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Flupropanate is an effective herbicide for African lovegrass control in south-western Australia

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Background

Weed invasions have substantial impacts on biodiversity and are regarded as a significant threat to many Australian plant species and ecological communities. Effective weed control methods are required to achieve flora and ecological community conservation. Herbicides are one approach frequently used for weed control but do have the risk of off-target impacts on native species.

African lovegrass (*Eragrostis curvula*) is a long-lived tussock grass native to southern Africa. African lovegrass is a serious invader of disturbed bushlands across a range of land tenures, particularly road and railway easements in heavier soils on the eastern side of the Swan Coastal Plain. Invasion impacts a range of threatened flora, including *Grevillea curviloba* (endangered; Fig. 1), *Darwinia foetida* (endangered) and *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (endangered), and threatened ecological communities such as *Corymbia calophylla – Kingia australis* woodlands on heavy soils (critically endangered).

As African lovegrass is resistant to grass-selective, group 1 herbicides (fops herbicides such as Fusilade®), most practitioners use glyphosate to control it in Western Australia. Glyphosate is a non-selective herbicide, meaning that off-target impacts can be expected where it is used to control African lovegrass growing among native species. As an alternative to glyphosate and to reduce impacts on co-occurring species, flupropanate (sodium 2,2,3,3-tetra-fluoropropionate; marketed under several product names) has been demonstrated to be effective for African lovegrass control in some eastern Australian agricultural and environmental settings. The aims of this study were to:

- Determine if flupropanate remains effective in controlling African lovegrass in the Mediterranean climate of south-western Australia, where herbicide effectiveness could plausibly be reduced by lower water availability over the warmer months of optimal African lovegrass growth; and
- Test for off-target effects on native flora when flupropanate is applied to control African lovegrass in a conservation context, including when co-occurring with *G. curviloba*.

Field experiments

We set up a repeated measures 'before-after-control-impact' experiment near Bullsbrook with replicate sets of 10 × 10m plots of three treatments; a no herbicide control, and a lower (1.5mL L^{-1}) and higher (3.0mL L^{-1} – label rate) flupropanate application rate. We measured cover and health (alive/dead) of plant species before and after an initial and then a follow-up application of liquid flupropanate to African lovegrass foliage. Co-occurring plant species were aggregated into functional groups based on life form and status as native or weedy (native woody shrubs, native perennial groundcovers, invasive perennial groundcovers and invasive annuals) for statistical analysis. Three potentially 'sacrificial' individuals of *G. curviloba* growing on a recurrently slashed road verge were deliberately sprayed with 3.0mL L^{-1} flupropanate and monitored periodically for 24 months.

Fig. 1. African lovegrass impacting a population of the endangered *Grevillea curviloba*

Findings

- Flupropanate was effective and significantly reduced African lovegrass cover, with a greater reduction at the higher label rate of 3.0mL L^{-1} (Fig. 2).
- No adverse effects of the herbicide were detected on co-occurring aggregated native woody shrubs, native perennial groundcovers, invasive perennial groundcovers and invasive annuals. Flupropanate has low contact activity and is mainly absorbed into the soil and taken up by the roots when it rains after application, so many co-occurring plants were likely incidentally exposed to flupropanate.
- There was a suggestion of off-target impact on the restio (native rush) *Desmocladus virgatus*, although the species occurred too sporadically among plots and treatments for formal statistical analysis.
- The deliberately sprayed *G. curviloba* showed no adverse effects of flupropanate exposure.

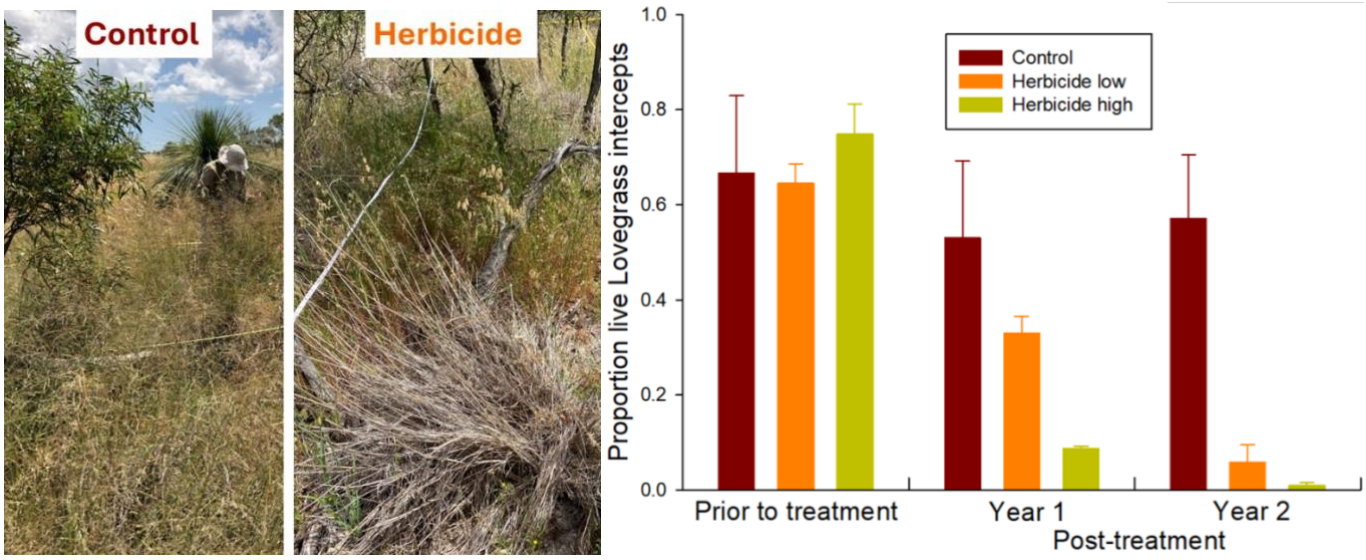

Fig. 2. Effects of treatment with flupropanate (**control** - untreated; **low rate** – 1.5mL L^{-1}; **high rate** – 3.0mL L^{-1}) on cover of African lovegrass.

Management implications

- This study shows that flupropanate is effective in controlling African lovegrass in conservation settings in south-western Australia, including where *G. curviloba* is present, providing another tool for African lovegrass management.
- Further testing of flupropanate is required in less degraded sites to fully appreciate off-target effects, noting that off-target effects are demonstrably much lower with flupropanate than the most widely used alternative herbicide for African lovegrass control (broad-spectrum glyphosate).
- Flupropanate herbicide resistance has emerged in agricultural contexts, emphasising the importance of integrated weed control. We recommend rotation of herbicides of different mechanisms of action and consideration of manual or mechanical treatments to reduce the potential for development of herbicide resistance in conservation applications of African lovegrass control. The off-target impacts of broad-spectrum herbicides are likely to be less significant, and physical removal more feasible and with less soil disturbance, after an initial flupropanate treatment to dramatically reduce the cover of African lovegrass.
- Flupropanate had no control on other weedy grasses such as perennial veld grass (*Ehrharta calycina*), indicating that multiple weed control approaches will be needed at sites with co-dominant grass weeds.

Further information

Gosper, C.R., Cullity, J., and Paczkowska, G. (2025) Control of African lovegrass by flupropanate in a flora conservation context. *Australian Journal of Botany* **73**, BT25005. https://doi.org/10.1071/BT25005

Gosper *et al.* (2025) Plot data for flupropanate treatment of African lovegrass [Data set]. Department of Biodiversity, Conservation and Attractions. https://doi.org/10.71726/hlmdqi80