

Managing feathertop Rhodes grass in sorghum with sequential residual programs

Linda Bailey, Lawrie Price & Richard Daniel, Northern Grower Alliance

Key words

feathertop Rhodes grass, *Chloris virgata*, residual, management

GRDC code

NGA2009-001RTX

Take home messages

- Feathertop Rhodes grass (FTR) is a major management challenge due to the lack of low cost, effective knockdown herbicide options and frequent emergence prior to or at sorghum planting
- Sequential residual herbicide application is the best current strategy for FTR control in sorghum
- Fallow applications in July or August may need to be considered and followed by a top up of Dual Gold® at 1 L/ha at planting
- Initial herbicide choice is influenced by rainfall forecast, timing of first application, other weed spectrum and cost
- Under wet conditions or applications more than 6 weeks prior to planting date, Valor® 500 WG appears a more robust option than Dual Gold for extended FTR management

Background

Management of feathertop Rhodes grass (FTR) has become a significant economic cost and major agronomic challenge in many areas of the northern grains region. Part of the challenge is that FTR is generally poorly controlled with either glyphosate or paraquat, even at seedling stage. In addition, although FTR is classed as a summer grass, it appears less temperature sensitive than other summer grasses and new seedlings can often be found in winter. Periods of soil wetness are more important than temperature for FTR germination and emergence. Consequently, in seasons with wet periods in late winter or early spring, FTR may emerge weeks prior to sorghum planting. In seasons with prolonged dry periods in late winter and early spring, FTR is likely to germinate on the sorghum 'planting rainfall event' and emerge at a similar time to crop planting (and at-planting herbicide application).

The combination of FTR resistance/tolerance to the key fallow knockdown herbicides (glyphosate and paraquat) and the likelihood of FTR emergence prior to or at sorghum planting means the focus needs to be on residual management of FTR in the fallow prior to sorghum planting, in addition to providing in-crop control.

Approach

The intent of these trials was to evaluate the benefit of sequential applications for providing extended control of FTR. There is a 1-month plantback to sorghum following applications of Valor at rates used for residual control of FTR, so Valor is not an option for at-planting use in sorghum. The Dual Gold label allows up to a total of 2 L/ha to be used in the combination of the preceding fallow, during planting or early post-emergence in sorghum. For this series of trials, all early fallow treatments were followed by a 1 L/ha rate of Dual Gold at planting. This limits the rate of Dual Gold in the early fallow use to 1 L/ha. It is allowable to apply the maximum label rate of 2 L/ha of Dual Gold in early fallow, and this would be expected to provide longer residual control than the 1 L/ha tested, especially in wetter seasons, however this means that no FTR treatment could be applied at sorghum planting to provide in-crop control. Other potential strategies which also may deliver even longer periods of control (not tested in these trials) are likely to be the full rate of Valor early in the fallow, followed by Dual Gold 2 L/ha, either at-planting or applied early post-emergence; or Valor

applied early fallow followed by a split rate of Dual Gold applied at-planting and early post-emergence. Atrazine was also included as a benchmark treatment in 2021 but does NOT have a FTR registration.

Table 1. Core treatments included in all trials in 2021 and 2022

Treatment	Herbicide treatment and timing		
	End of July	End of August	At planting
Untreated	–	–	–
Dual Gold* 1 L/ha July	Dual Gold 1 L/ha	–	–
+ DG 1 L/ha planting	Dual Gold 1 L/ha	–	Dual Gold 1 L/ha
Dual Gold 1 L/ha August	–	Dual Gold 1 L/ha	–
+ DG 1 L/ha planting	–	Dual Gold 1 L/ha	Dual Gold 1 L/ha
Valor 210 g/ha July	Valor 500 WG 210 g/ha	–	–
+ DG 1 L/ha planting	Valor 500 WG 210 g/ha	–	Dual Gold 1 L/ha
Valor 210 g/ha August	–	Valor 500 WG 210 g/ha	–
+ DG 1 L/ha planting	–	Valor 500 WG 210 g/ha	Dual Gold 1 L/ha
Dual Gold 1 L/ha planting	–	–	Dual Gold 1 L/ha
Dual Gold 2 L/ha planting	–	–	Dual Gold 2 L/ha

*Note sorghum must be treated with a seed safener when using Dual Gold. Refer to label.

Residual efficacy in a dry winter/spring – 2021

Data from a trial at Nandi in 2021 (~18 km SW of Dalby) highlights the benefit of sequential residual management for FTR. This was one of a series of four trials conducted in 2021. Treatments of Dual Gold at 1 L/ha or Valor 500 WG at 210 g/ha were applied at the end of July and end of August as single applications, and compared with the same timings ‘topped up’ with Dual Gold 1L/ha at planting (Table 1). All treatments were compared to Dual Gold at 1 L/ha or 2 L/ha applied at planting.

Rainfall

August and September were both dry with total rainfall <10 mm in each month. This represented ~30% of mean rainfall for the two-month period. Rainfall of <2 mm was received in the week following both the July and August applications. Two rain events occurred in October prior to planting; 17 mm over 2 days (~2 weeks pre-planting) and 32 mm over 3 days (3–5 days pre-planting).

Results

There was no emergence of FTR at this site prior to sorghum planting but a very large emergence just prior to planting. Figure 1 shows the number of FTR seedlings 4 days after planting, with >97% control of FTR from either the Dual Gold or Valor 500 WG treatments applied at the end of July or August. Atrazine did not provide commercially acceptable control of FTR from either application time. The Dual Gold at-planting treatments were applied immediately after this assessment.

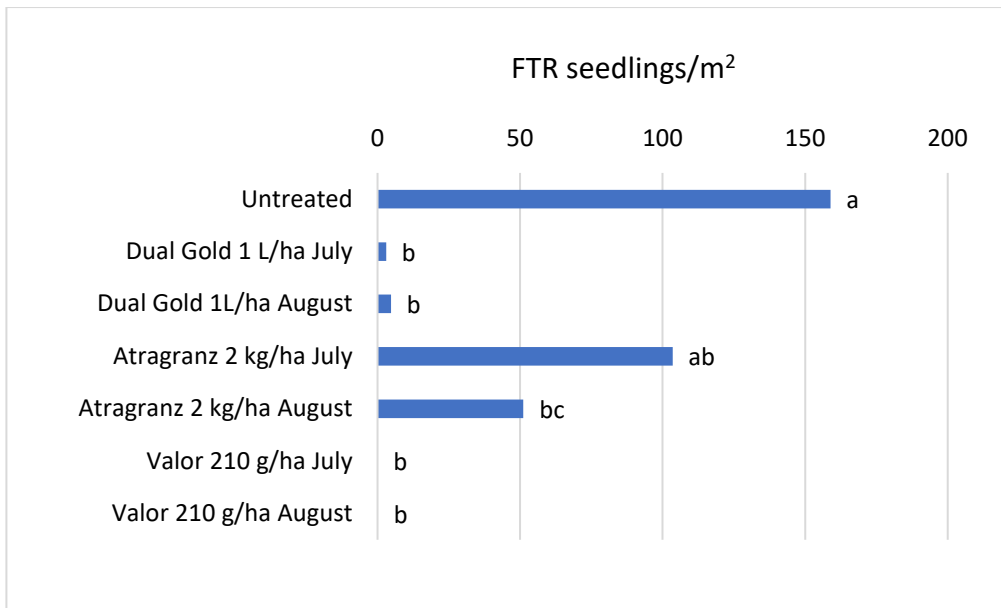


Figure 1. Feathertop Rhodes grass seedling numbers on 21/10/2021, 4 days after sorghum planting, 83 days after application 1 (83DAA1), 51 days after application 2 (51DAA2) at Nandi. Data with the same letters are not significantly different ($P = 0.05$).

Figure 2 presents the FTR plant population ~2 weeks later. It highlights that:

- Applications of Dual Gold at planting only reduced FTR counts from ~100 plants/m² (where no residual was applied) to ~30–50 plants/m²
- Dual Gold 1 L/ha or Valor 210 g/ha applied alone in July or August, reduced FTR to ~1–10 plants/m²
- When the July or August applications were ‘topped up’ with Dual Gold 1 L/ha at planting, FTR was reduced to 1–2 plants/m².

This trial was a clear example of the challenge of FTR management due to the lack of effective knockdown herbicides that can be used at sorghum planting.

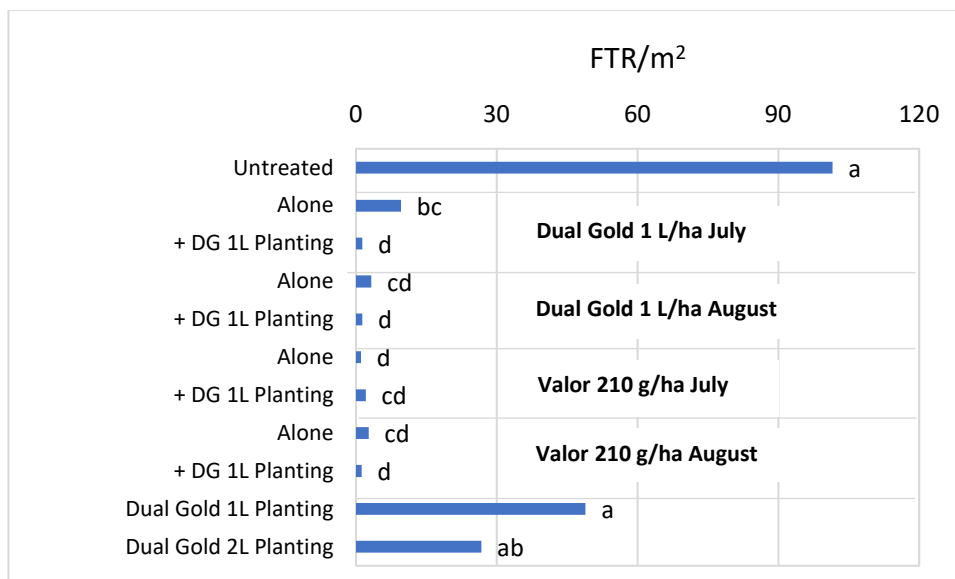


Figure 2. Feathertop Rhodes grass numbers on 5/11/2021, assessed 19 days after planting following July or August applications of either Dual Gold or Valor +/- 1L Dual Gold at planting. Data with the same letters are not significantly different ($P = 0.05$).

Similar results to those shown occurred at a second site, but with untreated FTR densities of only 1–2 plants/m². Only trace levels of FTR (<0.2/plants m²) emerged at the other two sites despite a history of FTR issues.

In 2021, under very dry conditions for the 2 months leading into sorghum planting, the most effective residual control strategies were:

1. Valor 210 g/ha in late July, alone ~99% control
2. Valor 210 g/ha in late August, topped up with Dual Gold 1 L/ha at planting ~99% control
3. Dual Gold 1 L/ha in late July or August, topped up with Dual Gold 1 L/ha at planting ~99% control

Residual efficacy in a wet winter/spring – 2022

Data from a trial at Springvale in 2022 (~17 km SW of Dalby) highlights the performance of the residual approaches under wetter conditions. This was one of a series of two trials conducted in 2022. The same core treatments were applied as in 2021: Dual Gold at 1 L/ha or Valor 500 WG at 210 g/ha at the end of July and end of August as single applications, and compared with the same timings 'topped up' with Dual Gold at 1 L/ha at planting (Table 1). All treatments were compared to Dual Gold at 1 or 2 L/ha applied at planting on 8 October.

Rainfall

Rainfall of 25 mm was received one day after the July applications and 14 mm received 5 days after the August applications. July, August, September and October all received high rainfall. In the 3 'fallow' months leading into planting (July-September) a total of 182 mm was recorded compared to a mean of 82 mm. Rainfall totals in all months were close to or exceeded the 90th decile. October rainfall was 92 mm compared to a mean of 70 mm and a 90th decile of 93 mm.

Results

The first FTR emergence was assessed on 19 August, 29 days after the July application (29DAA1) with 63 mm of rain received during that period. The untreated population of FTR was ~10 plants/m². All treatments of Dual Gold 1 L/ha or Valor 210 g/ha provided complete control. An optical spot-sprayer was used to control FTR seedlings after the assessment.

Figure 3 shows the number of new FTR seedlings in late September, 68 days after the July application (68DAA1), 32 days after the August application (32DAA2) and 11 days prior to planting. The July application received 152 mm up to 5 days prior to this assessment, the August application had received 90 mm.

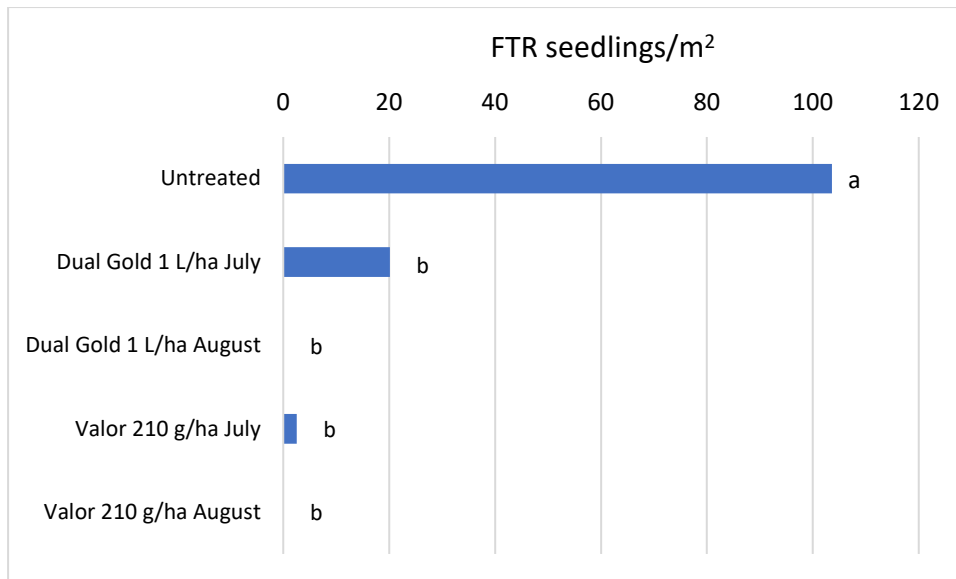


Figure 3. Feathertop Rhodes grass seedling numbers on 27/9/2022, 11 days pre-planting (68DAA1, 32DAA2). Data with the same letters are not significantly different ($P = 0.05$).

All treatments provided significant levels of control compared to the untreated control FTR population of ~104 plants/m². Although there was no significant difference, the July application of Dual Gold only provided ~80% control, 10 weeks after application and having received ~150 mm of rainfall since application. In contrast, the August application provided complete control after 4–5 weeks and ~90 mm of rain. An optical spot-sprayer was used to control FTR seedlings after the assessment.

Figure 4 shows the counts of FTR ~3 weeks after planting. It highlights that:

- All treatments with applications of Dual Gold at planting provided complete control of FTR emerging in the first 3 weeks after planting. Total rainfall of ~90 mm was received in this period.
- The July application of Dual Gold 1 L/ha alone reduced FTR emergence by ~61%, despite having received ~245 mm of rain since application 10–15 weeks earlier.
- The August application of Dual Gold 1 L/ha alone reduced FTR emergence by ~87%, despite having received ~180 mm of rain since application 5–9 weeks earlier.
- The July application of Valor 210 g/ha alone reduced FTR by ~90% with the August application alone reducing FTR counts by >99%.

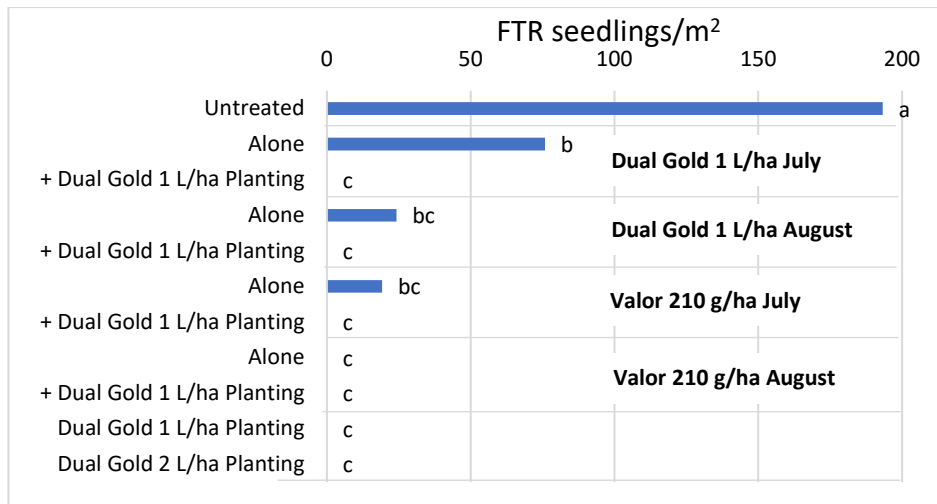


Figure 4. Feathertop Rhodes grass numbers on 31/10/2022, 23 days after planting (102DAA1, 66DAA2). Data with the same letters are not significantly different ($P = 0.05$).

The cumulative potential emergence counts of FTR over the 15 weeks from the July application is presented in Figure 5. It is described as ‘potential’ as experimentally, knockdown control of early FTR emergence was achieved with two optical spot-sprayer applications. The graph shows the potential FTR populations that would have been present without these spot-sprayer applications due to the lack of effective, economic knockdown herbicides for fallow FTR control.

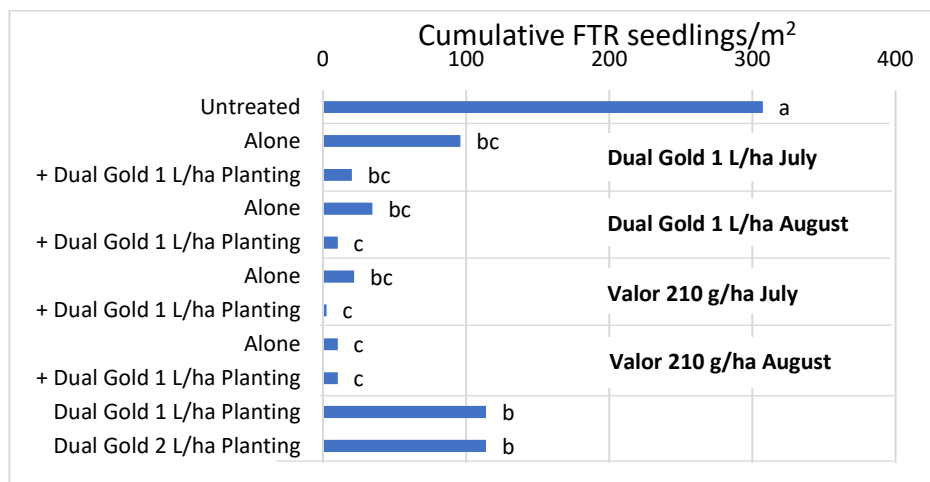


Figure 5. Cumulative potential feathertop Rhodes grass seedling numbers from 21/7/2022 to 31/10/2022, 23 days after sorghum planting (102DAA1, 66DAA2)

Note: + DG 1L Planting is a ‘top up’ of Dual Gold 1L at planting following the initial herbicide treatment in July or August. Data with the same letters are not significantly different ($P = 0.05$).

Figure 5 highlights the overall system impact from:

1. July application

- Dual Gold 1 L/ha alone was effective for ~6–10 weeks but only reduced overall FTR numbers under prolonged wet conditions by ~70%. When topped up with Dual Gold 1 L/ha at planting, the FTR population was reduced by ~93%.
- Valor 210 g/ha alone reduced overall FTR plant number by ~93%. When topped up with Dual Gold 1 L/ha at planting, it reduced overall FTR population by ~99%.

2. August application

- Dual Gold 1 L/ha alone reduced overall FTR plant number by ~89%. When topped up with Dual Gold 1 L/ha at planting, it reduced overall FTR population by ~97%.
- Valor 210 g/ha alone reduced overall FTR counts by ~97%. There was no benefit when topped up with Dual Gold 1 L/ha at planting as the Valor 210 g/ha treatment provided complete control in the first 3 weeks post planting.

3. Planting application

- Dual Gold at 1 or 2 L/ha alone at planting provided complete FTR control in the first 3 weeks after planting. However, without an effective, economic knockdown approach, these applications only would have reduced overall FTR populations by ~63%. This approach was the poorest option overall.

Under decile 90 rainfall conditions in 2022, the most effective residual control strategies were:

1. Valor 210 g/ha in late July topped up with Dual Gold 1 L/ha at planting: ~99% control
2. Dual Gold 1 L/ha in late August topped up with Dual Gold 1 L/ha at planting: ~97% control
3. Valor 210 g/ha in late August alone or topped up with Dual Gold 1 L/ha at planting: ~97% control

Conclusions

Until there is an effective, economic, non-residual knockdown option for FTR control, management prior to sorghum production will remain a challenge, particularly when FTR seedbanks are large.

The results obtained in these trials, together with feedback from commercial usage, strongly endorse the importance of a sequential residual herbicide program for FTR management prior to sorghum. The choice of herbicide is likely to be impacted by the type of fallow rainfall forecast (Dual Gold considered a poorer option under wetter conditions), timing of first application (Dual Gold generally provides a shorter residual length than Valor 500 WG), spectrum of other weeds, and product cost.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the author would like to thank them for their continued support.

Contact details

Richard Daniel
Northern Grower Alliance
PO Box 78, Harlaxton Qld 4350
Ph: 0428 657 782
Email: richard.daniel@nga.org.au

Date published

July 2023

® Registered trademark