Plant Risk Evaluator -- PRE™
Evaluation Report

Cordyline australis -- California

PlantRight

PRE Score: 7 -- Low Potential Risk
Confidence: 64 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: February 11, 2020

This PDF was created on April 18, 2022

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Plant Evaluated

Cordyline australis

Image by Jade

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Cordyline australis*) 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

This is a monocotyledonous tree native to New Zealand, which has been planted worldwide as an ornamental. It is capable of setting a large amount of seed but this reproduction may be limited by environmental conditions and a need for out-crossing to set seed. The plant does not appear to reproduce via the underground rhizome. There is a lack of information regarding the invasiveness of the species overall in any area where it has naturalized and particularly in the region of interest. Many international "wild"rec ords appear to be of plantings. It is adapted to fire, but does not appear to promote it, it does not pose threats to health and it seems to lack evidence of impacts on native systems where it has naturalized.

General Information

Status: Submitted
Screener: Lynn Sweet
Evaluation Date: February 11, 2020

Plant Information

Plant: *Cordyline australis*

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.

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:

The tree is native to New Zealand, but has naturalist in North America, Europe, and southeast Australia. (GBIF) USDA GRIN does not list any naturalized areas as of this evaluation.

Reference(s):

- GBIF (0). Global Biodiversity Information Facility (GBIF).

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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 **Very High** confidence in this answer based on the available literature.

Answer / Justification:

There are records in 13 counties in the region of interest, California, USA, the highest number (16) being in Marin County. (Calflora) Some of the occurrences in southeast Australia and Tasmania are in areas that match the climate of the region of interest, as well as a few noted occurences in Sicily, Spain and France. (GBIF).

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.
- GBIF (0). Global Biodiversity Information Facility (GBIF).

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

- 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:

The plant is an "emerging environmental weed" in Victoria, Australia (Queensland Government). Information from the study region of interest is noted in Q4, below.

Reference(s):

- Queensland Government (0). Cordyline australis (G. Forst.) Endl. Factsheet Weeds of Australia Biosecurity Queensland Edition.

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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: **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:

The plant is an "emerging environmental weed" in Victoria, Australia (Queensland Government). The populations in California as yet have not been described as invasive, though there are ~53 observations currently listed, with many listing many naturalized plants. (Calflora) "Habitat types invaded as noted in Redwood National Park suggest that disturbance may facilitate germination and growth, but my observations suggest that disturbance post-digestion is not necessary for germination." Cal-IPC PAF summary of Personal Communication from Andrea Williams

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.
- Williams, A. (2005). Personal Communication. Andrea Williams. 2005. Observations at Redwood National Park..

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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 **Very Low** confidence in this answer based on the available literature.

Answer / Justification:

No other Cordyline species were noted as invasive in a similar climate. Cordyline fructosa is fairly pan-tropical but is considered introduced to Hawaii, which is not a similar climate to the area of interest. (CABI)

Reference(s):

- CABI (2007). CABI Invasive Species Compendium.

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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:

Only about half of the native range in New Zealand matches the climate of the region of interest. Of the other regions in which there are records, the following do not match the climate: South America, inland-South Africa, England, Scotland, Northern Europe, Hawaii, coastal southeastern Australia and eastern Tasmania. (GBIF) The following areas match the climate: California (coastal) USA, southern Europe and the Mediterranean, occurrences on the South Island of New Zealand, and southeast Australia (some) and western Tasmania. (GBIF)

Reference(s):

- GBIF (0). Global Biodiversity Information Facility (GBIF).

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: **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:

Observed to establish as very minor component of north coast coniferous forests in Sonoma County in and adjacent to Salt Pt. State Park; does not appear to alter native composition of forest. (Warner) Observations do not indicate any major alteration of community composition, but potential to add a new layer (sub-canopy) in small stands, or to alter riparian zone composition. (Williams)

Reference(s):

- Williams, A. (2005). Personal Communication. Andrea Williams. 2005. Observations at Redwood National Park..
- Warner, P. (2005). Personal Communication. Peter Warner, Observations at Salt Pt. State Park and Kruse Rhododendron Preserve, Sonoma Co..

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

- 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:

This plant does have a mass of leaves, but they are on year-round and it is unlikely they would promote fire, since the lower trunk is bare in maturity. (Missouri Botanical Garden) The species is adapted to fire and can resprout from a rhizome. It is listed as Moderately flammable ("Most of these species produce heavy accumulations of flammable litter and elevated dead material, and/or have ?ammable green foliage. Not recommended for green breaks or for planting in defensible space") (McMahon & Pearce 2005; this information was also found in various brochures) No evidence that the species promotes fire and transforms the plant community.

Reference(s):

- Missouri Botanical Garden (2015). Missouri Botanical Garden.
- McMahon, S., & Pearce H. (2005). Flammability of native plants. Open Space. 63, 20-21.

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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 **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The plant has been harvested and consumed by Maori people, indigenous people of New Zealand and has been investigated for food ingredient production (Harris & Mann 1996)

Reference(s):

- Harris, W., & Mann J. D. (1994). Preliminary investigation of the suitability of Cordyline australis (Asphodelaceae) as a crop for fructose production. New Zealand Journal of Crop and Horticultural Science. 22(4),

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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 **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The plants are often single trunked or branching up high. It is unlikely that this would produce a thicket. Noted that if one coppices the tree that would increase branching, but this wasn't noted to happen naturally.

Reference(s):

- Missouri Botanical Garden (2014). Missouri Botanical Garden Plant Finder.
- Czernin, A., & Phillips C. (2005). Below?ground morphology of Cordyline australis (New Zealand cabbage tree) and its suitability for river bank stabilisation. New Zealand Journal of Botany. 43(4), 851 - 864.

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:

The species does produce underground shoots (rhizomes) that could technically sprout new plants, but I found no documentation of this whatsoever, even as a propagation technique.

Reference(s):

- Harris, W., & Mann J. D. (1994). Preliminary investigation of the suitability of Cordyline australis (Asphodelaceae) as a crop for fructose production. New Zealand Journal of Crop and Horticultural Science. 22(4),

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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:

While the species does produce a large underground rhizome and propagation may be done via aboveground stem cuttings, there was no documentation of fragments detaching and dispersing.

Reference(s):

- The International Cordyline Society (0). International Cordyline Society: General Information about Cordylines.

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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:

Studies have shown viable seed set, but plants must be in the presence of other plants (outcross) to set seed.

Reference(s):

- Beever, R. E., & Parkes S. L. (1996). Self-incompatibility in Cordyline australis (Asteliaceae). New Zealand Journal of Botany. 34, 135–137.

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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 **Medium** confidence in this answer based on the available literature.

Answer / Justification:

An investigation into the species demonstrated self-incompatibility (another plant is necessary for pollination/seed set). Wild trees in the area demonstrated: the total number of fruits summed for 3 ultimate infructescence branches per tree averaged 148-160 fruits. Each fruit had 1-16 seeds, with means of 2.5-4.2 per fruit. This means between 370-672 seeds per 3 panicles on average, assuming outcrossing. (Beever & Parkes 1996) Jepson has an unabridged note on the species indicating that the population in Sonoma, California had not yet been observed to have flowered. (Jepson) The plant seems to have 3-many stems that contain infloresences in photographs. (USDA Plants: photos)

Reference(s):

- Beever, R. E., & Parkes S. L. (1996). Self-incompatibility in Cordyline australis (Asteliaceae). New Zealand Journal of Botany. 34, 135–137.
- The International Cordyline Society (0). International Cordyline Society: General Information about Cordylines.
- United States Department of Agriculture (2014). USDA-NRCS Plants Database.

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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:

"Mean germination of samples of 10 seeds from each of the nine inter-plant crosses was 6.2." (Beever & Parkes 1996)

Reference(s):

- Beever, R. E., & Parkes S. L. (1996). Self-incompatibility in Cordyline australis (Asteliaceae). New Zealand Journal of Botany. 34, 135–137.

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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: **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:

A sample of 28 wild populations in the native range showed age at first flowering between 6-10 years typically.

Reference(s):

- Harris, W., Beever R. E., Parkes S., Smallfield B., Anderson R-A., & Scheele S. (2006). Genotypic variation of the flowering phenology of Cordyline australis (Laxmanniaceae) grown at three locations in New Zealand. New Zealand Journal of Botany. 44, 23–39.

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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: **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:

Calflora lists the flowering period at 3 months, which is consistent with other sources. (Calflora)

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.

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:

The plant is known to be eaten and spread by birds. (Kaka 2013; Thorsen et al. 2009)

Reference(s):

- K?k?, A. (2013). Ti kouka: a feast for birds big and small. Zealandia Te Mara a Tane. 2020,
- Thorsen, M. J., Dickinson K. J. M., & Seddon P. J. (2009). Seed dispersal systems in the New Zealand flora. Perspectives in Plant Ecology, Evolution and Systematics. 11, 285–309.

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

- 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:

Described as being dispersed by birds and animals. The seed is heavy, with no specialized mechanism for wind or water dispersal.

Reference(s):

- Thorsen, M. J., Dickinson K. J. M., & Seddon P. J. (2009). Seed dispersal systems in the New Zealand flora. Perspectives in Plant Ecology, Evolution and Systematics. 11, 285–309.

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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 **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The seeds are within fruits and they have no specialized mechanism of attachment.

Reference(s):

- Thorsen, M. J., Dickinson K. J. M., & Seddon P. J. (2009). Seed dispersal systems in the New Zealand flora. Perspectives in Plant Ecology, Evolution and Systematics. 11, 285–309.

Total PRE Score

PRE Score: 7 -- Low Potential Risk
Confidence: 64 / 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:

This evaluation does not have any reviewers.

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 PlantRight@suscon.org if additional action is required to resolve open issues.

There are currently no issues associated with this evaluation.

About PRE and this Plant Evaluation Report

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (https://pre.ice.ucdavis.edu) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, PlantRight@suscon.org, requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (http://www.suscon.org/) and a USDA Farm Bill grant.