Discussion

Until recently, *Lembidium longifolium* was considered to be an uncommon species by New Zealand bryologists, however, the spate of recent collections of this species has changed this view. Based on these recent observations, it is anticipated that *Lembidium longifolium* will prove more widespread in both North and South Islands. In the upper North Island it is expected that the plant will be present on all undisturbed major high points and axial ranges, wherever steep terrain supports cloud forest. *Lembidium longifolium* has to date, been found growing on vertical surfaces, and its occurrence appears tied to disturbance events that create vertical mineral substrates. Given its abundance on soil in forest on Hauturu, where burrowing seabirds are still common, along cuttings associated with the Croesus Track, and along the banks of Deadmans Creek, suitable habitat can be created by a range of disturbance events, though all occur over a small spatial scale. The fact that *Lembidium longifolium* reproduces asexually via caducous leaves, suggests a life strategy tied to short lived habitat that is periodically available for colonisation on a small spatial scale, the perennial shuttle life strategy of During (1979). *Lembidium longifolium* was searched for without success around Hauturu Trig in the Waima Forest, Northland, despite the similarity of the vegetation and terrain to that found at altitude on Little Barrier Island. The plant's absence there may be attributed to recent disturbance by stock and fire, or to the absence of soil disturbance by hole-nesting sea-birds. Should the plant prove to be less widespread than anticipated, the link between habitat creation associated with the burrowing of hole nesting seabirds on steep terrain, may be a worthy first avenue of investigation regarding any decline in the range of this species. In contrast, a deliberate search for *L. longifolium* on Mt. Pirongia, Waikato, was successful, despite the search covering only the track to Wharauroa, though here the plant was found growing on a vertical rock face. Due to the wide geographical range occupied by this species, and its abundance at some localities we recommend that this taxon not be listed as threatened. However, we recognise a need for more comprehensive and systematic approaches to liverwort conservation, coupled with greater ecological knowledge of the plants themselves.

Acknowledgements

We would like to thank David Glenny for bringing to our attention the Croesus Track population of *Lembidium longifolium*. We would like to thank the Auckland Botanical Society (in the form of a grant from the Lucy Cranwell Research fund) and the Auckland University Research Fund for providing financial assistance, and Ewen Cameron and Mei Nee Lee of the Auckland Museum Herbarium (AK) for their generous assistance. Thanks also to Peter de Lange, Josh Salter, and Matt von Konrat for reviewing drafts of this communication, and Steve Ferriss for assembling the map. One of the collections by M.Renner from Deadmans Creek forms part of a national Carbon/Biodiverstiy monitoring programme being established by the New Zealand Ministry for the Environment. Finally we would like to thank Matt von Konrat for stimulating discussions regarding liverwort conservation.

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Note added in proof: *L. longifolium* has recently also been collected on the Herangi Range, west of Te Kuiti. J.E. Braggins.

Identifying the pampas grasses, *Cortaderia jubata* and *C. selloana*

Rhys Gardner

So well established in our landscape are these invasive South American megatussocks that a visitor could well see them as the vibrant flagships of some nationwide ecorestoration initiative, our motorways, pine forests and urban wastes all covered with two distinctive and ornamental Gondwanan species.

To head off this error I mention here first some features by which the much less weedy native cortaderias, that is, the various kinds of toetoe, can be told from the pampas grasses. Then the latter pair are distinguished from one another. This is not exactly new ground: in New Zealand there are the monographs by Zotov (1963) and Knowles & Ecroyd (1985), both of which are well-illustrated, and then the Flora of New Zealand V treatment (Edgar and Connor 2000). In Australia there are several Flora accounts, in which some characters not stressed in the NZ literature are mentioned (Jacobs & Hastings 1993; Morris 1994; Walsh 1994).

The two pampas grasses contrasted with the native NZ species:

Leaf sheath not waxy, with age recurving or spiralling and breaking up transversely into chaffy pieces, the blade being shed by the uppermost break which is always a short way below the ligule.

Leaf blade uniformly harsh in texture, i.e. nerves not differentiated, midrib not continued down into the top few centimeters of sheath.

Inflorescence pale cream or pink or vinous ("purple", "violet") especially on axes and nerves of glumes, lemma and palea.

Pedicels comparatively long, with short stiff hairs, without conspicuously longer hairs near the base of the spikelets.

Glumes transparent and relatively densely asperulous, tending to persist on the old inflorescence; body of lemma in female florets with hairs arising throughout (at least to beyond tip of palea), lateral lemma lobes ± lacking.

So there are numerous ways of telling a toetoe from a pampas grass, whether one is dealing with the living plant, a piece of leaf, or a spikelet or floret. Even a single old weathered leaf of a toetoe is sufficient, its blade toughly nerved and still attached to the sheath, while the glumes and lemmas of the toetoe spikelet have a very different texture from those of the pampas grasses, being relatively stiff, straw-coloured and subopaque (cells much more thick-walled).

C. jubata is considered to be the smaller of the two pampas grasses, but some places, like newly bared areas of clay, do not particularly favour good growth of either species. The degree of ecological separation of the two appears slight. *C. jubata* generally flowers earlier than *C. selloana*: in early March, at least around Auckland, the first inflorescences of the latter are only just emerging from their sheaths, while those of the former have flowered a month or so previously. This is not much help when dealing with a specimen collected at some other time in the year. Also, in my observation (*ROG 10424*, AK), the common yellow-leaved cultivar of *C. selloana* regularly flowers at the earlier time.

C. jubata is apomictic. All its flowers are female, and although stigmas are put out in the usual way no pollination is required to produce grain; at flowering the ovary is relatively well-developed, and output of grain is almost 100 %. In contrast, *C. selloana* is gynodioecious, like all the toetoes (except *C. turbaria*), with its hermaphrodite flowers acting principally as males.

All these observations are relevant but at this stage the reader is probably wanting a key that will allow confident assignment of even the most deplorable piece of leaf, female spikelet or old inflorescence to either *C. jubata* or *C. selloana*. First though some comments on characters that have been touted for this.

1. It has been said that the leaf blade of *C. jubata* is dark (or "bright") green on both surfaces, and in *C. selloana*, blue-green above and darker below. To my eye, this "heterochromy" in *C. selloana* is slight (and is not due to any waxiness); the upper surface colour approximates British Standard BS 5252 "Pale Jade" 14D41. Any colour difference between the species is lost in drying.

2. A feature-by-feature "mining" of the Flora NZ V descriptions suggests that the leaves of the two species might differ in the pattern of hairs just above the ligule, with *C. jubata* having a more well-developed central triangular "pad" (conspicuously dirty in older leaves, because of its situation at the lower end of the midrib channel). A pad is always well-developed in the *C. jubata* culm- leaves (i.e. leaves of the inflorescence), but is usually present to similar degree in such leaves of *C. selloana*. It is the leaves on the vegetative shoots that differ somewhat, with a pad being hardly developed in *C. selloana.*

3. On the sheaths of the culm-leaves of *C. jubata* there is a loose cover of long woolly hairs, much more developed than in *C. selloana*. This is a very useful field distinction. It was not emphasized in the Flora NZ V descriptions, possibly because the hairs are easily eroded from dried specimens.

4. The number of florets in the female spikelets is given by Flora NZ V as "up to 7" in *C. jubata* and "up to 6" for *C. selloana*. The Australian workers cited above give *C. selloana* a higher number (on average) than *C. jubata*, which is my experience with NZ material too.

5. Flora NZ V says that the hairs on the lemma of the female floret spring from the entire lemma body in *C. selloana*, but in *C. jubata*, from mostly above palea height. I have never seen the latter condition. In my observation, both species have, in addition to the main group of hairs towards the base of the lemma body, a lesser amount of somewhat shorter ones from the upper half of the body, with very few hairs (half a dozen at most) coming from above palea tip level.

Key to vegetative material (including culm-leaves)

1. Sheath of culm-leaves at first woolly with long hairs, stiffly chartaceous, the central longitudinal ridges spaced c. 1 mm apart; ligule (2.5-)3-4 mm long; leaf blade darkish green, at 3/4 way to tip c. 5-8 mm wide, the midrib narrowly prominent (in living culm-leaves, at a few cm above the ligule, c. 0.15 x as wide as blade)---- ----***C. jubata***

Sheath of culm-leaves at first sparsely long-hairy, chartaceous, the central longitudinal ridges spaced c. 0.4-0.8 mm apart; ligule 2-3 mm long; leaf blade blue-green, relatively attentuate, at 3/4 way to tip usually 5 mm wide or less, the midrib relatively broadly prominent (in living culm-leaves, at a few cm above the ligule, c. 0.25 x as wide as blade) ----------***C. selloana***

Key to fertile female material

1. Glumes asperous, at midway to tip with c. 150 teeth per sq. mm; florets (2-)3(-5) per spikelet; lemma attenuate, 2.2-2.8 times as long as palea, the central terminal bristle above the minute or non-existent lateral lobes less than 0.25 mm long; at flowering time the ovary of lowermost floret c. 1.75 mm long; staminodes (particularly the lateral two) exceeding the lodicules----------***C. jubata***

Glumes sparsely asperous, at midway with c. 80 teeth per sq. mm; florets (2-4-)5-6(-7) per spikelet; lemma long-attenuate, 3-3.9 times as long as palea, the central terminal bristle above the minute lateral lobes usually distinct, 0.25-1.0 mm long and sometimes bent or reflexed at base; at flowering time the ovary of lowermost floret c. 1 mm long; staminodes shorter than lodicules ----------***C. selloana***

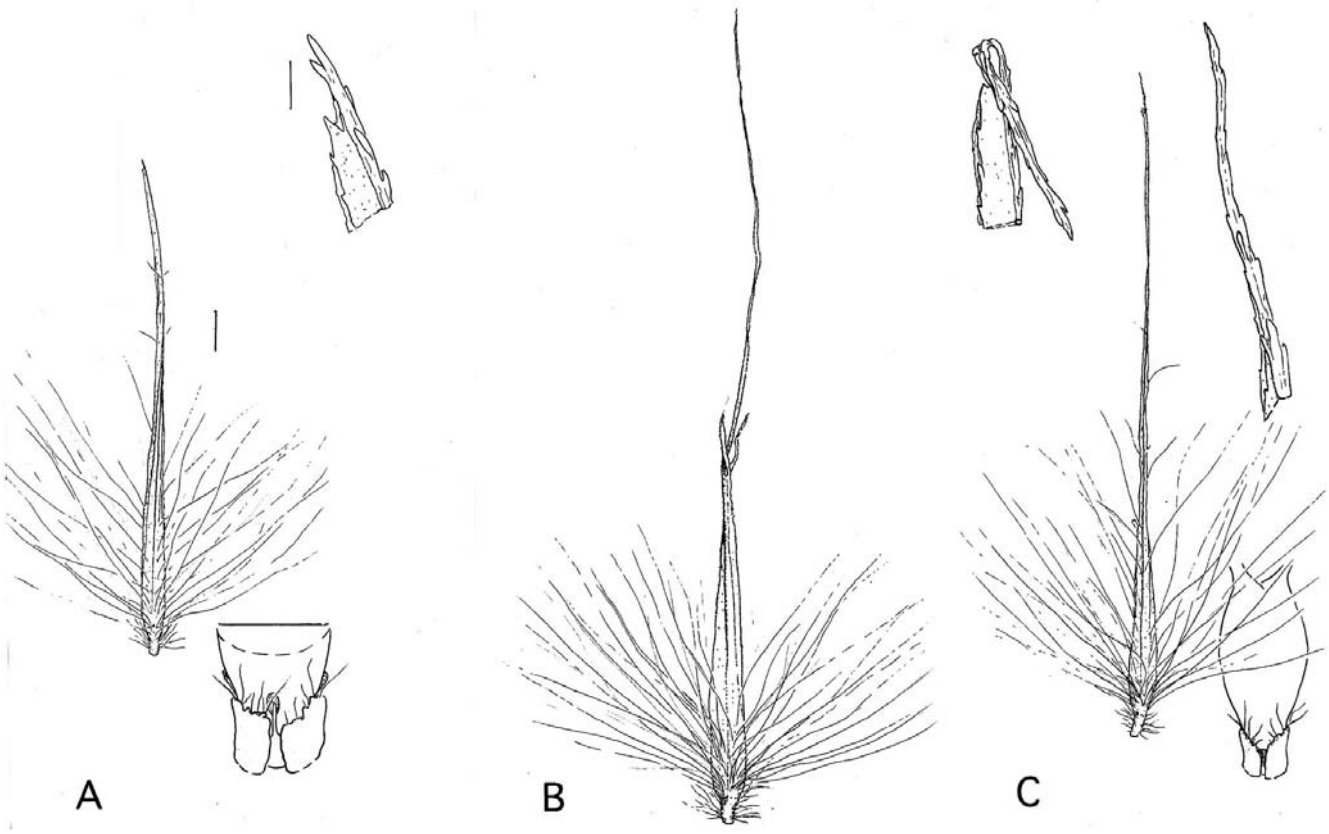

Figure 1. Florets of *Cortaderia* spp.
A. *C. jubata* (*ROG 10427*, AK). Scale bar 1 mm. Upper right: apex of lemma (scale bar 0.1 mm). Lower right: ovary with lodicules and exserted staminodes; ovary is 1 mm diam.
B. *C.* cf. *splendens* (*ROG 10407,* AK). Scale as in A.
C. *C. selloana (AK 120556*, except upper left. Upper left(*ROG 10424*): reflexed apex of lemma. Upper right: apex of lemma. Scales as in A. Lower right: ovary (*AK 120556*) with lodicules and included staminodes; ovary is 0.6 mm diam.

Illustrations of female spikelets of a toetoe (*C.* cf. *splendens*) and the two pampas grasses are given in Fig. 1.

Specimens intended for the herbarium need not reflect the size of the plant — a few representative tiller- and/or culm-leaves (state which) and a mid-portion of the inflorescence (note stage of development) are sufficient.

Currently AK holds no specimen of *C. jubata* from north of Moturemu Island in the Kaipara Harbour, and similarly, the map of pampas grass infestations in our exotic forests (Knowles and Ecroyd 1985) has *C. jubata* present only south of c. lat 36 deg. (Kaipara to Waipu). The absence might be an artefact of collecting, or can Northland's weed-controllers take the credit?

Acknowledgments
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What, no Maori name?

Jack Mackinder

Mike Wilcox ends his article on *Sigesbeckia orientalis* in the last Journal with the curious statement "It does not seem to have a Maori name".

But in Kirk's Students' Flora, 1899, on p. 318 the entry for *Siegesbeckia orientalis* gives the Maori name punawaru. And punawaru appears in Cheeseman's Flora, 1925, on p. 990; in Allan's Flora, 1961, on p. 1004; in H. W. Williams *A Dictionary of the Maori Language*, 7th edn 1975, on p. 310; in B. Biggs *Complete English-Maori Dictionary*, 1981, on p. 176; and in Jim Beever's *A Dictionary of Maori Plant Names*, 1st edn 1987, on p. 33 and p. 58, 2nd edn 1991, on p. 33 and p. 59.

Also curious is the spelling of the generic name, sometimes *Siegesbeckia*, sometimes *Sigesbeckia*. Linnaeus named the plant "after his bitter opponent Johann George Siegesbeck (1686-1755)" — Smith, Stearn, Smith *A Gardener's Dictionary of Plant Names*, 1972. Seems Linnaeus, not content to insult Siegesbeck with a small-flowered weedy plant, misspelt his name as well.

Coastal forest saved at Waikawau Bay, northeastern Coromandel

Ewen K. Cameron

In 2002 a prime piece of privately owned coastal property at northern Waikawau Bay, northeastern Coromandel, was advertised for sale as 'Jewel in the crown' (*NZ Herald* 12 Oct 2002: 16). On 18 Dec it was stated (*NZ Herald* feature: Environment) that American banker Paul Kelly had gifted this property worth $3.5 million to the Auckland University to help fund an expanded Business School and that it was the university who was selling it. There was a public plea for the Government to "Save a bit of coastal heaven" from the Thames Coromandel mayor, Chris Lux. This was followed on 16 Jan 2003 (*NZ Herald*) by Environmental Defense Society (EDS) warning off potential buyers of the university's land if they had intentions of subdivision because they would oppose it. EDS and the Conservation Minister Chris Carter pressurised the university, calling its intention to sell to the highest bidder "outrageous". On 10 Feb the Prime Minister asked the varsity to rethink (*NZ Herald*: A3), and 1 March it was announced that the Government's tender of $3.54m was the highest, with $2m coming from the Nature Heritage Fund - Waikawau forest was now in public ownership and everyone was happy (*NZ Herald*: A11). During the public debate I was asked in December by the Nature Heritage committee if I had any knowledge of the botanical values of the land. It was one of those unusual times when I had more data than I could supply in the short time frame so I passed on the salient points – see below. I am thrilled that the Department of Conservation will now be responsible for the management of this property.

Summary of northern Waikawau Bay vegetation values

The following observations are based on 12, almost annual, weeklong trips (family holidays) to the northern Waikawau area by the author from Jan 1991 to Sep 2002. A full vascular plant list for the area is held by the author and will be published in the future. So far I have only published on the flora of an adjacent rocky islet, Kawetoto Reef (Cameron 1992, 1999), adjoining to the Kelly property.

Introduction

The dissected property (here referred to as the Kelly property) at the north end of Waikawau Beach occupies 149 ha, a high ridge (to 203 m asl) and 2 main valleys that drain by small permanent streams to the south: one into the estuary and the other onto the northern part of the Waikawau Beach by Kawetoto Reef (Figs. 1 & 2). Both these catchments are totally within the property. There are also several smaller, steep valleys, with no permanent streams, directly draining to the east onto the rocky coast north of Kawetoto Reef. The vegetation of the property marked "bush" on Fig. 1 varies from rough pasture (c.20%), manuka (*Leptospermum scoparium*) and kanuka