



Bayer CropScience

Sakura 850 WG® influence of rainfall after sowing for annual ryegrass control under heavy stubble conditions



Department of Agriculture and Food



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AIM

1. Demonstrate the influence of rainfall on Sakura uptake.
2. Highlight the influence of a drying top soil when weeds have already germinated prior to application of Sakura.
3. Influence of rainfall to carry herbicide to soil active zone.
4. Comparison between root (Sakura) and shoot uptake herbicides (trifluralin, Boxer Gold®, Avadex® Xtra) efficacy including residual control over time.

Location: Warradarge Main Trial Site

Soil Type: Gravelly sand loam

Rotation: 2013 Wheat

Growing Season Rainfall (April- October 2014): 405.6 mm

BACKGROUND SUMMARY

- Time of sowing (TOS) dates were selected to ensure that treatments were applied after a germination event (significant rainfall ≥ 10 mm) had occurred but prior to significant emergence of annual ryegrass (ARG).
- Sakura 850 WG like other root uptake herbicides i.e. propyzamide works best when activated within a moist soil profile prior to or as weeds germinate.
- All pre-emergent herbicides are impacted by surface stubble especially under high grass weed numbers.
- The value of an effective knockdown in taking the pressure off pre-emergent herbicides cannot be underestimated when trying to drive a seed bank down.
- Pre-emergent herbicides should only form part of a fully Integrated Weed Management program with harvest weed seed practices strongly recommended to reduce numbers and delay the onset of resistance.

TRIAL DESIGN

Plot Size: 2.5 x 20 m

Trial Size: 25 m x 150 m

Seeding Date: Early (A) – 2/5/14, Grower (B) – 16/5/14, Late (C) 30/5/14

Seeding Rate: 60 kg/ha

Seeding Machinery: Small plot cone seeder, knife points and press wheels

Variety: Mace wheat treated with EverGol® Prime at 80 mL/100 kg

Fertilizer at seeding: Gusto® Gold 60 kg/ha banded + 60 kg urea top-dressed

Fertilizer post seeding: Urea 75 kg/ha 1/8/14

Knockdown: Early – glyphosate at 2 L/ha 2/5/14, Grower – glyphosate 2 L/ha 2/5 + SpraySeed® 2 L/ha 16/5, Late- glyphosate 2 L/ha 2/5 + SpraySeed 2 L/ha 16/5 + SpraySeed 2 L/ha 30/5

Post emergent: Velocity® 800 mL/ha + MCPA LVE 570 420 mL/ha + Prosaro® 420 SC 150 mL/ha + Hasten® 1% 27/6

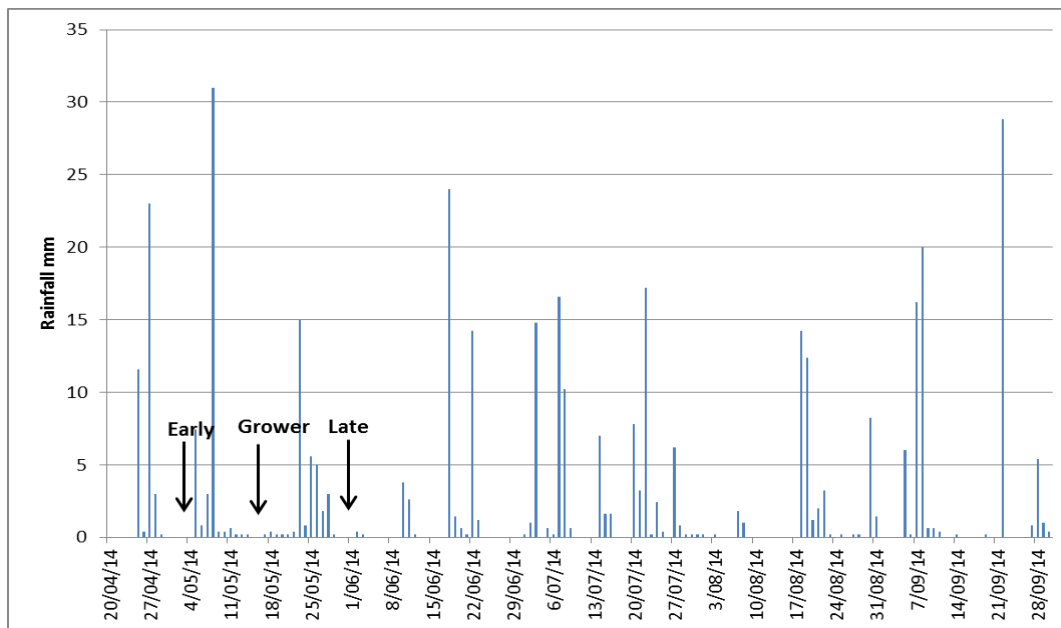


Figure 1. Daily rainfall figures for Warradarge East for key growing season

Site conditions:

Rainfall and sowing timings: The early application timing on the 2 May followed the season break on the 25 April by a week allowing significant ryegrass emergence to take place although only around ~50% of the germination had broken the soil at application of knockdown and pre-emergent herbicides. Follow-up rainfall activated all the herbicides. The “Grower” timing on the 16 April was closest to the district seeding date and allowed time for a further emergence of ryegrass and ensured that the second knockdown applied at sowing was effective. This timing also was also followed by enough rainfall to activate all the herbicides. The final late sowing on the 30 May recorded excellent control from the third knockdown. Follow-up rainfall activated all the herbicides.

Stubble: There was very heavy stubble (pic. below) across the site at application with up to 100% ground cover in thick surface trash. The stubble reduced efficacy from both knockdowns and pre-emergent herbicides at this trial site resulting in poor coverage of the target weed and soil. To achieve a better (commercial) result some form of stubble management through windrow burning or chaff dumps would have most likely improved the results from all herbicides.

Most of the surviving ryegrass in this trial was found along the side walls of the furrow or in areas of dense surface trash or prostrate stubble.



Figure 2. Site view 20/4/14 prior to seeding

Table 1. Annual ryegrass control ratings and panicle counts

			06/06/14 - 35DAA/ 7 DAC	11/07/14 - 70DAA/ 42 DAC	25/09/14 - 147DAA/ 118 DAC			25/11/14 - 207 DAA/ 179 DAC
Treatment	Time of Sowing	Knockdowns applied	ARG % Control rating	ARG % Control rating	ARG % Control rating in TOS	ARG Panicles/ m ²	ARG % Control vs. TOSA	% ARG seed cont.
Untreated	02-May	A: SpraySeed 2 L/ha	0	0	0	1143 a	0	1.9
Trifluralin 2 L/ha	02-May		75	68	53	637 bc	44	1.5
Trifluralin 2 L/ha + Avadex Xtra 2 L/ha	02-May		77	76	58	526 bc	54	0.4
Boxer Gold 2.5 L/ha	02-May		81	71	58	441 bc	61	2.1
Sakura 118 g/ha	02-May		82	77	77	326 bc	72	0.7
Sakura 118 g/ha + Trifluralin 1.5 L/ha	02-May		88	84	79	331 bc	71	0.7
Untreated	16-May	A: SpraySeed 2 L/ha + B: glyphosate 2 L/ha	-	0	0	877 ab	23	1.5
Trifluralin 2 L/ha	16-May		-	81	60	389 bc	66	0.5
Boxer Gold 2.5 L/ha	16-May		-	83	79	367 bc	68	0.4
Sakura 118 g/ha	16-May		-	86	89	229 c	80	0.2
Sakura 118 g/ha + Trifluralin 1.5 L/ha	16-May		-	89	87	246 c	79	0.4
Untreated	30-May	A: SpraySeed 2 L/ha+ B: glyphosate 2 L/ha + C: SpraySeed 2 L/ha	-	0	0	850 ab	26	2.6
Trifluralin 2 L/ha	30-May		-	82	67	481 bc	58	1.6
Trifluralin 2 L/ha + Avadex Xtra 2 L/ha	30-May		-	79	63	431 bc	62	0.5
Boxer Gold 2.5 L/ha	30-May		-	82	73	321 bc	72	0.7
Sakura 118 g/ha	30-May		-	82	84	201 c	82	0.4
Sakura 118 g/ha + Trifluralin 1.5 L/ha	30-May		-	91	88	197 c	83	0.4
				LSD (P=.05)		350.1		
				Standard Deviation		210		
				CV		44.67		

Means followed by same letter do not significantly differ (P=.05, Duncan's new multiple range)

Weed control ratings – early and late season at Warradarge

It is important to note that early weed control in June or July does not equate to final ARG control at the end of the growing season which is what really counts for seed bank management. A reduction in average percent control of ARG rating was recorded for all pre-emergent herbicides in between the June, July and September assessments.

Weed control panicle counts – What is going back into my seed bank?

Panicle counts are the most reflective measure of the effectiveness of a herbicide programs impact on how much seed is being set and contributing to the seed bank of the paddock for future rotations. Panicle counts in this trial site recorded 1143 panicles/m² in the untreated at TOSA (Table 1) with just a single knockdown and nil pre-emergent herbicides.

TOSA: All treatments recorded below commercially acceptable control of ARG panicles at this timing due to high weed numbers and dense stubble preventing good soil coverage at application. Both Sakura treatments recorded a higher level of control ($\geq 71\%$) than Boxer Gold (61%) or the trifluralin treatments ($\leq 54\%$). The addition of trifluralin to Sakura did not improve efficacy under a heavy stubble scenario. Trials conducted by Bayer CropScience over a number of seasons have indicated that the addition of trifluralin is most beneficial on non-wetting sands.

TOSB: The second knockdown reduced ARG numbers in the untreated by 23% with control improved from all herbicides and mixtures compared to untreated TOSA.

Sakura (80%) and Sakura + trifluralin (79%) recorded comparable control albeit borderline for below commercially acceptable results due to the high stubble load. Boxer Gold (68%) and trifluralin (66%) recorded a lower albeit not significant ($P>0.05$) level of control.

TOSC: The application of a third knockdown resulted in a 26% reduction in ARG numbers from the untreated. On average both trifluralin treatments and Boxer Gold (72%) recorded below commercially acceptable weed control although it was higher than the trifluralin treatments ($\leq 62\%$) while both Sakura treatments recorded good control ($\geq 82\%$).

% ryegrass seed contamination of the grain samples was analyzed in this trial. Sakura recorded a lower level of contamination at all timings compared to trifluralin and Boxer Gold.

Weed control – summary

The influence of the heavy surface stubble reduced the results from all herbicides including the knockdowns.

Sakura provided the longest acting control of ARG in this trial and resulted in the highest weed control compared to the standards in this trial at all timings. The addition of trifluralin a shoot uptake volatile herbicide to Sakura a root uptake product under heavy stubble provided little improvement in efficacy. Extensive Bayer CropScience field trials into the Sakura + trifluralin tank mixture have recorded $\geq 5\%$ improvements in efficacy on challenging non-wetting soil types prone to rapid drying or when weeds have pre-germinated below the soil. The addition of trifluralin to Sakura still contains the usual crop safety risks associated with trifluralin.

Table 2. Yield t/ha, herbicide costs and \$/ha return on investment (ROI) over trifluralin.

25/11/14 - 207 DAA/ 179 DAC																		
Treatment	Time of Sowing	Knockdown costs	Application Costs \$/ha	Herbicide cost \$/ha	Yield t/ha		% Yield Untreated TOS A	% ARG seed cont.	Gross \$/ha	Gross Margin \$/ha	\$/ha ROI TOS trifluralin	Grade	Protein (%)	Specific Weight (kg/hL)	Screens (%)			
Untreated	02-May	\$19.20	\$6.00	\$0.00	2.01	c	100	1.9	\$623.10	\$549.66	\$16.12	AUH2	11.5	78.6	6.2			
Trifluralin 2 L/ha	02-May			\$10.40	1.99	c	99	1.5	\$616.90	\$533.54	\$0.00	AUH2						
Trifluralin 2 L/ha + Avadex Xtra 2 L/ha	02-May			\$27.90	2.28	bc	113	0.4	\$706.80	\$653.70	\$120.16	AUH2						
Boxer Gold 2.5 L/ha	02-May			\$35.63	2.28	bc	114	2.1	\$706.80	\$591.25	\$57.71	AUH2						
Sakura 118 g/ha	02-May			\$38.35	2.16	c	107	0.7	\$669.60	\$606.05	\$72.51	AUH2						
Sakura 118 g/ha + Trifluralin 1.5 L/ha	02-May			\$46.15	2.27	bc	113	0.7	\$703.70	\$632.35	\$98.81	AUH2						
Untreated	16-May	\$29.60	\$12.00	\$0.00	2.35	bc	117	1.5	\$728.50	\$630.50	-\$151.40	AUH2						
Trifluralin 2 L/ha	16-May			\$10.40	2.69	abc	134	0.5	\$833.90	\$781.90	\$0.00	AUH2						
Boxer Gold 2.5 L/ha	16-May			\$35.63	2.93	ab	146	0.4	\$908.30	\$831.07	\$49.17	AUH2						
Sakura 118 g/ha	16-May			\$38.35	3.03	a	151	0.2	\$939.30	\$859.35	\$77.45	AUH2						
Sakura 118 g/ha + Trifluralin 1.5 L/ha	16-May			\$46.15	2.96	ab	147	0.4	\$917.60	\$829.85	\$47.95	AUH2						
Untreated	30-May	\$48.80	\$18.00	\$0.00	2.00	c	100	2.6	\$620.00	\$505.20	-\$78.26	AUH2						
Trifluralin 2 L/ha	30-May			\$10.40	2.31	bc	115	1.6	\$716.10	\$583.46	\$0.00	AUH2						
Trifluralin 2 L/ha + Avadex Xtra 2 L/ha	30-May			\$27.90	2.22	c	110	0.5	\$688.20	\$593.50	\$10.04	AUH2						
Boxer Gold 2.5 L/ha	30-May			\$35.63	2.34	bc	116	0.7	\$725.40	\$622.97	\$39.51	AUH2						
Sakura 118 g/ha	30-May			\$38.35	2.49	abc	124	0.4	\$771.90	\$666.75	\$83.29	AUH2						
Sakura 118 g/ha + Trifluralin 1.5 L/ha	30-May			\$46.15	2.20	c	110	0.4	\$682.00	\$569.05	-\$14.41	AUH2						
Price AUH2 Geraldton 23/12/14			\$310.00	LSD (P=.05)	0.42		Means followed by same letter do not significantly differ (P=.05, Duncan's new multiple range)											
Application Cost			\$6.00	Std. Dev.	0.25													
Grain cleaning inc loss \$/t (≥1.2% in bold)			\$24.00	CV	10.67													

Note: Figures for % ARG seed contamination in bold indicate where grain cleaning was required in order to meet the delivery standards for AUH2 of seed contamination less than 1.2%. Due to an issue during weed seed separation individual grain quality per treatment was not possible so an average for the bulk sample has been used for the purposes of \$ROI/ha calculations.

TOSA: The knockdown was not fully effective at this timing as all weeds had not emerged when applied. Therefore with the highest level of weed competition yields were below yield potential for the season. Sakura recorded 170 kg/ha increase in yield over trifluralin 2 L/ha, with % ARG contamination below the maximum allowable threshold (1.2%) for AUH2 it did not require grain cleaning for delivery and recorded a \$ROI/ha increase of \$72.51.

TOSB: All treatments benefited from an effective double knockdown strategy and additional weed control. At this timing Sakura recorded 340 kg/ha and \$77.45 \$ROI/ha over trifluralin 2 L/ha and 100 kg/ha with \$28.28 \$ROI/ha over Boxer Gold.

TOSC: Weed control was at its highest for all herbicides due to a triple knockdown, however with a dry hot August and crop stress at flowering reductions in yield were recorded. Sakura recorded 180 kg/ha additional yield over trifluralin and \$83.29 \$ROI/ha and 150 kg/ha with \$43.78 \$ROI/ha over Boxer Gold.

Sakura 850 WG influence of rainfall after sowing for annual ryegrass control at three locations across Western Australia in 2014.

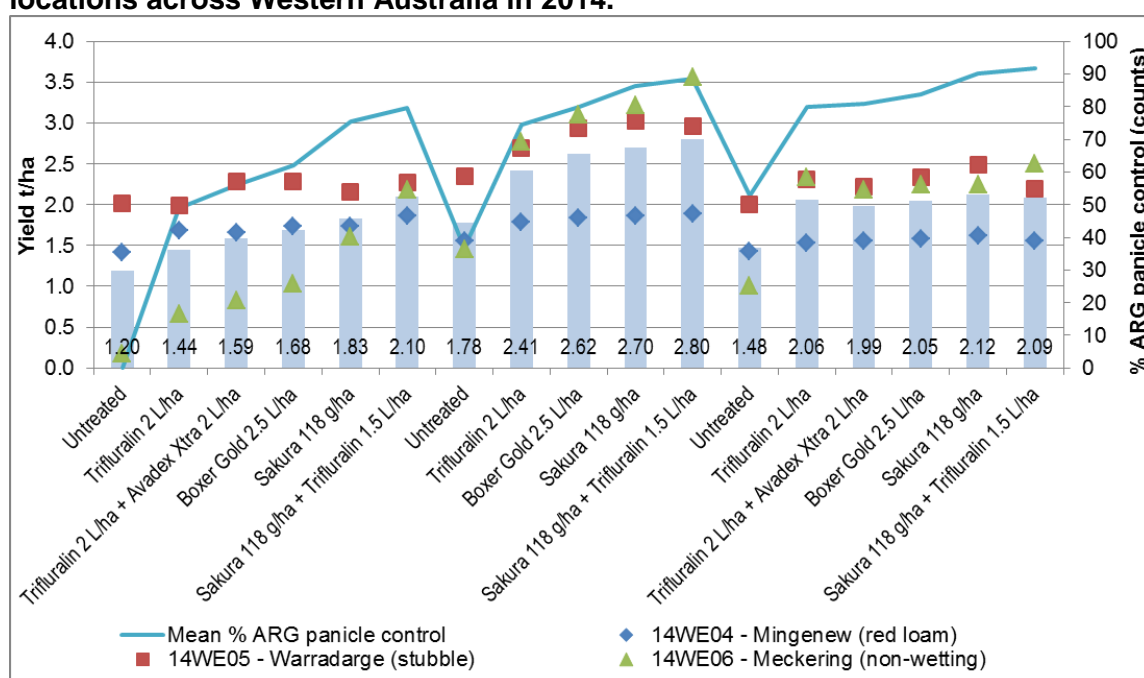


Figure 3. Average yield (t/ha) and % ARG panicle control by herbicide across three TOS and three locations across WA in 2014

Across the three sowing timings and three different locations this trial was conducted at in 2014 Sakura recorded the most consistent weed control and yields (see graph). TOSB recorded a 900 kg/ha yield increase over TOSA and 570 kg/ha over TOSC. Sakura recorded an average increase of 120 kg/ha over Boxer Gold and 280 kg/ha over trifluralin across the three trials. The addition of trifluralin to Sakura resulted in a yield increase of 350 kg/ha on the non-wetting sand at Meckering but comparable yields at Warradarge and Mingenew.

Final Comments: Using an effective knockdown with broad spectrum pre-emergent grass herbicide like Sakura can deliver excellent weed control, yields and return on investment not just in the year of application but in following seasons due to a reduction in the seed bank when combined with a complete integrated weed management program across the farm.

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PEER REVIEW/REVIEW Craig White, Bayer CropScience, Technical Advisor south