The advancing front of invasive lovegrasses across Australia's rangelands

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Summary Four species of invasive *Eragrostis* lovegrasses threaten the integrity of Australia's rangelands and reduce pasture production for livestock. Concerned rangeland graziers are calling for increased national awareness, development of useful identification guides and further adaptive research into cost-effective management options for invasive lovegrasses.

Keywords *Eragrostis*, lovegrass, rangelands.

INTRODUCTION

Rangeland graziers across northern, inland Australia are calling on four species of invasive lovegrasses to be considered as priority national weeds to help achieve effective prevention and management.

The invasive lovegrass complex of four introduced species has invaded vast pastoral areas of Australian rangelands (Figure 1). African lovegrass, *Eragrostis curvula* (Schrad.) Nees is well documented throughout southern and eastern Australia as an unpalatable, unproductive, invasive, introduced grass species, which is resistant to control measures. Trichophora, *Eragrostis trichophora* Coss. & Durieu, is a related introduced species, first identified in Australia in 1971, which has progressively invaded pastures across southern inland and western Queensland, particularly in the Western Downs and Maranoa districts. The third invasive species is soft lovegrass, *Eragrostis pilosa* (L.) P.Beauv., which occurs across most Australian states, including inland Queensland. Stink grass, *Eragrostis cilianensis* (All.) Vignolo ex Janch., has invaded all Australian states, since the early 1900's. These four introduced grass species are environmental weeds which thrive on low phosphorus, sandy soils with low ground cover or after ground disturbance. Major risk pathways include invasion from roadsides and vehicles into adjacent paddocks.

Once these weedy grasses become established, control options are very limited, and eradication is virtually impossible. High density grazing of young, immature plants, ploughing, mulching or slashing are partially effective at managing infestations. The only herbicide options in pasture situations are non-selective glyphosate and/or flupropanate. Flupropanate has a 14 day to four month grazing withholding period, depending if spot or broadacre applied. Herbicide resistance to flupropanate has been confirmed in African lovegrass from the Southern Tablelands of New South Wales, Australia (Powells 2022).

Rangeland graziers are calling for four actions:-

1. The four invasive lovegrass species are assessed under the new National Established Weed Priorities NEWP framework and all declared as Restricted Biosecurity Matter at state government levels.
2. Initiate research into ecology of trichophora lovegrass to refine prevention and management measures, especially under extensive pastoral conditions, drought impacts and drawing on landowner experiences.
3. Local governments consider listing the complex as a declared pest under local law, include management measures in biosecurity plans and roadside maintenance.
4. As per General Biosecurity Obligation requirements for all biosecurity matter, awareness and education initiatives are developed for all land users and farm visitors outlining control measures and actions to mitigate risk of lovegrass seed spread.

Farmers and graziers are faced with developing and implementing their own farm biosecurity protocols for invasive weeds that are not declared locally, state-wide or recognised nationally. Issues often arise when managing non-declared weeds near boundaries with transport corridors, conservation areas and floodplains. For example, active communication and voluntary collaboration are required with local government and contractors to implement equipment clean down when slashing roadsides infested with a non-declared weed. Co-existing land users such as resource companies, contractors, utility providers, small miners and tourists also pose biosecurity risks, especially when there is no regulatory requirement for them to manage non-declared weeds.

HISTORY

African lovegrass

African lovegrass was introduced from south Africa to Australia during the late 1800s or early 1900s, probably accidently as a contaminant of other pasture seeds. Subsequently, other types or cultivars were introduced up until the 1980's for pasture trials and environmental remediation (Parsons 2001). A more leafy and less weedy cultivar is 'Consol' which is used in parts of NSW. African lovegrass is a pernnial, drought tolerant tussock grass, which favours sandy soils and is a prolific seeder. It is widespread across eastern Australia and readily establishes along roadsides, disturbed soils and is a major weed of remnant, native grass regional ecosystems (Weeds Australia 2021).

Meat and Livestock Australia (2009) developed the 3D weed management best practice manual and documented four NSW producer case studies.

Trichophora lovegrass

The literature for trichophora lovegrass is scant. It is also native to southern Africa (Hosking *et al*. 2007) and is morphologically similar to African lovegrass. The first record from Australia is from Alice Springs in 1971 (Friedel 2020), as a possible contaminant of African lovegrass pasture seed.

Australian Virtual Herbarium records (2021) indicate the distribution of African and trichophora lovegrasses overlaps in the south-east quadrant of Queensland and northern parts of New South Wales.

Soft lovegrass

An annual environmental weed that is common across eastern Australia and north west Western Australia. It prefers disturbed areas and roadsides, with no shade.

Stink grass

A common annual environmental weed throughout Australia invading disturbed areas, pastures, roadsides and arid wetlands. The grass produces a distinct odour when wet. Mature flowering plants are not palatable to livestock. Stink grass is native to north Africa and the Mediterranean.

INVASIVE LOVEGRASS WEEDINESS

There are numerous examples in the literature citing African lovegrass as a pasture weed (Fensham 1998, Batianoff and Butler 2002).

Although not in the top 20, it was one of 71 weed species nominated by state and territory governments for assessment as Weeds of National Significance (WONS) and still remains a weed of potential national significance (Weeds Australia 2021).

African lovegrass is a declared weed in the ACT, New South Wales, South Australia, Tasmania and Victoria (Weeds Australia 2021) and is listed as a weed in Chile, South Africa, Lebanon, Colombia, parts of the United States, New Zealand and Japan (Csurhes *et al.* 2016). Although not declared in Queensland, Reardon-Smith (2009) identified African lovegrass as a significant risk to the Condamine catchment. Firn (2009) called for urgent action to reduce further spread across Australia.

Twelve years down the track and there has been no holistic, multi-stakeholder action to include invasive lovegrass species into national action plans to protect Australia's rangelands. Local grazier and landholder knowledge is rarely embedded into ecological research to protect grassy woodlands (Firn *et al* 2018). In contrast, concerned environmental scientists listed five high biomass pasture grasses as threatening process to northern Australia's biodiversity in 2009, under the *Environmental Protection and Biodiversity Conservation Act 1999*. National coordination under the Australian Weeds Strategy and the Threat Abatement Plan enables awareness and cost-effective management strategies to be developed for the five listed grass species. The five listed species are gamba grass *Andropogon gayanus* Kunth, para grass *Urochloa mutica* (Forssk.) T.Q.Nguyen, olive hymenachne *Hymenachne amplexicaulis* (Rudge) Nees, mission grass *Cenchrus polystachios* (L.) Morrone, and annual mission grass *Cenchrus pedicellatus* (Trin.) Morrone.

Rangeland graziers are concerned about the current and increasing impacts and costs of invasive lovegrasses across inland Australia. This has been the trigger for grass-roots action and requested solutions from graziers across southern inland Queensland and western New South Wales. There is value in sharing grazier knowledge and experiences in developing cost-effective integrated management strategies.

FUTURE MANAGEMENT

National awareness about the impact of invasive lovegrasses needs to increase. Ideally, the four invasive lovegrasses are assessed for declaration as Weeds of National Significance or Weed Issues of National Significance under the new National Established Weeds Priority Framework.

Resourcing is required to prepare and publish a practical ute guide for identifying invasive lovegrasses, including how to differentiate from beneficial native lovegrass species which are useful fodder. Of the 40 common native *Eragrostis* species, the AusGrass2 database (2015) lists four useful fodder species. These are *E. lacunaria* F.Muell. ex Benth., *E. laniflora* Benth., *E. setifolia* Nees and *E.*

xerophila Domin. The emerging technology of DNA taxonomic identification needs to be applied to the native and introduced *Eragrostis* species complex.

Best management strategies require collation and sharing amongst land managers. Further research into alternative herbicide options to glyphosate and flupropanate is required, especially since herbicide resistance is confirmed within populations of African lovegrass across New South Wales. The return on investment for agricultural chemical registrants to invest into Australian pasture weed herbicide research is low. Graziers hold grave concerns about future effective herbicide options, with less entities and research organisations investing in herbicide and integrated management research across Australia's rangelands.

Most importantly, in the current absence of regulated weed declaration processes and national weed status, this is a call from rangeland graziers to weed science networks for collaboration across multiple land users, agribusinesses and organisations to prevent new infestations and manage existing fronts of invasive lovegrass outbreaks which threaten Australia's rangelands and pasture productivity.

REFERENCES

AusGrass2 Grasses of Australia (2015) https://ausgrass2.myspecies.info/category/australian-grasses/australian-grasses/eragrostis (accessed 23 June 2022).

Batianoff G.N and Butler D.W. (2002). Assessment of invasive naturalized plants in south-east Queensland. *Plant Protection Quarterly* 17(1), 27-34.

Csurhes, S., Leigh, C. and Walton, C. (2016). Invasive plant risk assessment: African lovegrass. Queensland Department of Agriculture and Fisheries.

Fensham, R.J. (1998). The grassy vegetation of the Darling Downs, south-eastern Queensland, Australia. Floristics and grazing effects. *Biological Conservation* 84(3), 301–10. (DOI 10.1016/S0006-3207(97)00105-5).

Firn, J. (2009). African lovegrass in Australia: a valuable pasture species or embarrassing invader? *Tropical Grasslands* 43, 86-97.

Firn, J., Ladouceur, E. and Dorrough, J. (2018). Integrating local knowledge and research to refine the management of an invasive non-native grass in critically endangered grassy woodlands. *Journal of Applied Ecology* 55, 321–30 (DOI 10.1111/1365-2664.12928).

Friedel, M.H. (2020). Unwelcome guests: a selective history of weed introductions to arid and semi-arid Australia. *Australian Journal of Botany*, 68(2), 75–99. (DOI doi.org/10.1071/BT20030).

Hosking, J.R., Conn B.J., Lepschi, B.J.. and Barker, C.H. (2007). Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognised as naturalised in 2000–2001. *Cunninghamia* 10(1), 139-66. https://www.biodiversitylibrary.org/item/269996#page/143/mode/1up (accessed 3 May 2022).

Meat and Livestock Australia. (2009). '3D weed management African lovegrass' and 'African lovegrass case studies' https://publications.mla.com.au/login/redirectFrame (accessed 3 May 2022).

Parsons, W. T. and Cuthbertson, E.G. (2001). 'Noxious weeds of Australia'. (CSIRO Publishing, Collingwood).

Powells, J. (2022). Herbicide resistance in perennial pasture systems – The ostrich has bolted. Proceedings of the 20th Australian Agronomy Conference, Toowoomba, Qld. ed. Bell, L. http://agronomyaustraliaproceedings.org/images/sampledata/2022/Weeds/ASApowells_j_510s.pdf. (accessed 12 May 2022).

Weeds Australia – Profiles (2021). *Eragrostis curvula* (Schrad.) Nees. https://profiles.ala.org.au/opus/weeds-australia/profile/Eragrostis%20curvula (accessed 12 May 2022).

Figure 1. Australian distribution of four invasive lovegrass species (2022).
Source: The Australasian Virtual Herbarium (https://avh.ala.org.au/).