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Naturalisation of Mexican fan palm (*Washingtonia robusta*) in Auckland

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Introduction

Washingtonia is a genus of two palm species that is native to western North America; Mexican fan palm (*Washingtonia robusta*) is native to north-west Mexico, and Californian fan palm (*Washingtonia filifera*) is native to California. Both species are tall, solitary-trunked fan palms and both are cultivated in Auckland (Wilcox 2002).

At maturity, Mexican fan palm has a slender trunk to 30 m high, which is swollen at the base, and a compact crown of bright green leaves. Californian fan palm has a barrel-shaped trunk to a maximum of 20 m high, and a looser crown with leaves that are distinctly grey-green. On young plants, the petioles of Mexican fan palm are heavily armed with short spines and have a bright reddy-brown patch at their base, whereas the petioles of Californian fan palm are green and relatively unarmed (Floridata 2009).

Mexican fan palm has large costapalmate leaves ("Costapalmate" is the term given to palmate leaves for which the leaflets are joined for most of their length). The old leaves persist on the trunk after they die, forming a shaggy coat, but these are often removed by people to reveal the trunk (Fig. 1). The species is monoecious, self-compatible, and does not require specialist pollinators (Brusati 2003). The flowers which are produced on long panicles, are followed by small black fleshy fruit, which surround a single seed approximately 6 mm in diameter. In the USA, where the species has naturalised, dispersal of the seeds is by gravity, birds, mammals, and water (Weedwatch 2009). When the seeds germinate, the first growth is of a cotyledonary petiole down into the soil, which then swells at the tip. From here the first true root growth, the radicle, is initiated, and the seedling shoot, the plumule, grows upwards towards the surface (Meerow 2009). This germination strategy is common for palms of arid areas, as moisture is more available at deeper soil levels. This species germinates well at soil temperatures of 25-35ºC (Brown & Brown 2009).

The species is tolerant of drought, coastal exposure, and a wide range of soil types (Gilman & Watson 1994) but is best cultivated in full sun and well drained but moist soils (pers. obs). Leaves of adult plants are damaged at temperatures of -7ºC or colder (The Palm Society-Northern California Chapter 2009).

Mexican fan palm is commonly cultivated throughout the Auckland Region, and large mature specimens are scattered throughout established suburbs such as Remuera, Mount Eden, and Epsom. Over the past decade, increasing availability, coupled with relatively low prices due to the species ease of cultivation, has seen this species become increasingly common, particularly in new urban areas, and in some instances, as a street tree. This paper reports on the beginning of naturalisation of this species in New Zealand.

Recent records of naturalisation

Mexican fan palm has been recently been collected as growing wild at three locations in Auckland City.

The earliest record, by Peter de Lange in May 2007 (AK 299191), was of a single plant, c. 1 m tall, growing out of the base of a concrete wall. The plant was not immediately under adult plants, but adult Mexican fan palms were present in the local area.

Fig. 1. Specimen Mexican fan palm seedling with entire leaves and first costapalmate leaf (AK 305226). Collected from 'Countdown' supermarket carpark, April 2009.

Fig. 2. Established Mexican fan palm seedling with costapalmate leaves near footpath edge of garden. The plant has the characteristic reddy-brown petiole bases, sharp "shark teeth" like spines along the edges of the petiole, and hair-like fibres on the leaves. Photo: 'Countdown' supermarket carpark, Mt Wellington Highway, TM, 7 September 2009.

The second record, collected by myself in April 2009 (AK 305225-27), was of several seedlings and young plants in the carpark of 'Countdown' supermarket in Mt Wellington. In an unkempt bark garden at the entrance of the car park, juvenile seedlings with entire strap-like leaves (Fig. 1), and older seedlings to c. 1m tall with costapalmate leaves (Fig. 2), are present under three mature Mexican fan palms (Fig. 3). Since the time of collection, maintenance of the garden has removed all but two of the seedlings. A search of the site in September 2009 found three *Washingtonia* seeds on the ground, and at this time, both spent and developing inflorescences were present in the crowns of the two tallest of the planted adults.

The third record, by Peter de Lange in August 2009 (AK 305933), is of hundreds of seedlings in cracks in asphalt and footpaths, in cobble gardens, and adjacent private residential gardens, in Ngaoro Place, Parnell. Ngaoro Place is lined with mature Mexican fan palms and these are the presumed parents.

All three records are from relatively warm locations due to their urban location, and their close proximity to concrete or asphalt surfaces. These microsites are likely to sustain elevated temperatures during the summer months and allow for the germination of palm species such as Mexican fan palm that require high germination temperatures. The summer water deficits and sun exposure that probably also characterise these microsites are unlikely to pose a problem for Mexican fan palm, as the species originates from rocky ravines and canyons in desert areas.

Fig. 3. The three mature Mexican fan palms that are the likely parents of the seedling in Fig 1 and 2. Spent and developing inflorescences are present in the crown of the two tallest trees. Photo: 'Countdown' supermarket carpark, Mt Wellington Highway, TM, 7 September 2009.

Table 1. Identification characters of adults and fruit of Auckland's naturalised palm species

SPECIES	TRUNK	ADULT LEAF SHAPE	LEAF COLOUR	PETIOLE	RIPE FRUIT[1]	SEEDS
Archontophoenix cunninghamiana (bungalow palm)	Grey, ringed with leaf scars, prominent crownshaft	Pinnate	Green	Unarmed	Spherical, bright red 10-14 mm diameter	Spherical, c. 8-12 mm diameter
Livistona australis (Australian cabbage palm)	Brown, becoming grey with age	Costapalmate	Green	Armed	Fleshy, red ripening to black, c. 12-14 mm diameter	Spherical, c. 9-12 mm diameter
Phoenix canariensis (Canary Island date palm)	Grey, marked with prominent leaf scars	Pinnate	Green	Armed	Like a small, yellow-orange date, only slightly fleshy, c. 12 mm diameter x 16 mm long	Oval with longitudinal groove, 9 mm diameter x 15 mm long
Trachycarpus fortunei (Chinese fan palm)	Upper trunk covered in brown fibre	Costapalmate	Green	Unarmed	Black, often with glaucous bloom, not fleshy, c. 11 mm diameter	Roughly kidney shaped, c. 9 mm diameter
Syagrus romanzoffianum (Queen palm)	Grey, ringed with leaf scars.	Pinnate	Green	Unarmed	Fleshy, green ripening to yellow, c. 25 mm diameter	Like a miniature coconut with three eyes, c. 20 mm diameter
Washingtonia robusta (Mexican fan palm)	Grey, often retaining dead leaves or petiole sheath.	Costapalmate	Green, base of petiole reddy-brown	Armed	Black, spherical, fleshy, c. 10 mm diameter	Spherical, c.4 mm diameter

[1] Size data derived from measurement of AK herbarium specimens, except for fruit size of *Washingtonia robusta* (Uhl and Dransfield 1987).

A brief assessment of weed potential

The weed potential of this species in New Zealand is largely unknown. However Mexican fan palm has naturalised prolifically in Hawaii, and occasionally in California and Florida, in the USA (Brusati 2003). Self-sown plants should be searched for in close proximity to adult trees to determine the full extent to which this species has naturalised so far, and to determine if germination microsites are as limited as the records so far suggest. Additionally, any further records should assess the minimum distance of dispersal, and to determine if any dispersal mechanisms, other than gravity, are being used by this species in New Zealand.

Self-sown plants should also be searched for in close proximity to adults in other regions of New Zealand. Mexican fan palm may have greater potential as a weed in the warmest parts of New Zealand, such as coastal areas of Northland, or areas with sand-derived soils which have greater heat retention. Conversely, cold winter temperatures, and in particular those below -7ºC, are likely to set the southern limit of any potential future range of this species.

Identification of Mexican fan palm

The addition of Mexican fan palm naturalising – brings the total number of palms recorded naturalising in New Zealand to six species, all of which occur in the Auckland region (Cameron *et al.* 2002). Mexican fan palm seedlings are similar in appearance to four other palm species that have so far naturalised within New Zealand. The juvenile leaves of Mexican fan palm, Chinese fan palm (*Trachycarpus fortunei*), queen palm (*Syagrus romanzoffianum*), Canary Island date palm (*Phoenix canariensis*), and Australian cabbage palm (*Livistona australis*) are all entire, strap-like, and unarmed. Young seedlings of Mexican fan palm differ from all of these species by having a red or purplish base to the petiole, and often by the presence of fine hair-like fibres along the edge of the leaves. Older seedlings can be also distinguished from queen palm and Canary Island date palm by having costapalmate instead of pinnate leaves, and from windmill palm by the armed as opposed to unarmed petiole. The sixth species, *Archontophoenix cunninghamiana*, can be distinguished by having leaves that are initially bifid, before becoming pinnate without basal spines. "Bifid" means a leaf that is split into two parts, with an appearance approximating a "<". A comparison of botanical features between mature palms of the naturalised species is shown in Table 1.

Note added in proof: In November 2009 I searched for seedlings under mature *Washingtonia robusta* in a park in Napier. Two adventive *Washingtonia robusta* seedlings were found in a gravelled succulent garden (AK 307203). One of the seedlings was about 1 m tall with several palmate leaves.

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In pursuit of *Pittosporum pimeleoides*, Part 2

Maureen Young

As noted in my previous article on *Pittosporum pimeleoides* (Young 2007), June/July is the flowering period for this species.. At the moment I have an 80 cm tall plant (subsp. *pimeleioides*, provenance unknown) growing in a pot (Fig. 1). In April 2009 a single bunch of flowers appeared among the whorled

Fig. 1. *Pittosporum pimeleoides* subsp. *majus* (aka *P. michiei*) in an eponymous pot made by Ross Michie. Photo: Alison Wesley, 18 July 2009.

leaves crowded towards the end of one branchlet tip, and I was disappointed that it was presumably going to be such a poor flowering year. However, soon afterwards each branchlet tip produced a new whorl of branchlets, multiplying the leaf mass of the plant many times over. By mid June each new whorl was supporting up to six flowers, each on a slender pedicel c. 1 cm long. I estimate that in total the flowers on the whole plant would number in the low thousands, rather than hundreds. The number of flowers in each umbel indicated that it is a functionally male plant as functionally female plants are generally considered to have single, pairs or three flowers in each umbel. However, by October there were eight immature capsules beginning to swell, confirming that there was a little of Venus sprinkled among the Martians.

Fig. 2. Male flowers on *P. pimeleoides* subsp. *majus*. Photo: Alison Wesley, 18 July 2009.

In bud the petals are a deep maroon colour, but when the flowers open the outside of the floral tube is striped maroon and yellow, reminiscent of the Pied Piper's pantaloons, and the inside is a smudgy maroon-yellow (Fig. 2). They are not conspicuous and with only a casual glance one could miss that the plant was flowering. However, the moths were in no doubt - when I turned on the porch light at night I inevitably disturbed several moths that had been attracted by the pleasant scent. Some of the moths have been identified as *Pseudocoremia leucelaea* – conifer flash, *Rhapsa scotosialis* – slender owlet, *Mythimna seperata*, northern armyworm, *Hydriomena* sp., looper moth, and *Gelechiid* sp., litter moth.