

GROUP A HERBICIDES IN FALLOW FACT SHEET



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Using Group A herbicides to control grass weeds in fallow

With the increasing frequency of glyphosate resistance, growers require alternative solutions to control grass weeds in fallow. The use of Group A herbicides in fallow to control grass weeds such as the Chloris species – feathertop Rhodes grass (*Chloris virgata*) and windmill grass (*Chloris truncata*) – have shown to be a viable option for controlling young weeds. However, Group A herbicides have a high frequency of resistant individuals in unselected populations, so will quickly develop resistance if survivors are not controlled.

KEY POINTS

- Target weeds up to the early tillering growth stage only.
- Ensure weeds are fresh and actively growing.
- Medium to medium-coarse droplet spectrum. Minimum water rates of 50 to 70L/ha; higher water rates should be considered in heavy stubble conditions.
- One application per fallow, targeted at the main spring flush.
- Always follow up with a double knock after approximately seven days. Ensure all survivors are controlled.
- Apply the second spray in a double-knock program in the opposite direction to the first.
- Avoid tank mixing where possible. Consider adding required tank mix herbicides to the second knock.

Correct identification of grasses in the seedling stage – (left) liverseed grass, (right) barnyard grass – combined with early application of a double-knock strategy, can achieve consistent and effective results.



TABLE 1 Sub-groups of Group A herbicides.

Sub-groups	Examples
Aryloxyphenoxypropionates (fops)	Clodinafop (e.g. Topik [®]), diclofop (various), fenoxaprop (e.g. Foxtrot [®]), fluazifop (e.g. Fusilade [®]), haloxyfop (e.g. Verdict [®]), propaquizafop (e.g. Shogun [®]), quizalofop (e.g. Targa [®])
Cyclohexanediones (dims)	Butroxydim (e.g. Factor [®]), clethodim (e.g. Select [®]), tralkoxydim (e.g. Achieve [®])
Phenylpyrazoles (dens)	Pinoxaden (e.g. Axial [®])

Growers using Group A herbicides in fallow need to understand how to best use these herbicides to achieve consistent high level performance, while prolonging the effective life of this mode of action by avoiding resistance development.

Mode of action

Group A herbicides work by inhibiting acetyl coenzyme A carboxylase (ACCase), an important enzyme in the synthesis of certain fatty acids used

in the construction of cell membranes and waxy cuticle. Without this enzyme, growth is prevented. The ACCase enzyme is primarily found in the chloroplasts of the leaf, particularly in young, growing meristematic tissue at the base of young leaves and the crown of the plant.

For this reason, application is most effective when targeted at young grass weeds, up to early tillering.

As weeds become more advanced and move into a reproductive phase,

ACCCase production declines and therefore so does herbicide efficacy.

In Australia, there are three sub-groups of Group A herbicides. Table 1 (page 1) shows examples of herbicides from these sub-groups.

Product registrations and permits

Recent research has investigated the use of some of these herbicides for fallow applications to control grass weeds, in particular the *Chloris* species – feathertop Rhodes grass (*Chloris virgata*) and windmill grass (*C. truncata*).

Not all of the Group A herbicides have been tested against grass weeds in fallow situations, so only follow advice when registrations become available on product labels; or where there are Australian Pesticides and Veterinary Medicines Authority (APVMA) permits issued for approved use situations.

Shogun® Herbicide (100g/L propaquizafop) is registered for control of feathertop Rhodes grass in fallow situations. It should be applied to small, actively growing weeds from 3-leaf to early tillering at 500 mL/ha in combination with an adjuvant such as Kwickin® or Hasten® at 500 mL/100L water. All applications in fallow must be followed by an application of a minimum of 1.6L/ha Spraytop® 250SL (paraquat) within seven to 14 days. **DO NOT** plant cereal crops for a period of 28 days

after application of Shogun®.

Two current permits allow the use of certain Group A herbicides in fallow situations to control selected grass weeds. Growers wishing to use herbicides in these use situations should obtain a copy of the complete permit and follow all use directions on the APVMA website (<https://portal.apvma.gov.au/permits>). Table 2 provides a summary of these permits.

Resistance management

Resistance to Group A herbicides can develop in as few as six seasons, when survivors are not controlled and their seed is allowed to return to the weed seedbank.

For this reason, all applications of Group A herbicides applied in fallow must achieve a very high level of control, with no survivors being allowed to set seed and return the seed to soil.

To achieve this, growers should always use the maximum allowed application rate, and follow the Group A application with a double knock – for example cultivation or a robust rate of paraquat (Group L) applied approximately 7 days later – to control any survivors. More than one application of a Group A herbicide to the same paddock in the same fallow is not recommended. The best use of this targeted application is to direct it at the major spring weed flush.



Group A herbicides can be an effective control for weeds such as feathertop Rhodes grass.

Efficacy

When used in fallow, the lack of competition from a competitive crop will likely result in a lower performance, compared to an in-crop application of the same herbicide rate.

Delaying application until weeds are in the late tillering to seed head initiation stage will lead to reduced control and will often allow survivors to set seed. A series of trials conducted by the GRDC's Central Queensland Grower Solutions Project in 2011-12 measured the control of feathertop Rhodes grass in fallow (Figure 1). This demonstrated the importance of weed size on the performance of Group A herbicides. Across trials, mixed weed sizes were present that allowed for a comparison to be made under similar applications and a range of environmental conditions.

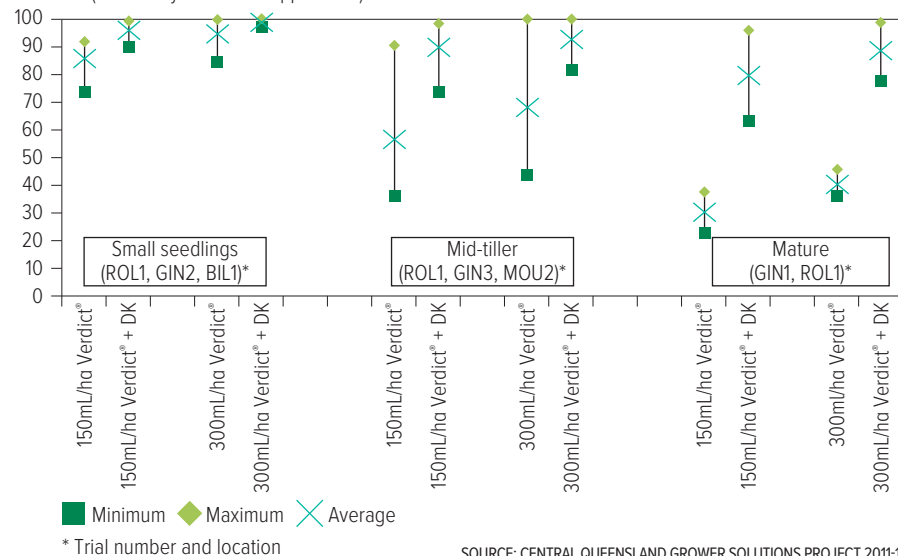
As can be seen from this analysis, no treatment consistently gave 100% control. However, these results clearly demonstrate the importance of weed size. Only applications made to small

TABLE 2 Summary of two current permits allowing for the use of selected Group A herbicides in fallow situations to control selected grass weeds.

Permit	Requirements
PER13460 Expires 31 March 2022	<ul style="list-style-type: none"> NSW only. Control of windmill grass in fallow situations with quizalofop-P-ethyl. Use rate: 250-500mL/ha of a 200g/L formulation (e.g. TargaBolt®) or 500mL to 1 L/ha of a 99.5g/L or 100g/L formulation, which must be followed by a minimum of 1.6L/ha paraquat 250g/L within 7 days. Follow relevant label directions for addition of adjuvant to spray solution. Minimum spray volume of 70L/ha. Three-leaf to early tiller growth stage. Only one application per season. Do not apply to stressed weeds. Do not graze or cut for stockfeed for 4 weeks after application.
PER12941 Expires 31 July 2024	<ul style="list-style-type: none"> Queensland only. Control of feathertop Rhodes grass in fallow situations with haloxyfop-R-methyl prior to planting mungbeans. Use rate: 150-300mL/ha of a 520g/L formulation (e.g. Verdict® 520) + Uptake® at 500mL/100L which must be followed by a minimum of 1.6L/ha paraquat 250g/L within 7-14 days. Minimum spray volume of 50-150L/ha by ground application or 30L/ha by air. Three-leaf to early tiller growth stage. Only one application per season. Do not apply to stressed weeds.

FIGURE 1 Control of feathertop Rhodes grass at different weed growth stages at 150 and 300 mL/ha Verdict® followed by paraquat double knock (DK).

% control (20-35 days after first application)



seedlings followed by a double knock (DK) of paraquat consistently achieved results above 90%.

For this reason, applications of Group A herbicides are recommended to be targeted at weeds in the 3-leaf to early tiller growth stage and be followed by a sequential double-knock application of paraquat.

Translocation

Translocation of Group A herbicides can be slow and somewhat limited; it is often several weeks before symptoms are observed. Translocation will be even slower on larger weeds and/or under less-than-ideal application conditions. Summer conditions in the northern region often result in extended periods where the soil surface dries out.

Many target grass weeds are shallow rooted and quickly become moisture stressed within days or weeks of a rainfall event. This further slows the rate of translocation, inhibiting the movement of the Group A herbicide in the plant. If the Group A herbicide is not effectively translocated to the meristematic regions of the weed (i.e. crown, base of the leaf, tips of the roots) then control will be unsatisfactory.

Application

Very good spray coverage is required to achieve consistent results with Group A herbicides.

SOURCE: CENTRAL QUEENSLAND GROWER SOLUTIONS PROJECT 2011-12

NOZZLE SELECTION

Use a medium to medium-coarse droplet spectrum. If using air-induction nozzles, the combination of an oil-based herbicide and oil adjuvant may lead to the formation of larger droplets, which may not be retained as well, particularly when operated at the lower end of their pressure range (i.e. towards very coarse spectrum). (See the video 'Applying Group A herbicides in fallow' in Useful Resources).

WATER RATES AND DEPOSITION

For Group A herbicides, spray volume should be a minimum of 50 to 70L/ha when targeting small weeds. Higher water rates are recommended when applying in high stubble loads. Ensure thorough coverage, including within the stubble line. The use of water-sensitive paper can provide a visual indication of the spray coverage achieved by your spray set-up.

TRAVEL SPEED AND DIRECTION

When traveling at speeds above approximately 20 kilometres per hour, typical spray set-ups will create forward momentum of the spray droplet after exiting the nozzle, which can lead to shading from stubble or other weeds. Techniques to minimise this effect include:

- use of increased spray volumes;
- reduce travel speed to below 20km/h;
- angling nozzles slightly to the rear; and

- when using double-knock applications required for Group A herbicides, make the second pass in the opposite direction, avoiding the same wheel track where possible.

DOUBLE-KNOCK TIMING

The timing of the second knock can greatly influence the final result of applications in fallow. Application of a following Group L herbicide (e.g. paraquat) will result in rapid weed desiccation and destruction of the vascular tissue within hours of application. This will curtail any further translocation of the Group A herbicide. Trial results have shown that a minimum period of 5 to 7 days should occur between applications.

If the second application is delayed longer than about 10 days, weeds may start to recover from the initial application. This places additional pressure on the paraquat and less effective weed control can result.

Tank mixing

Application of Group A herbicides in fallow is typically in situations where growers need to control difficult grass weeds, often those that are no longer susceptible to glyphosate. As control of these weeds is the primary objective, focus should be on ensuring the maximum performance on these grass weeds, in particular by maximising the performance of the first application in the double-knock strategy. This includes selecting a robust rate and timing application to small weeds that are actively growing. Any tank mixes that may reduce performance should also be avoided.

Group I herbicides, in particular 2,4-D and MCPA, are known to reduce the efficacy of Group A herbicides on grass weeds, so should be avoided. As a sequential application of paraquat is going to be required approximately 7 days later, use this application to control any broadleaf weeds.

Most Group A herbicides require the addition of an oil-based adjuvant to maximise performance. Follow label directions for individual herbicides. Most glyphosate herbicide labels contain a recommendation not to mix oil-based adjuvants with glyphosate because it may reduce herbicide performance on summer grass weeds. Therefore avoid adding glyphosate to the Group A + oil application where possible.

Rotational crops

Group A herbicides are typically considered to be post-emergent herbicides, entering the plant via foliar uptake. However, many Group A herbicides can persist in the soil with potential for residual impact on following monocot crops (e.g. cereals, sorghum or maize).

Current herbicide labels have been developed to support in-crop use patterns, so there is generally incomplete, short-term, plant back data for most herbicides, especially under northern climatic conditions and at the high use rates required for the control of *Chloris* species. For this reason, PER12941 for the use of haloxyfop specifically requires the sowing of mungbeans following an application in fallow.

Table 3 provides a summary of the currently available crop rotational recommendations as per registered labels (as at September 2019). Note that these rotational periods may need to be extended where application rates covered by the fallow permits are in excess of the use pattern on the current registered herbicide label.

PROJECT CODES

ICN00016, ICN1811-001SAX

MORE INFORMATION

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TABLE 3 Crop rotational recommendations as per registered labels (at September 2019).

Herbicide	Crop rotational constraints
Haloxyfop (e.g. Verdict®)	Cereal crops or grasses planted within 12 weeks of application may be damaged, particularly on light and red soils.
Propaquizafop (e.g. Shogun®)	Do not plant cereal crops for 4 weeks after application.
Quizalofop (e.g. Targa®)	Do not plant cereal crops into the treated area for 18 weeks after application.

RESOURCES

Effective double knock herbicide application Fact Sheet

www.grdc.com.au/GRDC-FS-DKHerbicide

Nozzle selection for boom, band and shielded spraying Back Pocket Guide

www.grdc.com.au/GRDC-BPG-NozzleSelection

Videos (Search by title in YouTube or enter URL):

Applying Group A herbicides in fallow

www.youtube.com/watch?v=ev75wYd1IRg&index=31&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W

Spray application of herbicides – Nozzle selection

www.youtube.com/watch?v=NjHa6zlfvbw&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W&index=32

Spray application of herbicides – Application volume in stubble

www.youtube.com/watch?v=nakSzTfYDg&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W&index=30

Spray application of herbicides – Spray deposition

www.youtube.com/watch?v=C9JEWjas26c&index=33&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W

Spray application of herbicides – Travel speed

www.youtube.com/watch?v=tosW4sLh_5Y&index=34&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W

Spray application of herbicides – Double knock

www.youtube.com/watch?v=z3LfmjzXNLs&list=PL2PndQdkNRHGripNhkDYN2dJWAY1-oH9W&index=36

Controlling feathertop Rhodes grass

https://www.youtube.com/watch?v=1uzPbGGkZAA&list=PL2PndQdkNRHGxgA3YBkhPgL8egQEO3fv_&index=1

Herbicide selection for feathertop Rhodes grass in fallow

https://www.youtube.com/watch?v=IXotXM8jBvU&list=PL2PndQdkNRHGxgA3YBkhPgL8egQEO3fv_&index=2

Group A herbicides in fallow

https://www.youtube.com/watch?v=QM2uUPWAEjA&list=PL2PndQdkNRHGxgA3YBkhPgL8egQEO3fv_&index=3

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