

1.0 Organism description

Scientific name

Lindernia ciliata (Colsm.) Pennell, Scrophulariaceae.

Common names

Fringed false pimpernel (Randall 2002).

Synonyms (Randall 2002).

Bonnaya brachiata Link & Otto

Gratiola ciliata Colsm.

Ilysanthes ciliata Kuntze

Ilysanthes serrata (Roxb.) Urb.

Cultivars, strains, or variants

None found.

Previously recorded in New Zealand

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

2.0 Summary

- *Lindernia* comprises 80 species, mostly from warm regions of the Old World tropics.
- *L. ciliata* is a low growing, stoloniferous, mat-forming, annual (possibly perennial), herb from 0.13 - 0.20m high.
- It is restricted to the tropics and sub-tropics of Asia, northern Australia and North America. Apparently absent from Central and South America, Africa, and the Pacific Islands. At worst, *L. ciliata* may establish and grow in warm areas of the northern North Island of New Zealand.
- Favoured habitat is sunny, or lightly shaded, disturbed sites in light, sandy or gravelly, soils. Moist sites are preferred and it can tolerate several days of submergence. It can be found in irrigated crops, rice fields, waste areas, roadsides, and disturbed natural vegetation up to about 1500m altitude.
- Very little information was found regarding the economic impacts of *L. ciliata*. It appears to be an insignificant weed, mainly of rice, in the tropics and sub-tropics. No environmental impacts overseas are known.

- In New Zealand it is likely to have a negligible impact in irrigated crops, and may cause minor problems in container nurseries. It is unlikely to be an environmental threat in New Zealand. Impacts, if any, would probably be restricted to the warmest areas of the northern North Island.

3.0 Basic biology and ecology

3.1 Overseas distribution

- Tropical and sub-tropical; probably native to Asia. Found in the Old World Tropics, northern Australia and North America [Florida]. It appears to be absent from Central and South America, Africa, and the Pacific Islands. It is found in the general regions below - including, but not necessarily restricted to, the countries listed.
- Asia (tropical/sub-tropical); India, Sri Lanka, Bangladesh, Tibet [south east], China [Fujian, Guangdong, Guangxi, Hainan, Yunnan], Taiwan, Thailand, Laos, Cambodia, Myanmar, Vietnam, Malaysia, Singapore, Indonesia, Japan [Ryukyu Islands] and the Philippines (Soerjani et al 1987, eFlora).
- Australia (tropical); West Australia [Kimberley Plateau], Northern Territory [Darwin, Arnhem Land] and Queensland [Cape York to north of Townsville] (AVH).
- North America; introduced to Florida (USDA).

3.2 Ecology/habitat

- *Lindernia* comprises 80 species, mostly from warm regions of the Old World tropics (Mabberley 1997).
- *L. ciliata* is a low growing, stoloniferous, mat-forming, annual (possibly perennial) herb from 0.13 - 0.20m high (FloraBase, Randall 2002).
- It favours sunny, or lightly shaded, disturbed sites in light, sandy or gravelly, soils. It prefers moist sites and can tolerate several days of submergence (Singh et al. 1983).
- The specimen grown in New Zealand was not very competitive, being small and slow growing, although it did produce copious amounts of very small seed (James pers. comm.).
- Habitats include rice fields, waste areas, fallow fields, roadsides, and disturbed natural vegetation (FloraBase, ANHSIR, Soerjani et al. 1987).

- It is found at altitudes of up to 700m in Indonesia, 1300m in China, and from 700-1500m in Nepal (Soerjani et al. 1987, eFlora).
- Flowering is in April in Western Australia, summer to winter in China, and all year round in Sri Lanka. The fruit is a non-fleshy, dehiscent capsule with irregularly triangular seeds (FloraBase, eFlora).
- Propagation is by seed and it can spread vegetatively from stolons.
- It has herbal or medicinal uses in Asia (eFlora), and is not listed as toxic (Randall 2002).
- Unknown palatability to mammalian browsers.
- Limited information was found on the general ecology of *L. ciliata*.

4.0 Likelihood of establishment and spread

4.1 Environmental tolerances overseas and comparison with New Zealand

4.1.1 Environmental tolerances overseas

- *L. ciliata* is restricted to warm, tropical or sub-tropical climates with associated high humidity and warm temperatures.

4.1.2 Comparison with New Zealand

- The warmer regions of Northland, Auckland and coastal Bay of Plenty provide the closest match with its sub-tropical environments overseas, and it seems likely to be limited by climate to these areas. However, this probably represents the limits of its climatic tolerance and it may not establish or grow in New Zealand at all.

4.2 History of spread in other countries

- Probably naturalised in Australia.
- No other information found.

4.3 Natural dispersal mechanisms and human assisted means of spread

4.3.1 Natural dispersal mechanisms

- No specific references found to seed dispersal of *L. ciliata*. The seed does not appear to have any specialised means of dispersal.
- Short to moderate distance seed dispersal is probably gravity/wind assisted.
- Internal transport by animals and birds is possible, although no information was regarding seed survival after passage through the gut. Seeds may also be carried on the exterior of animals (e.g. on pelts, or in mud on hooves etc.).

4.3.2 Human dispersal

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

4.4 Distribution of potential habitat in New Zealand

- It is likely to be limited to the northern North Island.
- Potential habitat is disturbed lowland, and coastal, moist sites, in light soils, and in full sun or partial shade; including crops, fallow fields, waste areas, and disturbed natural vegetation.

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

4.5.1 Predicted rate of spread

- Potentially low to moderate rate of spread from local infestations by natural seed dispersal (wind/gravity, possibly animal external/internal) and vegetatively from stolons.
- Could form widespread populations quickly via human vectors (e.g. in contaminated soil, produce, seed, machinery, and stock feed).

4.5.2 Constraints to spread

- Likely to be limited by climate. Competitiveness, growth rate and reproductive capacity may be affected if climatic conditions are marginal. The specimen grown in New Zealand was not very competitive, being small and slow growing.
- No information found on palatability to mammalian browsers.

- No information found regarding pests or pathogens specific to *L. ciliata*.

5.0 Consequences

5.1 Overseas impacts

5.1.1 Economic impacts

- Very little information was found regarding the economic impacts of *L. ciliata*. It appears to be an insignificant weed in the tropics and sub-tropics.
- It is reported as a minor weed of rice in India, Nepal, Bangladesh, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam (Moody 1989). It is reported as often abundant, but of minor importance in rainfed rice in Indonesia (Soerjani et al. 1987). It is not listed in Waterhouse (1993).
- It appears to have no economic impact in Australia (Groves et al. 2003).

5.1.2 Environmental impacts

- It is not listed as an environmental weed in Randall (2002).
- It appears to have no environmental impact in Australia. Not listed in Groves et al. (2003).

5.1.3 Other impacts

- None known

5.2 Potential impacts in New Zealand

5.2.1 Economic

- It is likely to have a negligible impact in irrigated crops and container nurseries. However, it is probably at the limits of its climatic tolerance in New Zealand and this may reduce its growth and competitiveness. Impacts, if any, are only likely in the warmest areas of the northern North Island.

5.2.2 Environmental

- It is unlikely to be an environmental threat in New Zealand. It appears to be a coloniser only of disturbed areas, and there is no history of invasiveness in natural systems elsewhere. Its mat forming habit could be a concern, but it is probably at the limit of its climatic tolerance in New Zealand which may reduce its growth and competitiveness. Impacts, if any, are only likely in the warmest areas of the northern North Island.

5.2.3 Other impacts

- Potentially a minor weed of gardens and wastelands.

6.0 Control techniques

- Limited references specific to *L. ciliata* were found. Herbicides known to be available in New Zealand are underlined.
- Pre-emergence application of pyrazosulfuron-ethyl significantly controlled grasses and broadleaved weeds (including *L. ciliata*) in rice (Mondal et al. 2005).
- Post-emergence application of ioxynil + 2,4-D controlled a range of broadleaved weeds, including a related species *Lindernia crustacea*, in sugar cane (Cooke et al. 1969).

7.0 Uncertainty summary

- Overseas distribution; it is listed as present in Florida, but no other records were found from the New World Tropics. Apparently absent also from Africa and the Pacific.
- New Zealand distribution; it seems most likely to be limited by climate to the northern North Island, although this region is likely to be at the limits of its climatic tolerance. It may not establish or grow in New Zealand at all.
- Constraints to spread; its palatability to mammalian browsers is unknown and no information was found on pests and pathogens specific to *L. ciliata*.
- Control; limited references regarding herbicide control specific to *L. ciliata* were found.
- Very little information was found on the history of spread in other countries.

8.0 References

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