Does my pot of Lees Valley peat represent a unique plant habitat?

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Introduction

On 3 January 2011, accompanied by QEII field representative Miles Giller, and with the permission of the landholder, I collected a plug of surface peat containing a solitary plant of the pink ladies' tresses orchid (*Spiranthes novae-zelandiae*) from an extensive wetland situated on the floodplain of the Ashley River in Lees Valley, North Canterbury. This was cultivated in a four inch (10 cm) plastic pot at my residence in Christchurch where it remains to this day. In the three seasons that have elapsed since then, several other plants of interest have emerged in the same pot and this account briefly records their emergence, features, behaviour, identity, and conservation status, including that of the native orchid.

Emerging plants of interest

Spiranthes novae-zelandiae

Each year since it was collected this plant has produced a single flowering stem about 22 cm tall, with a basal rosette of narrow, linear-lanceolate leaves 3 cm × 3-5 mm. These die back after flowering but are simultaneously replaced by a rosette of short young leaves for the next season.

The species is self pollinating with the lowermost flowers opening and setting seed before the uppermost ones. To prevent the plant shedding seed into the pot, the flowering stems were removed at a given stage of growth each year and retained for further comparative study. This relatively widespread but local orchid has been assigned the New Zealand conservation status of Threatened/Nationally Vulnerable (de Lange et al. 2013).

Oxalis exilis

A small depressed patch of this species was already growing in the plug of peat at the time of collecting. The growth and extension of this plant has been exceedingly slow since then, but it remains in a healthy state even though its tiny, bright green, trifoliate leaves are barely more than 3 mm long. It has produced only one bright yellow flower since it was collected. This species is not considered to be threatened.

Eleocharis gracilis

In the winter-spring of 2012, two minute tufts of this spiked sedge emerged almost side by side and close to the orchid. Their subsequent growth has also been very slow, each now with 4-5 tightly rolled green or brown leaves about 10 mm long and less than 1 mm wide. These plants have yet to flower to confirm their identity. This species is indigenous and not endemic, and is not threatened.

Cardamine cubita

During the spring of 2012, five diminutive plants of this species emerged in the peat pot. These were notable for their very small size (3-5.5 mm across), glabrous purplish persistent cotyledons, three to four purplish green leaves with adaxial septate hairs, minuscule flowers with a remarkable reduction in floral parts, including filaments bent 90 degrees distally (Fig. 1), hence the epithet *cubita* (elbow), as well as other distinctive floral features. Morphological examination of these plants with Allan Herbarium colleague Peter Heenan, complemented by nuclear and chloroplast DNA analysis by another Allan Herbarium colleague Rob Smissen, confirmed that these plants belong to the Brassicaceae, and should be assigned to *Cardamine* and treated as a new endemic New Zealand species.

This action has since been taken in an illustrated paper formally naming and describing the new species and its phylogenetic relationships, which was published in the online edition of *Phytotaxa* (Heenan et al. 2013), an international journal for accelerating the publication of botanical taxonomy.

No additional plants of *C. cubita* have emerged in the peat pot, and so far the species is known from only one locality in the field. As such it qualifies as Threatened / Nationally Critical, according to the New Zealand threat classification system of Townsend et al. (2008), with the added qualifiers Data Poor and One Location, recognising that further field survey is desirable to re-assess its threat status.

Isotoma axillaris

Also in the spring of 2012, an entirely different plant emerged in the pot, close to the orchid. This plant, also very slow growing, flowered and set seed during 2013/2014 and appears to be perennial. At the time of writing it is an erect plant about 10 cm tall with a single, purple, sparsely hairy stem, supporting several alternate, pinnatifid leaves, ovate in outline with sparse basal hairs and about 3.5 cm long. Three axillary flowers on long peduncles were produced during the past season, each bearing a terminal star-like, pinky-blue flower about 2.5 cm wide when fully open (Fig. 2). These flowers have self pollinated, producing abundant brownish cylindrical seeds about 0.8 mm long in an obconic capsule 10 × 5 mm. On removing a leaf for DNA analysis by colleague Rob Smissen, the cut leaf base exuded a milky sap narrowing down

Figure 1 Flower of *Cardamine cubita,* highly magnified, showing the two filaments bent 90 degrees distally towards the stigma (Photo: Peter Heenan).

Figure 2 Flowers of *Spiranthes novae-zelandiae* and *Isotoma axillaris* (Photo: Sigourney Juneau).

the field of enquiry to the Campanulaceae, or bell flower family. Subsequent DNA analysis confirmed this placement, and the plant keyed out to *Isotoma axillaris*, a native to eastern states of Australia, well known as a cultivated plant in that country and further afield.

The question is: How did this plant, or rather its seed, find its way into the Lees Valley wetland, surrounded by extensive farmland, or my pot of peat? As far as I know, the species is not cultivated in homestead gardens nearby, nor in gardens near my place of residence. And there is only a single specimen in the Allan Herbarium at Lincoln, which was collected by colleague Bill Sykes from a garden in Auckland (CHR 228026). On reflection, its most likely origin in my pot of peat would seem to be from seed dispersed from a nearby residential garden.

New Zealand species of *Isotoma* have recently been transferred to *Lobelia* in the family Lobeliaceae (Heenan et al. 2008). As far as I know, this action has not been followed by Australian colleagues with their species.

In February 2014 two very small dicots emerged in the peat pot at some distance from each other, and their growth to date has also been slow. At present both consist of a rosette of 3-4 glabrous green leaves barely more than 3 mm wide and with lobed margins. At this stage I am not prepared to hazard a guess as to what genus they belong to.The appearance of flowers on these plants is awaited with interest and should help to determine their identity and conservation status.

Of particular interest is the slow growth of all the dicot plants mentioned above, plus the fact that their cotyledons and often their first formed leaves are distinctly purple in colour, indicating a deficiency in phosphorus. This suggests that low levels of phosphorus and other essential plant nutrients in the peat may well be limiting or slowing plant growth.

The Lees Valley wetland habitat

The floodplains of the Ashley River and its feeder streams are hemmed in by the Puketeraki Range to the northwest and the Mt Oxford Range to the southeast. This has resulted in several diverse wetlands with varying degrees of natural drainage, disturbance and plant composition throughout the valley, including a rich mix (about 90 species) of native and introduced wetland plants. The orchid plug I cultivated was gathered from a short turfy micro-habitat over an organic peat about 2 m deep. Buried in the peat, and on the surface in places, are the woody remains of mountain celery pine (*Phyllocladus alpinus*), suggesting that this species dominated the wetland for at least the latter part of its history, if not for an even longer period. No plants of this species are present today. Other native plants of interest associated with the orchid in this habitat are *Lobelia angulata*, *Ranunculus glabrifolius*, *Gonocarpus micranthus*, *Nertera balfouriana*, *Centrolepis ciliata*, *Chaerophyllum colensoi* var. *delicatulum* (Threatened / Nationally Critical), *Drosera arcturi*, *Epilobium komarovianum*, *Utricularia monanthos*, *Sphagnum*

cristatum, and unidentified plants of *Carex*, *Craspedia*, *Lagenifera*, and *Schizeilema*. Among the adventive wetland plants present, a standout is the notorious mat grass *Nardus stricta*, here in one of its few known localities in the South Island.

In answer to the question posed in the title, yes, I believe the Lees Valley wetland is a unique habitat for its history and rich assemblage of native and introduced plants, including threatened and as yet unidentified ones. I hope to re-visit this habitat at some future date.

References

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