

Agixa™ herbicide – a new treatment for selective weed control in drill-sown rice

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Summary Agixa™ herbicide with Rinskor™ active (12 g L⁻¹ Rinskor + 160 g L⁻¹ cyhalofop) is a new treatment that will allow selective removal of grass and broadleaf weeds at three-leaf rice stage onwards. Rinskor active which is Group I mode of action, is one component of the formulation and as such, is a new mode of action for control of barnyard grass. Agixa herbicide is likely to be registered for Australian rice in the 2019/2020 season. It has a broad spectrum and is a strong new control option that has demonstrated value when used in sequence after the drill-sown rice foundation treatment.

Keywords Rice, drill-sown rice, barnyard grass, silvertop grass, weed control, Agixa, Rinskor active.

INTRODUCTION

The Australian rice industry has a major goal to improve water use efficiency, whilst increasing yield. By 2023 the industry aims to grow 1.5 T rice ML⁻¹ water used, with present levels about 1 T ML⁻¹. In part, this will be achieved by the use of drill-sown rice, with water strategically applied and removed, to allow rice establishment as well as best weed control, whilst minimising water use.

Under these aerobic conditions, weeds like barnyard grass (*Echinochloa crus-galli* (L.) P.Beauv.) readily establish after planting, as rice emerges. Therefore early weed removal to minimise competition with young rice is critical for effective establishment and to maximise yield. Grass weeds like barnyard grass and silvertop grass (*Leptochloa fusca* (L.) Kunth ssp. *fusca*) readily establish and are aggressive competitors with young rice.

The Australian rice industry has established an effective foundation (at planting) treatment combination of paraquat + pendimethalin + clomazone, which is selective to rice and effective on many key weeds in drill-sown rice. It has been very successful due to multiple herbicide modes of action being used at planting time, to remove a significant portion of the weed population, through both knockdown and residual control. This is generally applied post-flush, pre-emergence to maximise effectiveness. However,

the window of time is often very short from planting to emergence of rice. Another treatment was required to augment the foundation treatment and also enable effective weed control when paraquat was not able to be used at foundation timing, due to rice already being emerged.

There had been no new herbicides released for weed control in rice in Australia until 2016, when Rinskor was first introduced (Wells and Taylor 2016).

Ubeniq™ herbicide with Rinskor™ active is a new rice selective herbicide that suppresses dirty dora (*Cyperus difformis* L.) and controls broad leaf weeds and has short persistence in soil. It has been registered for weed control in water seeded rice.

This paper summarises new research trials to confirm rice selectivity and weed efficacy for registration of Agixa herbicide (12 g L⁻¹ Rinskor™ + 160 g L⁻¹ cyhalofop) for post-emergence weed control in drill-seeded rice in Australia.

MATERIALS AND METHODS

Trials were conducted in southern New South Wales and northern Victoria on rice research farms or commercial rice farms from 2012–2017 to determine the selectivity and weed control efficacy of combinations of cyhalofop and Rinskor active. Trials were designed as randomised complete block with three or four replications. Applications were made with gas powered small plot booms delivering 100 L ha⁻¹ of spray solution. Data were summarised using Agricultural Research Manager Summary Across Trials software (Gylling 2015) and analysed using Analysis of Variance (ANOVA) at the 5% significance level.

Rice selectivity Eleven field trials were conducted with tank mixes of cyhalofop and Rinskor. Tank mixes were applied at 30 g ha⁻¹ Rinskor plus 285 g ha⁻¹ cyhalofop, either alone or mixed, to determine rice selectivity and weed efficacy. Crop oil concentrate was added to all treatments at 1–2% v v⁻¹.

A further seven trials were conducted with formulated product (Agixa herbicide), containing 12 g L⁻¹ Rinskor plus 160 g L⁻¹ cyhalofop and applied at a

rate of 2 L ha⁻¹ alone or in sequence after foundation treatment to determine either rice selectivity or weed efficacy. Crop oil concentrate was added to all treatments at 1-2% v v⁻¹.

Crop injury was measured by subjective visual assessment where 0 = no injury and 100 = complete crop loss. Crop effect was considered acceptable if injury was up to 20%.

Weed efficacy In all 18 field trials outlined above, where tank mixes of Rinskor and cyhalofop or Agixa (formulated product) were applied, weed control was also assessed. Weed control was assessed using subjective visual assessment where 0 = no control and 100 = complete control. Weed efficacy was considered acceptable if control was more than 95% at final assessment.

RESULTS AND DISCUSSION

Rice selectivity Tank mixes of RinskorTM active plus cyhalofop at 30 g ha⁻¹ plus 285 g ha⁻¹ resulted in less than 15 % rice crop injury assessment across 11 trials (Table 1), which was commercially acceptable. Rice injury was seen as mild leaf curling, twisting or height reduction. There was no impact on yield.

Table 1. Mean rice injury (%) by Rinskor, cyhalofop or Rinskor plus cyhalofop tankmix.

Treatment (g a.i. ha ⁻¹)	Rice injury (%)
Untreated	0 c
Rinskor 30 g	11 a
cyhalofop 285 g	4 b
Rinskor 30 g + cyhalofop 285 g	14 a
LSD (p=0.05)	2.4

AgixaTM herbicide applied at 2 L ha⁻¹ resulted in slight injury to rice, with increased injury observed when applied in sequence after foundation treatment, but it was considered commercially acceptable (Table 2).

Table 2. Mean rice injury (%) by Agixa herbicide at 2 L ha⁻¹ and in sequence after foundation treatment. (F = foundation treatment at planting, P = post-emergence and fb = followed by).

Treatment (g a.i. or prod ha ⁻¹)	Timing	Rice injury (%)
Untreated		0 b
paraquat 200 g + pendimethalin 1496 g + clomazone 288 g	Foundation (F)	13 a
cyhalofop 320 g	F fb Post (P)	15 a
Agixa herbicide 2 L	F fb P	20 a
cyhalofop 320 g	P	0 b
Agixa herbicide 2L	P	2 b
LSD (p=0.05)		10.4

Weed efficacy Tank mixes of Rinskor active plus cyhalofop at 30 g ha⁻¹ plus 285 g ha⁻¹ resulted in excellent barnyard grass and silvertop grass control across 11 and three trials respectively (Table 3).

Table 3. Mean weed control (%) by Rinskor, cyhalofop or Rinskor plus cyhalofop tankmix.

Treatment (g a.i. ha ⁻¹)	Barnyard grass	Silvertop grass
Untreated	0 c	0 c
Rinskor 30 g	96 a	35 b
cyhalofop 285 g	71 b	92 a
Rinskor 30 g + cyhalofop 285 g	97 a	100 a
LSD (p=0.05)	2.5	14.4

Agixa herbicide applied at 2 L ha⁻¹ resulted in excellent weed control (Table 4), which was stronger and broader in spectrum than individual components. Best control was achieved when it was applied in sequence after foundation treatment.

Table 4. Mean weed control (%) by Agixa herbicide at 2 L ha⁻¹ and in sequence after foundation treatment. (F = foundation treatment at planting, P = post-emergence and fb = followed by).

Treatment (g a.i. or prod ha ⁻¹)	Timing	Barnyard grass	Silvertop grass
Untreated		1 d	0 c
paraquat 200 g + pendimethalin 1496 g + clomazone 288 g	Foundation (F)	80 bc	97 b
cyhalofop 320 g	F fb Post (P)	99 a	100 a
Agixa Herbicide 2 L	F fb P	98 a	100 a
cyhalofop 320 g	P	70 c	100 a
Agixa herbicide 2 L	P	88 ab	100 a
LSD (p=0.05)		11.1	0.9

CONCLUSIONS

Agixa herbicide premix of Rinskor active and cyhalofop is a new product that has acceptable rice selectivity, with strong weed control over a broad spectrum. It is a significant new tool for weed control in drill-seeded rice in Australia that will help the Australian rice industry move toward its new water use efficiency goal.

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