsula surveys in 2009 and 2014 (populations are considered resistant if 20 per cent of individuals survived the herbicide).***

No one method of control is suitable for the sustainable control of ryegrass. Two useful control methods include narrow windrow burning and chaff cart collection of stubble. However, both methods significantly reduce stubble load.

### In what areas does annual Ryegrass cause issues?

Annual ryegrass is well adapted to most soil types of Lower Eyre Peninsula.

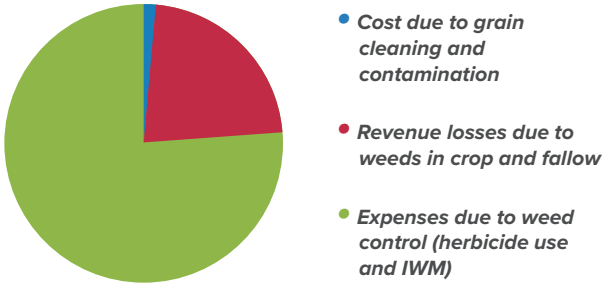
The number of emergence flushes and the density of plants that emerge are related to initial seedbank levels and frequency and amount of rainfall.

Poor crop growth, low pH soils (<4.5) and waterlogged areas all make controlling annual ryegrass more difficult. ryegrass populations can grow rapidly where poor crop growth reduces competition.

Large scale resistance to Group A herbicides has resulted in variable and inconsistent control of ryegrass.

Break crops, particularly canola on Lower Eyre Peninsula, provide an important avenue for ryegrass control. However continued use of clethodim on break crops has led to has led to increased levels of ryegrass becoming resistant to the herbicide. Spraying higher rates of clethodim may provide satisfactory ryegrass.

### Economic importance: when is it a problem worth worrying about?




Despite increasing levels of herbicide resistance, in-crop weed populations are being kept low and yield loss due to weed competition is much lower than total weed management costs. Reducing the cost of weed management is one of the grains industry's largest challenges. www.grdc.com.au/ImpactOfWeeds

## What are the solutions for annual ryegrass control?

| Practice | Average Control and (Range) | Comments |
|---|---|---|
| **Increasing crop competition** | 50% (range 20 to 80%) | Row spacing of greater than 250mm will reduce competitiveness. Select crop varieties with greater early vigor and sow at the optimum time. |
| **Burning residues (whole paddocks)** | 50% (range 0 to 90%) | Use a hot fire back burning into the wind. Avoid grazing crop residues to get a hotter burn. |
| **Knockdown herbicides (non-selective) for fallow and pre-sowing control** | 80% (range 30 to 95%) | May require delay in sowing. Avoid overuse of one herbicide group. |
| **Double knockdown** | 95% (range 80 to 99%) | Reduces likelihood of glyphosate resistance. Use glyphosate followed by SpraySeed®. May require delay in sowing. |
| **Pre-emergent herbicides** | 70% (range 50 to 90%) | Consider incorporation requirements for different products and planting systems and the effect of varying environmental conditions on efficacy. Rotate between herbicide groups. Have a good understanding of resistance status. |
| **Selective post-emergent herbicides** | 90% (range 80 to 95% when applied to susceptible ryegrass) | Apply as early as possible after the annual ryegrass has two leaves. Have good understanding of resistance status of ryegrass population. |
| **Crop-topping with non-selective herbicides** | 70% (range 50 to 90%) | Note stage of crop compared to stage of annual ryegrass. Often not possible to achieve without crop loss. |
| **Hay** | 80% (range 50 to 95%) | Research marketing options and gross margins. Need to consider ARG toxicity. May need to follow up with herbicides to control regrowth. |
| **Weed seed collection at harvest** | 65% (range 40 to 80%) | Best results where crop is harvested as soon as possible before weeds lodge or shatter. |
| **Narrow wind-row burning** | 70-80% seeds captured, 10-20% seedbank reduction | It is cheap to set up ($300-$400 per harvester), can be done to any harvester and it doesn't slow down harvest. |

## Narrow wind-row burning

- It is cheap to set up $300-$400 per harvester and can be done to any harvester
- It doesn't slow down harvest
- Paddocks are left with residue levels that stop wind erosion but do not cause trash flow problems at seeding
- Aim to keep rows to about 500-600mm wide.
- Make sure chutes capture all chaff and weed seeds into windrow.
- Do not over thresh crops. This leads to rows with little or no airflow making rows smoulder rather than burn. Rows that smoulder do get hot enough to kill weed seeds.
- Make sure your chute does not restrict air flow from the cleaning fan of the harvester. Most chutes need to open back and front and closing the front leads to reduced harvest capacity in 4 t/ha plus crops.
- Try not to drive over rows as this crushes the rows giving the same result as over threshing.
- Slow the harvester ground speed at the end of the runs so you empty the sieves at the same time as the rotors. This prevents tails of seeds with no straw mixed in to burn.
- The use of stubble mats to protect the front tyres of the harvester can help in forming a mini fire breaks along each side of the rows. The mats tend to lay down stubble at harvest when it is hot (generally it does not stand back up) so it is less prone to light up due to radiant heat coming from the rows when burning.
- Make sure the header knife is in good condition. This is very important if crops are lodged because blunt knifes tend to pull and lay ryegrass down in cool conditions rather than cut.
- Harvest the same direction the crop is sown. This is very important in heavy crops because the fire will carry down the individual rows that run away from the windrows.
- The exception to the above rule is if using old stubble rows to guide seeder bar steering (that is, when using I-TILL), you need to harvest at about 15 degrees to the way the crop was seeded. This is so you don't end up with any rows left for the paddle to work with for a full run.
- Wider header fronts allow you to get better windrows in lighter crop years but can prove challenging when it comes to burning 5t/ha crop windrows. But the results are worth the effort.
- **Ryegrass needs to be heated to 400C for 10 seconds to kill seeds.**

## Varieties and crop types

- Wheat varieties vary greatly in the type of residue that comes out of headers.
- Canola produces rows that will burn at the highest temperature for the longest period of time.
- Lupins also produces good rows that will burn hot for the required length of time.
- While barley windrows burn well, it can be tricky not to burn the whole paddock. Barley stubbles tend to spread out further, providing a bridge for fire to jump between rows.

## Burning and lighting

The FESA McArthur Index is a scale used to calculate the fire danger in grassland using a combination of temperature, humidity and the wind speed. The scale gives a guide to the best windrow-burning conditions. As a rule of thumb, a Fire Weather Index of:

- Less than 15 will give a reasonable burning result, but there is a risk of burning inter-row if windy.
- 8-10 is good and probably ideal.
- Two and lower will not give a good result as it is too cold and humid. At this level the rows smoulder and will flare up when conditions warm up the following day, burning the paddock bare.
- Greater than 15 carries the risk of the fire getting out of control.

| Bean Stubble - ARG Capture | ARG (plants/m²) | SE (plants/m²) |
|---|---|---|
| Between row | 22 | 7 |
| On row (pre-burn) (soil) | 110 | 41 |
| On row (non-burnt) (straw) | 32 | 18 |
| % Reduction in windrow | 71% | |
| % Reduction in paddock | 20% | |

| Canola Stubble - ARG Capture | ARG (plants/m²) | SE (plants/m²) |
|---|---|---|
| Between row | 41 | 12 |
| On row (pre-burn) (soil) | 94 | 25 |
| On row (non-burnt) (straw) | 18 | 6 |
| % Reduction in windrow | 81% | |
| % Reduction in paddock | 9.3% | |

***Table 1. Annual ryegrass capture and paddock control efficacy as measured by plant counts from weed seed banks of harvest 2015 from the LEP. SE = standard error, ARG = Annual ryegrass. (Cook et al 2016)***

A paddock survey conducted on the Lower Eyre Peninsula in 2015 showed that approximately 70-80% of ryegrass seeds captured within the windrow were destroyed resulting in a 10-20% reduction in the seedbank.

## Further Reading


https://grdc.com.au/__data/assets/pdf_file/0029/47873/iwmm6-pdf.pdf.pdf

Cook, A Fleet, B 2016, 'Grass weed management in retained stubble systems – farm demonstrations', Eyre Peninsula Farming Systems Summary 2016.

Cook, A Ware, A 2015, 'Ryegrass management in a retained stubble system – farm demonstration', Eyre Peninsula Farming Systems Summary 2015.

https://www.agric.wa.gov.au/grains/windrow-burning-tips-experts

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