Control of elongating flaxleaf fleabane in fallow – OSST application rates

Trial location: Newell Highway, Gurley

Objectives of the trial

A trial was established on the 7th of January 2026 to compare 'salvage' applications applied at optical spot spray (OSST) rates to advanced fleabane which had survived a previous double knock in fallow.

Note: While registered OSST application rates were used in this trial, the application was applied using a standard hand boom. While this application technique is different to the way an optical spot spray applies herbicide to each plant, this application method allows the research to accurately and consistently control the amount of herbicide applied per square meter of ground.

Weed target: Elongating to early flowering flaxleaf fleabane. Approximately 2-5 plants / m^2

Crop: Fallow

Application: 100L/ha Rainwater 110015 AIXR @ 2 Bar 6km/hr 4 Reps

Date	Weed size at application	Time	Temp	RH%	Delta T
7/1/2026	Elongating to early flower	2pm	34°C	36%	12

Treatment list

Base treatments and application rates

1	Untreated	
2	Crucial® @ 2.75 L/ha	600 g/L glyphosate (potassium, monomethylamine and ammonium salts)
3	Crucial® @ 5.5 L/ha	
4	Biffo® @ 10 L/ha	200 g/L glufosinate-ammonium
5	Amicide Advance 700 @ 4.8 L/ha	700 g/L 2,4-D amine (dimethylamine and monomethylamine salts)
6	Dropzone® @ 6.7 L/ha	500 g/L 2,4-D amine (dimethylamine and monomethylamine salts)
7	Colex®-D @ 7.3 L/ha	456 g/L 2,4-D amine (choline salt)
8	Trooper® 75D @ 2L/ha	300 g/L 2,4-D + 75 g/L picloram (both as triisopropanolamine salts)
9	Monsoon® @ 2 L/ha	300 g/L bromoxynil (octanoyl ester) + 150 g/L fluroxypyr (methylheptyl ester)
10	Monsoon® @ 4 L/ha	
11	Flagship® 400 @ 3 L/ha	400 g/L fluroxypyr (methylheptyl ester)
12	Gramoxone® 360 Pro @ 6.25 L/ha	360 g/L paraquat dichloride
13	Gramoxone® 360 Pro @ 4.17 L/ha	
14	Guerrilla® @ 5 L/ha	300 g/L paraquat dichloride + 12 g/L amitrole

1% Hasten® Spray oil was added all Gramoxone 360 Pro treatments. Hasten was also added to Guerrilla to enable a like-for-like comparison with Gramoxone 360 Pro at the 4.17L rate.

Notes for herbicide selection and application rates.

- Glyphosate efficacy on flaxleaf fleabane is often poor (and there is no label claim for fleabane in fallow), However glyphosate is commonly used as a base for fallow applications. At this site, elevated levels of glyphosate resistance were expected. Glyphosate was included at two application rates – a 'high' commercial rate of 2.75 L/ha of Nufarm Crucial and the maximum fallow label rate for Crucial of 5.5 L/ha.
- For comparison, the three different 2,4-D amine treatments in this trial were applied at equivalent rates (gai/ha), which are the maximum registered rates for Dropzone and Amicide Advance when applied via optical sprayers. The Colex-D label recommends an application rate of 6.16 L/100L for rosette to flowering fleabane, or 12.32 L/100L for late flowering to mature plants or plants under moisture stress. We considered the Colex-D application rate of 7.3 L/100L to be appropriate for the weed size at application, and this provided an equivalent rate comparison with the other formulations, but note that we didn't test the maximum allowed application rate of Colex-D.
- Trooper 75-D is registered for broadacre application in fallow for control of fleabane up to 25cm at 700 mL/ha + glyphosate, and a range of other weeds at 1 L/ha. The fleabane rate for optical spray applications is 2 L/100L for weeds up to flowering. The 2,4-D rate applied in the Trooper 75-D treatment contains approximately 18% of the 2,4-D amine rate applied as the stand-alone 2,4-D treatments in this trial.
- The optical spot spray rate for Flagship (fluroxypyr) is 1 to 3 L/100Lha. Only the top rate was applied in the trial.
- Two rates of Monsoon (fluroxypyr + bromoxynil) were applied to reflect the high and low label rates for optical spray applications. The high rate of Monsoon contains the same fluroxypyr concentration as the rate of Flagship applied in this trial.
- Gramoxone (paraquat) was applied at the high and low label rates for optical spray applications.
- The optical spot spray rate for Guerrilla (paraquat + amitrole) is 3.75 to 5.6 L/100L. The application rate chosen for this trial allows a direct comparison with the low Gramoxone rate (both 1500 gai/ha paraquat).

Supplementary treatments

While it was not feasible to test all Group 14's with all base herbicide combinations, we elected to test selected Group 14 and knockdown herbicide combinations: Terrad'or (700 g/L tiafenacil @ 40 g/100L) with the low rate of Gramoxone 360 Pro and Voraxor (250 g/L saflufenacil + 125 g/L trifludimoxazin @ 100 mL/100L) with the low rate of Gramoxone 360 Pro, the low rate of Crucial, and a low rate (6 L/100L) of Biffo.

Results

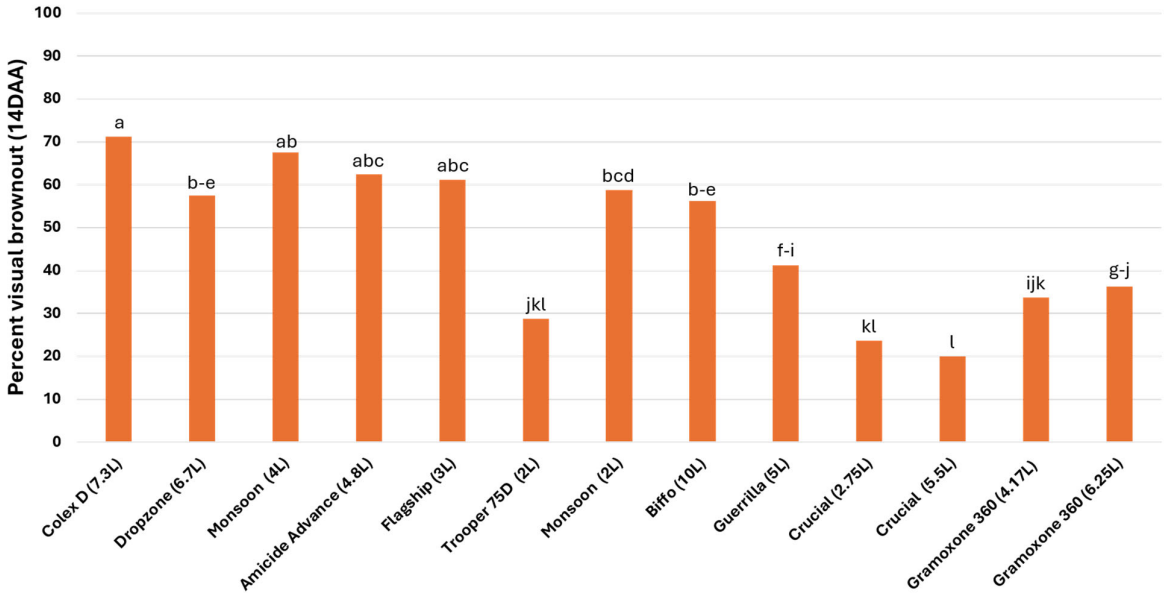
Treatments were applied to elongating fleabane plants that were about to commence flowering. These plants had previously survived a commercial double knock application. Soil moisture was considered acceptable at application. Conditions at application were hot and dry (Delta T of 12). While the hot dry conditions at application were not ideal (and especially for the hydrophilic herbicide treatments in this protocol), it was reflective of optical spray application conditions for summer applications that are often encountered in northern NSW.

Brownout was assessed at 14 days after application. Glyphosate brownout was the slowest of the herbicides tested. This was expected due to the known slow speed of activity of this herbicide, combined with expected glyphosate resistance in this population. Also, there is no label claim for control of fleabane on the Crucial label.

It was obvious at this assessment timing that the activity of treatments containing paraquat was less than what was normally expected (even considering the advanced growth stage of the fleabane). This aligned with the

growers' commercial experience in this paddock. Some more advanced plants had begun to set seed, so seed was collected from plants outside of the trial area and sent to Queensland University for resistance testing. (Note that these plants had been sprayed commercially more than four weeks prior but were still actively growing and not showing signs of herbicide damage at the time of seed collection.)

The Group 4 herbicides and glufosinate provided the fastest brownout and were the only herbicides to achieve greater than 50% brownout at this assessment timing.



Final control was assessed 28 days after application. No herbicide tested provided complete control.

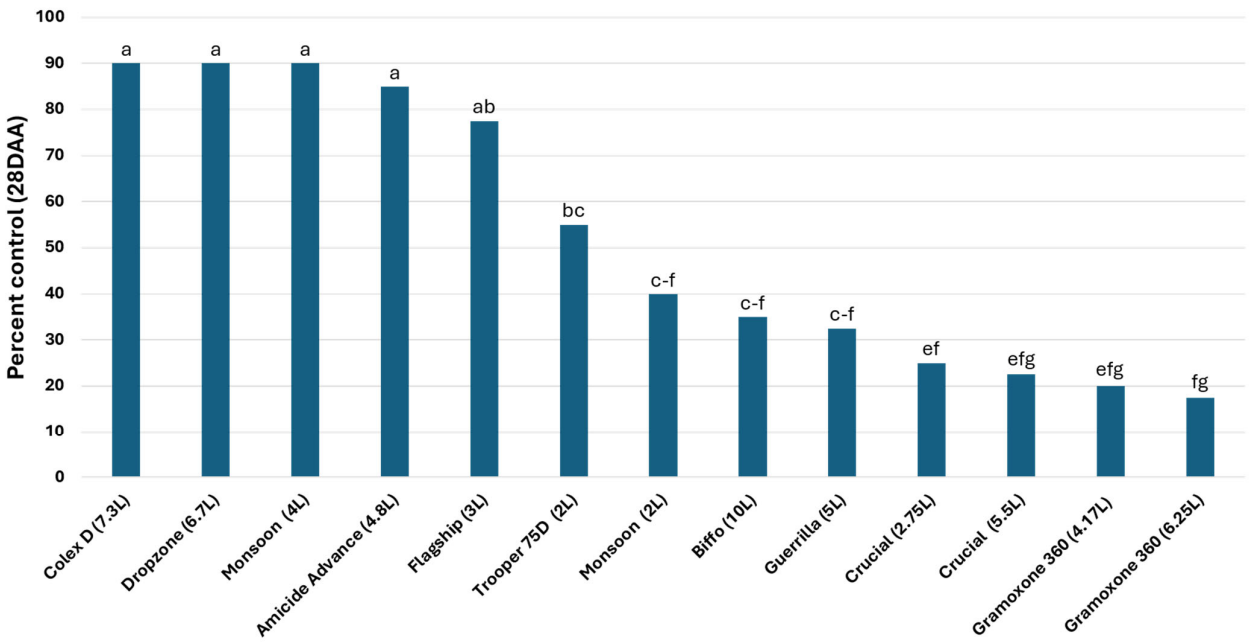
The 2,4-D amine herbicides Colex-D, Dropzone and Amicide Advance were among the best performing herbicides. While Dropzone appeared marginally slower to brownout, all three herbicides delivered equivalent final control when applied at the same rate of 2,4-D active ingredient.

The fluroxypyr based treatments largely performed as expected. The high application rate of Monsoon (fluroxypyr + bromoxynil) was equivalent to the best treatments in this trial, whereas control delivered by the low label rate was significant reduced. This reflects label advice on weeds size at application. Flagship (solo fluroxypyr) was statistically equivalent to the high rate of Monsoon, where both treatments were applied at the same rate of fluroxypyr. However, the Flagship treatment had numerically poorer control (78% control from Flagship versus 90% control with the high rate of Monsoon).

Other treatments did not deliver commercially acceptable control of the fleabane in this trial.

While the 2-week brownout score for Biffo (glufosinate) was similar to some of the better performing treatments, final control was poor at the labelled optical spot spray application rate of 10 L/100L.

As expected, glyphosate was poor on this population which is most likely reflecting glyphosate resistance now widespread in many flaxleaf populations. There was no dose rate response evident in this trial.



The Guerrilla (paraquat + amitrole) treatment, and the two application rates of Gramoxone (paraquat), all failed to control the fleabane. There was no statistical difference between these three treatments.

Paraquat resistance was subsequently confirmed in this population. Fleabane seed from outside the trial was sent to the University of Queensland for resistance testing, with over 70% of treated plants surviving a label rate application of paraquat when applied to cotyledon to 2-leaf seedlings.

Top tray: A susceptible flaxleaf fleabane population treated at the cotyledon to 2-leaf growth stage with the label rate of paraquat. No survivors.

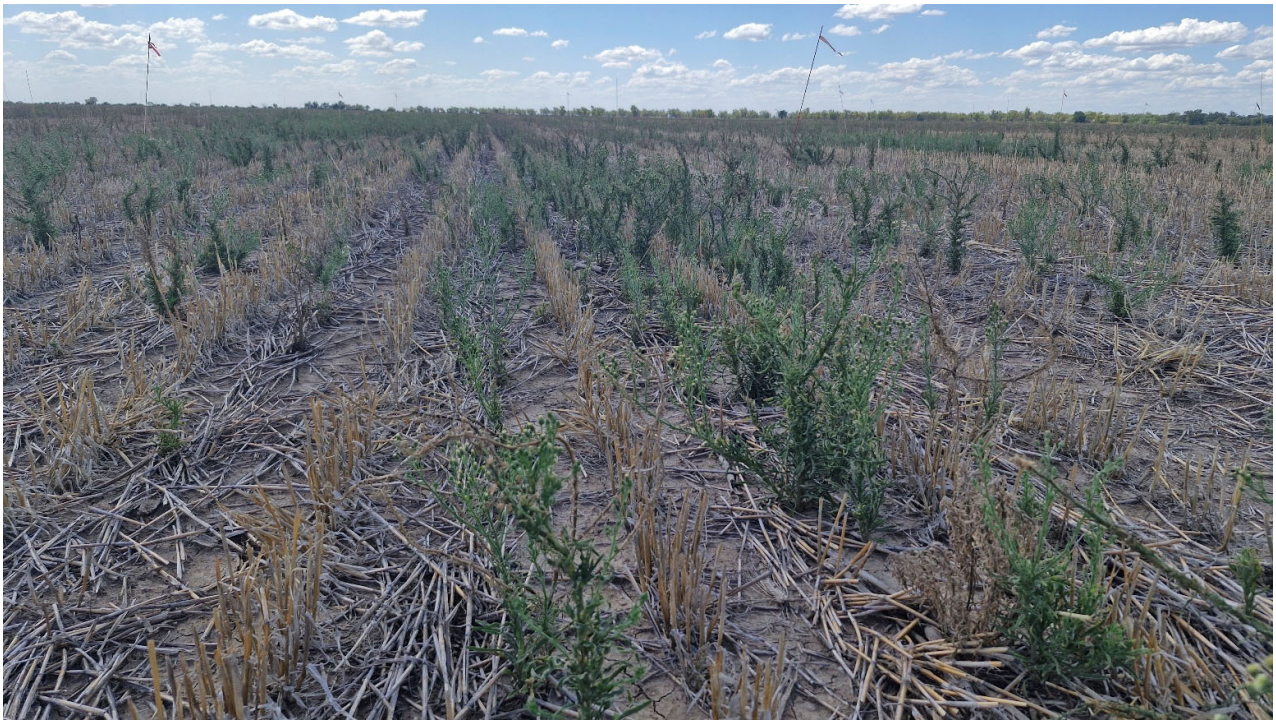
Bottom tray: Flaxleaf fleabane survivors from the trial paddock, sprayed with the same application rate at the same growth stage. Over 70% of treated plants survived this application.

Trial site managed by AMPS Research on behalf of ICAN

Supplementary treatments – the addition of Terrad'or (tiafenacil) to Gramoxone (paraquat), or the addition of Voraxor (saflufenacil + trifludimoxazin) to Biffo (glufosinate) did not improve control versus the knockdown herbicide applied alone at the same rate. Adding Voraxor to Crucial (glyphosate) numerically improved final control by 10%, but this was not statistically significant, and both treatments were still poor and unacceptable. The addition of Voraxor to Gramoxone did provide a significant increase in control over the same rate of Gramoxone alone, however the Voraxor + Gramoxone treatment still only was able to deliver about 50% control.

Take home message

Confirmation of glyphosate and paraquat resistance in this field just south of Moree is of concern. To our knowledge, this is the first confirmation of paraquat resistance in flaxleaf fleabane from northern NSW. In this situation, previous knockdown herbicide strategies failed to control this population and fleabane is now present in high numbers across the field (picture below). As a result, there is now a large seedbank of glyphosate + paraquat resistant individuals in this paddock.



This trial demonstrated that the population is both glyphosate and paraquat resistant (at maximum optical spot sprayer rates). Group 14 knockdown partners did not improve control and maximum optical spot spray application rates of glufosinate offered no useful control on the fleabane at this advanced growth stage. Application of very high rates of Group 4 herbicides appear to be still effective against this.

In following years this paddock is likely to require a combination of cultivation, increased reliance on residual herbicides in the crop and fallow and early application of effective post-emergent herbicides targeting small weeds to reduce the seedbank to manageable levels. Group 14 were never likely to provide much benefit on weeds at this advanced growth stage but may still be efficacious on small rosettes. Post-emergent Group 27 herbicides may also be useful on small rosettes for in-crop control (although they weren't included in this trial).

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