

1.0 Organism description

Scientific name

Cyperus distans L.f., Cyperaceae.

Common names

Piedmont flatsedge, slender cyperus, souchet distant (PIER).

Synonyms (Randall 2002, ECOPORT).

Cyperus nutans Presl.

Cyperus elatus Rottb

Cultivars, strains, or variants

None found.

Previously recorded in New Zealand

No (Ministry of Agriculture and Forestry, Landcare Research).

2.0 Summary

- Perennial sedge with a small corm-like rhizome. Leaves 20-50cm tall, up to 90cm. Sub-solitary or loosely tufted growth habit.
- Preferred habitats are moist or wet sites; generally swamps, water courses, grassy roadsides and pastures. It is an obligate wetland plant in the United States and the Caribbean.
- Worldwide distribution; restricted to tropical and sub-tropical regions.
- The genus includes very serious invasive species that are often difficult to control. New Zealand has a number of other introduced *Cyperus* species that are naturalised or invasive, including two that are listed on Regional Pest Management Strategies.
- Overseas, the economic impacts of *C. distans* are generally low and restricted to the tropics. It is not recorded as an environmental weed but is sometimes weedy within its native range.
- In New Zealand, it would probably be limited by climate to the northern North Island, with a small probability of growing in warm micro-climates further south.
- Unlikely to pose a significant economic or environmental threat to New Zealand. Its ecological niche is quite narrow, its impacts overseas are low, and its growth form is of less concern than other invasive *Cyperus* species already present.

However, ecological information is scarce and its potential impact may depend on its growth rate, seeding habit, and rate of spread.

- Other *Cyperus* species have some resistance to herbicides and are difficult to control effectively.

3.0 Basic biology and ecology

3.1 Overseas distribution

- Pan-tropical; native to New World tropics, Old World tropics, tropical Africa, Australia and some Pacific Islands.
- Africa (tropical/sub-tropical); Burundi, Central African Republic, Ethiopia, Gabon, Somalia, Kenya, Tanzania, Uganda, Cameroon, Equatorial Guinea, Benin, Cote D'Ivoire, Ghana, Guinea, Liberia, Mali, Nigeria, Senegal, Sierra Leone, Botswana. South Africa [Natal and Transvaal], and Swaziland (USDA, W³TROPICOS).
- Asia (tropical/sub-tropical); Bhutan, India, Nepal, Sri Lanka, Indonesia, Malaysia, China [Guangdong, Guangxi, Hainan and Yunnan], Japan, Myanmar, Papua New Guinea (USDA, PIER, W³TROPICOS).
- North America (sub-tropical); Florida, Georgia, North Carolina (USDA).
- Central America (tropical); Nicaragua, Honduras, Mexico (USDA, W³TROPICOS).
- South America (tropical/sub-tropical); French Guiana, Guyana, Suriname, Venezuela, Brazil, Colombia, Ecuador, Galapagos, Bolivia, Peru and Argentina (USDA, W³TROPICOS).
- Caribbean (tropical); Puerto Rico, Haiti, Jamaica, Virgin Islands, Antigua, Barbuda, Dominica, Dominican Republic, Guadeloupe, St. Vincent and Grenadines (USDA, W³TROPICOS).
- Indian Ocean (tropical); Mauritius (PIER)
- Australia (tropical/sub-tropical); Northern Territory and Queensland from Cape York to Brisbane (Hnatiuk 1990, AVH).
- Pacific (tropical); introduced invasive in Fiji, listed as native on Palau and Solomon Islands (PIER).

3.2 Ecology/habitat

- Perennial sedge with a small corm-like rhizome. Culms up to 100cm tall, leaves 20-50cm tall, up to 90cm. Sub-solitary or loosely tufted growth habit (PIER).
- Generally it prefers moist or wet sites; swamps, along water courses, grassy roadsides, pastures, open places in secondary forest, sandy low-lying wet sites and alluvial flats (PIER, Soerjani et al. 1987, ANHSIR). An obligate wetland plant in the United States and Caribbean (ISB).
- Found at altitudes of 600-1100m in Nepal, up to 1800m in Indonesia, 0-2000m in Papua New Guinea, 0-500m in Ecuador and 0-1500m in Peru.
- Propagation and dispersal is by seed and possibly from the rhizomes (PIER, ANHSIR).
- Fruit is an achene; narrowly oblong, papillose, approximately 0.5mm x 1.5mm, (eFlora).
- No references specific to reproductive capacity, seed ecology, or dispersal were found. However, the specimen grown in New Zealand produced copious amounts of seed (James pers. comm.) and in a seed bank study conducted in agricultural fields overseas, *C. distans* was present in 24.4% of samples, and at a density of 237 seeds/m². Its seed germinated over a three month period when incubated in 1cm of soil, at 74-92 % humidity and soil surface temperatures of 25-29.4° C (Kellman 1974).
- No references relating to palatability or toxicity were found.
- Contains insect anti-feedant chemical compounds (Morimoto et al. 1999).

4.0 Likelihood of establishment and spread

4.1 Environmental tolerances overseas and comparison with New Zealand

4.1.1 Environmental tolerances overseas

- Restricted to tropical or sub-tropical climates with associated high humidity and warm temperatures.
- Australia (tropical/sub-tropical); the climate of northern Australia is characterised by hot humid summers and hot to mild winters. In this broad region, mean daily minimum temperature ranges from 12-24° C, average annual rainfall is 800-3200mm, rain days (>1mm) number 50-150 days per year, frost days range from 0-10 days per year and humidity is 60-90% (Bureau of Meteorology).

4.1.2 Comparison with New Zealand

- The closest match to its sub-tropical environment overseas are the warmer regions of Northland, Auckland and coastal Bay of Plenty where average annual rainfall (1200-1500mm), rain days >1mm per year (111-137 days) and humidity (78-86%) are comparable, although mean daily minimum temperatures (10-11.8° C) are lower, and ground frosts are more frequent (1- 42 days per year) (NIWA).
- Note that other introduced and weedy *Cyperus* species are present in New Zealand. *C. rotundus* and *C. brevifolius* are found from the North Island to the top of the South Island; *C. congestus* extends south as far as Canterbury; and *C. eragrostis* grows in Fiordland. However, all these species grow in far more temperate areas overseas than *C. distans*, which is restricted to tropical regions in Australia and elsewhere. Therefore, *C. distans* seems likely to be restricted to the northern half of the North Island, although more southern areas with warm micro-climates may also provide tolerable growing conditions.

4.2 History of spread in other countries

- Does not appear to be considered invasive anywhere except Fiji (PIER).
- It is considered a weed in some parts of its native range (Randall 2002).
- In New Zealand, two troublesome introduced species, *C. rotundus* and *C. brevifolius*, were both first recorded toward the end of the 19th Century. *C. rotundus* is now found through the North Island and in the top of the South Island, while *C. brevifolius* grows in the northern North Island and the top of the South Island (Healy & Edgar 1980).

4.3 Natural dispersal mechanisms and human assisted means of spread

4.3.1 Natural dispersal mechanisms

- No references specifically dealing with the dispersal of this species were found. Short to medium distance dispersal may be achieved by a variety of means.
- *C. distans* is probably dispersed passively by wind/gravity.
- The seeds are papillose which could aid dispersal on the exterior of animals (e.g. on pelts, or in mud on hooves etc) and there may also be internal transport by animals and birds.
- It is possible that the seeds could be dispersed by water, and by fragmentation and transport of the rhizome.

- Several methods of dispersal are known for other *Cyperus* species. *C. brevifolius* seed is dispersed by wind and water (Holm et al. 1997), *C. eragrostis* seed survives passage through the gut of animals and birds (Parsons & Cuthbertson 1992), and *C. rotundus* can be spread by fragmentation of rhizomes (Healy & Edgar 1980).

4.3.2 Human dispersal

- Human mediated dispersal is likely via transport of seeds or rhizome fragments in contaminated machinery, produce, soil, and stock feed.

4.4 Distribution of potential habitat in New Zealand

- Probably limited by climate to the northern North Island but possibly extending further south in coastal and lowland localities to the northern South Island.
- Primary habitats in New Zealand are likely to be moist or wet sites such as swamps, water courses, ditches, and poorly drained pastures or forest clearings. Also cultivations, lawns, gardens and irrigated crops.

4.5 Constraints to spread and predicted rate of spread in New Zealand

4.5.1 Predicted rate of spread

- Moderate rate of spread from local infestations by natural seed dispersal (wind/gravity, possibly water and animal external/internal).
- Local spread following cultivation and fragmentation of rhizome.
- Could form widespread populations quickly via human vectors; seed or rhizome fragments in contaminated soil, produce, machinery, and stock feed.

4.5.2 Constraints to spread

- Being a true tropical species it is likely to be limited by climate. A useful comparison is provided by *C. rotundus* – in Australia this plant is most common from Cairns to northern Queensland but extends down through New South Wales and into Victoria. In New Zealand it reaches the top of the South Island but its foliage is frost tender and flowering can be restricted (Healy & Edgar 1980).
- Palatability to mammalian browsers is unknown, but *C. brevifolius* is palatable to sheep and cattle, and tolerates trampling (Healy & Edgar 1980).

- Host of the root-knot nematode pest *Meloidogyne incognita* (Atu et al. 1988). This nematode has a limited distribution in New Zealand, but is being investigated as a biocontrol for *Cyperaceae* overseas (James pers. comm.).
- *C. distans* is also host of stem-rot disease (*Macrophomina phaseolina*) in jute (Varada-Rajan & Patel 1943).

5.0 Consequences

5.1 Overseas impacts

5.1.1 Economic impacts

- The economic impacts of *C. distans* appear to be slight and restricted to the tropics. Crops affected include rice, cotton and groundnut.
- Holm et al. (1979) listed *C. distans* as a serious weed in Trinidad; a principal weed in Ghana and Swaziland; as common in the Philippines; present as a weed but rank unknown in Fiji, Mauritius, Nigeria, Vietnam and Cambodia; and present in the flora but requiring confirmation of weediness in Indonesia.
- Soerjani et al. (1987) cite it as a weed of minor importance in lowland-irrigated, rainfed, and upland rice fields throughout Indonesia.
- Not listed as a weed in Australia (Auld & Medd 1987, Parsons and Cuthbertson 1992).
- Not listed as a weed in South East Asia or the Pacific by Waterhouse (1993 & 1997), and considered a very minor weed of the Pacific by Swarbrick (1997).
- The direct costs to agriculture are reduced growth and yield of crop plants through competition for light, water and nutrients. Indirect costs are associated with increased herbicide use and manual weed control.
- In New Zealand, the related species *C. rotundus* is a troublesome weed in gardens, market gardens and some cultivated land, while *C. brevifolius* can invade poor pasture on damp soils (Healy & Edgar 1980).

5.1.2 Environmental impacts

- No environmental impacts known.

5.1.3 Other impacts

- It will grow in wet, poor pasture but no impacts were noted.
- A minor weed in lawns and home gardens.

5.2 Potential impacts in New Zealand

5.2.1 Economic

- Economic impacts are likely to be slight, but this will depend on its growth rate and seeding habit if it establishes.
- *C. distans* could be a minor problem in pastoral agriculture in limited areas (i.e. wet pasture in northern New Zealand).
- It may be moderately problematic in market gardens, irrigated crops and nurseries in the northern North Island.
- The direct consequence to agriculture would be potential losses in crop yield. Indirect costs are those associated with increased herbicide use or manual weed control. These costs would be ongoing if *C. distans* was to establish in New Zealand.

5.2.2 Environmental

- Environmental impacts are likely to be small, but this will depend on its growth rate and seeding habit if it establishes.
- *C. distans* is not reported as an environmental weed overseas, and its generally solitary growth habit is less of a concern than its spreading, mat forming relatives.
- Its potential impact is likely to be on wetlands, marshes and other freshwater riparian habitats. It may jeopardise the naturalness of these environments, and could displace native species, or threaten local populations of rare or endangered plants.

5.2.3 Other impacts

- May be a troublesome weed in home gardens.
- Establishment in lawns and turf could affect amenity values.

6.0 Control techniques

- May be difficult to control (other *Cyperus* species have some resistance to herbicides) but little information was found specifically relating to *C. distans*. Herbicides known to be available in New Zealand are underlined.
- Sedges are generally susceptible to 2,2-DPA. MCPA is recommended for selective control in some crops (Parsons & Cuthbertson 1992).
- Manual weeding; however manual cultivation can spread the rhizomes and the rhizomes may be difficult to remove completely.

7.0 Uncertainty summary

- Potential New Zealand distribution is uncertain but it seems likely to be limited by climate to the northern North Island.
- *C. distans* has limited economic and environmental impacts overseas, and its growth form is of less concern than other members of the genus that are considered weedy in New Zealand. However, ecological information is scarce and its potential economic and environmental impact may depend on its growth rate, seeding habit, and rate of spread.

8.0 References

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