

THE GAMBA DECLARATION

An open letter from scientists calling for a ban on Gamba grass across Northern Australia

Addressed to:

The Hon. Paul Henderson MLA
Chief Minister of the Northern Territory

The Hon. Anna Bligh MP
Premier of Queensland

The Hon. Peter Garrett AM MP
Minister for the Environment, Heritage
and the Arts
Australian Government

CC to:

Hon. Tim Mulherin MP
Minister for Primary Industries and
Fisheries
DPI@ministerial.qld.gov.au

Hon Andrew McNamara MP
Minister for Sustainability, Climate and
Innovation
Sustainability@ministerial.qld.gov.au

Hon Craig Wallace MP
Minister for Natural Resources and
Water
NRW@ministerial.qld.gov.au

Mr Christopher Natt MLA
Minister for Primary Industry and
Fisheries
Minister.natt@nt.gov.au

Hon Leonard Kiely MLA
Minister for Parks and Wildlife
Minister for Natural Resources,
Environment and Heritage
Minister.kiely@nt.gov.au

The Hon Senator Penny Wong MP
Minister for Climate Change and Water
Penny.Wong.MP@aph.gov.au

THE GAMBA DECLARATION

Since gamba grass (*Andropogon gayanus* Kunth.) was introduced to Northern Australia from Africa in the 1930s as a pasture grass for cattle, it has spread to become one of Australia's worst environmental weeds. Gamba grass also threatens human health and safety, infrastructure and Indigenous cultural values.

Growing up to 4 m tall in dense stands, gamba grass fuels dangerous fires, up to eight times hotter than natural fires, killing native savanna trees and grasses.

As an ecosystem transformer, gamba grass reduces tree cover, changes water availability, depletes nutrients and increases greenhouse gas emissions. Under climate change, gamba-fuelled fires will become more frequent, which will increase greenhouse gas emissions.

Gamba grass invasion is a serious risk to biodiversity, with several endangered and vulnerable species already being seriously affected.

Unless banned and controlled it threatens to turn vast areas of Northern Australia's woodlands into gamba grass monocultures. It could infest 38 million hectares in the Northern Territory alone, if its current spread is not stopped.

The Western Australia Government banned the sale and planting of the grass in January this year, and all known infestations in WA are to be eradicated.

Accordingly, we call on the Queensland, Northern Territory and Federal Governments, as appropriate, to:

1. Urgently and totally ban the sale and planting of gamba grass in the Northern Territory and Queensland, and ensure this ban is properly enforced.
2. In Queensland, declare gamba grass a prohibited (Class 2) weed, and allocate sufficient resources to ensure its control with a view to eventual eradication. Where gamba grass has been planted, develop management protocols to prevent further spread.
3. In the Northern Territory, declare gamba grass a Class B/C weed, and allocate sufficient resources for early eradication of small and/or strategic infestations and control of larger infestations. Where gamba grass has been planted and is beyond eradication, develop protocols for the species' use to reduce threats to natural ecosystems and key ecological assets.
4. Carry out comprehensive mapping of gamba grass infestations in both Queensland and the Northern Territory, to better inform management decisions.
5. Develop and implement a well-funded, integrated plan of management to reduce and manage the threat of gamba grass across Northern Australia, such as through a Threat

Abatement Plan under the federal *Environment Protection and Biodiversity Conservation Act*.

6. Determine the extent to which gamba-fuelled fires increase greenhouse gas emissions, and develop strategies to reduce those emissions.
7. Implement strategies to reduce the risks of gamba grass fires to human life and health, infrastructure and Indigenous cultural values

There is overwhelming scientific evidence, summarized in the Appendix to this letter, that gamba grass is a highly invasive and dangerous weed. This is reflected in the results of Weed Risk Assessments by the Western Australia, Queensland and the Northern Territory Governments, all of which concluded that gamba grass is an extremely high risk environmental weed.

Gamba grass has invaded iconic areas that support some of Australia's most important natural values and Indigenous cultures: the World Heritage listed Kakadu National Park, Arnhem Land, Cape York Peninsula and the east Kimberley.

Unless gamba grass is banned and controlled it will soon rank amongst the very worst of exotic introductions, on a par with rabbits and cane toads. The difference is that the planting of gamba grass is being allowed in full knowledge of its damaging impacts. A Queensland Government assessment recommended a ban more than two years ago, but as yet no declaration has occurred.

Northern Australia's tropical savannas are the largest and least damaged tropical savannas existing in the world today. We urge that you act quickly to stop these savannas from becoming further infested by gamba grass, preventing the degradation of this valuable ecological asset.

Yours sincerely

Appendix: Supporting information on gamba grass

Scientific research has demonstrated that gamba grass is an extremely serious environmental weed with the potential to transform much of northern Australia's diverse savanna woodlands into monospecific swards of this exotic grass. Gamba grass represents a major threat to native ecosystems by dramatically altering fire regimes, reducing tree cover, and threatening plant and animal biodiversity. In recognition of this threat, gamba grass was nominated as a Key Threatening Process under the federal EPBC Act in October 2005. In addition to its threat to native ecosystems, gamba grass also poses a significant risk to human life and property in areas it invades, because it dramatically increases the likelihood of severe fire.

It is the worst weed I know of...

Dr Rachel McFadyen, CEO Weeds CRC

The northern Australian landscape could be altered from biologically diverse open forest and woodland to alien grassland with little native flora and fauna.

Kean & Price (2003)
NT Government Scientists

Gamba grass can clearly be described as an ecosystem 'transformer' with the potential to alter the community structure and the nutrient, water and carbon cycling processes over large areas of Australia's savanna ecosystems.

Rossiter *et al.* (2003)

While it provides limited benefits to the pastoral industry, it causes numerous negative impacts due to its invasiveness and impacts on fire regimes. Gamba grass should be considered a weed of national significance.

Marion Scrymgour
Former NT Environment Minister
NT News 14/04/06

Gamba grass threatens many habitats across vast areas of northern Australia

Gamba grass threatens a diverse range of habitats across northern Australia, from wetlands margins, to riparian corridors and savanna woodlands (Flores *et al.* 2005).

In the Northern Territory it is predicted that gamba grass could potentially invade all savanna areas, wetland margins and rainforest margins north of Daly Waters (15°S) (Figure 1.), representing an area of approximately 38 million ha (Douglas and Setterfield 2005).

In Queensland the range of gamba grass could potentially extend over much of Cape York, northern and central Queensland, extending south to approximately 20° S (Csurhes 2005), which is north of about Bowen (Figure 1).

Gamba grass is highly invasive

Gamba grass has a very high seed output (up to 244 000 per plant; Flores *et al.* 2005) and can spread rapidly through native vegetation (up to 333 m/year; Barrow 1995). Although it is often found along roadsides and along other disturbance conduits, gamba grass is capable of invading long distances (greater than 500 m) into intact ecosystems (Douglas and Setterfield 2005).

Once established, gamba grass is very difficult to manage, as acknowledged by Northern Territory Government scientists.

While gamba grass can be a beneficial pasture plant on pastoral properties, it is difficult to manage for this purpose.

Cameron and Lemcke (2006)
NT Government Scientists

Gamba grass changes fire regimes and reduces tree cover

Gamba grass significantly alters the fuel characteristics in the savannas, replacing the typical native grass fuel loads of 3 to 5 tonnes/ha (Williams *et al.* 1998) with tall, dense fuel beds of up to 30 tonnes/ha (Rossiter *et al.* 2003; Douglas and Setterfield 2005). The higher fuel loads of gamba grass support fires up to eight times more intensive than those in native grass savannas (Rossiter *et al.* 2003).

The increase in fire intensity in gamba invaded areas causes substantial loss of tree cover. In parts of the Darwin rural area there was a 50% reduction in tree canopy cover over a 12 year period, due to repeated high intensity gamba grass fires (Ferdinands *et al.* 2006). This rapid and dramatic change in structure of savanna vegetation demonstrates the serious risk that gamba grass poses to the savannas across northern Australia.

Gamba grass fires increase nitrogen and carbon losses

Gamba grass invasion results in high biomass accumulation and high-intensity fires, leading to an increase in the loss of nitrogen and carbon from invaded ecosystems via fire.

Studies have shown that nutrient losses from gamba grass fires are substantially higher than that from native grass fires, with ~ 4 times higher nitrogen loss (Rossiter-Rachor *et al.* 2008) and ~ 3 times higher carbon loss from the grass fuel layer (Rossiter-Rachor *et al.* unpublished data).

This increase in nitrogen losses is likely to be significant for savanna ecosystems, as it has been estimated that it would take almost 10 years for the nitrogen loss from just one gamba fire to be replaced (Rossiter-Rachor *et al.* 2008). This large increase in nitrogen losses is likely to have a negative feedback effect on the N status of savanna soils, which are typically already deficient in nitrogen (Rossiter-Rachor *et al.* 2008).

In addition to the increase in fire-mediated carbon losses, the rapid decline in tree cover due to gamba grass invasion (Ferdinands *et al.* 2006) will result in a long term loss of carbon from these savannas, as the woody component stores approximately 50 t C ha⁻¹, above and below ground (Chen *et al.* 2003). This increase in carbon emission due to gamba grass fires could counteract any decrease in carbon emissions through fire emission abatement programs across the northern Australian savannas.

Under climate change, the number of 'severe fire risk' days in northern Australian is expected to substantially increase (Williams *et al.* 2001; Hennessy *et al.* 2004), which will increase the intensity and frequency of gamba grass fires. Although speculative, it is foreseeable that under a regime of more frequent, higher intensity gamba grass fires, the decline in tree cover could increase, leading to further increases in carbon emissions.

Gamba grass invasion alters water availability

As well as modifying fire regimes and increasing nutrient losses, gamba grass invasion can also reduce water availability (Rossiter *et al.* 2004). Gamba grass has been shown to use up to 3 times more water than native grasses, resulting in reduced water availability under gamba grass stands (Hutley *et al.* 2007). This suggests that gamba grass invasion will result in increased competition for soil moisture with evergreen trees (Hutley *et al.* 2007).

Enhanced competition for soil moisture represents another stress that gamba grass invasion imposes on the savanna ecosystem, particularly the woody component.

Hutley *et al.* 2007

Gamba grass threatens biodiversity

Gamba grass poses a serious threat to animal and plant biodiversity (Beggs and Ferdinands 2003; Brooks *et al.* in review). It turns diverse woodlands (which are typically rich in native animals) into exotic grass monocultures (which typically contain far fewer native animals) (Beggs and Ferdinands 2003). It can invade relatively undisturbed areas (Setterfield *et al.* 2005), and is already a problem in some national parks in the Northern Territory including Kakadu, Mary River and Litchfield National Park. In Queensland, it is likely that gamba grass will invade Lakefield National Park in the near future.

Grain-eating birds and mammals, such as the endangered gouldian finch (*Erythrura gouldiae*) will lose food resources, because their habitats will become dominated by a single grass species (which provides food at only one time of the year) rather than a mix of different grasses (which will seed differentially over a much longer period) (Cook 1991). Tree-dependent birds and mammals will lose hollows and nectar. Frequent hot fires will harm many native species. Even species that have persisted in this environment for millions of years are being threatened - the cycad *Cycas armstrongii*, for example (Liddle 2004; Kerrigan *et al.* 2006a). Other threatened species for which gamba grass has been determined to be a major threat include:

- Darwin palm (*Ptychosperma macarthurii*) (Kerrigan *et al.* 2006b).
- the shrub *Helicteres* sp. Glenluckie Creek (Kerrigan and Cowie 2006).
- Partridge pigeon, eastern subspecies (*Geophaps smithii smithii*) (Woinarski *et al.* 2007).
- Yellow chat (*Epthianura crocea tunney*) (Woinarski *et al.* 2007).
- Yellow-snouted gecko (*Diplodactylus occultus*) (Beggs *et al.* 2006).

As the spread of gamba grass continues, it will increasingly place at risk a wide range of endangered and vulnerable species and communities across northern Australia.

There is likely to be catastrophic change in the abundance of numerous plants and animals that comprise the biota of these tropical landscapes.

Liddle (2004)

The end result of gamba infestation is the transformation of wildlife-rich woodland, wetland and riparian environments into biologically impoverished, pyrogenic monocultures of gamba grass carrying regular hot fires.

Nomination of gamba grass as a key threatening process under the EPBC Act
Environment Centre of the Northern Territory

Gamba grass poses a serious risk to human life and property

Fire services have warned that gamba grass fires are extremely hazardous and difficult to manage, and they pose a significant risk to human life and property. Gamba grass fires are much more intense and fast moving than native grass fires (Rossiter *et al.* 2003). As a result, gamba grass fires in the NT are now being controlled using helicopters and planes, something never seen before in the NT. The speed and intensity of gamba grass fires also pose an increased risk to fire fighters. In the NT fire fighters in gamba grass areas have had to change from wearing their grass-fire rated personal protective clothing, to heavier structured protective equipment, rated for southern forest fires.

There is also evidence that bushfire smoke is detrimental to human health and can increase the incidence of asthma (Johnston *et al.* 2002). The large fuel loads of gamba grass fires lead to large amounts of smoke being released, and therefore may pose a further risk to human health, in addition to incineration.

Fires generated by gamba grass pose a serious threat to human life and property. In the late 1990's the NT Fire and Rescue Service became concerned about the increasing fire intensities around Darwin.

Each dry season in the Darwin region, there is considerable community concern expressed in the media at the potential for gamba grass to cause damage to property and possibly loss of life.

Csurhes (2005)
Draft risk assessment for the Queensland government

The introduced grasses...they burn up to ten times as hot as the local, the native grasses. That poses significant threats for fire fighters who are used to dealing with native grasses, obviously. But is also poses threats to people who live in the rural area ad have grass growing reasonably close to a building...

Steve Sutton
Acting Director, Bushfires NT
ABC Stateline (NT) 20/07/2007

Recommendation

As the evidence makes clear, and as the draft Queensland risk assessment concluded, gamba grass “has the potential to become one of [the] worst weeds of tropical savannas” (Csurhes 2005).

The results of the Draft Queensland Weed Risk Assessment clearly show that gamba grass should be declared, with a score of 22 (taxa with a WRA score >6 should be rejected). If gamba grass is not declared in Queensland, even though it is well within in the reject category, this clearly devalues the overall WRA process.

Although gamba grass has already invaded thousands of hectares in the Northern Territory and Queensland, it is still in the relatively early stages of invasion, with the potential to invade much larger areas, as shown in Figure 1.

Because gamba grass seed banks are short-lived (mostly <1 year) (Flores *et al* 2005; Setterfield *et al.* 2004), eradication of many infestations is feasible.

For all the reasons noted, gamba grass should be banned, and eradicated or controlled to the extent possible.

Action is recommended to stop sale and further plantings of gamba grass, eradicate isolated infestations and contain other infestations.

Csurhes (2005)
Draft risk assessment for the Queensland government

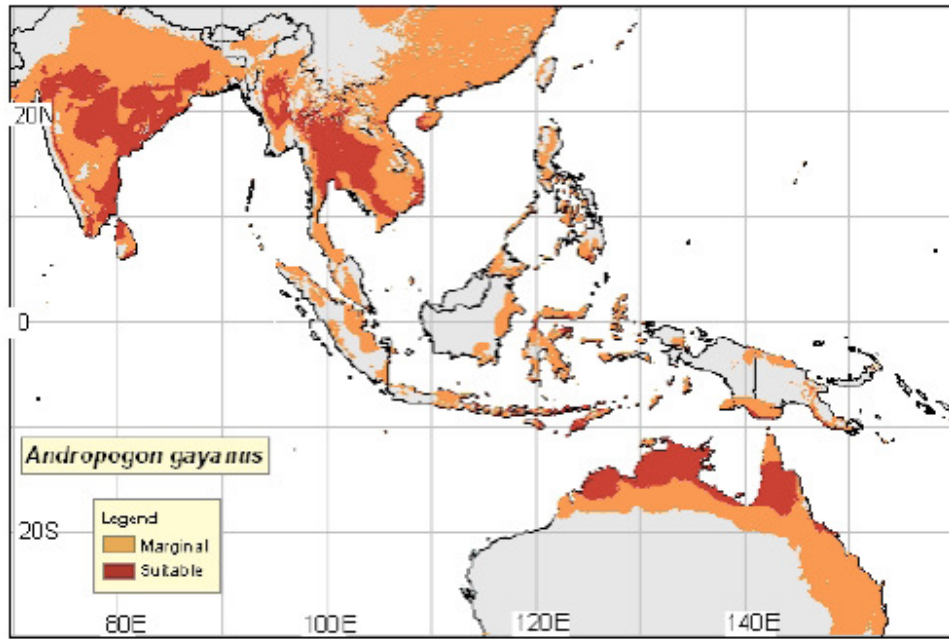


Figure 1. Potential Distribution of Gamba grass (*Andropogon gayanus*) in Australia.
Source: (Cook *et al.* 2005).

References

Barrow, P. (1995). The Ecology and Management of Gamba grass (*Andropogon gayanus* Kunth.). BSc (Honours) Thesis, Northern Territory University.

Beggs, K., Armstrong, M., and Woniarski, J. (2006). Threatened species of the Northern Territory- Yellow-snouted gecko (*Diplodactylus occultus*). NT Department of NRETA, Darwin.

Beggs, K.E. and Ferdinands, K. (2003) 'Wet, wild and weedy: exotic pastures and biodiversity conservation in the lower Mary River catchment, NT.' *Poster presentation at the National Landcare Conference, 29 April – 1 May 2003, Darwin.*

Brooks, K.J, Setterfield, S. A, and Douglas, M.M. (in review). Exotic grass invasions: applying a conceptual framework to the dynamics of degradation and restoration in northern Australia's tropical savannas. *Restoration Ecology*.

Cameron, A. and Lemcke, B. (2006). *Kent Gamba grass* (Agnote E8). Northern Territory Department of Primary Industry, Fisheries and Mines, Darwin.

Chen X, Hutley LB, Eamus D. (2003). Carbon balance of a tropical savanna of northern Australia. *Oecologia* 137:405-416.

Cook, B.G., Pengelly, B.C., Brown, S.D., Donnelly, J.L., Eagles, D.A., Franco, M.A., Hanson, J., Mullen, B.F., Partridge, I.J., Peters, M. and Schultze-Kraft, R. (2005). *Tropical Forages: an interactive selection tool (CD-ROM)*. CSIRO, DPI&F (Qld), CIAT and ILRI.

Cook, G. (1991). Gamba grass: impending doom for Top End savannas? *CSIRO TERC Newsletter*. 91(12):2.

Csurhes, S. (2005). *An assessment of the potential impact of Andropogon gayanus (Gamba grass) on the economy, environment and people of Queensland*. Queensland Department of Natural Resources and Mines, Brisbane.

Douglas, M.M. and Setterfield, S.A. (2005.) Impacts of exotic tropical grasses: lessons from gamba grass in the Northern Territory. In: *Proceedings of the Eighth Queensland Weed Symposium*, ed W. Vogler. The Weed Society of Queensland, Brisbane. Pp 69-73.

Ferdinands, K. Setterfield, S.A., Douglas, M.M. and Barratt, J. (2006). Africanising the tropical woodlands: Canopy loss and tree death following gamba grass *Andropogon gayanus* invasion. In: *Proceedings of the 15th Australian Weeds Conference*. Eds. C. Preston, J.H. Watts and N.D. Crossman. Weed Management Society of South Australia, Adelaide. Pp 296.

Flores, T.A., Setterfield, S. A., and Douglas, M.M. (2005) Seedling recruitment of the exotic grass *Andropogon gayanus* (Poaceae) in northern Australia. *Australian Journal of Botany* 53: 243-249.

Kean, L. and Price, O. (2003). The extent of mission grass and gamba grass in the Darwin region of Australia's Northern Territory. *Pacific Conservation Biology*, **8**, 1-10.

Kerrigan, R., and Cowie, I. (2006) *Threatened species of the Northern Territory: Helicteres sp. Glenluckie Creek*. NT Department of NRETA, Darwin.

Kerrigan, R., Cowie, I. and Liddle, D. (2006a). *Threatened species of the Northern Territory: Cycas armstrongii*. NT Department of NRETA, Darwin.

Kerrigan, R., Cowie, I. and Liddle, D. (2006b). *Threatened species of the Northern Territory: Darwin palm* (Ptychosperma macarthurii). NT Department of NRETA, Darwin.

Hennessy, K., Page, C., McInnes, K., Walsh, K., Pittock, B., Bathols, J., and Suppiah, R. (2004). Climate Change in the Northern Territory. Consultancy report for the Northern Territory Department of Infrastructure, Planning and Environment by CSIRO Atmospheric Research Climate Impact Group and Melbourne University School of Earth Sciences. Published by the Northern Territory Government, Darwin.

Hutley, L. B. (2007). Gamba grass alters hydrology. In: Evidence is in on the impact of gamba grass. *Savanna Links* 34:12.

Johnston, F.H., Kavanagh, A.M., Bowman, D.M.J.S. and Scott, R.K. (2002). Exposure to Bushfire Smoke and Asthma: an Ecological Study. *MJA* **176**: 535-538.

Liddle, D. (2004). The ecology of *Cycas armstrongii* and management of fire in Australia's tropical savannas. PhD Thesis. Charles Darwin University, Darwin.

Rossiter, N.A., Setterfield, S.A., Douglas, M.M. and Hutley, L.B. (2003). Testing the grass-fire cycle: alien grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* 9(3): 169-176.

Rossiter, N.A., Setterfield, S.A., Douglas, M.M., Hutley, L.B. and Cook, G. (2004). Exotic grass invasion in the tropical savannas of northern Australia: Ecosystem consequences. In: *Proceedings of the 14th Australian Weeds Conference*, eds B. M Sindel and S. B. Johnson. Weed Society of New South Wales, Sydney. Pp 168-171.

Rossiter-Rachor, N.A., Setterfield, S.A., Douglas, M.M., Hutley, L.B. and Cook, G.D. (2008). *Andropogon gayanus* (Gamba grass) invasion increases fire-mediated nitrogen losses in the tropical savannas of northern Australia. *Ecosystems* 11:77-88.

Setterfield, S.A., Bellairs, S., Douglas, M.M. and Calnan, T. (2004). Seed bank dynamics of two exotic grass species in Australia's northern savannas. In: *Proceedings of the 14th*

Australian Weeds Conference, eds B. M Sindel and S. B. Johnson. Weed Society of New South Wales, Sydney. Pp. 555-57.

Setterfield, S.A., Douglas, M.M., Hutley, L.B., Welch, M.A. (2005). Effects of canopy cover and ground disturbance on establishment of an invasive grass in an Australia savanna. *Biotropica* 37(1): 25-31.

Williams, A.A.J., Karoly, D.J., Tapper, N. (2001). The sensitivity of Australian fire danger to climate change. *Climatic Change* 49: 171-191.

Williams, R.J., Gill, A.M, Moore, P.H.R. (1998). Seasonal changes in fire behavior in a tropical savanna in northern Australia. *International Journal of Wildland Fire*. 8: 227-239.

Woinarski, J., Pavey, C., Kerrigan, R., Cowie, I., and Ward, S. (2007). *Lost from our landscape: threatened species of the Northern Territory*. NT Government Printer, Darwin.