

Pest plant risk assessment



Mexican feather grass

Nassella tenuissima

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Identity and taxonomy

Scientific name: *Nassella tenuissima* (Trinius) Barkworth

Common names: Mexican feather grass, Texas tussock, fine-stem tussock grass (US), white tussock, ponytail grass and tussock grass.

Identity: *N. tenuissima* is a member of the tribe Stipeae (spear grass group) within the family Poaceae. It was previously known as *Stipa tenuissima* Trin. (basionym). Synonyms for *N. tenuissima* include *Stipa cirrosa* E.Fourn. ex Hemsl., *S. geniculata* Phil., *S. mendocina* Phil., *S. oreophila* Speg., *Stipa subulata* E.Fourn. ex Hemsl., *S. tenuissima* Trin., *S. tenuissima* var. *oreophila* (Speg.) Speg., *S. tenuissima* var. *planicola* Speg. (Randall 2002). Closely related, invasive congeners in Australia include *N. trichotoma* (Nees) Hack. Ex Archav. (serrated tussock) and *N. neesiana* (Trin. & Rupr.) Bark. (Chilean needle grass), *N. hyalina* (Nees) Barkworth (cane needle grass), *N. leucotricha* (Trin. & Rupr.) (Texas needle grass) and *N. charruana* (Arech.) Bark. (lobed needle grass). The genus *Nassella* contains 98 species, of which 90 can be found in South America (Torres 1997).

Description

Mexican feather grass is a densely tufted, perennial tussock grass up to 70 cm tall (Figure 1). It is very similar to serrated tussock and indistinguishable from it except by the flowers and flowering heads. Tussocks are distinctly white in winter (Henderson 2001). The leaves are very numerous, fine, bristly, tightly rolled, rough to touch and up to 60 cm long (0.25–0.5 mm in diameter). Culms (stems bearing the flowers) are up to 70 cm high, with 2–3 unthickened nodes; smooth, hairless and round in cross-section between the nodes. The flower-bearing section of the culm is 15–25 cm long and green or purplish in appearance due to the colour of the glumes (lowermost of the bracts around the flowers). The lower section is enclosed by a leaf-like sheath. Unlike serrated tussock, the mature seed head does not always fully project and spread from this sheath and the flowering stem apparently does not break at the uppermost stem node when mature.

The flowers have a single, bisexual floret per spikelet, surrounded by two persistent bracts or glumes (the palea and the lemma) that are unequal in size and much longer than the floret (excluding the awn). The lower glume is 9–10.5 mm long (6–8.5 mm in serrated tussock, 14–24 mm in Chilean needle grass). The flower head is often only partly exerted and spread from the enclosing sheath at maturity. In serrated tussock the inflorescence is fully exerted and detaches at maturity (Faithfull 1999). The awns (the long, bristle-like appendages extending from the end of the seed) are 45–90 mm long (20–35 mm in serrated tussock and 60–90 mm in Chilean needle grass) and are not readily detached from the seed. The main body of the seed is 2–3 mm long (1.5–2 mm in serrated tussock and 8–10 mm in Chilean needle grass) (Faithfull 1999). Awns often become entangled, forming dense, ‘rats nests’ (Henderson 2001). Reference should be made to the keys of Walsh (1998) and Jacobs et al. (1998) to assist in identification of *Nassella* species. The species has been described in detail by Barkworth (1990).

Longevity

This study was unable to find any literature on longevity of Mexican feather grass. However, the species is known to be a perennial.

Phenology

Flowering generally occurs from December to January (summer in the Southern Hemisphere). This is comparable to the closely related Chilean needle grass.

Reproduction, seed longevity and dispersal

Mexican feather grass reproduces from seeds. While there are no data on seed production for *N. tenuissima*, closely related species, such as Chilean needle grass, can produce more than 20 000 seeds per square metre. The resulting seed-bank can persist for four years, even if further seed production is prevented. In South America, seedlings of *N. tenuissima* emerge in autumn and early winter, prior to the winter rains. This is probably an adaptation that reduces seedling mortality during hot, dry summers (Moretto & Distel 1998).

Seeds readily adhere to clothing and livestock. They can also be dispersed on farm machinery, or as a contaminant of seeds and fodder. Each seed weighs approximately 0.26 mg (Moretto & Distel 1998).

Moretto and Distel (1998) found that seedling establishment of *N. tenuissima* only occurred in the absence of competition from the shoots and roots of other plants. Also, fluctuation of temperature near the soil surface was found to reduce seed dormancy and promote rapid germination. The authors concluded that, in healthy pastures, where swards are dominated by palatable grasses, vegetation gaps of low competitive pressure favour seedling establishment of unpalatable grasses, such as *N. tenuissima*.

History of introduction

Mexican feather grass is not known to exist in Queensland. However, the plant is currently advertised on the internet sites of dozens of overseas suppliers of garden plants and seeds. It has been offered for sale by several nurseries in Victoria and New South Wales since 1996 (McLaren et al. 1999).

Mexican feather grass has been offered for sale in nurseries under at least two erroneous names—a nursery in Sydney sold specimens as *Austrostipa elegantissima* (an Australian native species) and a rare plants nursery near Melbourne sold specimens as *Stipa tenuissima* (an outdated synonym for *N. tenuissima*). To make matters worse, the Australian Quarantine and Inspection Service (AQIS) had listed *Stipa* species as permitted imports, whereas *Nassella* species were prohibited. To date, *N. tenuissima* specimens at two Victorian nurseries have been destroyed by authorities.

Origin and distribution

Mexican feather grass is native to Argentina, Chile, New Mexico (US) and Texas (US) (Jacobs et al. 1998). Its distribution in the US is provided in Figure 1 and in Mexico in Figure 2. A map of distribution in South America is not available.



Figure 1. Distribution of Mexican feather grass (*Nassella tenuissima*) in the United States (PLANTS database, US Department of Agriculture, <http://plants.usda.gov>).



Figure 2. Distribution of Mexican feather grass (*Nassella tenuissima*) in Mexico (Missouri Botanical Gardens w3 TROPICOS database).

In Argentina, it grows in the central, western, southern and north-western regions, extending from about 26°50'S to 47°34'S, and from near sea-level to about 2900 m altitude (Jacobs et al. 1998).

Preferred habitat and climate

Mexican feather grass prefers a dry, temperate climate, generally with a mean annual rainfall in the order of 300–800 mm.

In North and South America, it grows naturally in open woodlands and grasslands and can become abundant in areas that are heavily grazed by cattle.

Within Argentina, typical habitats include some zones of the ‘Pampeana’ grass steppe, Patagonian grass and shrub steppe, ground cover in various xeromorphic and semi-arid woodlands (e.g. the Calden woodlands of *Prosopis caldenia* Burk.), and highland, and sometimes, alpine meadows. In La Pampa Province in central Argentina (38°45’S; 63°45’W), *N. tenuissima* dominates areas of grazed, upland, native grassland, where the climate is semi-arid, with a mean annual temperature of 15 °C and a mean annual rainfall of 344 mm (Moretto & Distel 1998). At this site, the most severe droughts occur in summer and rainfall peaks in March and October. Soils are coarse texture Calciustolls. *Prosopis flexuosa* and *P. caldenia* are two common shrubs in the area.

In Texas, *N. tenuissima* is ‘locally abundant on open, rocky slopes’ (Gould 1975), mountain plateaux and arid valleys with an average annual rainfall of 300 mm. It occupies sites with soils of extreme variability (Hitchcock & Chase 1951; Correll & Johnstone 1970; Martin & Hutchins 1980; Connor & Ford 1996, 1997). In the southern US it grows over an altitude range of 600–2350 m (Jacobs et al. 1998).

Impact and status in other states

Currently, there are only two records of naturalised Mexican feather grass in Australia:

- John Hosking (NSW DPI) found c. 60 plants at a pre-school in Tamworth. The plants appear to have spread from ornamental specimens planted within the gardens of the pre-school (J. Hosking, pers. comm.).
- In early 2008, ACT Parks, Conservation and Lands discovered the first recorded naturalised populations of *N. tenuissima* in the ACT. Approximately eight mature plants were found with c. 30 seedlings. The site is located next to ‘Bendora House’ in Namadgi National Park. All plants are being removed.

History as a weed overseas

Mexican feather grass is a declared pest in South Africa, where it is invading mountain grassland and transforming these sites (Henderson 2001). It has also naturalised in California and New Zealand (Faithfull 1999). In Argentina, where Mexican feather grass is native, it is regarded as an unpalatable grass (Moretto & Distel 1998) and has been classified as a non-preferred species that can become dominant under continual heavy grazing pressure with a low frequency of high-intensity fire (Distel & Boo 1995).

Pest potential in Queensland

Based on climate modelling, it is predicted that Mexican feather grass could become a serious pest over substantial areas of southern Australia (Figure 3), generally between the 300–800 mm annual rainfall isohyets. McLaren et al. (1999) estimated the total area at risk to be some 14.1 million hectares. However, modelling by Queensland Department of Natural Resources and Mines, Queensland suggests that the area of Australia at risk could be up to 169 million hectares.

While Mexican feather grass is best suited to dry, temperate woodlands of southern Australia, it is predicted to survive further north in the subcoastal and semi-arid woodlands of southern and central Queensland. Of course, soils and other factors will influence abundance and distribution. Habitats considered at risk of invasion include most open eucalypt woodlands and open grasslands of southern Queensland. It is difficult to predict how far north Mexican feather grass could spread, but it may persist as far as subcoastal central Queensland.

If Mexican feather grass replaces other grasses on a large scale, the impact on beef and wool production could be substantial. It is a low protein, high fibre grass that has no grazing value. Pure stands of Mexican feather grass would render a paddock worthless. The wool industry is threatened by several species of *Nassella*, particularly since the seed awns contaminate wool. A study by the Cooperative Research Centre for Weed Management Systems (2001) estimated that the potential impact of Mexican feather grass in Australia could be in the order of \$39 million over the next 60 years. Similarly, Morfe et al. (2002) estimated that the net economic benefit to the community of eradicating Mexican feather grass over the next five years could be in the order of \$41–102 million.

Mexican feather grass is closely related to several other exotic stipoid grasses, including serrated tussock (*N. trichotoma*) and Chilean needle grass (*N. neesiana*), which are both 'Weeds of National Significance'. Serrated tussock costs New South Wales' agriculture more than \$40 million annually (Jones & Vere 1998) and is causing severe environmental damage to native grasslands (McLaren et al. 1998). In terms of ecology and growth, Mexican feather grass is quite similar to serrated tussock.

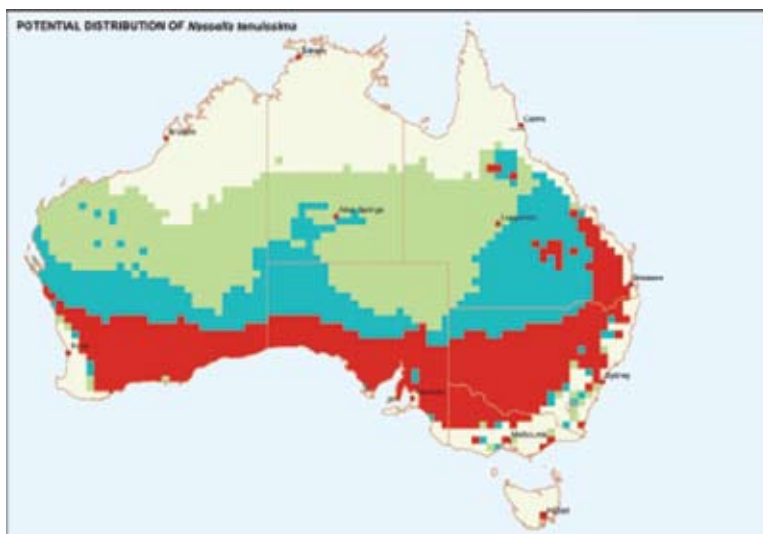


Figure 3. Potential distribution of Mexican feather grass in Australia (figure generated by CLIMEX program; red indicates areas where climate is considered to be highly suitable for growth of this species (c. 169 million ha); blue and green indicate areas where climate is considered less suitable (c. 376 million ha); remainder indicates areas that are considered unsuitable).

Control

There are no data available on the costs of controlling Mexican feather grass. However, control costs for Chilean needle grass, a similar species, have been estimated at \$60–120 per hectare, depending on whether the infestation is scattered or dense.

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