NEWP
NATIONAL ESTABLISHED WEED PRIORITIES

August 2024

Nationally significant weed nomination

Section A: General information

Purpose of this form	This form is for government and non-government organisations that have completed the first step in the nationally significant weed nomination process by submitting an EOI that met the threshold criteria. Use this form to nominate a nationally significant weed that is either a: • single species, or • group of closely related weeds that are similar in life-form and management requirements. Only nominate the weeds that were deemed eligible in your EOI. If you are nominating more than one weed or group of weeds, submit a separate nomination form for each.
Before applying	Ensure that you understand the nomination process described in the Guide to nominating a nationally significant weed.
To complete this form	1) Save the form to your desktop or device. 2) Complete the form using the latest version of Microsoft Word. 3) Sign the completed form and save it as a PDF.
Confidentiality	Mark any confidential material as 'CONFIDENTIAL' and explain the sensitivity.
Your application must include	☒ attachments such as letters of support, maps and research findings.
Closing date	9 pm AEDT, 12 January 2025
Email your application	Invasive Species National Coordination and Programs Department of Agriculture, Fisheries and Forestry Email weedpriorities@aff.gov.au

Section B: Weed species

Provide details of the weed or group of closely related weeds that we deemed eligible in the EOI step. For correct scientific names, see the Australian Plant Name Index.

1 Indicate type of nomination (select one box)

Single species ☒ Go to question 2

Group of closely related weeds ☐ Go to question 3

2 Single species

Scientific name *Cyperus aromaticus*

Common name(s) Navua sedge

3 Group of closely related weeds (add more lines if needed)

Weed 1

Scientific name _____

Common name(s) _____

Weed 2

Scientific name _____

Common name(s) _____

Weed 3

Scientific name _____

Common name(s) _____

Weed 4

Scientific name _____

Common name(s) _____

Section C: Lead organisation contact details

We will email all correspondence to the primary contact person and cc the secondary contact person. The primary contact must respond by the date requested and communicate with group members listed in Section D.

4 Lead organisation name (legal entity name) AgForce Queensland Farmers Limited

5 Australian Business Number (ABN) 57 611 736 700

6 Primary contact

Given name(s) Annie Family name Ruttledge

Position Senior Policy Advisor

Phone 0429 062 852 Email ruttledgea@agforceqld.org.au

7 Secondary contact person

Given name(s) Tudor

Family name Tanase

Position Manager Environment and Natural Resources, Tablelands Regional Council

Phone 07 4089 2390 | 0428 679 634 Email TudorT@trc.qld.gov.au>

Section D: Group members

8 List all other organisations that jointly support this nomination. (add more lines if needed)

Tablelands Regional Council

Department of Primary Industries (Invasive Plants and Animals, Biosecurity Queensland)

NOTE: While it has not been possible (due to time constraints) to get these organisations to review this nomination form, both organisations have provided Letters of Support.

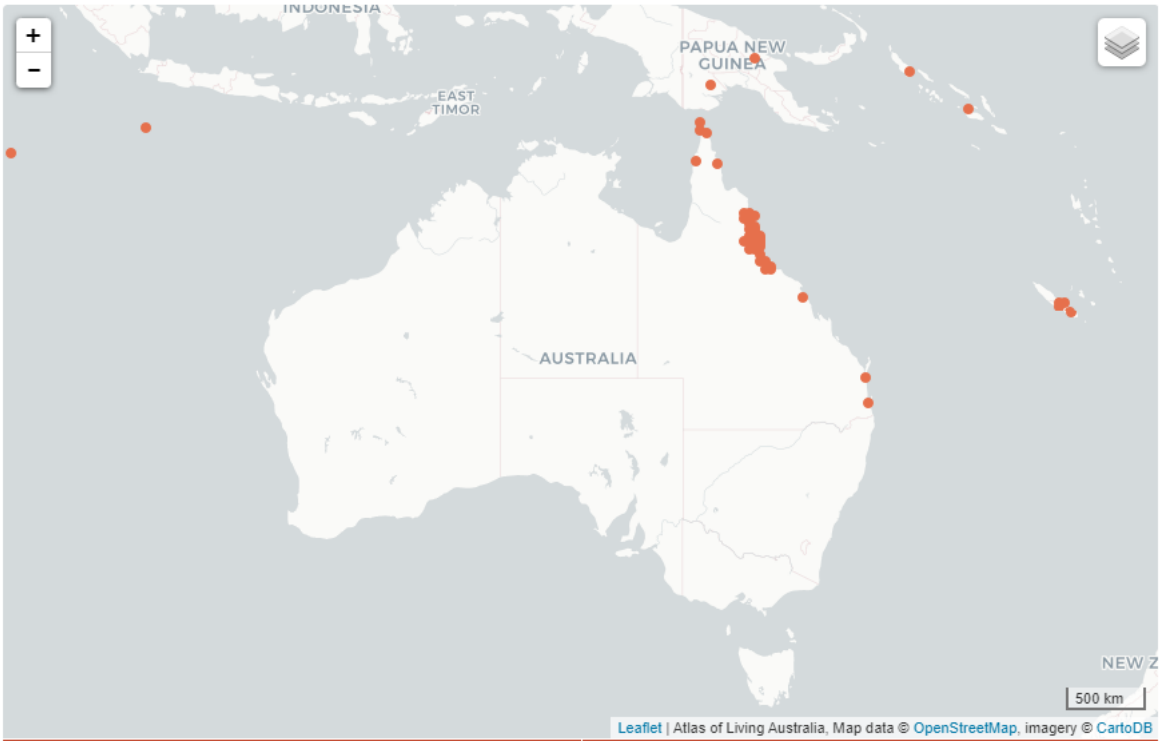
Section E: Current and potential range of the weed

To be considered nationally significant, the weed must have the potential to impact more than one state or territory.

9 What is the current distribution of the weed in Australia?

Provide evidence to support your claim, including maps from the Atlas of Living Australia (or other documented sources) showing the current distribution of the species in Australia.

Occurrence records map (188 records)



See also ALA Occurrence: https://doi.ala.org.au/doi/10.26197/ala.2d3d716a-f83e-45e6-8d4e-7acec61d2d89

From Biology, Ecology and Management of the Invasive Navua Sedge (*C. aromaticus*)—A Global Review

From its initial introduction into the Cairns region of Queensland in the 1970s, Navua sedge has spread north and south of its estimated initial point of entry. The weed has become established in grazing lands and horticultural fields (such as banana, sugarcane, sweet potato, etc.) of north and far north Queensland. It is commonly found along roadsides and railway embankments from Ingham to Cape Tribulation, as well as the upland areas of the Atherton Tablelands. For example, it is noted that approximately 650 km of main roads and 180,000 ha land are covered by Navua sedge in the Tableland regions (personal communication, Scott Morrison, Tableland regional council), where it often displaces desirable pastures species such as signal grass (*Urochloa decumbens* (Stapf) R. Webster), Rhodes grass (*Chloris gayana* Kunth) and humidicola grass (*Urochloa humidicola* (Rendle) Schweick.).

Data from the Queensland herbarium and the Atlas of Living Australia suggest that Navua sedge occurs in 21 of the 664, 50 km × 50 km grids (i.e., 3.16%) of Queensland's spatial land (Figure 4), and is ranked in the top 60% (59th out of 107) of assessed established weed species of the State in terms of spread rate and projected impact on nature conservation and agriculture [see here]. In Queensland, it has been estimated that there was a short lag time of 23 years (1970–1993) prior to its population explosion, with a major spike in its population spread occurring between 2000 and 2010. Navua sedge dispersal rates have been estimated to be 0.2 and 0.8 grids (of 50 × 50 km grids (0.5 degree [30 min]) per year at its lag and exponential phases, respectively [see here]. Nevertheless, only three of the ten regions of Queensland have so far been infested with Navua sedge, as distribution and abundance are still confined mainly to the coast. However, in view of climate change and increasing commerce, there is the potential for the weed to spread amongst other Queensland regions and into other States of Australia (Figure 4). State-wide, the Navua sedge invasion is categorised as stage III (requiring control and/or containment), with northern Queensland and Far North Queensland regions being in stages III and IV (requiring control-containment and/or asset protection, respectively) while minor, recent infestations (stage II category—requiring eradication and/or control) also occur in south-east Queensland.

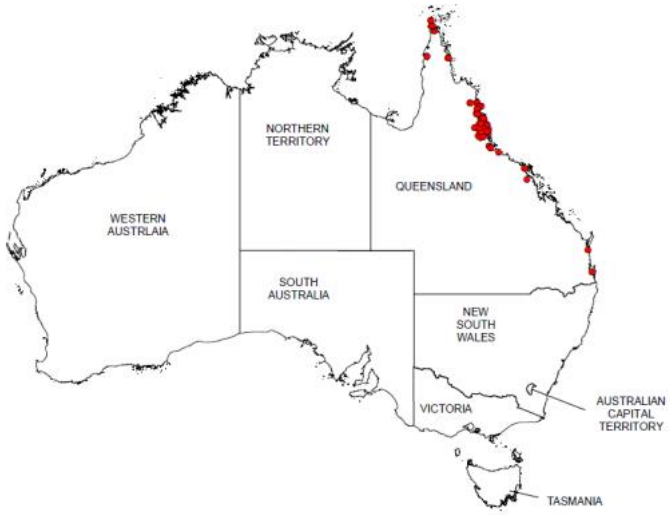


Figure 4. The distribution of *Cyperus aromaticus* (closed red circles) in Australia based on herbarium records (from AVH 2019).

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10 What is the potential distribution of the weed in Australia?

Provide supporting information on the species ecology, climatic requirements, land-use impact and potential distribution maps if available from the literature. You are not expected to undertake species distribution modelling.

In Biology, Ecology and Management of the Invasive Navua Sedge (*C. aromaticus*)—A Global Review the authors present a CLIMEX model (which uses distribution and climate data in native and novel ranges), indicating that in Australia, Navua sedge has the potential to spread further within Queensland and into the Northern Territory, New South Wales and Victoria.

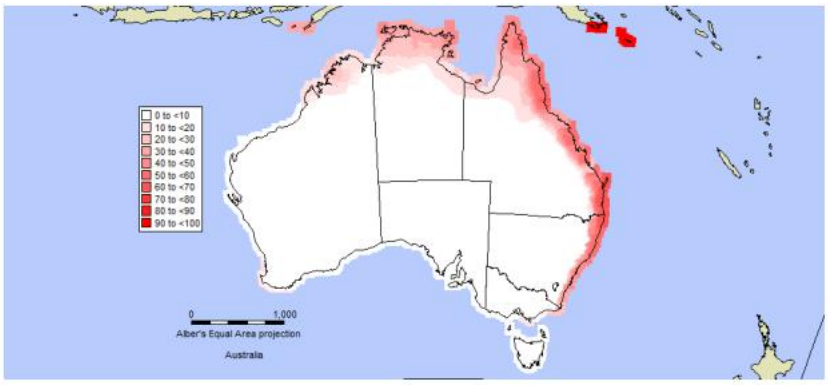
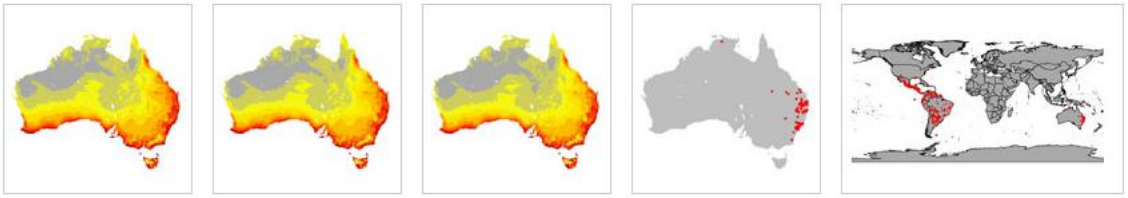


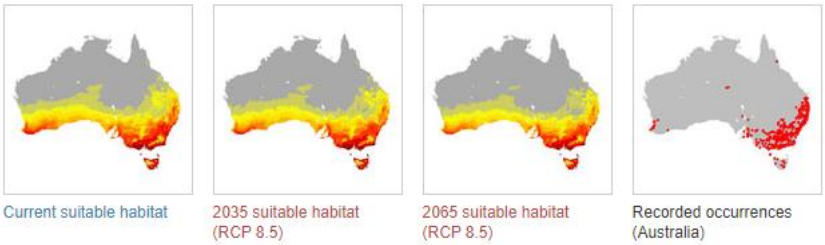
Figure 5. The potential distribution of *Cyperus aromaticus* in Australia as predicted by the CLIMEX model.

Climate modelling from the Weeds Futures website does not specifically cover *C. aromaticus*. However, information for *C. aggregatus, C. eragrostis, and C. esculentus* highlights the potential for this species to expand further.

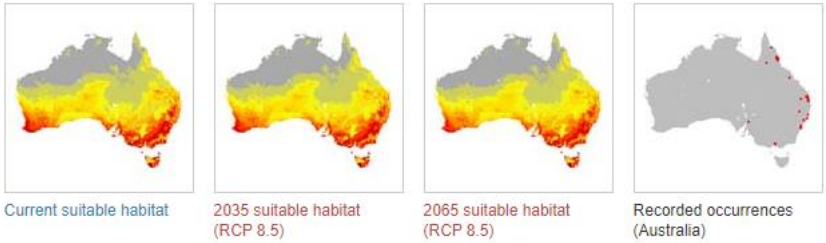
Maps of habitat suitability and recorded occurrences for *Cyperus aggregatus*



Maps of habitat suitability and recorded occurrences for *Cyperus eragrostis*



Maps of habitat suitability and recorded occurrences for *Cyperus esculentus*



Biology and Ecology from Fact Sheet for *C. aromaticus*:

Navua sedge is an extremely aggressive and unpalatable plant, capable of smothering many tropical pasture species and having little value itself, reducing pasture production. It is a strong competitor for nutrients, light, and moisture and at the same time harbors rats, plant pests, and diseases. It is most aggressive in areas where rainfall exceeds 2,500 mm annually. In areas with rainfall less than 2,000 mm and a distinct dry season, navua sedge is usually confined to the wetter low-lying pastures and waste places. It does not establish in areas with a prolonged dry spell (Parsons and Cuthbertson 1992). In Australia, although previously restricted to Queensland, it now also

occurs in New South Wales (Hosking and Groves, 1998). It was on the list of plants prohibited entry to Australia (Australia, 2000).

Citations:

Australian Weeds Committee. Noxious weed list for Australian States and Territories. http://www.weeds.org.au/noxious.htm

Hosking, J. R., and R. H. Groves. 1998. Recent naturalisations of species in Australia— some species which could become a problem in New South Wales. Pages 58-63 in M. Michelmore (ed.). Proceedings of the 9th Biennial Noxious Weeds Conference, September 1997, NSW Agriculture, Goulburn, Australia.

Parsons, W. T., and E. G. Cuthbertson. 1992. Noxious Weeds of Australia. Inkata Press, Melbourne.

Section F: Impact of the weed on multiple stakeholders

To be considered nationally significant, the weed must impact multiple stakeholder groups. Attach documents where relevant and list them in Section L.

11 Which land management groups are working to reduce the impacts of the weed?

Provide evidence demonstrating that the weed affects multiple stakeholder groups.

You may include:

- evidence from stakeholder organisations demonstrating why the weed is of concern
- efforts being undertaken to manage the weed
- links to relevant websites, weed management strategies or plans.

SEE ATTACHED DOCUMENTS IN SECTION L

Section G: Priority of the weed for management

To be considered nationally significant, the weed must be listed as a priority by government, industry and/or community organisations in more than one state or territory.

12 Which organisations have documented the species as a priority weed?

Provide supporting evidence (e.g. priority or target lists of weeds of concern), including the entity name that has listed the weed. Include links to relevant websites, weed management strategies or plans.

The Queensland Government provides a fact sheet detailing the description, impacts, and control methods for Navua sedge. This resource is part of their invasive plants management efforts.

A key resource for management is the Far North Queensland Regional Organisation of Councils (FNQROC) report *Navua sedge: Recommendations and regional management options for local government*. Adopted by the FNQROC Board, 9 December 2019. This report provides a series of recommendations and regional management approaches for local governments and is intended to assist in their decision making, management actions and communication regarding Navua sedge.

Navua sedge is a high priority in the Tablelands Biosecurity Plan and a locally declared species in the Local laws. Tablelands Regional Council carries out sustained control operations on road corridors (in collaboration with Transport and Main Roads), on TRC controlled public land and assists property owners with on farm control. The estimated cumulative annual cost for these actions exceeds $100,000.

Navua sedge is included the Biosecurity Plan for the City of Townsville, is listed as “RM3”– Restricted Matter – No gifting, selling, trading or releasing into the environment. See Biosecurity Plan 2024-2028_Nov draft-compressed.pdf

Navua sedge is locally declared in the Cassowary Coast Regional Council Biosecurity Plan 2019-2023 (ccrc-biosecurity-plan-2019-2023)

Cairns Regional Council have funded the Mulgrave Landcare & Catchment Group Inc. to the value of $15,000 (ex GST). Project: Barbagallo Road, Riparian Corridor Linkage Timeframe: 1 October 2023 to 31 October 2024. See Revegetation of Natural Areas Grant.

Navua sedge is also a Target Weed in the Mareeba Shire Council DRAFT
Mareeba Shire Community Biosecurity Plan 2020 - 2025 (MSC_BIOSECURITY-PLAN_2020-25_draft_SW.pdf)

Section H: Impact of weed nationally

To be considered nationally significant, the weed must have a demonstrated, nationally significant impact (economic, environmental, cultural or social).

13 What are the current and potential impacts of the weed?

Provide evidence demonstrating that the weed is causing nationally significant impacts and (if applicable) that the weed has the potential to cause further impacts. You may include evidence through a literature review and supporting evidence such as documents, reports, publications and testimonies.

Types of impacts include:

- Economic – impacts on yield (e.g. crop, pasture, forestry or other industries), animal production, weeds acting as alternative hosts for pests and diseases, increases in the cost of production or management, market access and product quality
- Environmental – impacts on vegetation structure, biodiversity and ecosystem function
- Social – impacts on human physical and mental health, social amenity (including services, infrastructure and non-First Nations cultural heritage)
- Cultural – impacts on First Nations culture and cultural heritage – oral traditions, arts, rituals, ceremonies and knowledge; traditional subsistence and sustenance resources; and place-based heritage.

The sedge is unpalatable, and can form dense stands by replacing palatable tropical pasture species. Over 1000 beef producers, dairy farmers and hay producers in the wet tropical region of north Queensland, including Atherton, Cairns, Daintree and Innisfail Regions are impacted by Navua sedge. Beef cattle and dairy farmers in these areas regard Navua sedge as a weed of major concern, since its presence results in productivity losses. Losses are caused by reduced pasture yield, reduced carrying capacity, and increased weed management costs. Chemical residues and grazing withholding (spelling) periods are of particular concern.

Waterhouse (1993) records occurrence of Navua sedge in rice, pineapple, watermelon, and vegetables. Waterhouse (1997) records it as widespread and very important in Fiji, French Polynesia, and Western Samoa. In Fiji it is a declared noxious weed. It is considered a vigorous and aggressive weed of the southeastern coastal and river districts and river valleys spreading throughout Fiji. It is not readily grazed by livestock and when established soon dominates the pastures, reducing yield in terms of milk, butterfat, and beef (Mune and Parham, 1967).

Far North Queensland Regional Organisation of Councils (FNQROC) has developed recommendations and regional management approaches for local governments to manage Navua sedge. This states:

- Navua sedge is considered by many to be grazing's worst weed in the Wet Tropics (one the industry cannot live with).
- Poses current impacts and a future risk to diversification in cane farming.

- Management costs and resource demands are perennial which makes it hard to get ahead in management and very easy to relapse is management effort is reduced.
- It has spread rapidly to a wide range of suitable habitat in the region and continues to expand.
- There is considerable landholder concern and frustration at the impacts and inability to prevent its spread.
- There are well documented overseas impacts on grazing and horticultural land.
- The mental health and stress in community are elements of the Navua sedge problem which cannot be ignored.
- Tourism and environmental impacts are not usually associated with Navua sedge but might have an increasing relevance in the future.
- Management can be a hopeless situation for producers with landholders often feeling they are not having a win, regardless of the amount of effort or resources put in.
- Obligations to future generations; some family farms have been rendered next to useless because of unmanaged or unmanageable Navua sedge infestation.

Supporting references:

Far North Queensland Regional Organisation of Councils (FNQROC). (2019). Navua sedge: Recommendations and regional management options for local government. Version 1.2, September 2019. Adopted by the FNQROC Board, 9 December 2019.

Mune, T. L., and J. W. Parham. 1967. The declared noxious weeds of Fiji and their control, 3rd ed. Fiji Dept Agric. Bull. 48:1-87.

Shi, B., Osunkoya, O.O., Chadha, A., Florentine, S.K., & Dhileepan, K. (2021). Biology, Ecology and Management of the Invasive Navua Sedge (*C. aromaticus*)—A Global Review. *Plants*, 10(9), 1851. https://doi.org/10.3390/plants10091851

Waterhouse, D. F. 1993. The Major Arthropod Pests and Weeds of Agriculture in Southeast Asia: Distribution, Importance and Origin. ACIAR Monograph No. 21, ACIAR (Australian Centre for International Agricultural Research) Canberra, Australia. 141 pp.

Vitelli, J.S.; Madigan, B.A.; van Haaren, P.E. Control techniques and management strategies for the problematic Navua sedge (*C. aromaticus*). Invasive Plant Sci. Manag. 2010, 3, 315–326.

Section I: Support for national coordinated action

For a weed to be considered nationally significant, you must be able to demonstrate the benefit of a nationally coordinated approach to managing the weed.

Provide evidence of the likely benefits of, and stakeholder support for, taking a nationally coordinated approach to containing the species spread and improving its management. You may include evidence through a literature review and supporting evidence such as documents, reports, publications and testimonies.

14 What are the goals and actions that require national coordination to manage the weed?

- Biocontrol research indicates a relatively high likelihood that agents could be developed which might reduce the impact of Navua sedge. See Biological control of Navua sedge (*C. aromaticus*) in Australia - DAF eResearch Archive (eRABBB). These efforts represent a significant step towards developing cost-

effective and long-term management solutions for Navua sedge in Australia. Greater financial support and partnerships could significantly enhance these efforts and deliver solutions sooner.

- Lack of control options suited to industry requirements is one of the biggest obstacles to management. Currently there is only a single selective herbicide available for the control of nutgrasses in cane.
- Herbicide suitability and effectiveness can accurately be described as the single biggest barrier to management for industry. There is likely to be strong support for federally supported research into development of additional herbicide tools and application technology.
- Funding for development of a Best Practice Manual could play a key role in cross-industry awareness (cattle and cane), as well as roadside managers, and might assist in developing news tools and approaches to management.
- Grants for installation of simple wash-down facilities as well as installing risk/hygiene signage could go a long way towards reducing the considerable issue of navua sedge spread by vehicles and machinery.

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15 What benefits would a nationally coordinated approach bring to management of the weed?

- Securing funds for research has been relatively successful based almost entirely on an effective lobby from local industry groups. Grassroots advocacy and fundraising would benefit from support from relevant national industry groups.
- With a national approach, there is less potential for efforts to be counterproductive, as there is a cohesive plan in place. Concerted action to prevent further spread, preventing the widespread establishment of weeds, is the most cost-effective strategy.
- Listing as a WONS would be useful to bring more emphasis to management priority.
- National coordination can amplify public awareness including the impact of management efforts, and how key stakeholders and individuals can help.

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16 What are the barriers or challenges to applying a nationally coordinated management approach?

1. Navua sedge is not currently declared under any state or territory regulation – providing little imperative for management.
2. The cane industry in northern Queensland is already heavily regulated for herbicide use, and is heavily reliant on machinery in all aspects of the operation which makes weed hygiene very challenging.
3. Spread risk originates from multiple pathways concurrently making it difficult to manage. Key spread pathways include; roadsides (particularly slashing operations); machinery and vehicles; feral pigs; waterways; contaminated machinery and produce.

Section J: Invasiveness of the weed

To be considered nationally significant, the weed must have invasive characteristics.

17 Describe the invasive characteristics of the species.

Provide evidence, including supporting references and risk assessments (if available), demonstrating the invasiveness of the species. Consider the species reproduction strategy, dispersal (human mediated and natural), growth and competitive ability, and ability to colonise and establish.

From Biology, Ecology and Management of the Invasive Navua Sedge (*C. aromaticus*)—A Global Review

Seedlings of Navua sedge develop quickly and initiate flowering 7–8 weeks after emergence, with seeds requiring an additional 30 days to ripen at the flower head. At the time of flowering, a new shoot is also produced on the

underground stem. This new shoot then grows as a (false) seedling, producing a flower seven weeks after emergence plus a new shoot from the underground stem. This process is continually repeated and results in a rapidly spreading colony of stems growing from an interconnected underground rhizome system.

The inflorescence heads on each shoot generally produce about 250 seeds, meaning that seed production per hectare is extremely high, in the order of ~450–550 million seeds. The longevity of these seeds is greater than 15 years with a third of the seed bank viable still after five years.

The Cyperaceae family is specialised in having high seed buoyancy, a trait that helps in the spread of its propagule by air and water movement. The small seeds can also hitchhike on the body of cattle, vehicles and transport equipment, thus they can be distributed into new and uninfected regions. Seed can also be spread through cattle excretion occurring due to grazing on Navua sedge. Furthermore, birds have been reported to gain nutrition from seeds of sedges, and hence their seeds can potentially be dispersed through their faecal matter. In this respect, these tiny seeds have less retention time in the gut of birds, allowing them to retain their structure. In summary, it can be expected that the small seed size and structure of barbs, high viability and long dormancy of seed will contribute to the further spread to novel ranges of Navua sedge.

Soil pH has been shown to have minimal impact on the seed germination of Navua sedge populations collected from far north Queensland. More than 85% of seeds can germinate with pH levels ranging from 4 to 10, indicating that Navua sedge seeds can easily germinate in most areas in Australia. Seeds will germinate in low saline water below 150 mM of sodium chloride concentration, and burning may not be effective to inhibit the seed germination of Navua sedge. Moreover, a recent study of Navua sedge has showed the possible presence of allelochemicals that suppress germination of pasture grasses.

Additional supporting references:

Black, I. Navua sedge in pastures in Fiji. *Aust. Weeds* 1984, *3*, 16–19.

Bryson, C.T.; Carter, R. The significance of Cyperaceae as weeds. *Monogr. Syst. Bot. Mo. Bot. Gard.* 2008, *108*, 15–101.

Chadha, A.; Florentine, S.K.; Dhileepan, K.; Dowling, K.; Turville, C. Germination biology of three populations of Navua sedge (*C. aromaticus*). *Weed Sci.* 2021, *69*, 69–81.

Ellett, P.G. The effect of interspecific competition from two tropical pastures on the growth of the invasive Navua sedge. In *C. aromaticus*; James Cook University: Townsville, QLD, Australia, 2011.

Haines, R.W.; Lye, K.A. *Sedges and Rushes of East Africa: A Flora of the Families Juncaceae and Cyperaceae in East Africa—With Particular Reference to Uganda*; East African Natural History Society: Nairobi, Africa, 1983; p. 404.

Vitelli, J.S.; Madigan, B.A.; van Haaren, P.E. Control techniques and management strategies for the problematic Navua sedge (*C. aromaticus*). *Invasive Plant Sci. Manag.* 2010, *3*, 315–326.

Section K: Feasibility of management

To be considered nationally significant, the proposed management approach must be technically feasible, practical and cost effective, and there is a demonstrated level of stakeholder support to manage the weed.

Provide evidence demonstrating how the weed is currently being managed, effectiveness of current management techniques and potential management options that might improve effectiveness (if known). Include evidence of existing or proposed collaborative initiatives to manage the weed, details of any benefits of the weed, as well as any potential conflicts in views about the need to manage the weed. Include references and/or supporting documentation to support your response.

18 How is the weed currently being managed through existing strategies, plans or processes?

The Queensland Government provides a fact sheet detailing the description, impacts, and control methods for Navua sedge. This resource is part of their invasive plants management efforts.

Far North Queensland Regional Organisation of Councils (FNQROC). (2019). *Navua sedge: Recommendations and regional management options for local government*. Version 1.2, September 2019. Adopted by the FNQROC Board, 9 December 2019.

Navua sedge is a high priority in the Tablelands Biosecurity Plan and a locally declared species in the Local laws.

Navua sedge is listed in the Biosecurity Plan for the City of Townsville, Navua sedge is listed as "RM3"– Restricted Matter – No gifting, selling, trading or releasing into the environment. See Biosecurity Plan 2024-2028_Nov draft-compressed.pdf

Cassowary Coast Regional Council Biosecurity Plan 2019-2023. (ccrc-biosecurity-plan-2019-2023)

Cairns Regional Council. Revegetation of Natural Areas Grant

Mareeba Shire Council DRAFT Mareeba Shire Community Biosecurity Plan 2020 - 2025 (MSC_BIOSECURITY-PLAN_2020-25_draft_SW.pdf)

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19 What is the effectiveness of current chemical, biological and mechanical control options for the weed?

If known, indicate cost (per hectare) of current control options.

Tablelands Regional Council carries out sustained control operations on road corridors (in collaboration with Transport and Main Roads), on TRC controlled public land and assists property owners with on farm control. The estimated cumulative annual cost for these actions exceeds $100,000.

Chemical control (see Navua sedge)

Sempra herbicide is the only selective herbicide registered for Navua sedge control. The Sempra herbicide label allows Navua sedge growing in pastures (*Brachiaria decumbens, B. humidicola, Setaria spp.* and *Pangola spp.*) to be controlled (see Table 1). The label allows the application of up to 200 g/ha per annum at application rates of 65–100 g/ha (depending on plant density) to actively growing plants, prior to seed set. Spot applications are also allowed at 1 g/100 m2. Treated areas should be resprayed within 8–12 weeks of the initial treatment. To optimise control, Bonza Spray Adjuvant is recommended at 1 L/100 L of spray solution. The minor use permit PER80065 (apvma.gov.au) allows for the foliar application of Sempra at 130 g/ha (broadacre) or 2 Navua sedge *C. aromaticus* 5.2 g/100 L (spot-spraying) using ground based equipment such as boom sprays, hand-held or knapsack sprayers for controlling Navua sedge growing in commercial and industrial areas, rights-of-way, including footpaths and road verges. The herbicide should be applied from February to October, when Navua sedge is actively growing and prior to seed set. A minimum re-treatment interval of 10 weeks between consecutive applications should be adhered to. Only apply a maximum of two foliar applications per year to the same area. Additional herbicides permitted are those registered for the control of sedges (Cyperus spp.) in general. These herbicides are registered for the control of sedges in certain situations, as specified on the herbicide label. Most of these herbicides are non-selective in pastures and have withholding periods. For aquatic areas, herbicides containing Glyphosate-ipa can be used. For areas of land, commercial/industrial or rights-of-way herbicides containing Glyphosate-ipa, glyphosate-mas or imazapyr are permissible.

Mechanical control (see Navua sedge)

Physical removal is possible for small clumps. Each clump must be dug out with a spade and the entire plant turned over, exposing the root system while making sure all aerial parts of the plant are completely covered. For large infestations, it may be possible to bring the underground roots to the surface by discing and allowing them to dry out. The effectiveness of this technique can depend on the weather, since considerable regrowth would be expected in damp conditions. Any mechanical techniques that contribute to deeper seed burial are likely to prolong seed longevity and reduce seed losses in the paddock. A single rotary hoe pass reduced the Navua sedge population by only 2%.

Biological control

Biological control is considered the most cost-effective and long-term management option. Navua sedge has been approved as a target for biological control in Australia (Government weed strategies and lists - Weeds Australia), where a biological control program was initiated in 2017. Native range surveys in Kenya, Nigeria and Tanzania found three promising biological control fungi; specifically, a smut fungus (*Cintractia kyllingae*) that infects flower heads and seeds; a rust fungus (*Uredo kyllingae-erectae*) that attacks leaves and stems; and an inflorescence-colonising ascomycete (*Curvularia tanzanica*). Field surveys have only recorded these fungi in association with Navua sedge. For effective biological control of Navua sedge, multiple agents that target different parts of the sedge maybe needed to reduce seed production and minimise its impact and spread. These three fungal pathogens have been exported to CABI-UK, where host-specificity testing for *C.kyllingaeis* in progress; and testing for *U. kyllingae-erectae* will commence soon. If proven to be host specific, the pathogens will be released in Australia. Current research in Australia has focused on the search for local pathogens on Navua sedge that may have potential as mycoherbicides. Several fungi of interest have been found in Australia, including species of *Curvularia, Epicoccum, Fusarium, Neopestalotiopsis, Nigrospora, and Phaeosphaeria,* as well as other fungal pathogens yet to be identified.

For further information see Biological control of Navua sedge (*C. aromaticus*) in Australia - DAF eResearch Archive (eRABBB)

Conclusions

Currently there is only a single selective herbicide available for the control of nutgrasses in cane. The currently registered herbicides are not adequate for the task; have onerous application restrictions and carry risks to reef and freshwater ecosystems if label directions are not closely adhered to. Mechanical control methods are generally not a long-term solution and require repeated applications. Treatments that result in seed burial, for example, discing, are likely to prolong seed persistence and should be avoided. The sprouting activity of vegetative propagules and root fragmentation also needs to be considered when selecting control options. Spread risk originates from multiple pathways concurrently making it difficult to manage, key spread pathways include; roadsides (particularly slashing operations); machinery and vehicles; feral pigs; waterways; contaminated machinery and produce.

Biocontrol research for navua sedge is promising, indicating a relatively high likelihood that agents could be developed which might reduce the impact of Navua sedge. Multiple agents have been identified that target different parts of the sedge and, if proven to be host specific, the pathogens will be released in Australia. Several fungi of interest have been found in Australia, including species of *Curvularia, Epicoccum, Fusarium, Neopestalotiopsis.* These have potential as mycoherbicides.

20 What other control options could be implemented to improve effectiveness of management?

Biological control is considered the most cost-effective and long-term management option. Research into biological control agents is promising for both pathogens and mycoherbicides. Greater national investment in biological control research could go a long way towards speeding up the timeframe for delivery of solutions.

Herbicide suitability and effectiveness can accurately be described as the single biggest barrier to management for industry. There is likely to be strong support for research into development of additional herbicide tools and application technology.

Grants for simple wash-down facilities and the development of associated protocols are considered an effective option for reducing risk of spread by vehicle and machinery operators.

Develop catchment-based or regional approaches to managing risk or impacts in partnership with industry and other key stakeholders.

Identify and prioritise key assets and high risk spread areas on locally managed roads and reserves for strategic management.

Grassroots advocacy and fundraising would benefit from support from relevant national industry groups.

21 What is the likely level of cooperation among stakeholders and land management groups to collaboratively manage the weed?

Include any potential conflicts in views about the need to manage the weed.

Include details of any benefits (economic, environmental, social or cultural) of the weed that need to be considered.

Navua sedge is primarily considered an invasive weed in Australia, particularly in northern Queensland. It negatively impacts agriculture, including crop and pasture production, as well as dairy and beef industries. Due to its invasive nature and the challenges it poses, it is not typically liked or used for any beneficial purposes in Australia.

Securing funds for research has been relatively successful based almost entirely on an effective lobby from local industry groups. Significant advocacy from local industry has been essential to progress management tools and R+D to date. Grassroots advocacy has demonstrated the effectiveness of local industry brokering support for producers. However, despite its significance to local industries there remains a low level of awareness of the impacts and risks, or control and hygiene strategies required to manage Navua sedge.

Section L: Attachments

You must include relevant attachments, such as letters of support, maps and research findings.

22 List the attachments that you have included in support of your nomination. (add more lines if needed)

- AuW 03-1 pp016-25 Black
- Biology, Ecology and Management of the Invasive Navua Sedge_Shi et al. 2021
- Biosecurity Plan 2024-2028_Nov draft-compressed
- BQ_IPA Research_Biocontrol and chemical R&D_Navua Sedge_2023-2024
- Cassowary Coast Regional Council Biosecurity Plan 2019-2023
- Chadha_etal Cyperus_germinationbiology 2021
- Chadha_etal Cyperus_seedbanks 2022
- Chadha_etal Navua_halosulfuron 2022
- Cyperus-aromaticus_WSA
- General Manager - Invasive Plants and Animals - Letter of Support for Agforce - Signed 20.12.24
- Letter of support NEWP Navua sedge
- Navua sedge biocontrol_Dhileepan et al_AWC 2022
- Navua-sedge_recommendations-and-regional-management-options-for-local-government_2019-
- Records from Atlas of Living Australia
- Shi et al. 2022
- navua-sedge

Section M: Declaration

To be completed by the primary contact named in Section C of this application.

I declare that:

- I am authorised to submit this nationally significant weed nomination on behalf of the lead organisation
- group members have reviewed and agreed on the content of this nomination. I will provide evidence of this authority to the department on request.

I have read and understood the privacy notice and Privacy Policy.

Full name Annemieke Ruttledge

Signature (type or insert signature)

Date (dd/mm/yyyy) 12/01/2025

Section N: Privacy notice

'Personal information' means information or an opinion about an identified, or reasonably identifiable, individual.

By completing and submitting this form you consent to the collection of all personal information contained in this form.

The Department of Agriculture, Fisheries and Forestry collects your personal information (as defined in the *Privacy Act 1988*) in relation to this form on behalf of the National Established Weed Priorities (NEWP) Steering Group and the Environment and Invasives Committee (EIC) Weeds Working Group for the purposes of assessing your nationally significant weed nomination and related purposes. If you fail to provide some or all of the personal information requested in the form, the department may be unable to process your nomination.

The department may disclose your personal information to the NEWP Steering Group; EIC Weeds Working Group; Australian, state or territory government agencies; persons or organisations where necessary for the purposes described, provided the disclosure is consistent with relevant laws, particularly the Privacy Act. Your personal information will be handled in accordance with the Australian Privacy Principles.

See the department's Privacy Policy to learn more about accessing or correcting personal information or making a complaint. Alternatively, email our Privacy Officer at privacy@aff.gov.au.