Flax (*Phormium*) Nectar and the Tides

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Mr Rod McDonald, who lived at Hokio Beach in the Horowhenua and worked many years in the flax industry, wrote "A curious thing about the flowers of the flax is that the state of the tide can be told from them with considerable exactitude. I will not guarantee that this holds good everywhere, but on the coastal country I can vouch for the correctness of the statement from personal observation. At low tide the flower is empty, and as the tide comes in, so the *wai-korari* [nectar] gradually rises in the flower, until at high tide it is full to the brim, and at spring tide actually flows over in a steady drip. As the tide goes out, the *wai-korari* recedes until the flower is dry again, and so on twice a day while the flowers are in full bloom" (O'Donnell 1929, p. 60).

If this were true, Mr McDonald must have stumbled on an osmotic or secretory mechanism unknown to plant physiology, and certainly worth investigating. To test his claim, I extracted as much nectar as possible from 100 *Phormium tenax* flowers growing on or near Hokio Beach at high tide on 10 December 1994. It amounted to 3.2 ml of nectar. At low tide the next day I took all the nectar I could from another 100 flowers on the same plants, and it amounted to 6.2 ml. Two similar samplings were made with *P. cookianum* at coastal sites near Wellington City and another sampling of *P. tenax* made at Paekakariki at low and high tides. Results are summarised in Table 1.

The sampling showed that on two occasions the flax flowers contained more nectar at high tide than at low tide but on two other occasions, the reverse was the case. Regrettably, these results do not support Mr McDonald's claim.

These pooled samplings also showed that *P. tenax* flowers contained a mean 32–65 µl of nectar per flower, and *P cookianum* 12–70 µl per flower. This is considerably less than the mean 175 µl of nectar taken from *P. tenax* on Tiritiri Matangi Island, Auckland (Craig & Stewart 1988). These measurements suggest that honey-eating birds must visit more flowers and expend more energy if they are to maintain themselves on flax nectar in Wellington than on Tiritiri Matangi Island and, presumably, other northern sites.

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REFERENCES

Craig, J.L. and Stewart, A.M. 1988: Reproductive biology of *Phormium tenax*: a honeyeater-pollinated species. *New Zealand Journal of Botany 26*: 453–463.

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Table 1. The amounts of nectar taken from flax flowers at low and high tides at four Wellington sites. All flax plants grew within 30 m of the sea except a few at Hokio which grew up to 1 km inland. Only newly opened, fresh, pollen-laden flowers were sampled. A micropipette was used to extract nectar from the plants at Evans Bay and Moa Point but a glass syringe was used at the other two sites.

Date	Location	Number of flowers	Tide	Time (hrs)	Nectar (µl)	mean µl/ flower
Phormium tenax						
10.12.94	Hokio Bch	100	High	1706	3.2	32
11.12.94	Hokio Bch	100	Low	1100	6.2	62
15.1.95	QEII Park	100	High	0935	6.5	65
15.1.95	QEII Park	100	Low	1530	5.2	52
Phormium cookianum						
22.10.94	Evans Bay	100	High	2018	2.3	23
22.10.94	Evans Bay	100	Low	1416	1.2	12
24.10.94	Moa Point	100	High	0912	6.5	65
24.10.94	Moa Point	100	Low	1338	7.0	70

Further Notes on *Corybas rivularis*

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Since I wrote "*Corybas rivularis* - One Species or Several?", which was published in Wellington Botanical Society Bulletin No. 46, continuing observations have modified some of my views.

CORYBAS "A"

Although when well grown, *Corybas* "A" usually appears quite distinct, occasional plants are found which tend towards other forms at present included within *C. rivularis* in the broad sense. I have sometimes recorded these plants as *Corybas* "a" (not capital A). Possibly some of these plants are hybrids, but I am more inclined to regard them as *Corybas* "A" which, because of unsuitable growing conditions, do not fully develop characters which make *Corybas* "A" so distinctive. One group of such plants grows on an east-facing bank near Waitomo. Most of the bank is moderately fertile and *Corybas* "A" is common,

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