

# Rice crop protection guide 2024–25

NSW DPI MANAGEMENT GUIDE



# Rice crop protection guide 2024–25

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This book summarises the pesticides currently approved for use to control weeds and pests in NSW rice crops, and some issues important in their safe and effective use.

#### Acknowledgements

The rice weed management strategies and programs outlined in this book have been developed in conjunction with the members of the Rice Crop Protection Working Group representing NSW Department of Primary Industries and Regional Development; Mark Stevens DPIRD, John Fowler Murray LLS, Rice Research Australia Pty Ltd, Bayer Crop Science Pty Limited, BASF Australia Ltd, Corteva AgriSciences, DuPont (Australia) Ltd, FMC Chemicals Pty Ltd, Nufarm Australia Ltd, Agropraisals Pty Ltd, Charles Sturt University, Rice Extension, AgriFutures Australia, aerial operators, NSW DPIRD Farm Chemical Unit and agribusiness in the MIA, CIA, and Murray Valley.

©State of NSW through the Department of Primary Industries  
ISSN 1832 – 6668 (print/web)

Job#: 17071

Published by NSW Department of Primary Industries and Regional Development.

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#### Always read the label

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**Front cover: Main:** Rice heads. **Left:** aerial spraying by plane; **Centre:** spraying by ground rig ; **Right:** aerial spraying by helicopter.

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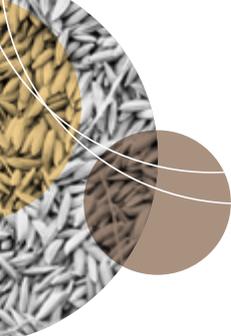
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# Outcomes and important information

## Outcomes from 2023–24 rice season

Most rice crops last season were kept clean of weed competition using the programs listed in this guide, however, there were a few challenges.

Cool weather during establishment resulted in often very poor and slow emergence of drill-seeded rice, with seedlings struggling to emerge through the soil crust. Mesocotyl extension is slowed by cold temperatures and eventually the seedling can run out of reserves from the endosperm.

Multiple flushings of these crops were often required. Post flush, applying STOMP (pendimethalin) pre-emergence can exacerbate poor emergence if the chemical comes into contact with the germinating seed.

Some growers chose to split applications of MAGISTER (applied before crop emergence) and STOMP (after crop emergence). While this can assist with crop establishment, it can compromise weed control as both are pre-emergence herbicides. If a split is contemplated, the STOMP needs to be applied as soon as possible after crop emergence in a second pass with a boom sprayer.

Concentration of pre-emergence herbicides in the drill row can exacerbate crop injury. The seedbed should be level following sowing using a disc seeder and/or harrows or a roller. Rilled seedbeds drilled with narrow points and presswheels are likely to slake upon flushing, leading to treated soil moving directly into the drill row.

## Season 2024–25

Molinate has been in short supply in recent seasons, prompting the substitution to MAGISTER to bolster grass weed control when delivering TAIPAN in water-seeded rice. MAGISTER will not suppress dirty Dora, so a follow up treatment with SATURN (+/- UBENIQ) is best used to obtain a full spectrum of weed control. All these treatments are delivered into floodwater using a Bickley boom or SCWIRT (soluble chemical water injection in rice technique) to avoid off-target drift.

## Spray drift

Minimise spray drift onto sensitive crops by understanding environmental conditions, how they affect spray behaviour and whether the chemical is hitting the intended target.

The diagram inside the front cover gives a guide for when to best spray in order to avoid spray drift.

Proximity of sensitive crops has an increasing effect on the decision of which method of sowing (water versus drill) is adopted. Ground-based boom applications are achieved with drill-sown crops, while many products/programs for water-seeded rice can be delivered direct to the floodwater. Where possible, adopt herbicide programs that control the full suite of weeds without having to resort to aerial applications of atomised foliar treatments that present a major risk of off-target drift (eg: MCPA, BASAGRAN M60 and AGIXA).

## General information

AGIXA and AURA remain an effective control for barnyard and silvertop grasses, but resistance development is highly likely if used without management strategies. A foundation treatment should always precede use of these 2 herbicides to reduce the weed challenge and prevent early season competition with the crop. Rotating the seeding method (water seeding versus drill sowing) is an important means of suppressing grass weed numbers and alternating herbicide MOA groups, as is rotating the field out of rice to deplete the weed seedbank.

## Changes in rice pest chemical control options

On 30 July 2024 the Australian Pesticides and Veterinary Medicines Authority (APVMA) announced its proposed decisions on the reconsiderations of paraquat and diquat, which are non-selective herbicides used for weed management across various agricultural, horticultural, and commercial applications.

The APVMA is phasing out the use of chlorpyrifos (e.g., Chlorban<sup>®</sup>, Stike-out<sup>®</sup>). This will effect chemical control options for rice bloodworm and armyworms. Chlorpyrifos will be available for use for the 2024–25 season. The final decision by the APVMA regarding chlorpyrifos use is expected after September 2024. Using any remaining stocks of chlorpyrifos is permitted for 12 months after the date of the final decision.

Alpha-cypermethrin (e.g., Dominex Duo<sup>®</sup>) is no longer an effective control for rice bloodworm due to the development of resistance; its use is no longer recommended.

Permit [PER94721](#): There is a new permit with APVMA for water application of Cosmos only by Bickley boom or SCHWIRT. Please note that this permit has been issued as a minor use permit on the basis that the use is intended as a short-term stop gap for effective control of rice bloodworm following the chlorpyrifos review outcomes.

This permit is valid until 30 August 2026. As the APVMA is reviewing fipronil use, this permit might be withdrawn at any time.

A minor use permit ([PER93840](#)) is available for the use of niclosamide (Efface<sup>®</sup>) to control rice snails. This permit is valid until 28 February 2025.

See the [pest section](#) of this publication for more information.

## Perennial sedges control

Perennial sedges (nutgrass and nutsedge) have emerged as an issue across both Murrumbidgee and Murray valleys in recent years. They commonly grow in drill-sown rice crops where minimum soil disturbance is practiced. Perennial sedges appear to tolerate all herbicides currently used in Australian rice crops. Cultural control by cultivation could be the best option.

## Smartweed

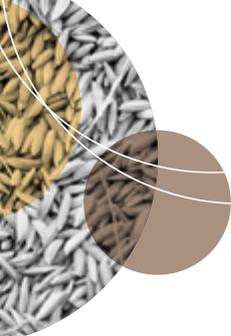
Smartweed (*Persicaria lapathifolia*) is occurring with increasing frequency in drill-sown rice. Commercial observations and trial results have demonstrated that Hammer<sup>®</sup> and Sharpen<sup>®</sup> are effective in desiccating emerged plants before sowing. Stomp<sup>®</sup> will control seedlings as a pre-emergence treatment, while Agixa<sup>®</sup> and Basagran<sup>®</sup> M60 control young plants post emergence.



Figure 1. Young smartweed. Best control is at seedling stage. Photo: Malcolm Taylor.



Figure 2. Mature smartweed with seed heads. Smartweed produces large numbers of seeds and is more difficult to control when past seedling stage particularly in crop. Photo: Malcolm Taylor.



# Rice crop protection overview

## Pesticide selection use

Integrated pest control using a combination of pesticides and non-pesticide options is an important component in all weed and pest management strategies. While weed and pest control is the principal objective of pesticide use, it is important to ensure all pesticides are used safely and efficiently for the user, the community and the environment.

The main issues for rice growers using pesticides on rice crops are:

1. **Effective use:** effectively controlling weeds and pests while minimising herbicide resistance.
2. **Safe use:** avoiding unintentional effects to humans, non-target crops and the environment.
3. **No residues in drainage water:** residues can be greatly minimised by not draining rice water into drains within 28 days of pesticide application.

Pesticide selection and use is the responsibility of each grower. Growers and users **must carefully study the label on the pesticide container before use** to ensure they are familiar with the specific instructions relating to use, rate, timing, application and safety. These instructions are designed to ensure pest control efficacy and economic benefits, and to avoid risks to the user, the community and the environment.

In selecting and using pesticides, growers need to answer some key questions.

- Has the weed or pest been properly identified?
- Are there sufficient weeds or pests to warrant control?
- What is the most appropriate pesticide or combination of pesticides to use considering the:
  - effectiveness
  - cost
  - crop
  - weed or pest stage
  - residual control
  - withholding periods
  - resistance strategy
  - drift hazards?
- What is the most appropriate rate of application within the label range?
- What are the management features of the pesticides to be used, e.g.:
  - which application techniques or equipment
  - warnings on use
  - what rice water management should be considered both before and after chemical use?
- What are the hazards of using this pesticide:
  - toxicity
  - drift hazards to non-target areas
  - residues in drainage water?

### NOTE

Applying pesticides to rice crops requires care and attention at all times.

## Guidelines for spraying pesticides onto rice crops

1. **READ THE LABEL** and understand what it says.
2. Appropriate chemical application training should be current before spraying.
3. Apply the correct rate of pesticide in the way described on the label.
4. **Wear protective clothing** and use proper safety equipment (and supply it for employees) when handling and mixing pesticides.
5. **Talk with your neighbours** about your spray programs and potentially sensitive crops.
6. Inform your aerial operator of your needs well in advance of spray application so that delays due to unfavourable weather conditions do not affect spray results. Discuss about spray directions, wind conditions and the location of dwellings and sensitive crops.

7. Ensure there are adequate **buffer zones** between the spraying target and non-target areas to protect dwellings, nature reserves, irrigation supply and drainage channels, watercourses, travelling stock routes, bees and sensitive crops. **Refer to the product label/s, where they are listed.**
8. *The Pesticides Act 1999* defines a **150 metre consent zone**: you must not undertake aerial spraying closer to a dwelling than this without the occupier's written consent.
9. The rice pesticides used while establishment of aerial-sown rice, for example, Ordram<sup>®</sup>, Saturn<sup>®</sup>, Londax<sup>®</sup>, chlorpyrifos and trichlorfon, are applied to the water surface of the flooded field. **Coarse droplets** are all that is required to carry the pesticides into the water, and this will ensure drift hazards are minimised. The Bickley boom, SCWIIRT and helicopters provide techniques that minimise the drift hazards while maintaining effective pest control.
10. It is now required that Ordram<sup>®</sup> be used through closed supply and delivery systems. Ordram<sup>®</sup> will therefore only be available in packaging fitted with industry standard micromatic fittings, in 200 L and 1000 L packs.
11. Particular care is required when using **MCPA** to avoid drift to non-target crops or areas.
12. Use drift management strategies for all chemical applications and avoid spraying when inversion conditions exist.

## Integrated weed management

Good weed control in rice involves integrated weed management, which is combining herbicides with other methods of weed control. The best weed management practices will depend on the characteristics of the various weed species, the seed bank and the level of infestation. The aim of weed management should be to avoid any surviving weeds replenishing seed into the soil.

Weed control can be part of many management practices including:

- **Sowing method** influences types and numbers of weeds. Ponding and draining associated with flushing for establishing drill-sown rice reduces aquatic weed numbers and growth. Permanent water for aerial sowing inhibits barnyard grass growth.
- **Crop rotation**: rotating rice with other summer or winter crops can help reduce weed numbers. Where high summer weed infestations occur, using broadleaf summer or winter crops or a long fallow with good weed control will reduce weed numbers before the rice phase.
- **Layout**: good layouts allow more even water depth and even weed germination, which allows easier and more effective herbicide timing.
- **Timely cultivations** with or without a knockdown herbicide, can be a valuable method for killing initial germinations of weeds such as barnyard grass. In drill sowing, harrowing barnyard grass after rice emergence is a possible option to reduce weed numbers.
- **Adequate sowing rates** and recommended plant populations are more able to compete with weeds than thin plant populations.
- **Burning rice stubble** helps to control populations of late-maturing weeds and seed.
- **Hygiene**: growers with localised or regional weed species should clean down equipment and harvesters between sites to reduce weed seeds from moving into uncontaminated areas.
- **Rice pure seed scheme** is operated by SunRice and the NSW Department of Primary Industries and Regional Development (NSW DPIRD). Farmers are not allowed to keep their own seed, with registered seed provided to farmers each season. This ensures seed is of high varietal purity and free of weed seeds.
- **Supply and drainage channel hygiene** helps prevent new weed populations from entering and building up in rice bays.
- **Green manuring and fodder conservation practices** allow weeds to be harvested before seed set, thus reducing weed seedbanks.
- **Cutting for rice hay** might be an option for any out of control weedy bays.

## Herbicide resistance management for weed control in rice

Good weed control in rice involves integrated weed management, the combination of cultural practices, herbicide use, and water depth management before, during and after herbicide application. The key strategies for managing herbicide resistance and achieving effective weed control in rice for 2024 are:

- Maximise the effectiveness: Use each herbicide alone, tank mixed or in programs at the approved label rate, timing and sequence.
- Rotate sowing methods between aerial and drill sowing as more modes of action and herbicide groups can be used.
- Rotating rice with other crops or pastures, that is, avoiding rice-only rotations will help prevent the development of resistant weeds.
- Use cultivation and knockdown herbicides before sowing, for example glyphosate or paraquat + diquat for grass control before rice emergence. They help to reduce reliance on Group 1 herbicides, which have high resistance risk.
- Use 2 or more different modes of action for each weed. Applying 2 herbicides at label rates with at least 2 different modes of action for each weed ensures that weeds resistant to one herbicide are controlled by the other herbicide. More is better, e.g. Agixa<sup>®</sup> after a foundation spray of Gramoxone<sup>®</sup>, Magister<sup>®</sup> and Stomp<sup>®</sup>, which gives 5 modes of action for barnyard grass.
- For broadleaf weeds this means applying either MCPA or Basagran<sup>®</sup>, M60 or Agixa<sup>®</sup> or Ubeniq<sup>®</sup> as the second herbicide in all the currently recommended herbicide programs.
- Rotating herbicide groups is also the recommended practice for controlling barnyard grasses.
- Rotate herbicides in the following rice crop by using herbicides with a different mode of action. Rotating herbicides by using a different herbicide with a different mode of action on the target weeds when the next rice crop is grown delays the development of resistance, i.e. where 2 herbicides are available to control a weed or weed group, alternate from one herbicide one year to the other herbicide the next.
- Do not rely solely on Group 1 herbicides such as Aura<sup>®</sup> as CropLife Australia lists them as being at high risk for developing herbicide resistance. Also do not rely solely on Group 4 herbicides such as Ubeniq<sup>®</sup> with Rinskor<sup>®</sup> Active, as CropLife Australia lists them as being at moderate risk for developing herbicide resistance. Agixa<sup>®</sup> is a Group 1 and Group 4 herbicide, which has a moderate to high risk of developing herbicide resistance. These herbicides should always be used in sequence with herbicides that have other modes of action, together with an integrated weed management strategy that uses other non-herbicidal management techniques.
- Prevent herbicide resistance: Herbicide options are extremely limited so it is important to closely monitor and record weed burdens, herbicide usage patterns and spray results, to minimise the risk of herbicide resistance. Check crops for any weed escapes. Send seed samples from suspect sites to the Charles Sturt University seed testing service at: Herbicide Resistance Screening, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW, 2678, and contact David Troidahl at NSW DPIRD or [Rice Extension](#).

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[Rice Extension](https://www.riceextension.au/)  
(<https://www.riceextension.au/>)

## Changes to herbicide modes of action on label

In order to manage herbicide-resistant weeds, all herbicides sold in Australia are grouped by mode of action. The mode of action has previously been indicated by a letter code, but as of July 2021, is transitioning to a number code on the product label.

The reason for the changes include:

- Farming is increasingly global and it's important to have global herbicide mode of action alignment.
- A letter-based system has minimal scope for new mode of action expansion; numerals are infinite.
- Fungicide and insecticide mode of action classification systems are already using numbers.
- A revision was needed to more accurately reflect mode of action groupings based on the current knowledge.

Products represented in Group 1 and Group 2 are HIGH RESISTANCE RISK herbicides and specific guidelines are written for using these products.

Specific guidelines are also included for the MODERATE RESISTANCE RISK herbicides: groups 3, 4, 5, 9, 10, 12, 14, 15, 22, 27 and 34 herbicides.

Table 1. Mode of action groups for rice chemicals alphabetical and numerical.

**Always read the label before use.**

Herbicide 2 resistance risk	Alphabetical MOA	Numerical MOA (new)	Active constituent	First trade name
High	A	1	cyhalofop butyl, profoxydim	Agixa®, Aura®
High	B	2	azimulfuron bensulfuron	Gulliver® Londax®
Moderate	C	5 6	propanil bentazone	Stam® Basagran® M60*
Moderate	D	3	pendimethalin	Stomp®
Moderate	G	14	carfentrazone ethyl	GatorH20®
Moderate	H	27	benzofenap	Taipan®
Moderate	I	4	MCPA Dicamba Basagran + MCPA florpyrauxifen-benzyl	MCPA, Banvel® Basagran®M60* Agixa® Rinskor® Active, Ubeniq®
Moderate	K	15	molinate thiobencarb	Ordram® Saturn®
Moderate	L	22	diquat paraquat	Spray Seed® Gramoxone®
Moderate	M	9	glyphosate	Roundup®
Moderate	N	10	glufosinate	Basta®
Moderate	Q	13	clomazone	Magister®

\*This product contains more than one active constituent. Source: [CropLife Australia](https://www.croplife.org).

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[CropLife Australia](https://www.croplife.org.au/resources/programs/resistance-management/)  
(<https://www.croplife.org.au/resources/programs/resistance-management/>)

## Which herbicide program?

In choosing which herbicide program to use, consider the following factors:

1. the weed species and density based on previous rice cropping and rotation:
  - ponding and draining associated with flushing for establishing drill-sown rice reduces aquatic weed numbers and growth
  - permanent water for aerial sowing inhibits barnyard grass growth
2. the level of resistance to herbicides in each weed species observed or recorded in previous seasons
3. the herbicide program used in the previous rice season.
4. the variety and establishment technique to be used.

## Plantback guidelines

Rice sown immediately after a cereal or broadleaf winter crop might be susceptible to injury from herbicide residue carryover. Many new residual herbicide products are entering the market, with little experience regarding safe rice plantback recommendations. Carryover will be influenced by:

- temperature
- seasonal rainfall
- soil pH
- organic matter
- soil texture,

therefore it is difficult to offer definitive answers to questions regarding the risk of damage to a following rice crop.

Groups 2, 5, 6 and 15 winter crop herbicide products are the most the likely to induce injury to following rice crops; growers need to seek advice from their agronomist.

Table 2 presents the best available data for some of the main winter crop herbicides that might affect rice.

## Simple test for herbicide residuals in soil

If a potential problem is identified, a simple method of confirmation is to conduct a pot experiment.

- Sample soil into a bucket from the top 10 cm of the field in at least 10 places, break up any clods then thoroughly mix up the sample.
- Take a similar sample from a nearby field with similar soil, but known **not** to have been sprayed with the herbicide product of concern (untreated).
- Keep the 2 samples separate, then subsample each into 2 take away food containers. Mark them accordingly.

Sow each of the 4 containers with approximately 20 rice seeds, burying the seed about 1 cm deep (rice seed samples are available from the rice extension team), water the pots and keep them moist for approximately 20 days. Store them somewhere warm (such as on top of the fridge).

Compare the rice seedling growth of treated and untreated pots about 3 weeks after sowing and look for major differences in root and shoot development. If all appear the same, then you can have greater confidence that winter crop herbicide residues have degraded and don't represent a challenge to your next rice crop.

Table 2. Plantback guidelines. **Always read the label before use**

Active ingredient, tradename	HRAC MOA	HRAC numeric (new)	Suggested plantback	Comments
<b>Group 1 haloxyfops: Inhibition of acetyl co-enzyme A carboxylase (ACCase inhibitors)</b>				
Group A herbicides could interfere with germination for a period after their application. This might not be on the label as these herbicides are used as selective post-emergence herbicides and the next crop is not normally sown until well after their plantback period has lapsed.				
haloxyfop, Verdict® 520	A	1	12 weeks	Cereal crops or grasses planted within 12 weeks of application could be damaged by the residual effects of this herbicide, particularly on light and red soils. Warm, moist soil results in the quickest degradation, due to microbial activity.
<b>Group 2 sulfonyleureas and imidazolinones: Inhibition of acetolactate synthase (ALS inhibitors), acetohydroxyacid synthase (AHAS)</b>				
The persistence of residual Group 2 herbicides depends on various environmental conditions such as soil pH, temperature, soil moisture and organic matter content.				
chlorsulfuron, Glean®	B	2	12 months	Higher soil pH leads to longer soil persistence. Glean® should not be used on soil pH 8.6 or higher as extended soil residual activity could adversely affect crop rotation options beyond normal intervals.
metsulfuron, Ally®	B	2	6 weeks	Recropping interval varies depending on pH, moisture and temperature.
triasulfuron, Logran®	B	2	12 months	As pH increases the rate of breakdown decreases. Replanting can be up to 24 months or more depending on pH and rainfall.
imazethapyr, Spinnaker®	B	2	10 months	Under conditions that do not favour this product's breakdown, carryover soil residues can affect susceptible following crops. Recropping can be up to 34 months, depending on crop type and rainfall, with rainfall and/or irrigation from application to sowing at least 500 mm.
MCPA imazapic imazapyr, Midas®	B	2	10 months	Under conditions that DO NOT favour breakdown, such as impoverished soils low in organic matter, non-wetting sands, anaerobic situations such as waterlogging, and prolonged dry periods, soil residues will persist longer and can affect susceptible follow crops.
imazapic, Onduty®	B	2	34 months	Severely damaged plants reduced yield in 2020 trials. No safe plantback period has been demonstrated.
<b>Group 5 triazines: Inhibition of photosynthesis at photosystem II -D1 histidine 215 binders</b>				
In addition to the triazine herbicides, other Group 5 herbicides also present potential rice plantback issues. Diuron, for example, presents a risk as aerial-sown rice is known to be extremely sensitive to it.				
atrazine, Atrazine 500	C	5	6–18 months	To avoid carryover on acid soils (pH <6.5) – the maximum rate of atrazine 500 g/L, or simazine 500 g/L, or a combination of the 2 products, to be applied to the crop during the growing season is 4 L/ha. On alkaline soils (>6.5) – the maximum rate of atrazine 500 g/L, or simazine 500 g/L, or a combination of the 2 products, to be applied to the crop during the growing season is 2 L/ha. To avoid carryover with post-emergence use, it is recommended that atrazine 500 g/L only be used, and at rates of 2 L/ha or less, on either acid or alkaline soils.
<b>Group 15 isooxazoline, α-chloroacetamides: Inhibition of very long chain fatty acid synthesis (VLCFA inhibitors)</b>				
pyroxasulfone, Sakura®	K	15	21 months	Rainfall of less than the minimum interim rainfall required (550 mm) can result in extended recropping intervals. Interim rainfall is the total rainfall between Sakura application and planting the particular following crop. See label for more information.
metazachlor, Butisan®	K	15	Min 12 months	There were severely damaged plants and reduced yield in 2020 trials. No safe plantback period has been demonstrated.
<b>Group 30 Benzyl ether: Inhibition of fatty acid thioesterase</b>				
cinmethylin, Luximax®	T	30	>5 months	Moderately damaging but no yield reduction in 2020 trials.
<b>Group 0 acetamides: Herbicides with unknown mode of action</b>				
napropamide, Devrinol®	Z	0	12 months	Moderately damage, reduced yield in 2020 trials. No safe plantback period has been demonstrated.

Table 3. Rice herbicide/insecticide compatibilities. **Always read the label before use**

This is a guide only. Read all product labels if using mixtures.

Formulation	Active	Product	Herbicides									
			Gulliver®	Londax® DF	Basagran® M60	Taipan®	Gator H20® y	Magister®	Agixa®	Kamba® 500	Roundup® CT	
<b>Herbicide</b>												
DF	azimsulfuron 500 g/kg	Gulliver®		✓								
DF	bensulfuron 600 g/kg	Londax® DF	✓		✓			✓	✓	✗ <sup>4</sup>		
SL	bentazone 400 g/L, MCPA 60 g/L	Basagran® M60		✓						✗ <sup>4</sup>		
SC	benzofenap 300 g/kg	Taipan®							✓ <sup>3</sup>			
EC	carfentrazone-ethyl 240g/L	Gator H20® <sup>6</sup>		✓					✓			
EC	clomazone 480 g/L	Magister®		✓		✓ <sup>3</sup>	✓			✗		✓
EC	cyhalofop butyl 160 g/L + floryprauxifen-benzyl 12 g/L	Agixa®		✗ <sup>4</sup>	✗ <sup>4</sup>				✗			
SL	dicamba 500 g/L	Kamba® 500										✓
SL	glyphosate 450 g/L	Roundup® CT							✓		✓	
SL	glyphosate 570 g/L	Roundup Ultra® MAX									✓	
SL	MCPA sodium salt 250 g/L	MCPA 250	✓		✓					✗ <sup>4</sup>		
SL	MCPA dimethylamine 750 g/L	Agritone® 750	✓		✓					✗ <sup>4</sup>	✓	
EC	molinate 960 g/L	Ordram® <sup>1</sup>		✓		✓			✓	✗	✓	
SL	paraquat 250 g/L	Gramoxone® 250							✓		✓	
SL	paraquat 135 g/L + diquat 115 g/L	Spray.Seed®									✓	
EC	pendimethalin 440 g/L	Stomp®							✓			✓
EC	profoxydim 200 g/L	Aura®		✗ <sup>4</sup>	✗ <sup>4</sup>				✗ <sup>4</sup>			
WC	propanil 480 g/L	Stam® <sup>2</sup>		✓					✓			
EC	thiobencarb 800 g/L	Saturn® EC		✓		✗						
SC	florpyrauxifen-benzyl 300 g/L	Ubeniq®										
SL	diquat 200 g/L	Reglone® <sup>7</sup>										
<b>Insecticide</b>												
EC	alpha-cypermethrin 100 g/L	Dominex Duo®							✓			
EC	chlorpyrifos 500 g/L	Lorsban®		✓		✓			✓	✓		
SC	copper chelates	Coptrol®										
G	copper sulfate pentahydrate 250 g/kg	Various trade names (bluestone)										
SC	fipronil 500 g/L	Cosmos® <sup>5</sup>										
EC	maldison 500 g/L	Maldison 500										
EC	trichlorfon 500 g/L	Lepidex®		✓		✓						

- ① Compatible with most pesticides used in rice provided correct mixing order is followed.
- ② Due to possible injury to rice do not mix other pesticides or liquid fertilisers with Stam®.
- ③ Only when applied by SCWIIRT from a motorbike or helicopter (min 5 L/ha water) or Bickley boom.
- ④ Separate application at least 7 days apart.
- ⑤ Seed treatment only.



Figure 3. Arrowhead. Photo: Rice extension.



Figure 4. Arrowhead flower. Photo: Rice extension.

Herbicides											Insecticides						
Roundup Ultra MAX	MCPA 250	Agritone 750	Ordram q	Gramoxone 250	SpraySeed	Stomp	Aura	Stam w	Saturn EC	Ubeniq	Dominex Duo	Lorsban	Copper sulfate	Diazinon	Cosmos	Maldison 500	Lepidex
		✓															
			✓				x <sup>4</sup>	✓	✓			✓		✓			✓
		✓					x <sup>4</sup>										
			✓						x			✓					✓
			✓	✓		✓	x	✓			✓	✓					
	x <sup>4</sup>	x <sup>4</sup>	x					x				✓					
✓		✓	✓	✓	✓												
						✓											
						✓											
					✓		x <sup>4</sup>										
					✓		x <sup>4</sup>					✓					
	✓	✓			✓		x <sup>4</sup>					✓					
✓		✓		✓	✓	✓						✓					
	x <sup>4</sup>	x <sup>4</sup>	x <sup>4</sup>					✓									
						✓			✓							x	
								✓									
									✓			✓					
			✓		✓			x		✓							
								x									

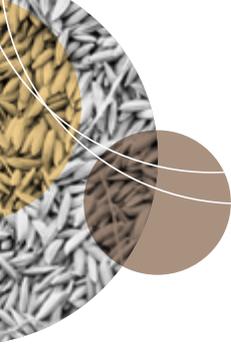
- 6 Herbicidal symptoms may appear on the crop in the form of leaf yellowing on submerged leaves and bronzing on exposed leaves. Do not apply Gator H20<sup>®</sup> to the long grain rice variety Doongara. Due to possible injury to rice do not mix Gator H20<sup>®</sup> with spray oils and surfactant blends. Compatibilities based on label.
- 7 New: Reglone<sup>®</sup> may be used for crop desiccation to assist in harvesting lodged crops using a rate of 2-3 L/ha. Spray when the grain is mature- not more than 2-3% of the grain is still at the milky stage and the grain moisture content must be less than 25%.  
**Do not harvest for 5 days after application.**



Figure 5. Barnyard grass. Photo: Rice extension.



Figure 6. Barnyard grass seed head. Photo: Rice extension.



# Aerial-sown programs

## Aerial-sown herbicide resistance management programs

There are 7 basic herbicide resistance management programs for aerial-sown rice based on the main aquatic weed herbicides used: Taipan<sup>®</sup> and bensulfuron methyl (Londax<sup>®</sup>, Kendax<sup>®</sup>). The number in brackets after each herbicide signifies the **mode of action group** to which the herbicide belongs:

**Program 1** Taipan<sup>®</sup> (27) with Ordram<sup>®</sup> (15) or Magister<sup>®</sup> (13)

**Program 2** Taipan<sup>®</sup> (27) with Saturn<sup>®</sup> (15)

**Program 3** Taipan<sup>®</sup> (27) with Ordram<sup>®</sup> (15) and Saturn<sup>®</sup> (15)

**Program 4** Londax<sup>®</sup> (2) with Ordram<sup>®</sup> (15) or Magister<sup>®</sup> (13) Once the most commonly used rice weed control program but now has widespread resistance to bensulfuron (Londax<sup>®</sup>, Kendax<sup>®</sup>). Rotate to a Taipan<sup>®</sup> program where it has been used for 2 or 3 crops on the same field.

**Program 5** Londax<sup>®</sup> (2) with Saturn<sup>®</sup> (15)

**Program 6** Londax<sup>®</sup> (2) with Ordram<sup>®</sup> (15) and Saturn<sup>®</sup> (15)

**Program 7** Londax<sup>®</sup> (2) with split Saturn<sup>®</sup> (15)

The post-emergent backup program for each of the aquatic weeds would include MCPA (Group 4) Basagran<sup>®</sup> M60 (Group 6/4) or Ubeniq<sup>®</sup> (Group 4) used in sequence after either Ordram<sup>®</sup> /Taipan<sup>®</sup> or Ordram<sup>®</sup> to provide 2 modes of action.

Aura<sup>®</sup> (dim) and Agixa<sup>®</sup> Rinskor<sup>®</sup> Active (fop) are the options for a post-emergent grass weed control backup treatment using another mode of action (Group 1). This backup treatment needs to be when the weeds are still only small as control will be difficult once tillering starts.

Table 4. Control options for major weeds in aerial-sown rice (to be read in conjunction with Table 5) (page 1 of 2)  
 The letter after the chemical rate in this table (i.e. a to p) refers to the appropriate part of the column headed 'Application: comments' in Table 5 (pp. 23–24).  
 Rates of product are in L/ha unless otherwise indicated. S – suppression only, † – requires follow-up herbicide treatment; # – requires follow-up herbicide treatment. Always read the label before use.

Weed stage	Rice stage	moliniate 960 g/L Ordram®	thiobencarb 800 g/L Saturn® EC	clomazone 480 g/L Magister®	propanil 480 g/L Stam®	cyhalofop butyl 160 g/L + florpyrauxifen-benzyl Agixa® (requires Uptake®)	profoxydim 200 g/L Aura® (requires Supercharge®)	azimsulfuron 500 g/kg Gulliver® (tank mixed with MCPA)	bensulfuron methyl 600 g/kg Londax® DF Kendax® 600WG	benzofenap 300 g/L Taipan®	MCPA sodium salt 250 g/L MCPA 250 MCPA	Basagran® M60 Dictate® M60 bentazone 400 g/L + MCPA 60 g/L	Gator H20® carfentrazone ethyl 240 g/L	Kamba® 500 dicamba 500 g/L	Copper chelates Coptrol® cop- per ethanalamine complexes Cupricide®	florpyrauxifen-benzyl 300 g/L Ubeniq®
<b>Grasses</b>																
<b>Barnyard grass</b>																
0	pre-sowing		1–1.5 † c	0.25–0.3 † d												
pre-emergence	pre-sowing – 2 leaf															
0–2 leaf	0–2 leaf	2.5 a														
0–3 leaf	1–2 leaf		2.75 # c													
0–3 leaf	1–2 leaf	2.5–3.75 # e	2.75–3.75 # e													
0–4 leaf	0–2 leaf			0.4–0.6 f												
1–4 leaf	pre-emergent – early tillering	3.75 a														
2–3 leaf	evenly germinated				7.5–8.5 g											
4–5 leaf	evenly germinated				12.5 g											
3–5 leaf	1–2 leaf – late tillering															
3 leaf – 6 tillers	3 leaf min					2 h	0.375 i									
3 leaf – 3 tillers	4 leaf – 3 tillers							40 S j								
<b>Silvertop grass</b>																
1–2 leaf	1–2 leaf	2.5–3.75 S # e		0.5–0.6 S f												
1–2 leaf	pre-emergent – early tillering	3.75 a														
3–5 leaf	1–2 leaf – late tillering															
2 leaf – 6 tillers	3 leaf – pre-panicle initiation					2 h	0.375 i									
<b>Broadleaf and sedges</b>																
<b>Alisma</b>																
pre-emergence to germinated	pre-sow to early post-sow									2 l						
4–6 leaves	4 leaf – 3 tillers						40 j									
seedling (preflowering)	3 tillers – P.I.										1.4–2.7 m					
<b>Arrowhead</b>																
pre-emergence to germinated	pre-sow to early post-sow									2 l				0.420 q		
up to 4 leaf & <5 cm	3 leaf to early tillering					2 h										0.15 r
4–6 leaf	early tillering (20–35 das) – P.I.														2–2.5 n	
4–8 leaves	4 leaf – 3 tillers						40 j									
<b>Cumbungi</b>																
seedling	early tillering (20–35 das) – P.I.														2–2.5 n	

Table 4. Control options for major weeds in aerial-sown rice (to be read in conjunction with Table 5) (page 2 of 2)

Weed stage	Rice stage	molinate 960 g/L Ordram®	thiobencarb 800 g/L Saturn® EC	clomazone 480 g/L Magister®	propanil 480 g/L Stam®	cyhalofop butyl 160 g/L + florpyrauxifen-benzyl Agixa® (requires Uptake®)	profoxydim 200 g/L Aura® (requires Supercharge®)	azimsulfuron 500 g/kg Gulliver® (tank mixed with MCPA)	bensulfuron methyl 600 g/kg Londax® DF Kendax® 600WG	benzofenap 300 g/L Taipan®	MCPA sodium salt 250 g/L MCPA 250 MCPA	Basagran® M60 Dictate® M60 MCPA 60 g/L	dicamba 500 g/L Kamba® 500	Copper chelates Coptrol® cop- per ethanalamine complexes Cupricide®	florpyrauxifen-benzyl 300 g/L Ubeniq®
<b>Docks</b>															
small to large	seedling to early tillering												0.4–0.56 o		
<b>Dirty dora</b>															
pre-emergence to germinated	pre-sow to early post-sow									2 s l					
0–2 leaf	1–2 leaf		2.75 # c												
0–2 leaf	1–2 leaf		3.75 b												
up to 2 leaf & <3 cm	3 leaf to early tillering														0.15 s r
0–3 leaf	2 leaf – mid tillering								50–85 g k						
0–4 leaf	2–4 leaf												0.630 S q		
3–6 leaf	4 leaf – 3 tillers						40 j								
4–6 leaf	early tillering (20–35 das) – P.I.											2–2.5 n			
seedling (preflowering)	3 tillers – P.I.										1.4–2.7 m				
<b>Jerry jerry</b>															
up to 4 leaf & <5 cm	3 leaf to early tillering														0.15 r
<b>Spikerush</b>															
3–6 leaves	4 leaf – 3 tillers							40 j							
<b>Starfruit</b>															
pre-emergence to germinated	pre-sow to early post-sow									2 l					
seedling to preflowering	3 tillers – P.I.											1.4–2.7 m			
Up to 4 leaf and < 5 cm	3 leaf to early tillering						2 h								
4–6 leaf	4 leaf – 3 tillers							40 j							
<b>Water plantain</b>															
pre-emergence to germinated	pre-sow to early post-sow									2 l					
up to 4 leaf & <5 cm	3 leaf to early tillering														0.15 r
4–6 leaf	4 leaf – 3 tillers						40 j								
4–6 leaf	early tillering (20–35 das) – P.I.														2–2.5 n
<b>Algae (green slime)</b>															
	sowing to early tillering														2–5 p

Table 5. Weed control options and herbicide combination options in aerial-sown rice (page 1 of 2). **Always read the label before use.** The letter in brown below (i.e. **a** to **p**) refers to the brown letter in Table 4, which is to be read in conjunction with this table.

Weed stage	Rice stage	Herbicide	Rate/ha	Application: comments
<b>Barnyard grass, <i>Echinochloa</i> spp., silvertop grass, <i>Leptochloa fusca</i></b>				
0 to 2-leaf	sowing to 2-leaf	molinate 960 g/L Ordram®	2.5 L	<b>(a)</b> Apply to permanent water by aircraft, from completion of initial flooding to as soon as possible after sowing.  Water movement to and within bays should cease 2 hours before application and for 3 days after application, but maintain permanent flood.
1 to 4-leaf	pre-emergent to early tillering		3.75 L	
Silvertop grass 1 to 2-leaf	pre-emergent to early tillering		3.75 L	
<b>Barnyard grass, <i>Echinochloa</i> spp.; dirty dora, <i>Cyperus difformis</i></b>				
Barnyard grass 0 to 3-leaf	Early post-sowing 1 to 2-leaf	thiobencarb 800 g/L Saturn® EC	3.75 L	<b>(b)</b> Apply by air or 4-wheel bike to flooded bays when the secondary (fibrous) roots of the rice seedling are developing and firmly attached to the soil surface.  Water movement to and within bays should cease 6–12 hours before application and for 3 days after application, but maintain permanent flood.
Dirty dora 0 to 2-leaf				
No weeds present	just before sowing	Split Saturn® thiobencarb 800 g/L Saturn® EC	1–1.5 L	<b>(c)</b> Note: Not recommended for long grain varieties. Apply by air or four-wheel bike to flooded bays. Apply first application within 7 days of starting bay filling.
barnyard grass 0 to 3-leaf	1 to 2-leaf		followed by 2.75 L	<b>(c)</b> Apply second application when the secondary (fibrous) roots of the rice seedling are developing and firmly attached to the soil surface. Water movement to and within bays should cease before application and for 3 days after application, but maintain permanent flood.
Dirty dora 0 to 2-leaf				
<b>Barnyard grass, <i>Echinochloa</i> spp.; suppression only: silvertop grass, <i>Leptochloa fusca</i></b>				
Barnyard grass pre-emergence	pre-sowing to 2-leaf	clomazone 480 g/L Magister® plus	0.25–0.3 L	<b>(d)</b> Apply to newly flooded bays before weed germination. Apply by helicopter, tractor or 4-wheel bike or fixed wing aircraft fitted with a Bickley boom. When using the Bickley boom, add 41-A drift retardant for Magister®.
		benzofenap Taipan® followed by thiobencarb 800 g/L Saturn® or molinate 960 g/L Ordram®	2 L	<b>(d)</b> Follow Taipan® label directions.
Barnyard grass 0 to 3-leaf	post-sowing	thiobencarb 800 g/L Saturn® or molinate 960 g/L Ordram®	2.75–3.75 L	<b>(e)</b> Follow Saturn® label directions.
			2.5–3.7 L	<b>(e)</b> Follow Ordram® label directions.
<b>Barnyard grass, <i>Echinochloa</i> spp.; silvertop grass, <i>Leptochloa fusca</i></b>				
Barnyard grass pre-emergence to 4-leaf	pre-sow to 2-leaf	clomazone 480 g/L Magister®	0.4–0.6 L	<b>(f)</b> Ensure seedbed is free of germinated grasses before flooding.  Apply by fixed wing aircraft fitted with a Bickley boom or by dripper (SCWIIRT method) using a helicopter, tractor or 4-wheel agbike to permanent water. When using the Bickley boom, always add 41-A drift retardant for Magister®.  Water movement must cease before application and for 3 days after, ensure sufficient water to maintain permanent flood.  Magister® can be applied by drip application at initial flooding at the 0.6 L rate.
Silvertop grass up to 2-leaf growth can be suppressed				
Note: Do not apply to Illabong if dry broadcast sowing.				
<b>Barnyard grass, <i>Echinochloa</i> spp.</b>				
2 to 3-leaf	evenly germinated rice	propanil 480 g/L Stam®	7.5–8.5 L	<b>(g)</b> Apply by fixed-wing aircraft or helicopter or tractor boom sprayer or by knapsack sprayers. Works by direct contact with weeds. Drain field thoroughly before application and flood within 5 days of application.  Only spray under ideal conditions, preferably with temperatures above 25 °C.
4 to 5-leaf			12.5 L	
<b>Barnyard grass, <i>Echinochloa</i> spp.; silvertop grass, <i>Leptochloa fusca</i></b>				
Up to 5-leaf	3-leaf to pre-panicle initiation	cyhalofop butyl 160 g/L + florpyrauxifen-benzyl 12 g/L Agixa® Rinskor® Active	2 L + 1–2 L/ha Uptake® spraying oil	<b>(h)</b> Apply by fixed-wing aircraft, helicopter or boom sprayer to partially drained fields, maintaining at least 1–2 cm water depth and ensuring that at least 75% of the weed foliage is exposed to the spray. Works by direct contact with weeds. Re-flood after 2 hours and fill as soon as possible to limit new weed germination. Agixa® Rinskor® Active should only be used if needed after a foundation treatment.
2-leaf to 6 tiller	3-leaf minimum	profoxydim 200 g/L Aura®	375 mL plus L/100 L Supercharge®	<b>(i)</b> Apply by aircraft, helicopter or ground boom to partially drained bays containing 1–2 cm water onto actively growing weeds with sufficient foliage exposed for adequate coverage. Re-flood after 2 hours and fill as soon as possible to limit new weed germination and maximise weed control. Avoid treating dense weed populations and preferably apply Aura® after a foundation herbicide that is effective on the target weed.
<b>Barnyard grass, <i>Echinochloa</i> spp.; dirty dora, <i>Cyperus difformis</i>; starfruit, <i>Damasonium minus</i>; arrowhead, <i>Sagittaria montevidensis</i>; alisma, <i>Alisma lanceolatum</i>; water plantain, <i>Alisma plantago-aquatica</i>; spike rush, <i>Eleocharis acuta</i></b>				
Barnyard grass 4-leaf to 4 stems or shoots Alisma 4–6 leaves Arrowhead 4–8 leaves Dirty dora, spikerush 3–6 leaves Starfruit 4 leaves to bolting Water plantain 4–6 leaves	4 to 5-leaf, up to 3 tillers	azimsulfuron 500 g/kg Gulliver®	40 g/ha plus 1.6–2.7 L MCPA 250 plus non-ionic surfactant	<b>(j)</b> Always apply in mixtures with MCPA.  Always add a non-ionic surfactant. Apply as a foliar spray in a minimum spray volume of 40 L/ha.  Ensure water is removed from bays and at least three-quarters of the weeds are exposed (on the low side of the bay) enabling direct contact by the spray. Water depth should be 1–2 cm deep, or at least the soil must be kept saturated. DO NOT allow the soil to dry out.  For resistance management applying an alternative mode of action grass herbicide as a presowing or at-sowing treatment is recommended.  Note: will only suppress barnyard grass.

Table 5. Weed control options and herbicide combination options in aerial-sown rice (page 2 of 2).

Weed stage	Rice stage	Herbicide	Rate/ha	Application: comments
<b>Dirty dora, <i>Cyperus difformis</i>; starfruit, <i>Damasonium minus</i>; arrowhead, <i>Sagittaria montevidensis</i>; cumbungi and spike rush suppression only</b>				
Up to 3-leaf	2-leaf up to mid-tillering	bensulfuron methyl 600 g/kg Londax® DF Kendax® 600WG	50–85 g	(k) Apply by air to flooded bays. Use higher rate where flood water is muddy or weeds are large. Water movement to and within bays should cease before application and for 5 days after application, but maintain permanent flood.
<b>Arrowhead, <i>Sagittaria montevidensis</i>, dirty dora, <i>Cyperus difformis</i> and starfruit, <i>Damasonium minus</i></b>				
Up to 6 leaf arrowhead	2–4 leaf	carfentrazone ethyl 240 g/L Gator H20®	420 mL	(q) Apply to permanent flood by SCWIIRT method on tractor, 4 wheel bike or helicopter, or by boom spray application using ground rig or aircraft. Lock up bays one day before application and 5 days after application.  Due to possible injury to rice do not mix Gator H20® with spray oils and surfactant blends. <b>Note:</b> will only suppress dirty dora; will not control starfruit
Up to 4 leaf dirty dora (suppression only)			630 mL	
Up to 6 leaf arrowhead	2.5-4 leaf	carfentrazone ethyl 240 g/L Gator H20®	630 mL +	(q) Apply to permanent flood by SCWIIRT method on tractor, 4 wheel bike or helicopter, or by boom spray application using ground rig or aircraft. Lock up bays 1 day before application and 5 days after application.  Herbicidal symptoms might appear on the crop in the form of leaf yellowing on submerged leaves and bronzing on exposed leaves. Do not apply Gator H20® to the long grain rice variety Doongara.
Up to 4 leaf dirty dora and starfruit			50 g Londax® DF	
<b>Dirty dora, <i>Cyperus difformis</i>; starfruit, <i>Damasonium minus</i>; arrowhead, <i>Sagittaria montevidensis</i>; alisma, <i>Alisma lanceolatum</i>; water plantain, <i>Alisma plantago-aquatica</i></b>				
Pre-emergence to germinated	pre-sow to early post-sow	benzofenap 300 g/kg Taipan®	2 L	(l) Apply by air or by SCWIIRT using a 4-wheel bike or helicopter to flooded bays within 10 days of flooding start. Water movement to and within bays should cease 12 hours before application and for 5 days after application, but maintain permanent flood. Note: <ul style="list-style-type: none"> <li>• will only suppress dirty dora</li> <li>• will only control starfruit for up to 28 days</li> <li>• will only control seedlings of alisma and water plantain.</li> </ul>
<b>Dirty dora, <i>Cyperus difformis</i>; starfruit, <i>Damasonium minus</i>; alisma, <i>Alisma lanceolatum</i></b>				
Seedling but before flowering	mid-tillering (3 tillers, 45 days or more after sowing) but not later than panicle initiation.	MCPA sodium salt 250 g/L MCPA 250 MCPA	1.4–2.7 L	(m) MCPA needs to contact the leaves. Before application, lower water levels to expose more than two-thirds of the weed growth for direct contact with the spray. MCPA will suppress the alisma and reduce competition to the rice. Late seeding can still occur.  Note: May be used at 2-tiller stage of rice (around 35 days after sowing) at 1.4 L/ha.
<b>Dirty dora, <i>Cyperus difformis</i>; starfruit, <i>Damasonium minus</i>; arrowhead, <i>Sagittaria montevidensis</i>; water plantain, <i>Alisma plantago-aquatica</i>; seedling cumbungi, <i>Typha</i> spp.</b>				
4 to 6 leaves	early tillering (20–35 days after sowing) but not later than panicle initiation.	bentazone 400 g/L and MCPA 60 g/L Basagran® M60	2–2.5 L	(n) MCPA needs to contact the leaves. Lower water levels to expose all weeds and soil surface before application. Submerged weeds will not be controlled. Can be applied at an earlier stage to rice than MCPA. For optimum dirty dora control, apply in a program after an aquatic herbicide effective on this weed, and apply to younger weeds up to 35 DAS. On late or denser dirty dora populations, use 2.5 L/ha Basagran® M60 and add up to 1 L/ha MCPA 25%.
<b>Docks, <i>Rumex</i> spp.</b>				
Small to large	seedling to early tillering	dicamba 500 g/L Kamba® 500	0.4–0.56 L	(o) Dicamba needs to contact the leaves. Before application, lower water levels to expose the weed leaves for direct contact with the spray.
<b>Arrowhead, <i>Sagittaria montevidensis</i>; dirty dora (suppression only), <i>Cyperus difformis</i>; jerry jerry, <i>Ammannia multiflora</i>; starfruit, <i>Damasonium minus</i>; water plantain, <i>Alisma plantago-aquatica</i></b>				
2–4 leaf, less than 5 cm (DD 2 leaf, <3 cm)	3 leaf to before PI	Ubeniq®	0.15 L	(r) Always use Ubeniq® in sequence after foundation herbicides that have a different MOA. Always apply with Uptake™ spraying oil, Hasten® spray adjuvant or Loveland™ products MSO™ with LeciTech™ spray adjuvant at 2–4 L/ha in total spray volume of 5–20 L/ha. Premix Ubeniq® thoroughly in oil, then once fully dispersed, add remaining water to make up total spray mix volume.
<b>Algae, green slime</b>				
Apply lower rates when filaments first seen and higher rates when algal blooms are smothering emerging rice seedlings	sowing to early tillering	copper chelates Coptrol®  copper ethanolamine complexes Cupricide®	2–5 L	(p) Rate of application depends on depth of water and level of algal infestation. See product label.  Note: There is no registration or permit for using copper sulfate against algae in rice crops, so its use cannot be recommended.
<b>Arrowhead, <i>Sagittaria montevidensis</i>; starfruit, <i>Damasonium minus</i>; water plantain, <i>Alisma plantago-aquatica</i></b>				
Up to 4-leaf and <5 cm diameter	3-leaf to panicle initiation	cyhalofop butyl 160 g/L + florypyrauxifen-benzyl 12 g/L Agixa® Rinskor® Active	2 L + 1–2 L/ha Uptake® spraying oil	(h) Apply by fixed-wing aircraft, helicopter or boom sprayer to partially drained fields, maintaining at least 1–2 cm water depth and ensuring that at least 75% of the weed foliage is exposed to the spray. Works by direct contact with weeds. Re-flood after 2 hours and fill as soon as possible to limit germination of new weeds. Agixa®Rinskor® Active should only be used if needed after a foundation treatment.

Table 6. Recommended chemical programs for aerial-sown rice-costs. **Always read the label before use.**

Aerial-sown programs	Chemical	Rate L/ha or g/ha	\$/L or \$/g	\$/ha	Fixed-wing aerial application	Total program cost (\$/ha)	
<b>Program 1:</b>							
Rotate from Taipan® program after 2–3 crops to avoid resistance.	Taipan®	2	93.33	187			
	Ordram®	3.75	39.71	149	25	361	
	Taipan®	2	93.33	187			
	Magister®	0.5	67.28	34	25	245	
<b>Program 2:</b>							
Rice must have secondary (fibrous) roots before applying Saturn®.	Taipan®	2	93.33	187			
	Saturn®	3.75	28.56	107	25	319	
<b>Program 3:</b>							
This program is for high weed pressure.	Taipan®	2	93.33	187			
	Ordram®	2.5	39.71	99	25		
	Saturn®	3.75	28.56	107	25	443	
<b>Program 4:</b>							
Rotate from Londax® program every 2–3 crops to avoid resistance.	Londax®	70	0.22	15			
	Ordram®	3.75	39.71	149	25	189	
	Londax®	70	0.22	15			
	Magister®	0.5	67.28	34	25	75	
<b>Program 5:</b>							
Narrow window of Saturn® application main limitation.	Londax®	70	0.22	15			
	Saturn®	3.75	28.56	107	25	148	
<b>Program 6:</b>							
This program is for high weed pressure.	Londax®	70	0.22	15			
	Ordram®	2.5	39.71	99	25		
	Saturn®	3.75	28.56	107	25	250	
<b>Program 7:</b>							
Not for long grain varieties or where weeds have germinated before flooding.	Londax®	70	0.22	15			
	Saturn®	1.5	28.56	43	25		
	Saturn®	2.75	28.56	79	25	179	
<b>All programs should ideally include MCPA or Basagran M60 to provide 2 modes of action on each aquatic weed, costs:</b>							
Backup sprays using secondary mode of action.		Basagran® M60	2.5	27.55	69	25	94
	35 days	MCPA 750	0.485	10.05	5	25	30
	45 days	MCPA 750	0.97	10.05	10	25	35
		Ubeniq®	0.15	410.06	62	25	87
		Gulliver®	40	2.00	80	25	105

**Note:** Indicative costs only. Prices are average retail (excluding GST), from resellers in the Murrumbidgee and Murray valleys, at August 2024. They are to be used as guide only. Prices will vary depending on location, availability and quantity purchased.

Table 7. Herbicide resistance management programs: Taipan®-based programs. **Always read the label before use.**

All rates in these tables are per hectare

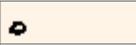
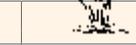
Program Consult labels of individual products for details of rates, application and weeds controlled.	safe for medium grains	safe for long grains	Modes of action per weed				
			DD	SF	AH	A, WP	BYG
<b>Program 1:</b> Taipan® with Ordram® or Magister® • To be effective, Taipan® needs a weed-free seed bed before flooding, to be applied within 10 days of the start of flooding and good water management. • MCPA, Basagran® M60 or Ubeniq® provide a second herbicide action and cleanup and escapes for all aquatic weeds. Agixa® Rinskor® Active and Aura® provide a second herbicide action and cleanup for all grass weeds. • For Basagran® M60 or MCPA, lower water level and apply to weed foliage.	yes	yes	?✓	?✓	✓✓	✓✓	✓✓
<b>Program 2:</b> Taipan® with Standard Saturn® Taipan®, MCPA, Basagran® M60, Ubeniq®, Agixa® Rinskor® Active, Aura®: Comments as above. Saturn®: Apply when dirty dora is in the 0–2 leaf stage and barnyard grass is 0–3 leaf stage. Rice must have secondary (fibrous) roots.	yes	yes	?✓✓	✓✓	✓✓✓	✓✓	✓✓
<b>Program 3:</b> Taipan® with Standard Saturn® and Ordram® • A robust program where weed pressures are high. • Ordram®: Apply to newly flooded weed-free fields before sowing rice. • Taipan®, Saturn®, MCPA, Basagran® M60, Ubeniq®, Agixa® Rinskor® Active, Aura®: Comments as above.	yes	no	?✓✓	✓✓	✓✓	✓✓	✓✓

✓– each mode of action per species is one tick ✓✓– at least 2 ticks is desirable for sound resistance management of aquatic weeds.

? A mode of action where the herbicide used might only suppress the weed or might not carry a label claim for control of that weed species.

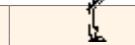
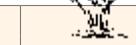
Table 8. Herbicide resistance management programs: Londax® based. **Always read the label before use**

Program Consult labels of individual products for details of rates, application and weeds controlled.	safe for medium grains	safe for long grains	Modes of action per weed				
			DD	SF	AH	A, WP	BYG
<b>Program 4:</b> Londax® with Ordram® or Magister® • Once the most commonly used rice weed control program but now has widespread resistance to bensulfuron (Londax®, Kendax®). Rotate to a Taipan® program where it has been used for two or three crops on the same field. • 3.75 L of Ordram® is the preferred rate in most situations. • MCPA, Basagran® M60, or Gulliver® plus MCPA provide a second herbicide action and cleanup and escapes for all aquatic weeds. Agixa® Rinskor® Active and Aura® provide a second herbicide action and cleanup for all grass weeds. For MCPA or Basagran® M60, lower water level and apply to weed foliage.	yes	yes	✓✓	✓✓	✓✓	??	✓✓
<b>Program 5:</b> Londax® with Standard Saturn® • Londax®: comments as above. • Narrow window of Saturn® application is the main limitation. • Tank mixtures of Londax® plus Saturn® may reduce BYG control with Saturn®. • For long grains, ensure Saturn® is applied before and separately to Londax®, to avoid damage. • MCPA, Basagran® M60, Gulliver® plus MCPA provide a second herbicide action where aquatic weeds other than DD are present. Lower water level and apply to weed foliage. Agixa® Rinskor® Active and Aura®: comments as above.	yes	yes	✓✓✓	✓✓	✓✓	✓?	✓✓
<b>Program 6:</b> Londax® with Standard Saturn® and Ordram® • This program is for high weed pressures. • Londax®: comments as above. • Ordram®: Apply to newly flooded fields before rice sowing. • Can injure long grain varieties excessively. • MCPA, Basagran® M60, Gulliver® plus MCPA, Agixa® Rinskor® Active and Aura®: comments as above.	yes	no	✓✓✓	✓✓	✓✓	✓?	✓✓
<b>Program 7:</b> Londax® with Split Saturn® • Londax®: comments as above. • The Saturn® primer rate widens the application window for the main postsowing Saturn® application. The two sequential Saturn® treatments are essential parts of this strategy. • Not for long grain varieties or where weeds germinate before flooding. • MCPA, Basagran® M60, Agixa® Rinskor® active and Aura®: comments as above.	yes	no	✓✓✓	✓✓	✓✓	✓?	✓✓

										
	filling up	seed	coleoptile	1 leaf	2 leaf	3-4 leaf	1st tiller	early tiller	mid tillering	panicle initiation
<b>Taipan</b> ® 2 L @ pre-sow to early post-sow						<b>Aura</b> ® 0.375 L @ 3-leaf to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
Plus <b>Ordram</b> ® 2.5-3.75 L @ pre- to post-sowing. Apply <b>Ordram</b> ® when BYG is at the 0-4 leaf stage OR <b>Magister</b> ® 0.4 to 0.6 L @ pre-sow to 2-leaf stage rice. Apply <b>Magister</b> ® when BYG is at the 0-3 leaf stage							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4-5 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		or <b>MCPA 2.7 L</b> @ 3 tillered rice	
						<b>Ubeniq</b> ® 150 mL @ 3-leaf stage to pre-panicle initiation				
<b>Taipan</b> ® 2 L @ pre-sow to early post-sowing						<b>Aura</b> ® 0.375 L @ 3-leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
					<b>Saturn</b> ® 3.75 L @ secondary (fibrous) root rice stage. Apply when DD is 0-2 leaf stage, and BYG is 0-3 leaf					
						<b>Ubeniq</b> ® 150 mL @ 3-leaf stage to pre-panicle initiation				
							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4-5 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		or <b>MCPA 2.7 L</b> @ 3 tillered rice	
<b>Taipan</b> ® 2 L @ pre-sow to early post-sow						<b>Aura</b> ® 0.375 L @ 3-leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
						<b>Ubeniq</b> ® 150 mL @ 3-leaf stage to pre-panicle initiation				
Plus <b>Ordram</b> ® 2.5 L @ pre-sow. Apply to weed-free, newly flooded fields before sowing					<b>Saturn</b> ® 3.75 L @ secondary (fibrous) root rice stage Apply when DD is 0-2 leaf stage, and BYG is 0-3 leaf					
							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4-5 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		or <b>MCPA 2.7 L</b> @ 3 tillered rice	

The number of modes of action assumes no significant resistance to Londax® is present.

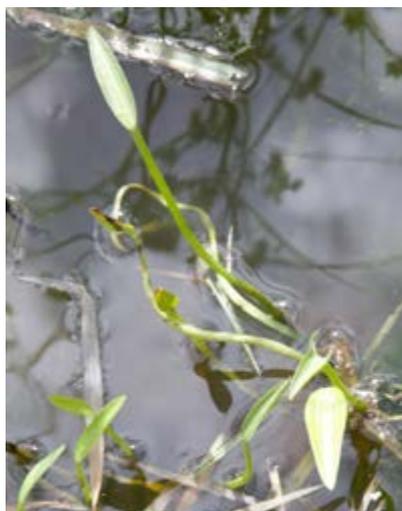
DD – dirty dora, SF – starfruit, AH – arrowhead, A – alisma, WP – water plantain, BYG – barnyard grass

										
	filling up	seed	coleoptile	1 leaf	2 leaf	3-4 leaf	1st tiller	early tiller	mid tillering	panicle initiation
<b>Ordram</b> ® 2.5-3.75 L @ pre to post sowing. Apply <b>Ordram</b> ® when BYG is at 0-4 leaf stage OR <b>Magister</b> ® 0.4-0.6 L @ pre-sow to 2 leaf stage rice. Apply <b>Magister</b> ® when BYG is at 0-3 leaf stage							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1 to 2 tillered rice		OR <b>MCPA 2.7 L</b> @ 3 tillered rice	
						<b>Aura</b> ® 0.375 L @ 3 leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation <b>Londax</b> ®/Kendax® 50-85 g @ 2 leaf stage rice. Apply when weeds are small, up to 3-leaf stage				
						<b>Aura</b> ® 0.375 L @ 3 leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
					<b>Saturn</b> ® 3.75 L @ secondary (fibrous) root rice stage. Apply when DD is 0-2 leaf stage, and BYG is 0-3 leaf					
						<b>Londax</b> ®/Kendax® 50-85 g @ 2 leaf stage rice (apply as above)				
							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		OR <b>MCPA 2.7 L</b> @ 3 tillered rice	
<b>Ordram</b> ® 2.5 L @ pre-sow Apply to newly flooded fields before sowing						<b>Aura</b> ® 0.375 L @ 3 leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
					<b>Saturn</b> ® 3.75 L @ secondary (fibrous) root rice stage (apply as above)					
						<b>Londax</b> ®/Kendax® 50-85 g @ 2 leaf stage rice (apply as above)				
							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		OR <b>MCPA 2.7 L</b> @ 3 tillered rice	
<b>Saturn</b> ® 1 to 1.5 L @ pre-sow. Apply to weed-free, newly flooded fields before sowing						<b>Aura</b> ® 0.375 L @ 3 leaf stage to late tillered rice <b>Agixa</b> ® 2.0 L @ 3-leaf to pre-panicle initiation				
					<b>Saturn</b> ® 3.75 L @ secondary (fibrous) root rice stage (apply as above)					
						<b>Londax</b> ®/Kendax® 50-85 g @ 2 leaf stage rice (apply as above)				
							<b>Gulliver</b> ® 40 g with 1.6-2.7 <b>MCPA 250</b> @ 4 leaf stage to 3 tiller <b>Basagran</b> ® M60 2-2.5 L @ 1-2 tillered rice		OR <b>MCPA 2.7 L</b> @ 3 tillered rice	

# Weed and pest identification

Identifying and controlling weeds early in the paddock is essential. Knowing the weed you have and identifying the best control strategy will lead to cleaner crops and fewer resistance issues. The following pages show photos of some important weeds at various growth stages as well as the symptoms you might encounter from some pests in emerging rice crops.

## Arrowhead



### ARROWHEAD

Arrowhead seedling leaves are similar to starfruit narrow; straplike, 20–30 mm long but mature leaves are arrow shaped. Seed germinates quickly on newly flooded bays.

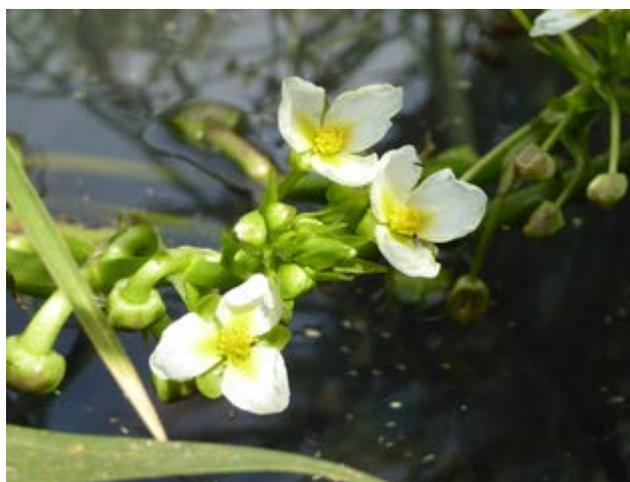
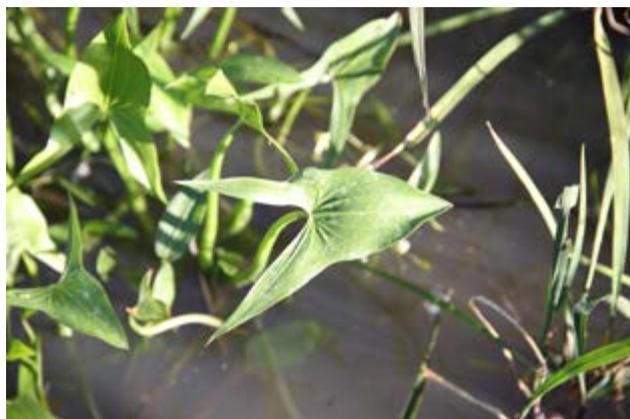


Figure 7. Arrowhead from seedling to flower. Photos: John Broster & Allison Chambers (CSU).

## Barnyard grass



### **BARNYARD GRASS**

Barnyard grass seedlings are hairless and bright green to blueish often with distinctive red markings. No ligules or auricles present, which distinguishes it from rice. The plant might be erect or prostrate depending on the species. Controlling barnyard grass in seasons before sowing is very important.



Figure 8. Barnyard grass identification from seedling to maturity. Photos: John Broster & Allison Chambers (CSU).

## Silvertop grass



### **SILVERTOP GRASS**

Silvertop grass seedlings have narrow and often droopy, dull green leaves with pronounced white mid vein, membranous ligule but no auricles at leaf-stem junction. Seeds germinate readily on still water surface at 25°C then sink and establish.



Figure 9. Silvertop grass from seedling to maturity. Photos: John Broster, Allison Chambers (CSU), David Troidahl & Agropraisals Pty Ltd.

## Dirty dora



### **DIRTY DORA**

Dirty dora has triangular, hairless and bright green stems. Seeds germinate quickly in shallow water. Seedlings require moist or wet conditions to survive.



Figure 10. Dirty dora identification from seedling to maturity. Photos: John Broster & Allison Chambers (CSU).



## Jerry jerry



### **JERRY JERRY**

Erect, rigidly branched plant, grows to 60 cm high, lanceolate leaves to 50 mm long and 8 mm wide, leaves paired on stem, purple to brown seeds..

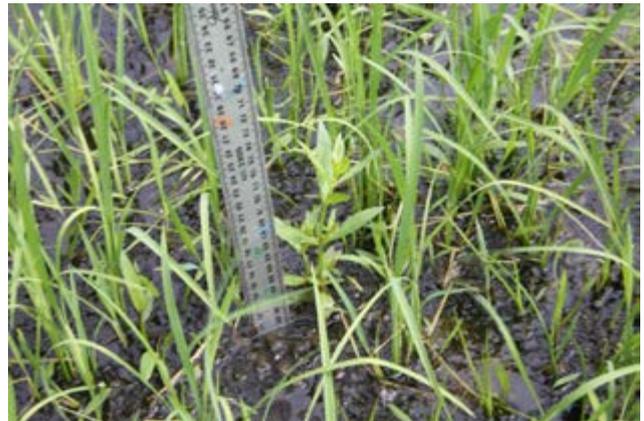


Figure 11. Jerry jerry identification from seedling to maturity.  
Photos: John Broster & Allison Chambers (CSU)



## Starfruit



### STARFRUIT

Starfruit seedling leaves are narrow and straplike, radiating from the centre of the plant. Fruit is star shaped. Seedlings germinate on soil surface after several days of continuous flooding.



Figure 12. Starfruit identification from seedling to maturity. Photos: John Broster & Allison Chambers (CSU).

## Water plantain



### WATER PLANTAIN

Water plantain is closely related to *Alisma*, but has broader leaves with seven prominent parallel veins, connected by numerous transverse veins. Leaves are attached to a long stem it reproduces from both seeds and corms. Seeds are spread in irrigation water on machinery and by birds.

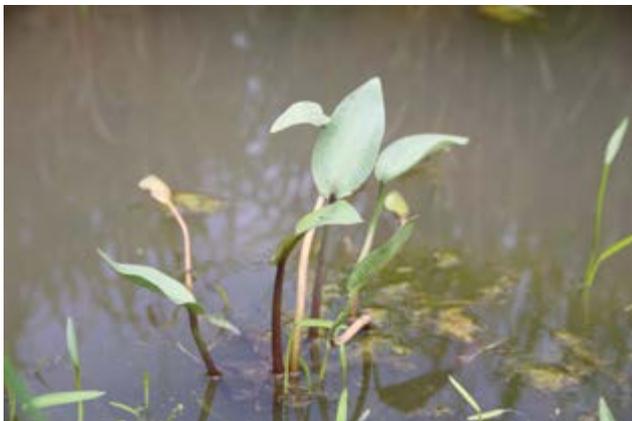


Figure 13. Water plantain identification from seedling to maturity. Photos: John Broster & Allison Chambers(CSU).

## Leafminer



Figure 14. Leafminer symptoms in rice (top and centre).  
Photos: David Troidahl; and pupae on rice plants (bottom). Photos: Glen Warren.

# Drill-sown programs

## Drill-sown herbicide resistance management programs

Grass weed control in the paddock over the previous 18 months and during fallow is essential to minimise grass weeds in the crop. This is even more important if considering a delayed permanent water crop. There are 5 drill-sown herbicide programs. The first 3 are based on Ordram®. The number in brackets after each herbicide signifies the mode of action group to which the herbicide belongs.

**Program 1** Gramoxone® (22) followed by Saturn® (15) with Stam® (5) followed by Ordram® (15) Apply this backup treatment when the weeds are small as control will be difficult once tillering has started.

**Program 2** Gramoxone® (22) followed by Ordram® (15)

**Program 3** Gramoxone® (22) followed by Magister® (13) followed by Ordram® (15)

**Program 4 Recommended program for drill-sown rice:** tank mixture of Gramoxone® (22) mixed with Magister® (13) and Stomp® (3) all applied post sowing to pre-rice emergence. The post-emergent backup program for each of the aquatic weeds would include MCPA (Group 4) or Basagran® M60 (Group 5/4) to provide 2 modes of action.

**Program 5** Tank mixture of Stam® (5) Magister® (13) and Stomp® (3) all applied post sowing, but where rice has emerged.

Aura® (dim) is an option for a post-emergent grass weed control backup treatment using another mode of action (Group 1). Agixa® (arylpicolinate + fop) is another option and is both a Group 1 and Group 4 mode of action. These backup treatments need to be when the weeds are small as control will be difficult once tillering has started.

When using Program 4 and Program 5 and intending to extend the residual weed control before flood (delayed permanent water), monitor crops carefully after 14 days. New grass weed germinations will need to be treated with appropriate herbicides that could include: Stam® alone, Stam® and Saturn®, Stam® and Stomp®, Stam® and Magister® or Agixa® or Aura®.

Some herbicides e.g. Stomp® and Saturn® will bind with organic matter and ash left on the surface, reducing efficacy.

When using a program including Magister®, do not use drainage water on corn or other sensitive crops.

### NOTE

See tables 9 and 10 on pages 31–33.



Figure 15. Drill sowing rice. Photo: Vince Bucello.

Table 9. Control options for major weeds in drill-sown rice (to be read in conjunction with Table 10). **Always read the label before use.**

The brown letter in brackets after the chemical rate in this table (i.e. a to s) refers to the appropriate part of the column headed 'Application: comments in Table 10 (pp. 32 and 33). Rates of product are in L/ha unless otherwise indicated.

Weed stage	Rice stage	glyphosate 450 g/L Roundup® CT	glyphosate 570 g/L Roundup Ultra® MAX	paraquat 135 g/L diquat 115 g/L SpraySeed® 250	paraquat 250 g/L Gramoxone® 250	molinate 960 g/L Ordram®	thiobencarb 800 g/L Saturn® EC	clomazone 480 g/L Magister®	propanil 480 g/L Stam®	pendimethalin 440 g/L Stomp® 440	cyhalofop butyl 160 g/L + floryprauxifen-benzyl 12 g/L Agixa® (requires Uptake®)	profoxydim 200 g/L Aura® (requires Supercharge®)	dicamba 500 g/L Kamba® 500
<b>Annual winter pasture</b>													
6–8 cm	1–14 days pre-sowing	0.8–1 a	0.795–0.95 b										
well grazed	pre or post sowing before rice emerges			1.6–3.2 c									
<b>barnyard grass</b>													
1–3 leaf	pre-emergence			1.7–2.2 e	0.8–1.6 d								
1–4 leaf	up to early tillering					3.75 f							
0–3 leaf	up to early tillering						5 g						
0–5 leaf	up to early tillering						5 + Stam® h						
0–4 leaf	pre-sow							0.5–0.6 + paraquat j					
0–4 leaf	post sowing to rice emergence							0.5–0.6 + Stam® k	7.5 + clomazone k				
1–2 leaf	0–4 leaf							0.6 l					
2–3 up to 5 leaf	evenly germinated								7.5–12.5 m				
1–3 leaf	after 1st flush before rice emergence				0.8 + Stomp® n					3.4 + paraquat n			
0–3 leaf	after 1st flush before rice emergence				0.8 + clomazone & Stomp® o			0.4 + Stomp® & paraquat o		3.4 + clomazone & paraquat o			
0–3 leaf	after 1st flush where rice has emerged							0.4 + Stomp® & Stam® s	3.75 + Stomp® & Magister® s	3.4 + Magister® & Stam® s			
5 leaf	1–2 leaf to late tillering												
1–2 tillers	3-leaf to pre panical initiation										2 p		
past 5-leaf	1–2 leaf minimum					up to 5.2 L/ha							
<b>silvertop grass</b>													
0–4 leaf	pre-sow							0.5–0.6 + paraquat j					
0–4 leaf	post sowing to rice emergence							0.5–0.6 + Stam® k	7.5 + clomazone k				
1–2 leaf	0–4 leaf							0.6 l					
2–3 up to 5-leaf	evenly germinated								7.5–12.5 m				
0–3 leaf	after 1st flush before rice emergence				0.8 + clomazone & Stomp® o			0.4 + Stomp® & paraquat o		3.4 + clomazone & paraquat o			
0–3 leaf	after 1st flush where rice has emerged							0.4 + Stomp® & Stam® s	3.75 + Stomp® & Magister® s	3.4 + Magister® & Stam® s			
3–5 leaf	1–2 leaf to late tillering												
1–2 tillers	1–2 leaf to late tillering												
2 leaf–6 tillers	min 3 leaf										2 p	375 mL q	
<b>docks</b>													
small to large	seedling–early tillering												0.4–0.56 r

Table 10. Weed control options and herbicide combination options in drill-sown rice (page 1 of 2). **Always read the label before use.** The letter in brown below (i.e. a to r) refers to the brown letter in Table 9 to be read in conjunction.

Weed stage	Rice stage	Herbicide	Rate/ha	Application: comments
<b>Annual winter pasture for sodseeding rice (annual ryegrass, barley grass, subterranean clover, annual medic)</b>				
6–8 cm high and actively growing	1–14 days before sowing	glyphosate 450 g/L e.g. Roundup® CT, Glyphosate 450	0.8–1 L	(a) Use higher rate where annual ryegrass is dominant. For subterranean clover dominant pastures, or where improved clover/medic control is required, add dicamba 0.5 L/ha.
6–8 cm high and actively growing	1–14 days before sowing	glyphosate 570 g/L e.g. Roundup®, Ultra® MAX	0.795–0.95 L	(b) Note: Other glyphosate products containing different amounts of the active herbicide will require different rates: <b>Read the label.</b>
well-grazed, actively growing	Just before to just after sowing but before rice emerges	paraquat 135 g/L + diquat 115 g/L e.g. Spray.Seed® 250	2.2 L (1.6–3.2 L)	(c) Allow up to one week for pasture re-greening. For clover dominant pastures add dicamba 0.5 L/ha. Up to 3.2 L/ha may be required for ungrazed pastures.
<b>Barnyard grass, <i>Echinochloa</i> spp.</b>				
1–3-leaf	pre-sow to pre-emergence	paraquat 250 g/L e.g. Gramoxone® 250	0.8–1.6 L	(d) Ideally spray to knockdown barnyard grass seedlings before rice is sown or emerges. Spraying when rice has up to 50% coleoptile emergence may be justified to avoid large, advanced grass seedlings at the permanent water stage.
1–3-leaf	sowing to pre-emergence	paraquat 135 g/L + diquat 115 g/L e.g. Spray.Seed® 250	1.7–2.2 L	(e) Note: A permanent water stage application of a rice herbicide will still be necessary to control subsequent germinations of grass weeds.
1–4-leaf	seedling to early tillering	mollinate 960 g/L Ordram®	3.75 L	(f) Apply to permanent water by aircraft. <b>Note:</b> Will also control silvertop grass if applied up to the 2-leaf stage.
0–3-leaf	pre-emergent to early tillering	thiobencarb 800 g/L Saturm® EC	5 L	(g) Apply to drill or pasture sodsown rice onto moist or dry soil surface before the last flushing if permanent water can be applied within 11 days of spray application. <b>Note:</b> Will also control dirty dora in the 0–2-leaf stage.
0–5-leaf	pre-emergent to early tillering	thiobencarb 800 g/L Saturm® EC	5 L	(h) Apply to drill or pasture sodsown rice onto moist or dry soil surface before the last flushing if permanent water can be applied within 11 days of spray application. Do not use this mix within 10 days of organophosphate insecticides.
		plus propanil Stam®	7.5 L to 8.5 L	(h) Works by direct contact with weeds. Drain field thoroughly before application and flood within 5 days of application. Only spray under ideal conditions, preferably with temperatures above 25 °C.
0–5-leaf	3-leaf to pre-panicle initiation	cyhalofop-butyl 160 g/L + florpyrauxifen-benzyl 12 g/L Agixa®	2 L/ha plus 1–2 L/ha Uptake® spraying oi	(i) For best results with Agixa®, water must be at least 1–2 cm deep in fields at spraying to ensure active weeds growth. Start reflooding after 2 hours and fill the field as soon as possible to limit new weed germination and maximise weed control. DO NOT treat weeds if mud, cracks, or firm soil have appeared throughout fields before treatment, as poor control will result due to moisture stress. Only treat small seedling weeds that are actively growing. Weeds larger than 5-leaf will not be controlled.'
<b>Barnyard grass, <i>Echinochloa</i> spp.; silvertop grass, <i>Leptochloa fusca</i></b>				
Up–4-leaf	pre-sow	clomazone 480 g/L Magister® plus	0.5–0.6 L	(j) Apply to dry soil after the first flush but before crop emergence. A second flush or rainfall is needed within 5 days to activate the Magister®. Permanent water needs to be applied within 2 weeks of application to minimise the likelihood of barnyard grass late germinations. Apply by ground using a flat fan nozzles, which produces medium to coarse droplets to minimise off-target movement. After permanent water re-treat with an alternative product if required.
		paraquat Gramoxone®	0.8 L	
Up–4-leaf	after sowing to emerged rice	clomazone 480 g/L Magister® plus propanil Stam®	0.5–0.6 L 7.5 L	(k) Apply to dry soil to emerged rice then allow 1-5 days between application and permanent water. Fully submerge barnyard grass with permanent water for 3 days before allowing flood levels to subside. Only suppression control for silvertop grass. Do not apply to Illabong. Apply by ground using flat fan nozzles, which produce medium to coarse droplets to minimise risk of off-target movement.
Up–2-leaf	up to 4-leaf	clomazone Magister®	0.6 L	(l) Apply as a drip at inundation to permanent water using a constant head siphon; to permanent water by fixed-wing aircraft with a Bickley boom; by dripper (SCWIIRT) using a tractor or 4-wheel agbike. Water movement must cease for 3 days after application. Silvertop grass suppression only. Not on Illabong.
2–3-leaf up to 5-leaf	evenly germinated rice	propanil 480 g/L Stam®	7.5–8.5 L up to 12.5 L	(m) Propanil is a contact herbicide. Apply 12.5 L/ha for 4–5-leaf barnyard grass ( <b>See comments for aerial sowing</b> ).
Up to 3-leaf barnyard grass, silvertop grass and sedges	after the first flush but before rice emergence	Tank mix: pendimethalin 440 g/L Stomp® 440 plus	3.4 L	(n) Apply after the first flushing and ensure the soil surface is sealed by the flushing or rainfall before application. Apply a second flush or permanent water after 2 days but not later than 5 days after applying Stomp® 440 EC. Use the higher rate when sodseeding into pasture for annual sedge control or if more than 10 days is expected between treatment and permanent water. Do not apply to weakened rice.
		paraquat 250 g/L, Gramoxone® 250	0.8 L	

Table 10. Weed control options and herbicide combination options in drill-sown rice (page 2 of 2).

Weed stage	Rice stage	Herbicide	Rate/ha	Application: comments
Up to 3-leaf	after the first flush but before rice emerges	Tank mix: <b>clomazone</b> Magister®	0.4 L	(o) Apply after the first flushing and ensure the soil surface is sealed by the flushing or rainfall before application. Not on Illabong.
		plus <b>pendimethalin</b> Stomp® 440	3.4 L	
		plus <b>paraquat</b> 250 g/L Gramoxone® 250	0.8 L	Preferred option for drill-sown rice
	after first flush but rice has emerged	Tank mix: <b>clomazone</b> Magister®	0.4 L	(s) Apply after the first flushing and ensure the soil surface is sealed by the flushing or rainfall before application. Not on Illabong. Option for early weed control when rice has emerged before herbicide application. This lower rate of Stam® is on the Stomp® label and can only be used when mixing with Stomp®.
plus <b>pendimethalin</b> Stomp® 440	3.4 L			
plus <b>propanil</b> Stam®	3.75L			
<b>Barnyard grass, <i>Echinochloa</i> spp.; silvertop grass, <i>Leptochloa fusca</i></b>				
0–5-leaf	3-leaf to pre-panicle initiation	<b>cyhalofop-butyl</b> 160 g/L + <b>florpyrauxifen-benzyl</b> 12 g/L Agixa®	2 L plus 1–2 L/ha Uptake spraying oil, Hasten™ or Loveland Products MSO	(p) Apply after flooding by fixed-wing aircraft, helicopter or boom sprayer to partially drained fields ensuring there is still 1–2 cm water depth to ensure active growth and at least 75% of weed foliage is exposed to the spray. Works by direct contact with weeds. Re-flood after 2 hours and fill as soon as possible to limit germination of new weeds. If it is applied pre-flood, it is recommended the bays are flushed immediately before and after Agixa® application to ensure weeds are not stressed at the time of application. Results might be more variable when not applied in permanent water.
2-leaf–6 tiller	3-leaf minimum	<b>profoxydim</b> 200 g/L Aura®	375 mL plus 1 L/100 L Supercharge®	(q) Apply by aircraft, helicopter or ground boom to partially drained bays containing 1–2 cm water onto actively growing weeds with sufficient foliage exposed for adequate coverage. Re-flood after 2 hours and fill as soon as possible to limit germination of new weeds and maximise weed control. Avoid treating dense weed populations and preferably apply Aura® after a foundation herbicide effective on the target weed. If Aura® is applied pre-flood, it is important to ensure weeds are not dry stressed before application, which could reduce the level of weed control. After application apply sufficient water to cover.
Past 5 leaf	1–2 leaf minimum	<b>molinate</b> 960 g/L Ordram®	up to 5.2 L/hr	(s) Salvage control of barnyard grass: After rice emergence and where the barnyard grass is past the 5-leaf stage and up to the early tillering stage, useful suppression or partial control can be achieved by increasing the rate of barnyard grass herbicide. Good water coverage of weed growth after spray application will assist weed suppression. For Ordram®: Increase rates up to 5.2 L/ha. Avoid spray overlap as some crop injury might occur.
<b>Docks, <i>Rumex</i> spp.</b>				
small to large plants	seedling to early tillering	<b>dicamba</b> 500 g/L	0.4–0.56 L	(r) Dicamba needs to contact the leaves. Apply before permanent water. Can be applied after permanent water if water is lowered to expose dock plants.

Table 11. Recommended chemical programs for drill-sown rice – costs. **Always read the label before use.**

Drill sown programs	Chemical	Rate L/ha or g/ha	\$/L or \$/g	\$/ha	Fixed wing aerial application	Total program cost (\$/ha)	
<b>Program 1:</b>							
Pre rice emergence.	Gramoxone®	0.8	6.32	5			
Prior to last flush.	Saturn®	5	28.56	143			
Only spray if temperature is above 25 °C	Stam®	7.5	11.33	85			
Apply to permanent water by aircraft.	Ordram®	3.75	39.71	149	25	407	
<b>Program 2: For paddocks with good grass weed control</b>							
Pre rice emergence.	Gramoxone®	0.8	6.32	5			
Apply to permanent water by aircraft.	Ordram®	3.75	39.71	149	25	179	
<b>Program 3:</b>							
Pre rice emergence	Gramoxone®	0.8	6.32	5			
Apply to permanent water by aircraft.	Magister®	0.5	67.28	34			
	Ordram®	3.75	39.71	149	25	213	
<b>Program 4:</b>							
Pre rice emergence.	Gramoxone®	0.8	6.32	5			
	Magister®	0.5	67.28	34			
	Stomp®	3.4	14.94	51		89	
<b>Program 5: Post rice emerging</b>							
Only spray if temperature is above 25 °C	Stam®	3.75	11.33	42			
This lower rate of Stam® can only be used if mixed with Stomp®.	Magister®	0.5	67.28	34			
	Stomp®	2.25	14.94	34		110	
<b>All programs may need a backup spray</b>							
Backup spray using secondary mode of action.	Agixa®	2	91.06	182	25	207	
	Aura®	0.375	489.60	184	25	209	
	35 days	MCPA 750	0.485	10.05	5	25	30
	45 days	MCPA 750	0.97	10.05	10	25	35
		Basagran® M60	2.5	27.55	69	25	94
		Gulliver®	40	2.00	80	25	105

**Note:** Indicative costs only. Prices are average retail (excluding GST), from resellers in the Murrumbidgee and Murray Valley, as at August 2024. They are to be used as guide only. Prices will vary depending on location, availability and quantity purchased.

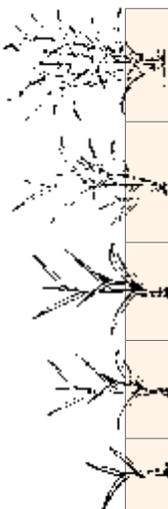
Table 12. Timing of herbicide applications for resistance management programs for drill-sown rice. Always read the label before use.

Program	Number of modes of action per weed		pre sowing seed flush	coleoptile	1 leaf	2 leaf	3-4 leaf	1st tiller	early tiller	mid tillering	panicle initiation	
	DD	SF										AH
<p><b>Program 1:</b> Gramoxone®, Saturn® plus Stam® followed by Ordram®</p> <ul style="list-style-type: none"> <li>Spray Gramoxone® to knockdown barnyard grass seedlings before rice is sown or after the first flush before rice emergence.</li> <li>Apply Saturn®EC to rice before last flush. Best if permanent water can be applied within 11 days of spray application.</li> <li>Stam®. Only spray under ideal conditions, preferably with temperatures above 25 °C. Do apply within 10 days of organophosphate insecticides.</li> <li>Apply Ordram® to permanent water by aircraft using closed supply and delivery systems.</li> <li>Water movement into and between bays should stop 2 hours before applying Ordram® and for 3 days after application.</li> <li>Ordram® will control silvertop grass up to the 2-leaf stage.</li> </ul> <p><b>Program 2:</b> Gramoxone® with Ordram®</p> <ul style="list-style-type: none"> <li>This program is designed for paddocks with good grass weed control before the rice crop.</li> <li>Gramoxone® and Ordram® comments as above.</li> </ul> <p><b>Program 3:</b> Gramoxone® tank mixed with Magister® followed by Ordram®</p> <ul style="list-style-type: none"> <li>Apply Gramoxone® and Magister® after first flush before crop emergence.</li> <li>A flush is needed within 5 days of application to activate the Magister®. Permanent water needs to be applied within 2-3 weeks of application to minimise the likelihood of late germinations of barnyard grass.</li> <li>Magister® will only suppress silvertop grass and can cause transient bleaching of rice.</li> <li>Prevent water movement for at least 3 days after treatment with Magister®.</li> <li>Do not apply Magister® to rice variety Illabong.</li> <li>Gramoxone® and Ordram® comments as above.</li> </ul> <p><b>Program 4:</b> Gramoxone® plus Magister® and Stomp® followed by Agixa® or Aura®</p> <ul style="list-style-type: none"> <li>Apply Gramoxone®, Magister® and Stomp® after first flush before crop emergence and ensure soil surface is sealed by flushing or rainfall before application.</li> <li>Gramoxone® and Magister® comments as above.</li> <li>Agixa® or Aura® might be needed to clean up escapes and provide another herbicide MOA for all grass weeds.</li> </ul> <p><b>Program 5:</b> Stam® plus Magister® and Stomp® followed by Agixa® or Aura®</p> <ul style="list-style-type: none"> <li>Apply Stam®, Magister® and Stomp® after first flush when crop has emerged and ensure soil surface is sealed by flushing or rainfall before application.</li> <li>Stam® and Magister® comments as above.</li> <li>Agixa® or Aura® might be needed to clean up escapes and provide another herbicide mode of action for all grass weeds.</li> </ul>	✓		✓	✓	✓✓✓	✓✓✓	Gramoxone® 0.8-1.6 L, pre sowing or before rice emergence	Saturn®EC @ 5 L plus Stam® @ 7.5-8.5 L applied to barnyard grass at 0-5 leaf stage	Ordram® 3.75 L @ permanent water			
	✓		✓	✓	✓✓	✓✓	Gramoxone® @ 0.8-1.6 L, pre sowing or before rice emergence			Ordram® 3.75 L @ permanent water		
			?	?	✓✓✓	✓✓✓	Gramoxone® @ 0.8 L with Magister® @ 0.6 L post sowing before rice emergence			Ordram® 3.75 L @ permanent water		
	✓	✓✓	✓	✓	✓✓✓✓	✓✓✓✓	Gramoxone® @ 0.8 L with Magister® @ 0.4 L plus Stomp® @ 3.4 L post sowing before rice emergence			Aura® 0.375 L post flooding		
	✓	✓✓	✓	✓	✓✓✓✓	✓✓✓✓				Agixa® 2 L 3-leaf to pre-panicle initiation		
	✓	✓✓	✓	✓	✓✓✓✓	✓✓✓✓				Stam® @ 3.75 L, Magister® @ 0.4 L and Stomp® @ 3.4 L post sowing post rice emergence.	Aura® 0.375 L post flooding	
											Agixa® 2 L 3-leaf to pre-panicle initiation	

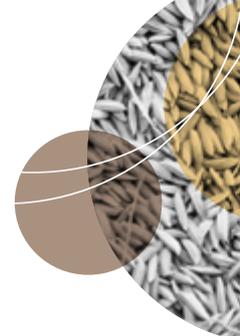
**KEY** ✓ – each mode of action per species is one tick ✓✓ – at least 2 ticks is desirable for sound resistance management of grass weeds.  
 ? A mode of action where the herbicide used may only suppress the weed or may not carry a label claim for control of that weed species.

**NOTE:** All of the drill-sown programs might need a second herbicide action for cleanups or escapes after permanent water. Agixa® or Aura® are ideal for grass escapes or cleanups.  
 Some drill-sown crops could have broadleaf weeds germinating before canopy closure and might need to be cleaned up by using one of the broadleaf weed control options for rice: Taipan®, MCPA or Basagran® M60.

**DD** – dirty dora, **SF** – starfruit, **AH** – arrowhead, **A** – alisma, **WP** – water plantain, **BYG** – barnyard grass



# Controlling invertebrate pests in rice



## Bloodworms (*Chironomus tepperi* and other species)

There are many different bloodworm species present in rice fields, and not all of them feed on rice. Identifying which species are present is not possible without specialised equipment, and this makes it impractical to provide density-based population thresholds to indicate when bloodworm treatment is required.

Bloodworms are one of the most consistent pest problems in aerial-sown rice crops. All aerial-sown crops should be treated for bloodworm at or immediately before sowing. Crops should be inspected regularly after treatment, and if there are signs of significant re-infestation and crop damage within 20 days of sowing, the affected crops should be re-treated by air. Crops are most vulnerable in the first 16 days after the bays are flooded since *C. tepperi* larvae are at their highest density during this period.

Bloodworms (Figure 16), can cause significant damage in drill-sown crops, however, this is fairly uncommon as the plants generally have well-developed secondary root systems by the time permanent water is applied. Drill-sown rice should be inspected regularly after permanent water and treated only if bloodworms are present in large numbers and plant root damage is evident.

Seed treatment with fipronil (e.g. Cosmos<sup>®</sup>, Emporium<sup>®</sup>) provides far better residual control than other registered seed treatments (maldison, trichlorfon), protecting plants for 9–14 days. If fipronil seed treatment is not available, the only alternative initial treatment recommended by the NSW Department of Primary Industries and Regional Development is chlorpyrifos, which should be applied by air (**not on seed**) the day **before** sowing. This treatment will provide 7–12 days protection under normal conditions, and is also recommended for use as a follow-up treatment when required.

Any crops sown with maldison seed treatments are likely to require a follow-up application of chlorpyrifos 5–7 days after sowing.

## Important updates on chemical control for bloodworms

The APVMA is phasing out chlorpyrifos. The final decision regarding its use will be made after September 2024. Chlorpyrifos (e.g. Strike-out<sup>®</sup>, Chlorban<sup>®</sup>) can be used for 12 months after the date of the [APVMA's final decision](#).

Laboratory trials have revealed alpha-cypermethrin (e.g., Dominex Duo<sup>®</sup>) is no longer effective as a control for bloodworms due to resistance development – this pesticide, although still available for use, is no longer recommended.

A minor use permit ([PER94721](#)) was obtained to use fipronil (Cosmos<sup>®</sup>) as an alternative to chlorpyrifos (Table 13 for more details). This permit is valid from 26 August 2024 till 30 August 2026. **NOTE:** The APVMA is reviewing fipronil and this pesticide might be removed from use at any time. Using fipronil as a direct spray has not been extensively tested and, as such, results can vary.

### GO TO PAGE

APVMA page on chlorpyrifos review (<https://www.apvma.gov.au/chemicals-and-products/chemical-review/listing/chlorpyrifos>)

PER94721 (<https://permits.apvma.gov.au/PER94721.PDF>)

Table 13. Chemicals for bloodworm control. **Always read the label before use.**

Pesticide	Rate	Method of application		Notes
		to seed at aerial sowing	by air to flooded bays	
fipronil 500 g/L, e.g. Cosmos <sup>®</sup> , Emporium <sup>®</sup>	20 mL/100 kg of seed or 25 mL/ha	Yes	No	Will provide 9–14 days residual control of target species.
fipronil 500 g/L, e.g. Cosmos <sup>®</sup>	25mL/ha	No	Yes	Application is via SCWIIRT or bicklev boom only. This should supply 9 days of control – this has not been tested extensively in the field. Results can vary. Minor use permit only ( <a href="#">PER94721</a> ) valid until 30 August 2026.
alpha-cypermethrin 100 g/L, e.g. Dominex Duo <sup>®</sup> , Astound Duo <sup>®</sup>	100 mL/ha	No	Yes	Unlikely to provide satisfactory control of target species
alpha-cypermethrin 300 g/L, e.g. Alpha-Scud <sup>®</sup> , Alpha Omega <sup>®</sup>	35 mL/ha	No	Yes	Unlikely to provide satisfactory control of target species
maldison 440 g/L, Fyfanon <sup>®</sup>	680 mL/ha	No	Yes	Will provide 5–7 days control.
maldison 1000 g/L, Fyfanon <sup>®</sup>	300 mL/ha	Yes	Yes	Will provide 5–7 days control.
maldison 1150 g/L, Hy-mal <sup>®</sup>	260 mL/ha	Yes	Yes	Will provide 5–7 days control.
chlorpyrifos 500 g/L, e.g. Chlorban <sup>®</sup> , Strike-out <sup>®</sup>	60 mL/ha or 150 mL/ha	No	Yes	Use maximum rate where water is more than 15 cm deep or amount of decaying plant material is high. Will provide 7–12 days residual control of target species.
trichlorfon 500 g/L, e.g. Dipterex <sup>®</sup> , Lepidex <sup>®</sup>	600 – 850 mL/ha	Yes (625 mL/ha)	Yes	Use higher rate where water is more than 8 cm deep or where the amount of decaying plant material is high.

The advice in 'Notes' is based on NSW DPIRD research.



Figure 16. Partially cleared bloodworms showing their conspicuous head capsules and abdominal appendages (see insets). Live bloodworms are much redder in colour. Length c.a. 20 mm.

### Leafminers (*Hydrellia michelae*)

Leafminers are the larvae of a small fly. The female fly lays eggs on the rice plant near the waterline, and the larvae burrow into the leaves, feeding, and ultimately pupating within the plant tissues. Affected leaves lie flat on the water, often developing pale areas around the point where the leafminer has been feeding (Figure 14 on page 29).

Larvae and pupae within the plant can usually be detected by feeling for irregularities in the leaves or examining suspect leaves in front of a strong light. Damage is more severe in deep water and during cold seasons, with plants generally being most susceptible during mid October to mid December. Thresholds listed below should be used as guidelines for determining if treatment is required.

Table 14. Damage thresholds for treating leafminer infestations.

A registered pesticide should be applied when the percentage of infested plants meets or exceeds the guideline values listed.

Seedling density (plants/m <sup>2</sup> )	% of plants infested
<80	Treat if >5%
80 to 120	Treat if >10%
>120	Treat if >20%

### Common armyworm (*Mythimna convecta*) and sugarcane armyworm (*Leucania stenographa*)

Armyworms are the caterpillars of noctuid moths, and 2 native armyworm species are now known to occur in NSW rice crops. Whilst the adult moths are distinctive, the caterpillars of the 2 species look identical. Armyworms may require chemical control at any stage from tillering through to harvest. Care must be taken to ensure that the correct withholding periods are observed before harvest to ensure no chemical residues are present in the grain. At present, the registered withholding periods for maldison, trichlorfon, alpha-cypermethrin and chlorpyrifos are one, 2, 7 and 10 days respectively. It is suggested, however, that growers voluntarily observe the following increased withholding periods in order to provide an even greater margin of safety:

- maldison 8 days minimum between treatment and harvest
- trichlorfon 12 days minimum between treatment and harvest
- alpha-cypermethrin 20 days minimum between treatment and harvest
- chlorpyrifos 25 days minimum between treatment and harvest

Growers considering treating for armyworms within 20 days of harvest should consult their agronomist to ensure that the level of infestation justifies the treatment cost.



Figure 17. Armyworm and armyworm damage. Photos: Rice extension.

The following treatment thresholds are based on data from overseas species and on the results of a survey of experienced NSW rice agronomists. Damage thresholds for *M. convecta* on Australian rice varieties have not yet been developed experimentally; these thresholds should be considered as a guide only.

Table 15. Damage thresholds for treating armyworm infestations.

A registered pesticide should be applied when armyworm populations meet or exceed threshold levels.

Crop stage	Treat if pest density exceeds:
Panicles not exposed	8 armyworm/m <sup>2</sup>
Panicles exposed – more than 2 weeks to harvest	10 armyworm/m <sup>2</sup>
Panicles exposed – less than 2 weeks to harvest	12 armyworm/m <sup>2</sup>

### Sampling and assessing armyworm infestations

When armyworms are found, it is important to systematically assess infestations by sampling in diagonal transects across the bays before deciding whether treatment is warranted. Estimates of armyworm densities can be made by using a 'beatsheet' or sampling tray and hitting or shaking the foliage to make the armyworm drop onto the sheet or tray where they can be counted. Alternatively, armyworms dislodged from the foliage can be counted whilst floating on the water surface. A wire frame either 0.5 m<sup>2</sup> or 1 m<sup>2</sup> can be easily made out of fencing wire and used to delimit an area for each sample. At least 8 samples should be taken along each of 2 transects for each bay. No samples should be taken within 3 m of the crop edge, and no more than 2 samples should be closer than 8 m to the crop edge. The average count should be adjusted to an armyworms/m<sup>2</sup> value, and a decision whether or not to spray should be based on the threshold values provided. Further information is available in the NSW DPIRD Primefact *Armyworms in rice*.

### Snails (*Isidorella newcombi*)

Snail infestations occur in most rice crops each season, however not all snail species will attack the crop. Infestations occurring after mid-late December are unlikely to cause significant damage regardless of the snail species involved. *Isidorella newcombi* is the most common snail species associated with crop damage. *Isidorella* is capable of surviving in dry soil by entering dormancy, leading to serious problems in fields sown to rice for a second consecutive year. The snails cannot survive the period between rice crops if summer crop rotations are used – a single summer fallow is enough to eliminate dormant populations provided the soil is not waterlogged.

Snails can remain dormant in dry channel banks as well as in fields, so if crop rotations are used to minimise snail infestations it is important that on-farm supply channels be kept as dry as possible between crops.

Copper sulphate (bluestone) is registered for rice snail control, however, growers need to be aware that the 2 registered brands of copper sulphate, Snailblitz<sup>®</sup> and Grochem<sup>®</sup>, have different maximum application rates (see Table 16 on page 38).

#### GOTO PAGE

*Armyworms in rice*  
<https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice/armyworms>

## Update regarding chemical control of rice snails.

A minor-use permit for niclosamide (Efface®) has been obtained (PER93840). This permit is valid until 28 February 2025

**NOTE:** In order to be effective the application of Efface® requires the addition of a spray adjuvant. There are two options for this BS1000® and Hasten®, DO NOT use Hasten® as this will reduce the effectiveness of Efface®.

Table 16. Chemicals for leafminer, snail and armyworm control. **Always read the label before use.**

Pest	Crop stage	Pesticide	Rate per hectare	Notes
Leafminers – <i>Hydrellia michelae</i>	Seedlings above permanent water	trichlorfon 500 g/L, e.g. Dipterex®, Lepidex®	850 mL	
Snails – <i>Isidorella newcombi</i>	Seedlings to late tillering	copper sulphate pentahydrate (bluestone) 250 g/kg copper, Snailblitz®, Grochem®	6–12 kg (Snailblitz®) 6–10 kg (Grochem®)	Use higher rates for deep water and/or high organic matter levels.
	Apply within 28 days of aerial sowing or 14 days of drill sowing after flooding.	niclosamide 250 g/L Efface® 250EC plus adjuvant BS1000®	1 L to 1.5 L (Efface®) 100 mL to 200 mL (BS1000®)	APVMA minor use permit PER94380 valid until 28/02/2025. Use higher rates for deeper water. Maximum water depth is 10cm.
Armyworms – <i>Mythimna convecta</i> and <i>Leucania stenographa</i>	Generally flowering to harvest	trichlorfon 500 g/L, e.g. Dipterex®, Lepidex®	1200 mL	
		maldison 440 g/L, Fyfanon®	1800 mL	
		maldison 1169 g/L, Fyfanon ULV®	700 mL	
		chlorpyrifos 500 g/L, e.g. Chlorban®, Strike-out®	700 mL to/or 900 mL	Use higher rate if caterpillars are more than 15 mm in length.
		Alpha-cypermethrin 100 g/L, e.g. Dominex Duo®, Astound Duo®	200 mL	
		Alpha-cypermethrin 250 g/L, e.g. Alpha-Duo®, Alphanex®	80 mL	
		Alpha-cypermethrin 300 g/L, e.g. Alpha Omega®	70 mL	
		Alpha-cypermethrin 400 g/L, e.g. Ellias Plus®	53 mL	

Higher rates within the registered ranges are recommended for use in deeper water or where large amounts of organic matter are present. Whilst copper sulphate is effective against immature and adult snails, it has no significant effect on snail eggs, and as a consequence a second application might be required.

This information should be used as a guide only – always read product labels to ensure that the proposed use conforms to a registered use pattern.

**Growers should also be aware that the APVMA is currently reviewing some of the insecticides used on rice. The results of these reviews might affect the future availability of these chemicals.**

Other commercial products may also be registered for particular uses. Interstate growers in particular should check labels to ensure that product registrations mentioned here are valid in their own state.

For more information

*Armyworms in rice* NSW DPIRD Primefact

*Managing drill-sown rice* NSW DPIRD Factsheet

*Rice Extension* web page

*Rice field guide to pests, diseases and weeds in southern NSW*

### GOTO PAGES

#### *Armyworms in rice*

Primefact (<https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice/armyworms>)

*Rice Extension* (<https://www.riceextension.au/>)

#### *Rice field guide to pests, diseases and weeds in southern NSW*

(<https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice-development-guides/field-guide>)

#### *Managing drill sown rice*

Primefact (<https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice-agronomy/drill-sown>)

*APVMA website* (<https://portal.apvma.gov.au/permits>)

Rice crop protection guide 2024–25

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