

# African fountain grass

*Pennisetum setaceum*



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**Queensland**  
Government

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# Summary

African fountain grass (*Pennisetum setaceum*) is a perennial grass native to drier parts of northern and eastern Africa and south-western Asia. It has been planted extensively in Queensland as a garden ornamental and has naturalised in proximity to most planting sites. It spreads via windblown seeds.

African fountain grass is a major weed in Hawaii, where it has colonised thousands of hectares of early successional plant communities developing on old lava flows. In California, it has increased fire frequency and converted desert shrub communities into grassland.

Climate modelling suggests African fountain grass is well suited to extensive areas of arid and semi-arid Australia, including large areas of Queensland. The species is currently in its early stages of population development in Queensland, but its long-term potential for spread is significant. Habitats most at risk are naturally open, hot, rocky sites in the arid and semi-arid zones, particularly rocky ridges. While perhaps best adapted to inland climates, it can still thrive on exposed, rocky, hot sites in high rainfall coastal areas.

Based on the evidence collected in this weed risk assessment, it seems reasonable to conclude that African fountain grass is a high-risk species and that current restrictions on sale in Queensland are justified.

# Introduction

## Identity and taxonomy

**Species identity:** *Pennisetum setaceum* (Forssk.) Chiov.

**Synonyms:** *Pennisetum ruppelii* Steud., *P. macrostachyum* Fresen., *P. rueppelianum* Hort., *Phalaris setacea* Forssk.

**Cultivars:** 'Rubrum', 'Eaton Canyon'

**Common names:** fountain grass, crimson fountaingrass (California), tender fountaingrass

**Family:** Poaceae

## Description

*P. setaceum* is an erect, densely tufted perennial which grows to about 1 m tall. The culms are sometimes branched near the base and the nodes are glabrous. Leaf sheaths are more or less glabrous except for cilia on the margins. Ligules are a ciliate rim. Leaf blades are linear, convolute, folded or flat, with a tapered apex, mostly 8–30 cm × 0.05–0.3 cm, glabrous or with a few hairs towards the base, scabrous above and on the margin. The inflorescence is a pinkish, feathery spike, 10–25 cm × 1.2–1.6 cm, excluding bristles. One to three spikelets are arranged in clusters on stalks 1–3 mm long. Each cluster is enclosed by numerous bristles, usually up to 2.6 cm long with one bristle up to 4 cm long. Spikelets are 4.5–6.5 mm long; lower glume absent or up to one-third length of spikelet, upper glume one-quarter to two-thirds the length of spikelet, one-nerved; lower floret sterile or male, lemma more or less as long as spikelet, one- to five-nerved, scabrous on nerves, palea absent or up to as long as lemma; upper floret bisexual or male, lemma as long as spikelet, with mucro up to 1 mm long, five-nerved, scabrous towards apex, occasionally margin ciliate, palea slightly shorter than lemma (Stanley and Ross 1989). The fruits are small, dry achenes adorned with long showy bristles (Benton 1997).



**Figure 1.** African fountain grass in a garden

## Biology and ecology

*P. setaceum* is a perennial plant that can live for up to 20 years (CDFA 2001), although most specimens live for a shorter time. Flowering occurs over a prolonged period from spring through summer.

*P. setaceum* is reported to be apomictic (asexual reproduction where embryos develop without fertilisation) and to a lesser extent, out-crossing (CDFA 2001). Pollination is required for apomictic seed development. Seeds require several months (autumn to early spring) to mature. Flower heads typically remain intact during this period, giving the impression that the plant flowers throughout the year. The plant utilises the C<sub>4</sub> photosynthetic pathway and is more or less winter-dormant (CDFA 2001).

## Reproduction and dispersal

Most seeds germinate in late spring through to early summer. Seeds are primarily wind-dispersed (Benton 1997). Other dispersal vectors include flowing water, vehicles and livestock (seeds attached to fur), and perhaps kangaroos and humans. Field evidence in Hawaii suggests that seeds can survive for more than six years in the soil (Benton 1997; CDFA 2001). Ornamental cultivars such as ‘Rubrum’ and ‘Eaton Canyon’ usually do not produce seeds (CDFA 2001).

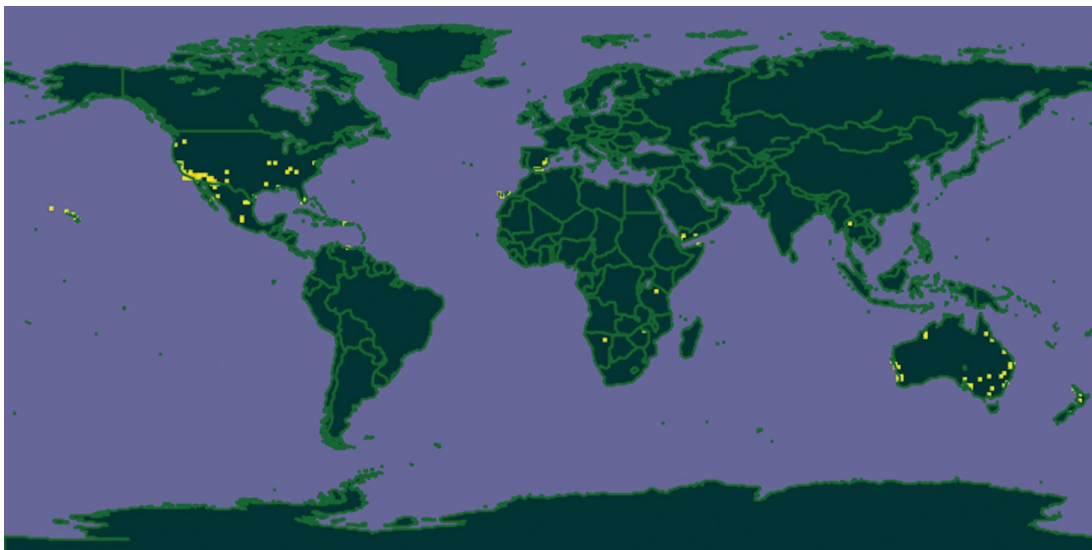




**Figure 2.** African fountain grass raceme

## Origin and distribution

*P. setaceum* is native to the drier parts of northern and eastern Africa and south-western Asia (Stanley and Ross 1989). It was probably introduced into Australia for use as a garden ornamental as it is widely cultivated for its 'graceful, arching habit' (Harden 1993). Naturalised populations are scattered across North America (especially California), Hawaii and Mexico (GBIF n.d.) (Figure 3).



**Figure 3.** Global distribution of African fountain grass (Source: GBIF n.d.)

## Preferred habitat

*P. setaceum* prefers exposed, hot, dry habitats, particularly rocky or stony areas, but can also colonise sandy sites. It is commonly seen growing in cracks in concrete and rocks along roadsides, urban places and other open, disturbed sites. The plant appears adapted to arid and semi-arid climates, but can persist on rocky or otherwise exposed sites in high rainfall coastal areas.

In Hawaii, *P. setaceum* grows in xeric (dry) and mesic (wet) habitats on rangelands, barren volcanic substrates, sand hills and other relatively open sandy sites (Tunison 1992; Loope et al. 1992) with a wide elevational range from sea level to 2740 m (Tunison 1992). It is limited to areas with a median annual rainfall of less than 1250 mm (Benton 1997).

In California, it invades undisturbed coastal dunes, coastal sage scrub, desert shrubland, grasslands, canyons and roadsides (CDFA 2001; Benton 1997). It also grows in rock crevices and pavement cracks.

*P. setaceum* does not tolerate prolonged periods of freezing or saline conditions (CDFA 2001).

## History as a weed elsewhere

*P. setaceum* has naturalised in New South Wales, Western Australia and South Australia (Hnatiuk 1990). In South Australia, it exists along roadsides east of Murray Bridge, north of Port Wakefield, west of Port Augusta and in Adelaide (J. Virtue, pers. comm.). It has not been declared noxious in any other state or territory.

*P. setaceum* is a weed in Hawaii, mainland United States and South Africa (Holm et al. 1979; Wells et al. 1986).

*P. setaceum* is considered one of the most disruptive alien species in Hawaii, where it poses a major threat to a number of critically endangered plant species and plant communities (Smith 1985; Benton 1997). It was first collected in Hawaii in 1914 and is now recognised as a highly aggressive, fire-adapted coloniser that readily outcompetes native plants. It has invaded many types of natural areas, from bare lava flows to rangelands. On lava flows, it can disrupt primary succession and has formed monospecific stands (Figures 4 and 5). *P. setaceum* increases fuel loads, which increases the intensity and spread of fires, resulting in severe damage to native, dry forest species adapted to less extreme fire regimes (Benton 1997). Hawaiian authorities have been trying to control *P. setaceum* for more than 20 years (Loope et al. 1992).





**Figure 4.** African fountain grass dominating primary succession in Hawaii (Image by Forest and Kim Starr, USGS, Wikimedia Commons)

In South Africa, *P. setaceum* has invaded native vegetation and pastures in dry areas. It also contaminates seed products (Wells et al. 1986).

In the United States, it has naturalised in Arizona, California, Colorado, Hawaii, Florida, Louisiana and Tennessee. It is spreading in southern California and desert regions of the south-western United States and Mexico. In California, it exists in central and south-western regions, especially coastal areas, including the San Francisco Bay region, the delta area of the Central Valley and the Sonoran Desert, to an elevation of 600 m (CDFA 2001). Invaded habitats include desert grasslands, canyons, roadsides, wet montane shrublands and coastal dunes. It has increased fire frequency in some areas, contributing to the conversion of desert shrub communities to grassland (CDFA 2001).



**Figure 5.** African fountain grass (grey area) dominating primary succession in Hawaii (Image by Forest and Kim Starr, USGS, Wikimedia Commons)

## Pest potential in Queensland

### Current distribution and impact

*P. setaceum* has been widely planted as an ornamental in Australia and overseas. In Australia, it has formed small populations scattered over a wide range from Western Australia to the south-eastern corner of South Australia, including eastern Queensland, the greater Brisbane area and New South Wales (Hnatiuk 1990). There are few areas where it can be described as extensive. Perhaps the largest infestations in Queensland are near Mount Morgan and on mine spoil heaps near Ipswich. Near Charters Towers, African fountain grass has dominated rocky ridge lines—habitat used for day-time shelter by rock wallabies (*Petrogale assimilis*) (Figures 6 and 7). It is uncertain whether it is having any negative impacts, however, as rock wallabies generally graze in nearby lowlands (Figures 6 and 7).





**Figure 6.** African fountain grass dominating rock wallaby habitat near Charters Towers



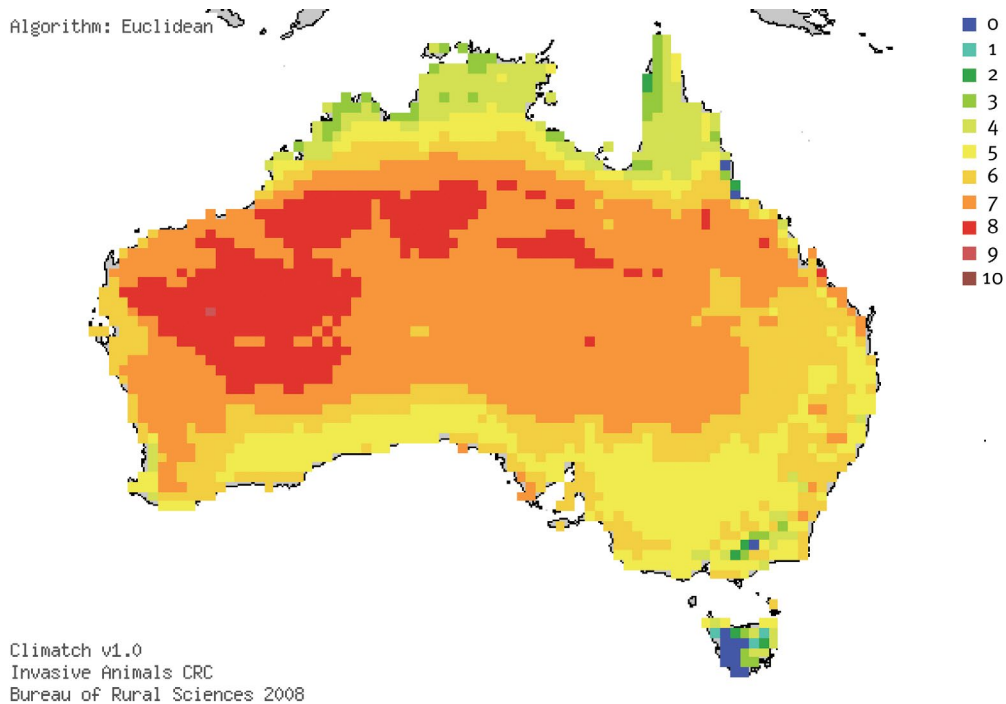
**Figure 7.** Rock wallaby habitat near Charters Towers dominated by African fountain grass

## Potential distribution and impact

*P. setaceum* has several attributes that confer invasive potential in Queensland. Perhaps most importantly, it has a history as a significant weed overseas in tropical and subtropical climates.

Climatically, the plant is well suited to arid and semi-arid regions, but will persist in coastal areas, particularly exposed, rocky sites that get hot in summer. The estimate of the plant's native range in northern and eastern Africa falls within a latitudinal range of 28° to 10°, a range corresponding to

the region between northern New South Wales and Cape York. Climate modelling using the computer program Climatch (BRS 2009) suggests the species could survive over a substantial area of inland Queensland (Figure 8).



**Figure 8.** Areas of Australia where climate appears suitable for *P. setaceum*. Red and orange indicate areas that are highly suitable, yellow is marginally suitable, and green and blue are unsuitable. Map produced using Climatch computer software (BRS 2009)

Habitats at risk of invasion include virtually any open, dry, rocky sites. These could include semi-arid and arid shrubland, grasslands and ridgelines (Figure 9). Exposed (hot) urban habitats, such as mine spoil heaps, road cuttings and cracks in cement footpaths appear particularly prone to colonisation. *P. setaceum* might invade open, coastal sand dune communities, as it has done in California. However, areas covered with thick wallum or forests are unlikely to be invaded.

Of concern is the plant's potential to increase fuel loads and fire intensity, thereby destroying or modifying native plant communities that are adapted to less intense and perhaps less frequent fires. In California, more intense fires fuelled by *P. setaceum* have resulted in the conversion of shrubland to grassland.





**Figure 9.** Elevated, rocky ridges such as this site near Charters Towers, North Queensland, are at risk of invasion by African fountain grass

Since *P. setaceum* produces large numbers of wind-dispersed seeds, its spread could be rapid and almost impossible to prevent. The plant appears to be unpalatable to stock (Wells et al. 1986) and may become an unwanted pest in tropical rangeland pastures, particularly on dry, stony or rocky ridges. *P. setaceum* was listed as an environmental weed by Swarbrick and Skarratt (1994) and as a candidate for preventative control by Csurhes and Edwards (1998).

## Feasibility of eradication

The prospects for eradicating *P. setaceum* from Queensland are poor. The plant is common in gardens across eastern Queensland and has naturalised at numerous sites.



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