OPTIMISING CEREAL ESTABLISHMENT IN CHALLENGING ENVIRONMENTS:

ADVANCING KNOWLEDGE OF PRE- AND EARLY POST-EMERGENT HERBICIDE SAFETY

Kangaroo Flat, SA
2025

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WE'RE PROUD TO BE A PARTNER IN THE SA DROUGHT HUB

Australian Government
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Future Drought Fund

SA DROUGHT HUB

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Table of Contents

1. Acknowledgement 3
2. Agronomist Profile 4
3. Introduction 4
4. Trial Overview 5
5. Key Findings 6
6. Treatment List 7
7. Site Layout 8
8. Evaluations & Conditions 8
9. Results Discussion 10
10. Discussion 12
11. Appendix 13

Disclaimer

Elders is pleased to present its [year] Trial Results Booklet. The Booklet [provide summary of information in booklet]. The information provided is intended to be informative and should be used as a guide only. It is not intended as a substitute for advice. If you require detailed or specific advice tailored to your business, property or circumstances, please contact us. Elders is not responsible, and will not accept responsibility, for any damage or loss that you or your business suffer in the event the information in this Booklet is relied upon.

1. Acknowledgement

Elders would like to express gratitude to the following people, industry partners and suppliers:

- SA Drought Hub
- Christopher Preston, Professor of weed management, University of Adelaide
- Lyndon May, Tech Service Manager Central Zone, Elders
- Alex Newbold, Rural Product Specialist: Seed Treatments, AgTech, Elders

Special thanks to Elders Roseworthy for their generous provision of product and equipment that made this R&D project possible.

Please note; Elders encourages you to consider the information presented in the context of paddock history and application conditions



2. Agronomist Profile



Craig Prior

With over 19 years of experience as a broadacre agronomist, I partner closely with growers to provide tailored, practical, and highly informed technical advice. My focus is on helping producers maximise the performance of their operations through strategic crop planning, proactive pest and disease management, and clear, consistent communication. Over the years, I've built strong, long-standing relationships with growers, many of which have grown well beyond the traditional business partnership.



Chris Hallion

With more than 16 years' experience managing broadacre cropping operations in South Australia, I offer a deep understanding of the practical and strategic decisions required to run a productive and profitable farming enterprise. This hands-on background is complemented by formal study in Rural Science through the University of New England, providing a solid foundation in agronomic principles and modern production systems.

In my current role as an agronomist with Elders, I work closely with growers to deliver tailored advice across crop planning, input optimisation, and the integration of precision agriculture tools. My approach is grounded in local knowledge, backed by data, and informed by both on-farm experience and academic training. I'm committed to helping clients make confident, informed decisions that deliver results both in the paddock and across the broader farm business.

3. Introduction

As many farmers like to say, the ideal break of the season arrives on ANZAC Day, whilst that timing would offer a low risk start to seeding and a great window for a knockdown on early germinating weeds, it rarely happens. In recent years, the rainfall event we classify as the opening break has more often come in the second half of May. This pushes growers to seed into dry, hard soil and increases the reliance on pre-emergent and early post-emergent herbicides to manage both grass and broadleaf weeds in-crop.

Using pre-emergent herbicides under dry-sown conditions in South Australia is inherently difficult, without certainty around rainfall timing for herbicide activation, achieving consistent weed control becomes more complicated. Understanding the key factors that influence herbicide performance and crop safety under these conditions is critical for making sound decisions and maximising weed control whilst minimising crop effect.

Growers have the advantage of applying herbicides either incorporated-by-sowing (IBS) or as early post-emergent (EPE) treatments. Using multiple timings is becoming more important, particularly in high-production zones where greater winter rainfall drives longer periods of ryegrass germination (Preston et al., 2023).

4. Trial Overview

Optimising cereal establishment in challenging environments: Advancing knowledge of pre- and early post-emergent herbicide safety

Aim: Evaluating the latest pre-emergent and early post emergent herbicides in wheat and their efficacy on ARG (other grasses) and BLW and crop safety with a KPPW wheel system.

Date:	17/12/2025
Author:	Craig Prior & Chris Hallion
Situation:	Wheat crop with background ryegrass & broadleaf weeds
Objective:	Evaluating the latest pre-emergent and early post emergent herbicides in wheat and their efficacy on ARG (other grasses) and BLW and crop safety with a KPPW wheel system.
Design:	Randomised complete block
Replications:	3
Treatments:	Incorporate by sowing (IBS) and early post-emergent (EPE)
Plot Size:	2x10m
Water Rate:	100l/ha

For the trial map, please see the Trial Map Section.

For supporting images and reports see the Appendix.





5. Key Findings

- Under the conditions of this trial, the IBS and EPE herbicide treatments had minimal impact on wheat establishment and given the lack of weed pressure produced comparable yield outcomes.
- A low intensity rainfall period to initiate the break of season and subsequent germination provided ideal conditions for emergence without crop effect.

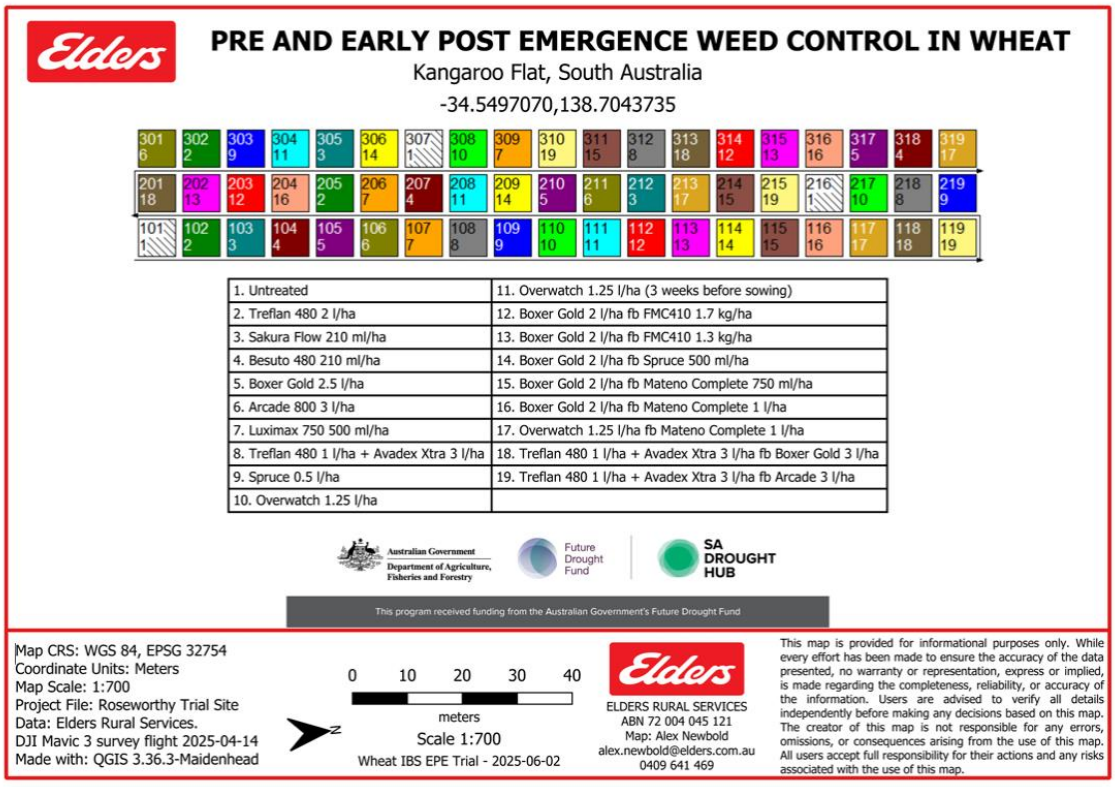


6. Treatment List

Treatments						
No.	**Timing**	**Treatment**	**Rate/Ha**	**Timing**	**Treatment**	**Rate/Ha**
1		Untreated	----	-----	-----	-----
2	A	Treflan 480	2 L	-----	-----	-----
3	A	Sakura Flow	210 mL	-----	-----	-----
4	A	Besuto 480	210ml	-----	-----	-----
5	A	Boxer Gold	2.5L	-----	-----	-----
6	A	Arcade	3L	-----	-----	-----
7	A	Luximax	500mL	-----	-----	-----
8	A	Treflan 480 + Avadex Xtra	1L + 3L	-----	-----	-----
9	A	Spruce	0.5L	-----	-----	-----
10	A	Overwatch	1.25L	-----	-----	-----
11	C	Overwatch	1.25L	-----	-----	-----
12	A	Boxer Gold	2.5L	B	FMC410	1.7kg
13	A	Boxer Gold	2.5L	B	FMC410	1.3kg
14	A	Boxer Gold	2.5L	B	GPH1121	0.5L
15	A	Boxer Gold	2.5L	B	Mateno Complete	750 ml
16	A	Boxer Gold	2.5L	B	Mateno Complete	1L
17	A	Overwatch	1.25 L	B	Mateno Complete	1L
18	A	TriflurX + Avadex Xtra	1L + 3L	B	Boxer Gold	3 L/ha
19	A	TriflurX + Avadex Xtra	1L + 3L	B	Arcade	3 L/ha

A = Pre-emergent (IBS). Attention to detail with planting depth (30mm+) particularly important with IBS treatments. **B =** Early Post Emergent (Apply post emergent ryegrass no bigger than 2 leaf). Ideally prior to rainfall. **C =** 4 Weeks before seeding

7. Site Layout



8. Evaluations & Conditions

Assessments			
Evaluations	**Measure**	**Timing**	**Description**
Crop emergence	Count	21 DAAA	Plants/m row
Crop effects	Visual	21 DAAA	Crop rating.
Crop biomass & discolouration	Visual	28DAAB	28DAB =(~49DAA) Crop safety rating 1-6 (1=poor, 6=excellent)
Weeds counts & % control (ryegrass & 2 other weed species)	Visual	28DAAB 98DAAB	Identify and assess weed type and density (3 subsamples).

* Terminology – DAS (Days after sowing), DAAA (Days After Application A (IBS), DAAB: Days After Application B (EPE).

Products			
Product	**Active Ingredient**	**Concentration**	**Supplier**
Sakura Flow	Pyroxasulfone	480g/L	Bayer
Besuto 480	Pyroxasulfone	480g/L	Titan
Mateno Complete	Aclonifen Pyroxasulfone Diflufenican	400g/L 100g/L 66g/L	Bayer
Boxer Gold	Prosulfocarb S-Metolachlor	800g/L 120g/L	Syngenta
Treflan 480	Trifluralin	480g/L	Titan
Overwatch	Bixlozone	400g/L	FMC
FMC410	Bixlozone + B + C		FMC
Luximax	Cinmethylin	750g/L	BASF
Spruce	Pyroxasulfone Diflufenican	200 g/L 250 g/L	UPL
Avadex Xtra	Triallate	500g/L	Nufarm
Arcade	Prosulfocarb	800g/L	Syngenta

Conditions		
Application	**Soil Condition**	**Application Conditions**
4 weeks before seeding- 8th April	Dry soil	15.4°C, 11.1km/hr ENE, 59% RH
Pre-Emergent - 7th May	Dry soil	18.2°C, 14.7km/hr WNW, 52% RH
Early post-emergent – 20th June	Moisture to 10cm	18.5°C, 13km/hr NW, 37% RH

9. Results

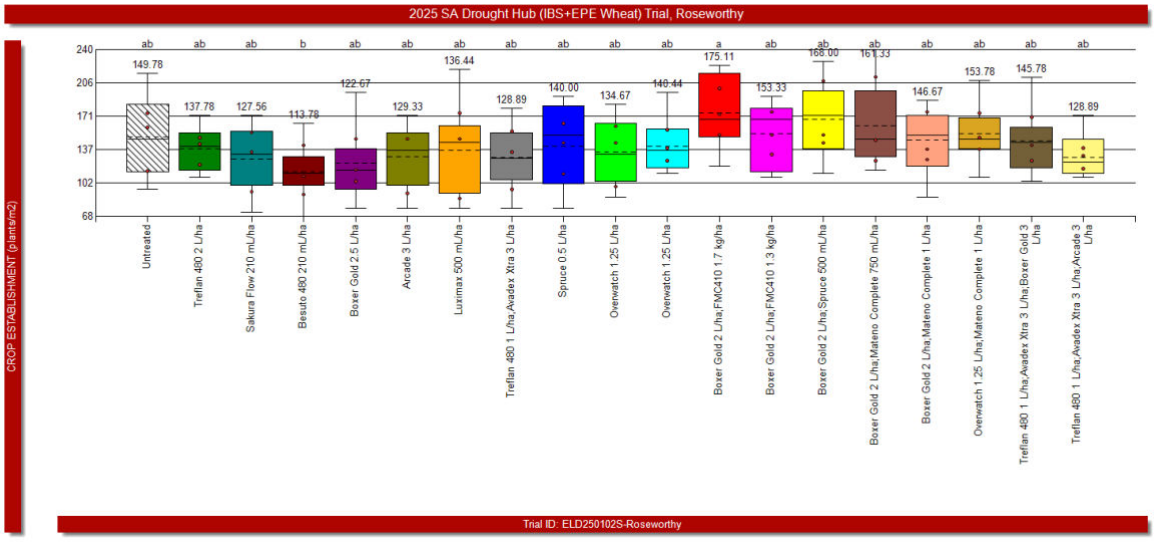


Figure 1. Wheat plant establishment, 16/06/2025

Most treatments were not statistically different from one another, with most treatments assigned the grouping “ab” (Figure1). This indicates that establishment across these treatments was statistically comparable despite observable numerical variation.

One treatment, Boxer Gold 2.5L/ha + FMC 410 at 1.7 g/ha, recorded the highest mean establishment (175 plants/m²) and was the only treatment assigned solely to group “a”, indicating significantly higher establishment compared with treatments assigned exclusively to group “b”. Besuto 480 at 210mL/ha was assigned to group “b”, recording one of the lowest mean establishment values (114 plants/m²), and was statistically lower than the highest-performing treatment. Sakura Flo @ 210ml/ha equivalent product to Besuto 480 @ 210ml/ha there was no significant difference in establishment.

The untreated control (150 plants/m²) was classified as “ab”, indicating no statistically significant difference from either the higher or lower establishment treatments.

Overall, while numerical differences in crop establishment were observed between treatments (ranging from approximately 114 to 175 plants/m²), only limited statistically significant separation was detected.

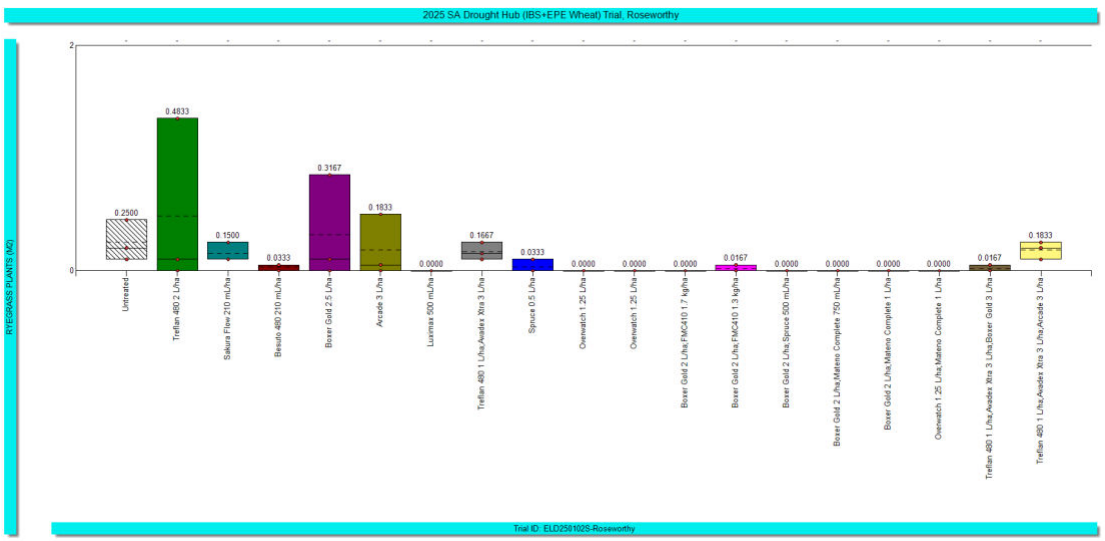


Figure 2: Ryegrass plan counts, 51 days after emergence (DAE)

Annual ryegrass plant density was low across all treatments in the 2025 SA Drought Hub (IBS + EPE Wheat) trial at Roseworthy (Figure 2). The untreated control recorded a mean ryegrass density of 0.25 plants/m², confirming overall low weed pressure at the site. Several herbicide treatments further reduced ryegrass densities numerically, with many treatments recording zero plants/m².

Statistical analysis detected limited separation between treatments due to the low overall ryegrass population and high incidence of zero counts. Treatments containing Overwatch-based, Boxer Gold-based, and combination IBS + EPE programs consistently achieved complete control (0 plants/m²) and were statistically comparable to one another.

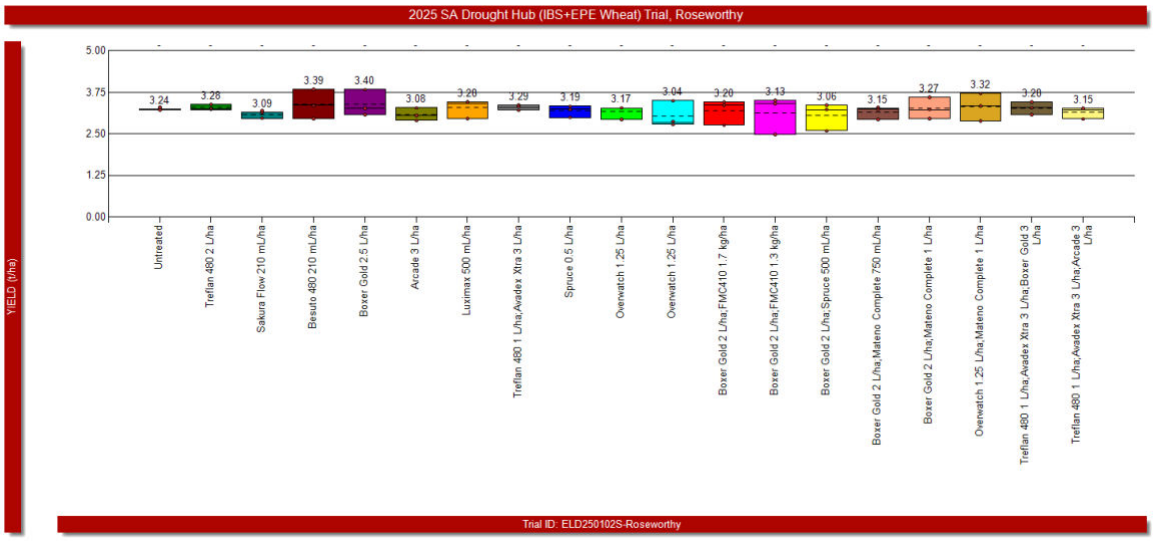


Figure 3. Wheat Yield, 07/12/2025

Despite this numerical variation, no statistically significant differences in grain yield were detected between treatments ($P \leq 0.05$). All treatments, including the untreated control, were statistically equivalent, as indicated by the absence of distinct letter groupings.

The untreated control yielded 3.24 t/ha, which was comparable to all herbicide treatments. The numerically highest yields were observed in Boxer Gold 2.5 L/ha (3.40 t/ha) and Besuto 480 at 210 mL/ha (3.39 t/ha); however, these treatments were not statistically different from the lowest-yielding treatments, including Overwatch 1.25 L/ha (3.04 t/ha) and Boxer Gold 2 L/ha + Spruce 500 mL/ha (3.06 t/ha).

Overall, yield responses were consistent across treatments, indicating that none of the IBS or EPE herbicide programs had a measurable positive or negative impact on final grain yield under the conditions experienced at this site in 2025.

10. Discussion

The 2025 season at Roseworthy was characterised by a dry start, with late breaking rainfall occurring in the first week of June. As a result, crop establishment and early weed control relied heavily on pre-emergent (IBS) and early post-emergent (EPE) herbicide strategies, with limited opportunity for early knockdown. These conditions are typical of dry-sown programs and place increased importance on the performance and crop safety of soil-applied residual herbicides.

Dry sowing inherently carries an elevated risk to crop establishment, particularly when there is a prolonged period between sowing and crop emergence. Risks include uneven emergence, reduced plant populations, and increased sensitivity to IBS and EPE herbicides. When crops are sown into a full soil moisture profile, the risk of herbicide-related crop injury is generally low, as additional rainfall is less likely to move soil-applied herbicides into the crop rooting zone. Under these conditions, herbicide movement within the soil profile is limited, increasing overall crop safety. In contrast, dry-sown systems require greater care, as extended periods between sowing and emergence can increase the potential for herbicide concentration near the seed. This risk is further elevated when high-intensity rainfall events occur following application, as heavy rainfall can wash herbicide into the seed row or rapidly flush active ingredients into the crop rooting zone, increasing the likelihood of crop effects.

In this trial, the opening rainfall occurred over a four-day period and was of low intensity, which reduced the risk of soil-applied herbicides being washed into the seed row or flushed into the crop root zone. This rainfall pattern likely moderated herbicide movement within the soil profile, thereby minimising the potential for crop injury or negative establishment effects commonly associated with intense rainfall events following application.

Annual ryegrass pressure was low across the entire trial, including the untreated control, which recorded very low plant densities. This low weed burden limited the effect of early-season crop competition and reduced the likelihood that differences in herbicide efficacy would translate into measurable impacts on crop performance. While most IBS and EPE herbicide programs achieved complete or near-complete ryegrass control, the low overall population restricted the ability to statistically differentiate between treatments based on weed control alone.

Under the conditions of this trial, the IBS and EPE herbicide treatments had minimal impact on wheat establishment and given the lack of weed pressure produced comparable yield outcomes.





11. Appendix

Preston et al. (2023). https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2023/02/optimising-control-of-annual-ryegrass

Hart Field Site (2025). https://www.hartfieldsite.org.au/media/Hart_pre_emergent_herbicide_decision_guide_Sep_2025.pdf

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