Plant Risk Evaluator -- PRE™
Evaluation Report

Melinis repens -- California

PlantRight

PRE Score: 17 -- High Potential Risk
Confidence: 77 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: July 31, 2021

This PDF was created on June 13, 2024

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Plant Evaluated

Melinis repens

Image by Bernard Dupont

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Melinis repens*) in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

Summary

Melinis repens (natal grass) is an annual / short-lived perennial ornamental grass that has naturalized in California and is invasive in other parts of the world outside of its native range in southern Africa. It can displace native plants and increase fire hazards. It produces many seeds that are dispersed by wind and animals.

General Information

Status: Completed
Screener: Kristina Wolf
Evaluation Date: July 31, 2021

Plant Information

Plant: *Melinis repens*

Regional Information

Region Name: California

Climate Matching Map

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click here to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.

Evaluation Questions

These questions are based on an article published by PLOS One, which can be found here: https://doi.org/10.1371/journal.pone.0121053.

Invasive History and Climate Matching (Questions 1 - 6)

1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Natal grass is native to southern Africa. It is very widely naturalized in Australia and most abundant in the northern and eastern parts of the country. It is common in Queensland, the Northern Territory and eastern New South Wales and scattered in other parts of New South Wales, in southern Victoria, in northern and south-western Western Australia and some parts of South Australia. Also naturalised on Norfolk Island and Christmas Island. Widely naturalized elsewhere in the world, most or all of the Central American countries (Panama through Guatamala), Ecuador, Peru, Columbia, Singapore, Taiwan, China, the southern USA (i.e. California, Arizona, New Mexico, Texas, Louisiana, Florida, Georgia and North Carolina) and on several Pacific islands (i.e. the Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Nauru, New Caledonia, the Solomon Islands) and Hawaii (Weeds of Australia Biosecurity Queensland Edition) .

Reference(s):

- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.
- GBIF Secretariat (2021). Melinis repens.

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2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Naturalized in coastal California and the San Joaquin Valley (Jepson e-Flora). Widely naturalized in Australia, and most abundant in the northern and eastern parts of the country. It is common in Queensland, the Northern Territory and eastern New South Wales and scattered in other parts of New South Wales, in southern Victoria, in northern and south-western Western Australia and some parts of South Australia. Also naturalised on Norfolk Island and Christmas Island. Widely naturalised elsewhere in the world, including southern USA (i.e. California, Arizona, New Mexico, Texas, Louisiana, Florida, Georgia and North Carolina) and on several Pacific islands (i.e. the Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Nauru, New Caledonia, the Solomon Islands and Hawaii (Weeds of Australia Biosecurity Queensland Edition). Its distribution overlaps with more than 50% of California Hardiness Zones (Cal-IPC global map of climate areas matching California).

Reference(s):

- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.
- Cal-IPC (2016). Cal-IPC global map of climate areas matching California.
- Jepson Flora Project (2014). Jepson eFlora.

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- Answer: **Yes**, which contributes **2** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

A very common weed of roadsides, railways, parks, gardens, footpaths, disturbed sites, waste areas, pastures and crops in tropical and sub-tropical regions. Also present in temperate, semi-arid and arid areas. Natal grass is a grass native to southern Africa that has become a problematic weed in many tropical and subtropical regions around the world, including Florida, Mexico, the Caribbean, Central America, Brazil, and many Pacific islands, Australia (New South Wales, Queensland and Western Australia) Dominican Republic and French Polynesia (CABI). In Florida, Natal grass exists in many areas but is particularly widespread in the southern pine rocklands and central part of the state (David and Menges 2011), where it is documented to have spread from roadsides into intact habitat (USDA 2011). It is listed by the Florida Exotic Pest Plant Council as a Category I invasive (FLEPPC 2015). Although considered a weed in many countries, it is not currently regulated. Natal grass is regarded as an environmental weed in Queensland, New South Wales, Western Australia and the Northern Territory and was also recently listed as a priority environmental weed in at least one Natural Resource Management region (Weeds of Australia Biosecurity Queensland Edition).

Reference(s):

- FLEPPC (2015). Florida Exotic Pest Plant Council's 2015 List of Invasive Plant Species..
- CABI (2007). CABI Invasive Species Compendium.
- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.
- David, A.S., & Menges E.S. (2011). Microhabitat preference constrains invasive spread of non-native natal grass (Melinis repens). Biological Invasions. 13, 2309-2322.
- USDA Forest Service Data and Information Systems (2011). Fire Effects Information System - Management Project Summary: Fire effects on 3 subtropical invasive plants in Florida and the Caribbean—Common bamboo, Natal grass, and white leadtree.

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4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

- Answer: **Yes**, which contributes **3** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Melinis repens is mainly considered invasive in natural grasslands and shrublands and is considered a very common weed of roadsides, railways, parks, gardens, footpaths, disturbed sites, waste areas, pastures and crops in tropical and sub-tropical regions. Holm et al. (1979) list it as a 'serious' weed in Australia, Brazil and Ghana, and 'principal' in Malaysia and Zambia. It is considered to be invasive in parts of Texas, southern California, Mexico, Queensland, New South Wales, and Western Australia that match California's climate. It is also considered invasive in many other areas that do not match, including Florida, Hawaii, the Dominican Republic and French Polynesia (CABI). Natal grass also occurs in temperate, semi-arid and arid areas. Red Natal grass (Melinis repens) is formally regarded as an environmental weed in Queensland, New South Wales, Western Australia and the Northern Territory. It was also recently listed as a priority environmental weed in at least one Natural Resource Management region (Weeds of Australia Biosecurity Queensland Edition).

Reference(s):

- Peirce, P. (2008). Lawn begone.
- Watershed Health (2007). Melinis repens (Rhynchelytrum repens).
- CABI (2007). CABI Invasive Species Compendium.
- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.

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5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Melinis minutiflora in Brazil (Zones 9b-13); Melinis nerviglumis in Madagascar, Africa Sub Saharan South Africa, Zones 8a-11 (GCW), both of which overlap substantially with California's Zones (5a-11) (GCW WRA). However, per personal communication with Joseph DiTomaso, "I would answer a NO to this question. Melinis minutiflora is pretty much only a tropical grass." As such, this is scored a 'No'. Melinis nerviglumis is sold occasionally as a landscape ornamental in California, but there is no evidence that it has naturalized to date (R. Vanderhoff, personal communication).

Reference(s):

- Global Compendium of Weeds (GCW), Hawaiian Ecosystems at Risk (HEAR) project, Pacific Island Ecosystems at Risk (PIER) (2007). Invasive species information for Hawaii and the Pacific: Global Compendium of Weeds (GCW).

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6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Ecology: Disturbed areas, slopes; Elevation:
Reference(s):

- Jepson Flora Project (2015). The Jepson Herbarium Online.
- Peirce, P. (2008). Lawn begone.
- CABI (2007). CABI Invasive Species Compendium.
- Dave's Garden (2015). Dave's Garden.
- GBIF Secretariat (2021). Melinis repens.

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Found in disturbed open places, often forming large stands (Flora of Zimbabwe). This species will compete with and displace native species (Possley and Maschinski 2006). In the USA, this species invades undisturbed pine rocklands in Florida (Stokes et al., 2011) and invades coastal grasslands dominated by Heteropogon contortus in Hawaii. In Sonora, Mexico it is replacing native grasses in desert grasslands including unique grassland with feather trees (Lysiloma watsonii). It is also growing in disturbed openings in tropical deciduous forests in eastern Sonora (Van Devender and Reina, 2005). Found to be an intermediate competitor with other grasses in an Arizona experiment, M. repens was better able to tolerate resource depletion by buffel grass (Pennisetum ciliare), than the native Arizona cottontop (Digitaria californica), giving it a competitive edge over the native species (Stevens and Fehmi, 2009). Rare plant species on Brazilian inselbergs are threatened by the spread of M. repens (Porembski et al., 1998). Six Hawaiian species growing on Lanai and/or Maui are threatened by M. repens because of its impact on fire frequency. Stands of M. repens can increase the number of fires; negatively affecting the growth and survival of other native flora and fauna (La Rosa et al., 2008 - CABI). Displaces native vegetation and prevents the natural succession of native species (FloraBase—the Western Australian Flora). It is a primary invader of abandoned crop fields and unimproved pastures and prevents the natural succession of native species such as Andropogon and desirable forbs in Florida (University of Florida IFAS Extension). Natalgrass competes with native plants for nutrients, light, water and space, and prevents colonization by native species. In fact, its invasive potential was noted early on when Tracy (1916) reported its value as a “smother crop,” which “makes such vigorous growth as to choke out most other grasses and weeds.” (Southeast Exotic Pest Plant Council, SE-EPPC). M. repens density class was strongly associated with a reduction in native species diversity, with high density (20% cover) plots having five fewer species than low density (0.2%) ones. When we separated species by functional groups, we found that graminoids were affected much more than other native species, with M. repens cover explaining 23% of the variation in graminoid diversity (Possley and Maschinski, 2006). In San Diego County, California, there are numerous records of M. repens dominating a site and presumably displacing native plant species (e.g., Vanderhoff 2015: https://www.calflora.org/entry/occdetail.html?seq_num=po8507).

Reference(s):

- Flora of Zimbabwe (0). Flora of Zimbabwe.
- Watershed Health (2007). Melinis repens (Rhynchelytrum repens).
- CABI (2007). CABI Invasive Species Compendium.
- Commonwealth of Australia, Western Australian Herbarium, Department of Parks and Wildlife (0). FloraBase—the Western Australian Flora.
- UF/IFAS Center for Aquatic and Invasive Plants, University of Florida (2015). University of Florida IFAS Extension.
- Center for Invasive Species and Ecosystem Health, University of Georgia (2016). Southeast Exotic Pest Plant Council (SE-EPPC).
- Possley, J., & Maschinski J. (2006). Competitive Effects of the Invasive Grass Rhynchelytrum repens (Willd.) C.E. Hubb. on Pine Rockland Vegetation. Natural Areas Journal. 26, 391–395.
- Stevens, J. M., & Fehmi J. S. (2009). Competitive Effect of Two Nonnative Grasses on a Native Grass in Southern Arizona. Invasive Plant Science and Management. 2, 379–385.
- USDA Forest Service Data and Information Systems (2011). Fire Effects Information System - Management Project Summary: Fire effects on 3 subtropical invasive plants in Florida and the Caribbean—Common bamboo, Natal grass, and white leadtree.

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

The dry biomass of the plant leads to an increase in fire frequencies and its dense growth crowds out native early successional species (CABI). Stands of M. repens can increase the number of fires; negatively affecting the growth and survival of other native flora and fauna (USDA 2011). Six Hawaiian species growing on Lanai and/or Maui are threatened by M. repens because of its impact on fire frequency (La Rosa et al., 2008). "...[I]n dry areas and scrub habitats that historically supported discontinuous grass cover mixed with shrubs, natal grass creates continuous fine surface fuels unlike those in natural stands" (USDA 2011). Fire does not offer long-term control, and may actually provide an advantage by creating disturbed areas that are quickly colonized from seed (Southeast Exotic Pest Plant Council, SE-EPPC). Natal grass is also tolerant of fire and establishes easily in burned areas (USDA 2011).

Reference(s):

- CABI (2007). CABI Invasive Species Compendium.
- Center for Invasive Species and Ecosystem Health, University of Georgia (2016). Southeast Exotic Pest Plant Council (SE-EPPC).
- LaRosa, A.M., Tunison J.T., Ainsworth A., & al et. (2008). Chapter 11: Fire and nonnative invasive plants in the Hawaiian Islands bioregion. Wildland Fire in Ecosystems: Fire and Nonnative Invasive Plants. Gen. Tech. Rep. RMRS-GTR-42, 225-242.
- USDA Forest Service Data and Information Systems (2011). Fire Effects Information System - Management Project Summary: Fire effects on 3 subtropical invasive plants in Florida and the Caribbean—Common bamboo, Natal grass, and white leadtree.

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9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Cattle and sheep eat M. repens but have not been used to control it (CABI). The pollen is a mild allergen (Landscape Plants for South Florida). An exhaustive Google/Google Scholar search did not additional reveal information about health hazards or toxicities.

Reference(s):

- CABI (2007). CABI Invasive Species Compendium.
- Rogers, G. K. (2013). Landscape Plants for South Florida.

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10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Found in disturbed open places, often forming large stands (Flora of Zimbabwe). Natalgrass forms tussocks that grow up to 1 m in height (Seed Biology and Ecology of Natalgrass (Melinis repens)). An exhaustive Google/Google Scholar search did not reveal additional information about formation of thickets of slowing/blocking of movement, although the potential height of this plant makes it possible. This question defaults to a "No" at this time.

Reference(s):

- Flora of Zimbabwe (0). Flora of Zimbabwe.
- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Although this species does not produce rhizomes, it can root at the nodes and sometimes develops a sprawling appearance (Haselwood and Motter 1966, cited in Stokes et al., 2011). Can be propagated by division (Dave's Garden), although this does not warrant a classification of natural "vegetative" propagation; however, the "layering" capability of this plant does. However, per personal communication with Joseph DiTomaso, "I have never seen this plant reproduce vegetatively. It is a bunchgrass and I do not believe that spread is due to vegetative growth, so it is pretty much a perennial that reproduces by seeds." As such, this is scored a 'No'.

Reference(s):

- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.
- Dave's Garden (2015). Dave's Garden.

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12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

An exhaustive Google/Google Scholar search did not reveal information about production of new plants by fragmentation. Per personal communication with Joseph DiTomaso, this should be answered a 'No' and not left blank.

Reference(s):

- [Anonymous] .

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13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Natal grass is a prolific producer of windborne seeds. Tracy (1916) suggests that 45.4 kg (100 lb) of seeds per 0.4 ha(1 acre) could be expected from the initial growth of a natal grass crop. In areas where severe natal grass infestations occur, dense layers of seeds up to 5 cm thick have been observed on the soil surface (C. A. Stokes, unpublished data). Natal grass seeds appear to be key to the rapid spread of this species, and extensive seed deposits are likely a reason for the persistence of natal grass in a given area (Stokes et al., 2011).

Reference(s):

- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.

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14. Does this plant produce copious viable seeds each year (> 1000)?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Díaz Romo et al. (2012) measured up to 3,906 seed/m2 in Mexico (CABI). Natal grass is a prolific producer of windborne seeds. Tracy (1916) suggests that 45.4 kg (100 lb) of seeds per 0.4 ha(1 acre) could be expected from the initial growth of a natal grass crop. In areas where severe natal grass infestations occur, dense layers of seeds up to 5 cm thick have been observed on the soil surface (see Stokes et al., 2011).

Reference(s):

- CABI (2007). CABI Invasive Species Compendium.
- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.

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15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Most natal grass germination occurs at temperatures higher than 15 C and in conditions with adequate moisture available. Natalgrass appears to require an after ripening period following seed shed to reach maximum germination potential. Although natalgrass can form dense seed deposits in infested areas, the seed bank appears to quickly become depleted when conditions are favorable for germination and further seed rain is prevented. Seeds can remain viable in the soil for up to a year but once adequate moisture and temperature conditions are reached nearly all seeds germinate. Seed collected from the duff layer had an initial germination rate of 49% ± 3.8%, while seed collected directly from seedheads had a germination rate of 6% ± 5.1% (Stokes et al, 2011). Seeds do not germinate well when first shed, but after an after-ripening period, germinate in less than 24 hours when exposed to water (Southeast Exotic Pest Plant Council (SE-EPPC)). Seeds can germinate with adequate moisture, although they do require an unspecified after-ripening period. This question remains unanswered at this time.

Reference(s):

- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.
- Center for Invasive Species and Ecosystem Health, University of Georgia (2016). Southeast Exotic Pest Plant Council (SE-EPPC).

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16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

In California is an annual or short-lived perennial (Jepson). Natal grass is an annual species that sometimes perennates in warmer climates (Hafliger and Scholz 1980; Haselwood and Motter 1966; Kleinschmidt and Johnson 1977). Although its native range in south and east Africa has a warm climate, these regions experience seasonal dry conditions and heavy grazing pressure from animals, which migrate at certain times of the year, causing plant dieback (Klages 1942). In Florida, Natal grass will sometimes perennate in those areas of the state that do not experience freezing temperatures (MacDonald et al. 2008). [All references cited in Stokes et al, 2011]

Reference(s):

- Jepson Flora Project (2015). The Jepson Herbarium Online.
- Stokes, C. A., MacDonald G. E., Adams C. Reinhardt, Langeland K. A., & Miller D. L. (2011). Seed Biology and Ecology of Natalgrass (Melinis repens). Weed Science. 59, 527–532.

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17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Blooms year-round in California (Calflora; Jepson). In Zimbabwe, Sep - Jun (Flora of Zimbabwe).

Reference(s):

- Calflora (0). Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria.
- Jepson Flora Project (2015). The Jepson Herbarium Online.
- Flora of Zimbabwe (0). Flora of Zimbabwe.

Dispersal (Questions 18 - 20)

18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Watershed Health (2007) reports that M. repens (aka Rhynchelytrum repens) is spread by wildlife. The light, fluffy seeds of natal grass are, according to "Weeds of Australia", often wind-dispersed and may also become lodged in clothing, vehicles and animals. Seeds can also be spread in mud and contaminated agricultural produce (i.e. fodder and pasture seed) (Queensland Government 2011).

Reference(s):

- Watershed Health (2007). Melinis repens (Rhynchelytrum repens).
- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.

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19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Seed is distributed by wind and establishes readily along roadways, coastal sage and grasslands primarily in coastal areas and foothills (Watershed Health 2007). Some seeds have been discovered in seed shipments (CABI). Red Natal grass (Melinis repens) reproduces mainly by seed. These light and fluffy seeds are often wind-dispersed and may also become lodged in clothing, vehicles and animals. Seeds can also be spread in mud and contaminated agricultural produce (i.e. fodder and pasture seed) (Weeds of Australia Biosecurity Queensland Edition).

Reference(s):

- Watershed Health (2007). Melinis repens (Rhynchelytrum repens).
- CABI (2007). CABI Invasive Species Compendium.
- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.

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20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Red Natal grass (Melinis repens) reproduces mainly by seed. These light and fluffy seeds are often wind-dispersed and may also become lodged in clothing, vehicles and animals. Seeds can also be spread in mud and contaminated agricultural produce (i.e. fodder and pasture seed) (Weeds of Australia Biosecurity Queensland Edition). However, per personal communication with Joseph DiTomaso, "This is not a primary means of dispersal. I think only animals and wind are the main methods." As such, this is scored a 'No'. There is no documentation of "frequent" dispersal via contaminated seed, equipment, etc.

Reference(s):

- Queensland Government (2011). Weeds of Australia Biosecurity Queensland Edition.

Evaluation Notes

In California is an annual or short-lived perennial (Jepson).

Jutta Burger revised the original evaluation that was conducted in 2016 by Kristina Wolf.

Web resources accessed for 2021/2022 revision:

GBif: https://www.gbif.org/species/2702504 Accessed 2/9/2022

CABI: https://www.cabi.org/isc/datasheet/116730 Accessed 2/10/2022

https://www.fs.fed.us/database/feis/management_project_summaries/CFILN11/all.html#NATAL%20GRASS Accessed 2/10/2022

The following websites were referenced or searched for the original 2016 screen:

http://www.tropicos.org/Name/25518941

https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?409666

http://www.desertmuseum.org/invaders/invaders_natalgrass.php
startChar=N&queryParam=comname&sort=comname&format=Print

http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=12147
http://www.sfgate.com/homeandgarden/article/Lawn-begone-3201642.php
http://herbaria4.herb.berkeley.edu/eflora_display.php?tid=91775
http://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=107420
http://www.herbarium.usu.edu/webmanual/info.asp?name=Melinis_repens&type=map
http://www.kew.org/data/grasses-db/www/imp06222.htm https://www.researchgate.net/publication/232680081_Seed_Biology_and_Ecology_of_Natalgrass_Melinis_repens
https://florabase.dpaw.wa.gov.au/browse/profile/14985
http://esameetings.allenpress.com/2007/P6105.HTM
https://eco.confex.com/eco/2008/techprogram/P12040.HTM http://www.feedipedia.org/node/389
http://www.bioone.org/doi/abs/10.1614/WS-D-11-00028.1 http://davesgarden.com/guides/pf/go/59604/#b
http://www.plantbook.org/plantdata/weeds/w_melinis_repens.html
http://www.hear.org/pier/wra/pacific/melinis_nerviglumis_htmlwra.htm
http://www.hear.org/pier/wra/pacific/melinis_minutiflora_htmlwra.htm
https://www.daf.qld.gov.au/__data/assets/pdf_file/0008/64637/IPA-Assessment-Invasive-Plants.pdf
http://ntbg.org/herbarium/detail.php?tempid=28131 https://www.anbg.gov.au/photo/apii/id/dig/19652
http://www.eol.org/pages/1115846/details
http://www.efloras.org/florataxon.aspx?flora_id=1050&taxon_id=200026134
http://ufdc.ufl.edu/UFE0042608/00001
http://digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1800&context=etd

Total PRE Score

PRE Score: 17 -- High Potential Risk
Confidence: 77 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

PRE Score Legend

The PRE Score is calculated by adding the point totals for each (answered) question.
< 13 : Low Potential Risk
13 - 15 : Moderate Potential Risk
> 15 : High Potential Risk

Questions Answered Legend

It is important to answer at least 16 questions to consider a PRE Score as "valid".
>= 16 : valid (80% or more questions answered)
<= 15 : invalid (not enough questions answered)

Organization Ownership and Content Privacy

Organization: PlantRight
Content Privacy: Public

Evaluation Reviewers

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

• Scott Oneto	February 11, 2022
• Ron Vanderhoff	February 11, 2022
• Jutta Burger	February 11, 2022
• Chris McDonald	August 27, 2021
• Jason Giessow	August 25, 2021
• Ron Vanderhoff	August 18, 2021

This evaluation has a total of 6 reviewer(s).

Evaluation Issues

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email info@plantright.org if additional action is required to resolve open issues.

Issue ID # 7860

Date Created: February 11, 2022 - 11:10am
Date Updated: April 27, 2022 - 9:45pm

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

Issue Description

I might consider moving the confidence on this. I cannot offer a citation source, other than my own observations and some others on iNat and Calflora, but stands of this sp. can be quite dense. Although it is a wispy herbaceous grass that can be travelled through, it does nonetheless fill the open spaces between larger woody shrubs. I suspect it could impede animal and livestock movement, at least to a moderate degree.

Issue Resolution (Screener's Response to Issue)

Given that there is no strong evidence of it impeding movement, I will leave it as "no" with low confidence.

Issue ID # 7859

Date Created: February 11, 2022 - 11:02am
Date Updated: April 27, 2022 - 9:42pm

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it has been established?

Issue Description

No change needed, but if there is a CA reference here it would add to the credibility. There are numerous records from San Diego County that could serve as the citation. Here's one of my own observations:https://www.calflora.org/entry/occdetail.html?seq_num=po8507

Issue Resolution (Screener's Response to Issue)

Added comment about SD records and reference to this particular one.

Issue ID # 7858

Date Created: February 11, 2022 - 10:51am
Date Updated: April 27, 2022 - 9:57pm

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Plant Information

Issue Description

I believe somewhere in the evaluation there should be a comment re a sister species, Melinis nerviglumis. M. nerviglumis is fairly common in horticulture and very similar in general appearance, but is not invasive. In fact, I have never seen M. repens for sale in the trade, at least not the retail trade. However, M. nerviglumis is periodically sold and seen in landscapes. I bring this up because of the complexity of identifying the two and the potential for any Melinis seen in a horticultural setting to be assumed as invasive - quite the opposite. This may be a comment better for the informational page once the Evaluation is published.

Lastly, I have some comparison images of the two spp.
here: https://www.calflora.org/entry/occdetail.html?seq_num=mu19673&editor=t

or here:

https://www.calflora.org/entry/poe.html#vrid=mu19673

Issue Resolution (Screener's Response to Issue)

That is good information to include in the general plant description. I'll add it there.

Issue ID # 7856

Date Created: February 11, 2022 - 9:34am
Date Updated: February 11, 2022 - 9:34am

Submitted by: Jutta Burger

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Q06. Is the species found predominately in a climate matching the region of concern?

Issue Description

Question is answered "Yes", however GBIF shows its distribution to be very broad, extending into many tropical areas that do not have climate matching that of California. Recommend changing score to "No" with "medium" confidence. - Jutta Burger

Issue Resolution (Screener's Response to Issue)

Answer changed to "No" with "medium" confidence.

Issue ID # 6946

Date Created: August 27, 2021 - 10:22am
Date Updated: February 9, 2022 - 5:50pm

Submitted by: Chris McDonald

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Q15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

Issue Description

According to Stokes et al 2011, fig 1. the germination of Natal grass after 16 weeks does reach 25%. Also fig. 2 shows high germination during 20C temp (~70F). I think it is safe to assume that after 1 years the germination could be at least 25, during summer growing conditions.
% or more. Change to Yes and very high confidence. (Chris McDonald)

Issue Resolution (Screener's Response to Issue)

I agree. The references provided also suggest that the species does not have a long-lived seedbank and no seed viability issue are mentioned.

Issue ID # 6929

Date Created: August 25, 2021 - 3:00pm
Date Updated: February 10, 2022 - 3:59pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Evaluation Notes

Issue Description

Dead links:

https://www.watershedhealth.org/weedwatch/docs/matrix/Melinus_repens_042207.pdf

https://herbarium.usu.edu/webmanual/info.asp?name=Melinis_repens&type=map

http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Melinis_repens.htm

https://ntbg.org/herbarium/detail.php?tempid=28131

http://www.tecnicapecuaria.org.mx/journal/publicacion04.php?IdPublicacion=1348

http://www.lrm.nt.gov.au/__data/assets/pdf_file/0012/10452/threats.pdf

-Jason Giessow

Issue Resolution (Screener's Response to Issue)

Thanks for checking these. At this point, I have added a few other resources and will just delete these.

Issue ID # 6926

Date Created: August 25, 2021 - 2:52pm
Date Updated: February 10, 2022 - 2:51pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q20. Are the plant’s propagules frequently dispersed via contaminated seed, equipment, vehicles, boats or clothing/shoes?

Issue Description

I think I would more clearly say that the seeds are not barbed or hooked, and as such they are not known to stick to clothes, shoes, fur etc.

-Jason Giessow

Issue Resolution (Screener's Response to Issue)

This question is not further informed by the "sticky" nature or barbed appendages of seed, but rather mostly by a seed's size. I left the answer as is and added a statement about lack of evidence.

Issue ID # 6925

Date Created: August 25, 2021 - 2:47pm
Date Updated: February 10, 2022 - 2:37pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

Issue Description

Typo: perennatesin and space needed between sentences

Natalgrass is an annual species that sometimes perennatesin warmer climates (Ha ?fliger and Scholz 1980; Haselwoodand Motter 1966; Kleinschmidt and Johnson 1977).Although its native

Also: space missing InFlorida, natalgrass

-Jason Giessow

Issue Resolution (Screener's Response to Issue)

Corrected.

Issue ID # 6924

Date Created: August 25, 2021 - 2:40pm

Date Updated: February 10, 2022 - 12:39pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q08. Is the plant noted as promoting fire and/or changing fire regimes?

Issue Description

Citations in text not listed in references, different names and dates. - Jason Giessow

Issue Resolution (Screener's Response to Issue)

Added LaRosa reference and corrected reference to CABI.

Issue ID # 6923

Date Created: August 25, 2021 - 2:38pm
Date Updated: February 9, 2022 - 7:30pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it has been established?

Issue Description

Missing 'I': (Rhynchelytrum repens)). n USA this species invades undisturbed pine rocklands in Florida (Rhynchelytrum repens)). In USA this species invades undisturbed pine rocklands in Florida

-Jason Giessow

Issue Resolution (Screener's Response to Issue)

Fixed and partially rewritten.

Issue ID # 6914

Date Created: August 25, 2021 - 12:17pm
Date Updated: February 9, 2022 - 7:08pm

Submitted by: Jason Giessow

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q05. Are other species of the same genus invasive in a similar climate?

Issue Description

This question is odd, in that it is asking or setting two criteria. Melinis minutiflora is definitely invasive, so it demonstrates that the genus is invasive or species may have the capacity to be invasive. Why the species need to be in same climate zone/type I am not sure.

-Jason Giessow

Issue Resolution (Screener's Response to Issue)

I've changed your suggestion to a comment, because it is something that can't be addressed in a single evaluation. This question is helpful when little information is available for a species but more is known about near relatives. The assumption is that this information can factor in to predicting invasiveness.

Issue ID # 6913

Date Created: August 25, 2021 - 12:04pm
Date Updated: February 9, 2022 - 7:04pm

Submitted by: Jason Giessow

Status: Fixed

Type: Suggestion
Severity: Minor
Scope: Q03. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

Issue Description

In Florida, natalgrass exists in many areasbut In Florida, natalgrass exists in many areas but

(Jason Giessow)

Issue Resolution (Screener's Response to Issue)

Text has been cleaned up.

Issue ID # 6912

Date Created: August 25, 2021 - 12:01pm
Date Updated: February 9, 2022 - 5:52pm

Submitted by: Jason Giessow

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q01. Has the species (or cultivar or variety, if applicable) become naturalized where it is not native?

Issue Description

.... the Solomon Islands and Hawaii

.... the Solomon Islands) and Hawaii

Jason Giessow

Issue Resolution (Screener's Response to Issue)

Fixed.

Issue ID # 6910

Date Created: August 25, 2021 - 11:22am
Date Updated: February 10, 2022 - 2:53pm

Submitted by: Jason Giessow

Status: Fixed
Type: Comment
Severity: Minor
Scope: General Information

Issue Description

Why is date of eval 2016? Isn't this a new eval- or an update of old material. Seems it should have a more recent date to me.

Jason Giessow

Issue Resolution (Screener's Response to Issue)

This was an old evaluation from 2016 that had issues that were never fully resolved. It fell through the cracks until we discovered it this year. I've made the revisions for Kristina and changed the evaluation date.

Issue ID # 6909

Date Created: August 24, 2021 - 3:18pm
Date Updated: February 10, 2022 - 2:29pm

Submitted by: Chris McDonald

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

Issue Description

It appears there is some evidence this plant roots at the nodes, but that is not a major pathway for spread of fragments. I would change that the evidence for this is medium not low. https://plants.ifas.ufl.edu/plant-directory/melinis-repens/

(Chris McDonald)

Issue Resolution (Screener's Response to Issue)

Agree and corrected

Issue ID # 6906

Date Created: August 23, 2021 - 4:37pm
Date Updated: February 9, 2022 - 7:32pm

Submitted by: Chris McDonald

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it has been established?

Issue Description

Add Stevens and Fehmi 2009 to sources. I added the citation in the bibliography, I'm not sure if I can add it to the evaluation as a reviewer. I do not see the paper cited in the references section below the question.

(Chris McDonald)

Issue Resolution (Screener's Response to Issue)

Reference added.

Issue ID # 6904

Date Created: August 23, 2021 - 4:25pm
Date Updated: February 9, 2022 - 7:15pm

Submitted by: Chris McDonald

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q06. Is the species found predominately in a climate matching the region of concern?

Issue Description

Can add new information on distribution from GBIF https://www.gbif.org/species/2702504 This does not change the answer to the question at all, it just gives a better map matching the climates.

(Chris McDonald)

Issue Resolution (Screener's Response to Issue)

Agree. I have added GBIF as a reference.

Issue ID # 6903

Date Created: August 23, 2021 - 4:23pm
Date Updated: February 9, 2022 - 7:12pm

Submitted by: Chris McDonald

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q05. Are other species of the same genus invasive in a similar climate?

Issue Description

I'd move the confidence level to this question to a high or moderate (but still keeping the answer No). It looks like iNaturalist has over 100 sightings for Melinis minutiflora and all locations are tropical or semi-tropical (HI FL, NSW Australia, Colombia, etc.). Melinis nerviglumis has been rated in Hawaii as high risk (HEAR), but the climate deos not match California. GBIF does not have a page for these species. Are closely related species invasive (yes) in a climate that matches CA (No) = No. (Chris McDonald)

http://www.hear.org/pier/wra/pacific/melinis_nerviglumis_htmlwra.htm

Issue Resolution (Screener's Response to Issue)

Seems reasonable. Done.

Issue ID # 6850

Date Created: August 14, 2021 - 5:17pm
Date Updated: September 8, 2022 - 8:18am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q20. Are the plant’s propagules frequently dispersed via contaminated seed, equipment, vehicles,

boats or clothing/shoes?

Issue Description

It appears that this seed is relatively available for purchuse within the trade. An Amazon search turned up a few sellers and even reputable "native" sources like S & S Seed list it. It is alcertainly used occaaslly in hydroseed mixes, but not sure if thatqualifies as this form of dispersa. Here are three of my own observations, all almost certainly from seeded landscape applications and then into adjacent wilands:

https://www.calflora.org/entry/occdetail.html?seq_num=po9375&editor=t

https://www.calflora.org/entry/occdetail.html?seq_num=gp10314&editor=t

https://www.calflora.org/entry/occdetail.html?seq_num=po24726&editor=t

Ain Q19: "These light and fluffy seeds are often wind-dispersed and may also become lodged in clothing, vehicles and animals. Seeds can also be spread in mud and contaminated agricultural produce (i.e. fodder and pasture seed". (https://keyserver.lucidcentral.org/weeds/data/media/Html/melinis_repens.htm)

It seems that with your documentation you might consider raising your confidence to Medium.

Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

I'm going to leave the answer as "no" and "low", both because the question asks about "frequent" movement for which we don't have evidence and because Joe DiTomaso weighed in on this answer to reinforce that a "no" would be appropriate. Your examples are very good evidence of this species still being consciously planted and escaping from planting but not of it inadvertently being included in agricultural or restoration seed.

Issue ID # 6849

Date Created: August 14, 2021 - 4:50pm
Date Updated: September 8, 2022 - 8:21am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q18. Are the plant’s propagules dispersed long distance (>100 m) by mammals or birds or via domestic animals?

Issue Description

I found the following:

"These light and fluffy seeds are often wind-dispersed and may also become lodged in clothing, vehicles and animals. Seeds can also be spread in mud and contaminated agricultural produce (i.e. fodder and pasture seed)." (https://keyserver.lucidcentral.org/weeds/data/media/Html/melinis_repens.htm) Probably not enough though to suggest a scoring change.

Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

I left the answer without further addition (though rewrote it for brevity and clarity) since they covered the dispersal observations you mention.

Issue ID # 6848

Date Created: August 14, 2021 - 4:39pm
Date Updated: September 8, 2022 - 8:21am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

Issue Description

Similar to Q11, I would also consider a Medium confidence score. Although I don't see any documented source, dryland bunchgrasses have little, if any, likelihood of this method of propagation.

Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

Agree and changed confidence to medium.

Issue ID # 6847

Date Created: August 14, 2021 - 4:32pm
Date Updated: September 8, 2022 - 8:21am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

Issue Description

I also could not locate ay documentation of vegetative propagation in a natural environment. Given there is no evidence of this behavior, nor is it common in other bunchgrasses, I would consider raising the confidence to at least medium.

Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

Agree and fixed.

Issue ID # 6846

Date Created: August 14, 2021 - 4:27pm
Date Updated: September 8, 2022 - 8:22am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q08. Is the plant noted as promoting fire and/or changing fire regimes?

Issue Description

Not that you need more documentation (very well rearched andcumented), but here is additional information supporting this YES answer:

"Fuel properties of Natal grass are similar to those of many native grasses, including wiregrasses. In the understory of pine rocklands, Natal grass co-occurs with native grasses and does not affect fuel loading or spatial arrangement. However, in dry areas and scrub habitats that historically supported discontinuous grass cover mixed with shrubs, Natal grass creates continuous fine surface fuels unlike those in natural stands. The dried grasses accumulate over winter, creating greater fuel loads in spring [2].

Natal grass burns readily, especially in winter and spring. Thick patches of dry Natal grass may provide a flashy fuel bed that burns "hot" and spreads fire rapidly. In the Bahamas, however, Natal grass is not considered a particularly flammable fuel [2]".
(https://www.fs.fed.us/database/feis/management_project_summaries/CFILN11/all.html)

Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

Very helpful, Ron. I've added some of this information and included the reference.

Issue ID # 6845

Date Created: August 14, 2021 - 4:21pm
Date Updated: September 8, 2022 - 8:22am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it

has been established?

Issue Description

Excellent , very thorough and very well documed answer to this question. Ron Vanderhoff

Issue Resolution
No resolution has been entered for this issue.

Issue ID # 6844

Date Created: August 14, 2021 - 4:12pm
Date Updated: September 8, 2022 - 8:22am

Submitted by: Ron Vanderhoff

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q01. Has the species (or cultivar or variety, if applicable) become naturalized where it is not native?

Issue Description

Your answer is probably adequate. However, if needed there is documentation of invasiveness in many other regions, including most or all of the Central American countries (Panama through Guatamala), also Columbia, Singapore, Taiwan, China, Ecuador and Peru (http://www.hear.org/pier/species/melinis_repens.htm). Ron Vanderhoff

Issue Resolution (Screener's Response to Issue)

Agree that more should be added regarding naturalization. I've added your other regions, confirmed them in GBIF and added GBIF as a reference.

Issue ID # 743

Date Created: January 29, 2016 - 1:44pm
Date Updated: October 7, 2021 - 8:21pm

Submitted by: Joe DiTomaso

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Evaluation as a whole

Issue Description

I would answer NO to four questions were a YES was scored. Q4. Melinis minutiflora (spelled wrong in notes) is pretty much only a tropical grass. Q10 and 11. I have never seen this plant reproduce vegetatively. It is a bunchgrass and I do not believe that spread is due to vegetative growth, so it is pretty much a perennial that reproduces by seeds. Q19. This is not a primary means of dispersal. I think only animals and wind are the main methods.

The score with these 4 NOs goes to 15, which is still reject.

-Joe DiTomaso

Issue Resolution (Screener's Response to Issue)

Marked fixed by Elizabeth Brusati 1/8/2021

About PRE and this Plant Evaluation Report

The Plant Risk Evaluator (PRE) is an online database and platform designed to assess the risk of a plant becoming invasive in a given region.This tool offers many benefits, and we encourage you to visit the PRE website (https://pretool.org) for more information.

If you would like to learn more about PRE, please email us at info@plantright.org, requesting a PRE Account.

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