remember locating one reference defining the steeping period as being one week. Freshly steamed karaka seed steeped in running creek water would be a stinking putrid mess long before a week was up. Reports of Maori being poisoned as a result of eating karaka seeds should be taken very seriously, however, as some of the most toxic compounds known to science are produced by fungi often found infecting improperly stored seeds, grains and nuts.

As karaka seed have enormous potential for development as a food crop this whole issue needs to be approached with an open mind and in the light of a new day. Fresh cashew nuts, almonds and apricots are three nuts that contain toxic organic compounds. The presence of toxins has not hindered their development as major commercial crops.

The tree producing the very large seeds in the photograph growing at the north Taranaki pa site was destroyed not long after I commenced taking an interest in it. Fortunately cuttings were taken and the tree is currently represented by one small tree under cultivation.

Distribution and abundance of *Pimelea tomentosa* in the Auckland Region

Ewen K. Cameron

Nationally

The endemic New Zealand shrub *Pimelea tomentosa* (Thymelaeaceae) is listed as Nationally Threatened under the category 'Declining' (de Lange *et al.* 1999). It appears to have no common or Maori name, and has been recorded from the North Island and northern South Island to nearly latitude 42º (Allan 1961). In the past it has also been recorded from the Three Kings Islands (e.g. Allan 1961), but the Three Kings entity appears to be an undescribed taxon (*pers*. *ob*.). *Pimelea tomentosa* occurs in coastal to lower montane shrublands and open places (Allan 1961) as an erect shrub; usually 0.3-0.5m tall, but when shaded can reach 1.5m (*pers*. *ob*.). It appears to be sexually perfect and self-compatible because in cultivation Peter de Lange (*pers. comm*.) found it freely produced seedlings - a feature he has not experienced with other *Pimelea* species. It is nicely illustrated by Audrey Eagle (1986: no.26) showing its white flowers and the usual dark coloured fruit.

Auckland Region

Based on specimens in the herbaria of Auckland Museum (AK, including AKU), Landcare Research (CHR), Forest Research Rotorua (NZFRI), Waikato University (WAIK) and Te Papa Museum (WELT) its distribution in the Auckland Region has been recorded from Woodhill Forest dunes (1986- present); Te Henga (1977); Remuera (1860s), Orakei (1870s), Waikowhai (1934), Purewa (1947), Murrays Bay (1959), Goat Id (Motu Hawere) (1966-1973, extinct 1996 *pers*. *ob*.); Waiheke Id (1895 & present), Ponui Id (1978); Little Barrier Id (1981); Great Barrier Id (1867-present). Note - the only confirmed localities in the last 20 years are Woodhill Forest (population estimated to be c.40, pers. ob.), Waiheke Island (population c.35) and Great Barrier Island (>130, see below).

Table 1. Herbarium specimens (29) literature records (2) and *pers*. *ob*. (1) of *Pimelea tomentosa* from the Auckland Region by Ecological Districts

Kaipara Ecological District

AK 275456 (ex AKU 19084), Woodhill, Coal Seam Hill Biological Reserve, 8 Jan 1986, *E.K. Cameron 3830* & P.J. Bellingham, single tall shaded plant.

AK 206008, Woodhill, Hodges Basin Biological Reserve, 13 Dec 1991, *E.K. Cameron 6647* & P.J. Bellingham, c.25 plants under 8m kanuka canopy.

AK 210008, Woodhill, Hodges Basin Biological Reserve, 10 Oct 1992, J. Komsars, locally common under kanuka.

Pers. ob., Woodhill, Old Lookout Biological Reserve, 15 Jul 2000, 12 plants.

Rodney Ecological District

AK 128892, [Leigh] Goat Island, 18 Dec 1966, *B.S. Parris*.

AK 216108, Leigh, Goat Island, 21 Aug 1970, *A.E. Esler*, ex. herb. Esler.

AK 129040, [Leigh] Goat Island, 3 Dec 1970, *B.S. Parris*.

AK 268995 (ex AKU 11313), near Leigh, Goat Island, 28 Jul 1973, E.K. Cameron, small shrub.

Waitakere Ecological District

AK 262297 (ex AKU 3530), Waitakerei [Waitakere], Oct 1885, *Ball*.

AK 141240, Bethells Beach [Te Henga], 6 Feb 1977, *A.E. Wright 1885*, roadside bank below native forest.

Tamaki Ecological District

AK 101209 & WELT SP52966, Remuera, [1860s], ex. herb. T. Kirk.
CHR 91623, Remuera, Oct 1865, [ex. herb. T. Kirk ?].
SYRF (photocopy: AK 232433), Orakei, Aug 1877, *T.F. Cheeseman*.
AK 5380, Orakei, Oct 1879, *T.F. Cheeseman*.
AK 101208, between Waikowhai and Wattle Bay, 26 Nov 1934, *N. Mackie*. Cranwell's record (Cranwell 1981: 149) "in scrub by Manukau" is presumably based on this record.
AK 44764, Purewa Bush, 28 Jan 1947, *H.E. Powell*, shrub to 1m.
AK 252168, Murrays Bay, Jan 1959, ex. herb. *M.E. Sexton*.

Rangitoto Ecological District

Cheeseman in Kirk (1879: 453); recorded as *Pimelea virgata*.

Inner Gulf Islands Ecological District

Buchanan (1877: 515) Kawau Id; recorded as *Pimelea virgata*.
WELT SP52977, Waiheke Id, Dec 1895, ex. herb. *L. Cockayne*.
AK 151196, Chamberlain's [Ponui] Id, 31 Aug 1978, *E.A. Brown*.
AK 280123, eastern Waiheke Id, Nov 2002, *C.D. Kilgour*, 10-15 plants to 0.5m tall, out of reach of stock, coastal cliff; another c.20 plants 200m along cliff.

Little Barrier Ecological District

AK 154918, Little Barrier Id, 23 Aug 1981, *A.E. Wright 4121*, trackside in low Leptospermum scrub.

Great Barrier Ecological District

WELT SP52972, Great Barrier Id, Dec 1867, *T. Kirk*.
WELT SP52965, Great Barrier Id, Blind Bay, 13 Dec 1867, *T. Kirk*.
CHR 330472 (ex CANTY), Great Barrier Id, Oyster Bay [by Nagle Cove], Jan 1919, *H. Carse*, *H.B. Matthews* & *S.G. Bolteril*.
AK 171286 (dup. CHR 411663), Junction Id, 31 Dec 1984, *A.E. Wright 6822*.
AK 275193 (ex AKU 18795), West Junction Id, 4 Jan 1985, *R.M. & P.J. Bellingham*, 5 bushes under pohutukawa forest.
AK 235381, Great Barrier Id, Windy Point south, N of Rosalie Bay, 13 Nov 1997, G.S. Stone, 2 adults and handful of seedlings.
AK 237872, Great Barrier Id, Mt Young, 31 Mar 1999, P.J. de Lange & G. Platt, 1 large bush; not observed here during 2002 (P.J. de Lange *pers. comm.*).
AK 280250, Great Barrier Id, NE of Windy Hill, 21 Nov 2002, *E.K. Cameron 11308*, >60 plants most in flower, coastal forest 40-200m asl.

Great Barrier & associated islands in more detail

There are 8 herbarium collections: unknown (Kirk 1867), Blind Bay (1867), Oyster Bay [by Nagle Cove] (1919), Junction Islands (1984 & 1985), NE of Windy Hill (1999 & 2002) and Mt Young (1999). Junction Islands appeared to be <10 plants, and Mt Young was a single plant. In November 2002 near a point ("Windy Point" T09 388421) NE of Windy Hill together with Fred Littin we saw >60 plants within 600m of the point (on or east of the ridge from Windy Hill to "Windy Point"). Most plants were 30-50(-75) cm tall, healthy and in full flower. They mainly occupied broadleaf forest areas with high light, e.g. light gaps, under thin canopy or ridge tops dominated by kanuka. Since then Littin has surveyed the Little Windy Hill property area immediately north of the previous area recording 31 plants, and south of the area recording 25 mainly near the coast (F. Littin *pers. comm.*, Feb 2003). He also saw 3 plants c.200m south of the Little Windy Hill boundary, but thought they appeared to be petering out in this direction. Only one plant appeared to have been browsed by goats which are feral in the area (F. Littin pes. comm., and *pers. ob.*).

Conclusions

It is not surprising given the early successional nature of the vegetation of the Auckland isthmus at the time of European colonisation that suitable habitat existed for *P. tomentosa* (and other seral species), and equally unsurprising that development of suburbia has not favoured its survival and has likely led to its local extinction (see Duncan & Young 2000). It appears to have gone from five of the eight Ecological Districts that it has previously been recorded in from the Auckland Region. The Windy Hill population on southeastern Great Barrier Island numbers >120 plants and is the largest population known in the Auckland Region. *Pimelea tomentosa* requires: either regular disturbances to maintain suitable stages of seral vegetation, (e.g. by shifting sand dunes, storm damage), or natural open sites, (e.g. coastal cliffs), rock outcrops and frost flats (Peter de Lange *pers. comm.*). Note – frost flats only occur south of the Auckland region.

The long-term outlook for this species in the Auckland Region looks bleak without some form of active management. It is worth noting that two of the three known extant Auckland populations exist in heavily browsed forest: Windy Hill on Great Barrier Island has goats and Woodhill Forest has fallow deer. These feral mammals have possibly increased the occurrence of pimelea at these sites by browsing the more palatable species because various members of *Pimelea* are known to be toxic to mammals (Connor 1977). However, this is not an argument to retain these feral

animals for the sake of the pimelea, because they are unnaturally maintaining seral vegetation. At Woodhill this is an argument to retain open buffers of at least 100m around the native forest stands rather than maintaining dense pine plantations right up to the boundaries. In this way seral species, like this pimelea (and also *Pseudopanax ferox* at Woodhill), would be able to spread into new open areas, as they would have done when the dunes were mobile. The current culling of feral goats at Great Barrier will probably restrict the pimelea to the cliffs and cliff tops. Important for its success at all these sites will be controlling weed species like pampas grass, so that the open habitats remain available to the pimelea.

Up-to-date surveys of some of the more historical sites where suitable habitat may still occur may provide some more extant regional records, e.g. at Te Henga, Kawau Id, Ponui Id and Little Barrier Id. Also early successional sites need to be valued more highly for conservation, instead of subjecting them to incompatible land uses (e.g. pine planting on the Woodhill dunes). But securing suitable habitat is only part of the solution; these sites will also require active management (e.g. to maintain seral vegetation, control weeds, and possibly assisting seed dispersal). Are we up to the challenge?

Acknowledgements

Fred Littin for guiding me around Windy Hill coast and for details of his later two surveys; curators of CHR, NZFRI, WAIK and WELT herbaria for their label data of herbarium records; comments on a draft of this article by Peter Bellingham, Peter de Lange and Bec Stanley; and Little Windy Hill Company for excellent accommodation and Judy Gilbert for encouragement to survey the Little Windy Hill pimelea population.

References

Allan, H.H. 1961: Flora of New Zealand. Vol. I. Government Printer, Wellington.

Buchanan, J. 1877: On the botany of Kawau Island: physical features and causes influencing distribution of species. *Transactions of the NZ Institute 9*: 503-527.

Connor, H.E. 1977: The poisonous plants in New Zealand. Government Printer, Wellington.

Cranwell, L.M. 1981: The botany of Auckland. A book for all seasons. Auckland Institute & War Memorial Museum, Auckland.

de Lange, P.J.; Heenan, P.B.; Given, D.R.; Norton, D.A.; Ogle, C.C.; Johnson, P.N. Cameron, E.K. 1999: Threatened and uncommon plants of New Zealand. *NZ Journal of Botany* 37: 603-628.

Duncan, R.P. & Young, J.R. 2000. Determinants of plant extinction and rarity 145 years after European settlement of Auckland, New Zealand. *Ecology* 81: 3048–3061.

Eagle, A. 1986 (revised ed.): Eagle's tress and shrubs of New Zealand. Vol. 2. Collins, Auckland.

Kirk, T. 1879: Notes on the botany of Waiheke, Rangitoto, and other islands in the Hauraki Gulf. *Transactions of the NZ Institute 11*: 444-454.

Tolpis barbata (Asteraceae: Lactuceae)

Mike Wilcox

This plant first came to my attention on the scoria slopes of Mangere Mountain. It is conspicuous there in summer, its pale lemon-yellow flower heads setting it apart from other, deeper yellow-flowered composites, namely hawksbeard (*Crepis capillaris*), catsear (*Hypochoeris radicata*) and hawkbit (*Leontodon taraxacoides*). One thing I noticed was that the flowers were all fully out one day (sunny) and completely closed the next (dull) – so *Tolpis* is obviously a "sun flower", with a phototropic response. It grows only on rather bare, sunny rocky sites, commonly accompanied by *Polycarpon tetraphyllum*, *Echium plantagineum*, *Aira caryophyllea*, and *Geranium purpureum*, and is unable to get established and compete on grassy sites. It also grows on rocks at Otuataua stonefields. It is confined to rather bare scoria and rock outcrops and was recorded by Cheeseman (1883) between Penrose and Panmure, though first seen in 1868. It was noted by Esler (1988) to be still fairly localised on gravel and scoria. I also have seen it on Mt Richmond (Otahuhu) and Mt Wellington.

Vegetatively it is a very open, stalky sort of annual plant with lengthened, spreading, leafless branches, growing to about 30 cm tall, with the flower heads in open umbels. In the seedling stage, the leaves form a rosette, with the cotyledons lengthened and spoon-shaped, and the leaves greyish, entire, ovate or triangular, or irregularly dentate.

Tolpis includes approximately 12-20 species distributed primarily in southern Europe, Middle East, and Africa with most species (10) confined to the Macaronesian archipelagos of the Azores, Madeira, Canary Islands, and Cape Verde Islands. In New Zealand, the sole representative is *Tolpis barbata* subsp. *umbellata* (Bertol.) Jahandiez & Maire [Catal. Pl. Maroc 3: 828 (1934)], rather than the nominate subspecies *Tolpis barbata* (L.) Gaertner subsp. *barbata*, the main distinguishing feature being that the flower heads are uniformly yellow in our populations (*umbellata*), not yellow with reddish or brownish inner flowers (*glabra*).

In France, *Tolpis barbata* subsp. *umbellata* is classified as a rare and endangered plant in certain regions (e.g. Brittany, Limousin) and is a protected wild flower by government decree. It goes under various common names , including Doldenblütige Tolpis (Germany), oeil du christ, trepáne barbue (France), olho-de-mocho (Portugal), and radicchio ombrellato (Italy). It also occurs in Spain and Morocco. It is sometimes called yellow hawkweed, but in New Zealand, the official name appears to be tolpis (NZ Weed & Pest Control Society 1969).