

1.0 Organism description

Scientific name

Eragrostis tenella (L.) P.Beauv. ex Roem & Schult., Poaceae.

Common names

Lovegrass, Japanese lovegrass, female grass, feathery lovegrass, delicate lovegrass, bug's egg grass (Randall 2002).

Synonyms (USDA)

Eragrostis amabilis (L.) Wight & Arn. ex Nees

Poa tenella L.

Cultivars, strains, or variants

None found.

Previously recorded in New Zealand

Yes (Cameron 2005) but not on Plant Biosecurity Index or in Flora of New Zealand (Ministry of Agriculture and Forestry, Landcare Research).

2.0 Summary

- Erect or ascending, annual, caespitose grass with culms up to 50cm and leaf blades up to 10cm high.
- Pantropical and widely naturalised throughout the tropics of Asia, Africa, America, Australia and the Pacific with minimal extensions into warm-temperate and arid regions of Asia, Arabia and Australia.
- First recorded in New Zealand in 2002 and possibly naturalised in the Auckland area. While *E. tenella* may still be expanding its range in New Zealand, its current distribution broadly reflects its environmental preferences overseas.
- Preferred habitats are open, sunny, disturbed places, particularly in dry locations and usually at altitudes below 500m. It is found in cultivated fields, forest margins, roadsides, waste places, beaches, scrub, gardens, lawns and grassland.
- Reported to be a minor weed of cultivated areas and disturbed places overseas. No information to suggest that it has any environmental impacts elsewhere.
- Environmental and economic impacts in New Zealand likely to be negligible.

- In New Zealand it would probably be restricted to coastal and lowland areas in the northern North Island, but may extend to the northern South Island, with a low probability of growing in central areas of the South Island.

3.0 Basic biology and ecology

3.1 Overseas distribution

- Paleotropical origin; now widely naturalised throughout the tropics of Asia, Africa, America, Australia and the Pacific with some extensions into warm-temperate and arid regions of Asia, Arabia and Australia (PIER, Randall 2002, Clayton et al. 2006). Recently recorded in New Zealand (Cameron 2005).
- Asia (tropical/sub-tropical/warm-temperate); Tibet, Indonesia, Philippines, Papua New Guinea, Japan, Taiwan, Cambodia, China [Anhui, Fujian, Guangdong, Guangxi, Hainan, Hubei, Shandong, Yunnan], Malaysia, Singapore, Thailand, Vietnam and Myanmar (PIER, eFlora¹).
- Africa (tropical/sub-tropical); north, west, east, central, and south tropical regions (Clayton et al. 2006).
- Arabia (sub-tropical/warm-temperate/arid); west Asia and Arabia including Iran and Pakistan (Clayton et al. 2006, Termeh 2000, eFlora²).
- North America (sub-tropical); Florida, Georgia, Mississippi, South Carolina, Alabama and Texas. Widely reported in Florida (USDA).
- Central America/Caribbean (tropical); Meso-Americana including Puerto Rico, Costa Rica, Mexico (USDA, Clayton et al. 2006, W³TROPICOS)
- South America (tropical/sub-tropical); northern, southern, and western South America including Galapagos, Ecuador, Columbia and Brazil (PIER, Clayton et al. 2006).
- Pacific (tropical); American Samoa, Western Samoa, Mariana Islands, Guam, Cook Islands, Micronesia, Fiji, French Polynesia, Hawaii, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Palau, Solomon Islands, Tonga, Tuvalu Islands, Vanuatu and New Hebrides (PIER).
- Australia (tropical/sub-tropical/arid); introduced and naturalised in Northern Territories, West Australia and north eastern Queensland. Mostly tropical areas around Kimberly, Darwin and the Queensland coast but some collections in arid central Australia (AVH, Hnatiuk 1990).

- New Zealand (sub-tropical/warm-temperate); probably naturalised in Auckland. Also recorded in Rotorua and Chatham Island (Cameron pers. comm.)

3.2 Ecology/habitat

- Erect or ascending, annual, caespitose grass. Culms up to 50cm long, leaf blades up to 9cm long.
- The specimen grown in New Zealand was smaller, prostrate, and had quite a short time to maturity (James pers. comm.).
- Preferred habitats are open, sunny disturbed places, particularly in dry locations. It is found in cultivated fields, forest margins, roadsides, waste places, between stones, beaches, scrub, gardens, lawns, grassland and dry river beds (ANHSIR, Whistler 1995, USDA, PIER).
- It grows generally at low altitudes (0-500m) but sometimes as high as 1400m (ANHSIR, Whistler 1995, USDA, PIER).
- Propagation is by seed. Seeds are small (0.3-0.5mm) and fall free from the spikelet (eFlora¹, Whistler 1995).
- Seedbank properties unknown but other species of *Eragrostis* are known to have 6-9 month seed dormancy (Holm et al. 1997).
- Maximum germination is at a temperature of 20° C (lower limits not given), in continuous light, and on the soil surface (Sharma 1987).
- Cultivated and used both as a fresh and dry forage grass (eFlora², SEPASAL, Randall 2002). Reproductive capacity increases with grazing pressure (Sant 1966).

4.0 Likelihood of establishment and spread

4.1 Environmental tolerances overseas and comparison with New Zealand

4.1.1 Environmental tolerances overseas

- Mostly tropical or sub-tropical climates with associated high humidity and warm temperatures. Also recorded in arid areas of Australia and Arabia, and sparingly in warm-temperate Asia.
- 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 per year, frost days range from 0-10 per year and humidity is 60-90% (Bureau of Meteorology).

- Australia (arid); climate through most of central Australia is classed as ‘hot dry summer, cold winter’ with mean daily minimum temperature ranging from 9-15°C, average annual rainfall 0-300mm, 10-30 rain days (>1mm) per year, 30-50% humidity and 10-50 days of frost per annum (Bureau of Meteorology).

4.1.2 Comparison with New Zealand

- While *E. tenella* could still be expanding its range in New Zealand, its current distribution broadly reflects its preference for warmer regions overseas.
- 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) 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). The Chatham Islands also have a warm temperate, maritime climate with high humidity and infrequent frosts (NIWA).
- Note that the Australian and west Asian distribution suggests that *E. tenella* tolerates both hot, dry conditions, and possibly more temperate climates. Therefore it has the potential to grow further south in cooler parts of New Zealand. It is possible, but unlikely, that it could grow in hot, dry areas such as Marlborough and the central South Island.

4.2 History of spread in other countries

- There are four known New Zealand collections of *E. tenella*; Auckland 2002, Auckland 2005, Chatham Islands 2006, and Rotorua city 2006. It is locally well established, and possibly naturalised, in Auckland where it was probably present for some years before detection (Cameron pers. comm., Cameron 2005). There is no information on potential entry pathways, but its arrival in New Zealand pre-dates the large-scale importation of coco peat.
- *E. tenella* was first recorded in Hawaii in 1895 and is now found throughout the Pacific (Whistler 1995). It is reportedly invasive in the Marianna Islands, Galapagos, Micronesia, Fiji, French Polynesia, Hawaii, Kiribati Line Islands, Marshall Islands, Nauru, New Caledonia and Niue (PIER).
- Naturalised in Australia, North America and elsewhere (USDA). First recorded collection in Australia (Queensland) in 1922 (ANHSIR).

- Four *Eragrostis* spp. (excluding *E. tenella*) are naturalised in New Zealand, but only two of these are widespread (Edgar & Connor 2000). *E. curvula* is listed on the New Zealand Pest Plant Accord and is invasive in New Zealand, Australia, North America and Hawaii. However, it is a large tufted perennial from South Africa that is unpalatable to livestock, and tolerates far more temperate environments than *E. tenella*. The other is *E. brownii*, a spreading perennial, introduced in 1870 and found throughout the North Island to Nelson/Marlborough. It appears to have had little or no economic or environmental impact here. It too is adapted to temperate climates overseas; for example it is widespread in cooler areas of Victoria, in Australia.
- One-off transient records exist in New Zealand for five other non-native *Eragrostis* species, but none of these appear to have established (Edgar & Connor 2000).

4.3 Natural dispersal mechanisms and human assisted means of spread

4.3.1 Natural dispersal mechanisms

- *E. tenella* appears to have no specialised adaptations to aid dispersal.
- The seed is light so is likely to be moved short to medium distances by the wind.
- Animal dispersal, either external (e.g. mud in hooves, pelts etc) or internal is possible.
- Other *Eragrostis* species may be dispersed by water, and some species in Hawaii may have arrived in the gut of birds (Holm et al. 1997).

4.3.2 Human dispersal mechanisms

- Human mediated dispersal likely via movement of contaminated machinery, mowers, 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 northern and central South Island.
- Habitat in New Zealand is likely to be in disturbed, open areas such as cultivated fields, forest margins, roadsides, waste places, beaches, scrub, gardens, lawns and grasslands.

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

4.5.1 Predicted rate of spread

- Moderate rate of spread by natural seed dispersal (wind, water, and possibly animals and birds) from local infestations.
- Could form widespread populations quickly via human vectors; in contaminated soil, produce and machinery, and stock feed.

4.5.2 Constraints to spread

- Spread probably limited somewhat by climate but overseas distribution suggests some tolerance for temperate conditions.
- Palatable to mammalian grazers but appears to be well adapted to grazing (Sant 1966).
- Host to various parasitic nematodes (Olabiyi & Adesina 2006).

5.0 Consequences

5.1 Overseas impacts

5.1.1 Economic impacts

- A minor weed in the Pacific of dryland field crops, pasture and disturbed places. Listed as locally important in French Polynesia and Samoa; present but not important elsewhere (Waterhouse 1997, Swarbrick 1997).
- A minor problem in Asia where it is a weed of pineapples, bananas and vegetables. Widespread and important in Singapore; locally important in Myanmar, Thailand and Malaysia; present but not important in Vietnam, Indonesia and Philippines (Waterhouse 1993).
- Introduced and naturalised but not considered weedy in North America (USDA).
- Introduced and naturalised in Australia but no information found to suggest that it is anything more than a minor problem.

5.1.2 Environmental impacts

- No environmental impacts known.

5.1.3 Other impacts

- None known.

5.2 Potential impacts in New Zealand

5.2.1 Economic

- Economic impact is likely to be negligible. At most it could be a minor weed of cultivation and disturbed areas in the northern North Island. It is unlikely to be a problem in pastoral agriculture.
- The direct consequence to agriculture could be potential losses in crop yield, although these would probably be minimal compared to those resulting from other grass weeds already present in New Zealand.

5.2.2 Environmental

- Unlikely to pose any environmental threat. It is not reported to be an environmental problem overseas, its growth habit is not of concern, and it is unlikely to establish in undisturbed natural environments.

5.2.3 Other impacts

- It may become a nuisance weed in amenity areas and home gardens.

6.0 Control techniques

- An acceptable range of control techniques exist. Herbicides known to be available in New Zealand are underlined.
- Sencor (2.0 kg/ha) as pre-emergence, or Roundup (2.5-3.0 kg/ha) as post-emergence, gave good control in sugar cane (Singh & Kaur 2003).
- Pendimethalin and fluchloralin were effective in controlling a variety of weeds in cumin, with Pendimethalin at 0.5 kg proving the most economic (Patel & Mahta 1989).
- Hand weeding.

7.0 Uncertainty summary

- Potential New Zealand distribution is uncertain. It prefers tropical/sub-tropical environments overseas, but also tolerates arid, and to some extent, warm-temperate climates.

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