

5. *Leptinella dioica* subsp. *dioica* (Asteraceae)
—2 Jan 1990, Mt Eden B.C., Nicholson Park; quite common.
—11 Oct 2021, Rocky Nook B.C., Fowlds Park; locally abundant at edge of one of the greens, not seen in the ditches.

6. *Leptinella maniototo* (Asteraceae)
—28 Apr 1989, Edendale B.C., Gribblehirst Park; not nearly as abundant as "*Cotula* [*Leptinella*] *dioica*".
—AK 199869 (*ROG 6058*, 2 Jan 1990), Mt Eden B.C., Nicholson Park, quite common.
—30 Dec 2021, Balmoral B.C., Mont Le Grand Rd, green composed largely of this sp., which is flowering abundantly.

7. *Lobelia angulata* (Lobeliaceae)
—28 April 1989, Edendale B.C., occasional [on the greens]
—AK 206203 (*ROG 6060*, 2 Jan 1990), Mt Eden B.C., Nicholson Park, occasional weed of cotula green.
—29 Dec. 2022, Central B.C., Kiwitea Street, Mt Roskill; extensive flowering patches.

8. *Oxalis exilis* (Oxalidaceae)
—2 Jan 1990, Mt Eden B.C., Nicholson Park.

9. *Plantago triandra* subsp. *triandra* (Plantaginaceae)
—28 April 1989, Edendale B.C., occasional on the greens and a few larger plants in the ditches.
—2 Jan 1990, Mt Eden B.C., Nicholson Park.
—21 Nov 2021, Auckland B.C., Grafton Road, plentiful near outer edges of green and notably large specimens in the ditches.

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Notes

1. I am not sure when *L. maniototo* began to replace fine-leaved grasses on Auckland's greens. It has a practical advantage over other leptinellas—in winter it makes 'bulbils', very short, swollen, drought-resistant, abscission-prone, axillary shoots. These are said to be short-lived but are otherwise ideal for being transferred in the winter's consignment of groovings.

2. In Auckland the flowering heads of *Leptinella maniototo* appear in late December. They are conspicuous in a modest way by the red-flecked tips of the corolla tubes of the heads' inner (larger, anther-bearing) flowers. These flowers are nectar-bearing too (Lloyd 1972, p. 288), and I have seen tiny flies visiting the plant (Balmoral B.C., Dec 2021). I have not found any seed-bearing heads, although the search has been hampered (the greenkeepers are mowing, again!) by summer-grooming.

3. E.B. Levy (writing as Director of Grasslands Division DSIR) admitted that because fine-leaved grass greens were difficult to maintain it was reasonable for bowling clubs to want to work with weed greens; he could not resist saying though, that "To the connoisseur the weed green is vegetation run riot, untamed, untutored, unrefined; an ecological accident, the outcome of technical inefficiency." (Levy 1949: 24).

Acknowledgements

Thanks to Colin Meurk for the impetus. Peter de Lange and Marley Ford made collections and gave advice on identifications. Jennifer Tate (MPN) helped with herbarium records.

***Verbena bonariensis* L. and *V. incompta* P.W.Michael (Verbenaceae) in Auckland**

Rhys Gardner

Introduction

The two species of the title, and the closely related *V. brasiliensis* Vell., are native to South America. They are now found in many other countries,

including our own, as weedy naturalisations. In New Zealand *V. brasiliensis* is currently known only as a rare plant of the Hokianga region, so the focus of this article is just on distinguishing between the

other two species. Sykes (1980: 1277) in his *Flora of New Zealand* account treated them together under *V. bonariensis*, though recognizing a large-flowered variety, which he called var. *conglomerata*. A new taxonomy here, in particular the need for the name *V. incompta*, is provided by the work of Michael (1995) and Nesom (2010). More information about these plants (including *V. brasiliensis*) in New Zealand is given by Ford (2022).

Morphology and ecology

The two verbenas are annuals or short-lived perennials, rather leggy and hispid-scabrid, a metre or somewhat more in height, with small, violet-coloured, tubular flowers aggregated in terminal spikes. They favour dry open sites, for example, the grasslands of our volcanic cones. They colonize newly bared clay areas and silty gravel at road edges and seem to be especially persistent in cemeteries and waste places near the coast.

In the Auckland War Memorial Museum herbarium (AK) most of the collections from around the city belong to *V. incompta*. The earliest record is probably that of Thomas Kirk (1871: 160, as *Verbena bonariensis*), but I have not been able to locate his specimen. Although the plant seems likely, then, to have been in the Auckland region for a long time, I doubt that it has ever been as abundant in dry

places as, say, the fennel plant (*Foeniculum vulgare*, Apiaceae) used to be.

The epithet *incompta* means “poorly groomed, untidy”. Beauty is in the eye of the beholder, though, or in this case the eyes of the butterflies and bumblebees that visit the flowers, and in my opinion the plant is quite suitable for a meadow garden at least (Fig. 1).

Verbena bonariensis in the strict sense (that is, the plant which Sykes called var. *conglomerata*) is much less common around Auckland. Alan Esler nicknamed it *Verbena* “Onehunga” (see AK 362315), and for the last fifty years most sightings of it have come from the Onehunga-Hillsborough area. It is said to have been planted for ornament, having relatively large flowers and a denser inflorescence (Fig. 2). This supposition might be confirmed through searches of illustrated nursery catalogues. (Newspapers of the 1940s, e.g., *Waikato Times* issue 22282, 25 Feb 1944, p. 6, carry sale advertisements of “*V. bonariensis*”, but the descriptions are insufficient for identification).

Some features of the flower of *V. bonariensis* (and a comparison with that of *V. incompta*) are shown in Fig. 3. The curious ‘moniliform’ (beaded) hairs of the upper corolla tube are shown in Fig. 4.



Figs. 1 & 2: 1. *V. incompta*. Terminal part of inflorescence, loosely obconical, c. 5 cm diam. From an unvouchered plant at Unitec, Carrington Rd, Mt Albert. 25 Dec 2022. 2. *V. bonariensis*. Terminal part of inflorescence, dome-shaped, c. 5 cm diam. ROG 11609, 28 Dec 2022. All photos by Rhys Gardner.

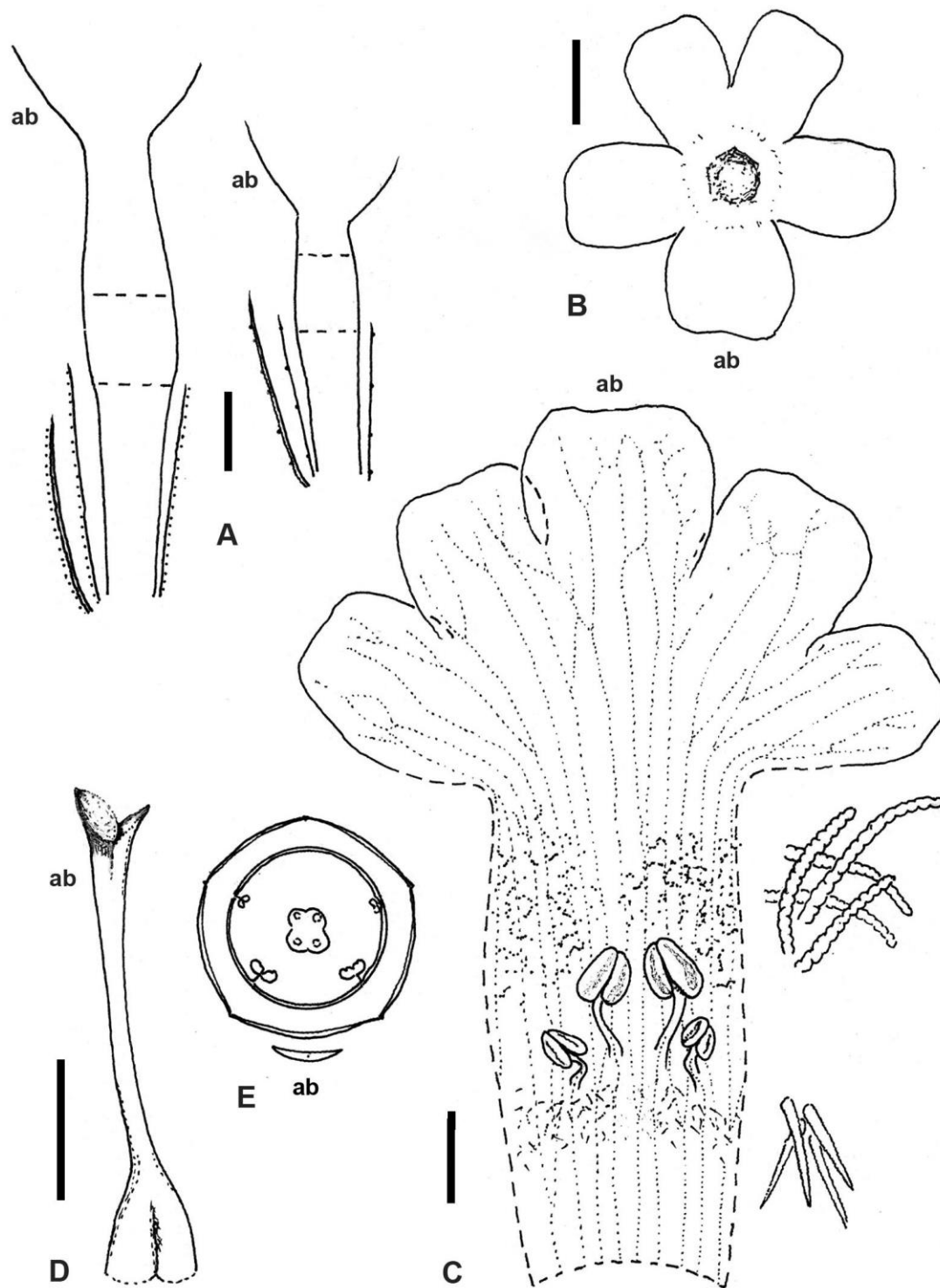


Fig. 3. Characteristics of the flower of *V. bonariensis*. **ab** abaxial side of corolla. **A.** Diagram of flowers of *V. bonariensis* (left) and *V. incompta* (right) showing diagnostic differences between corolla tube length, length of calyx relative to that of bract, and presence of glandular hairs (dots) on bract and calyx (these hairs stalked in the former sp., sessile in the latter). Horizontal dashed lines indicate position of the anthers. Scale bar 1 mm. Based on *ROG 11647*, -8 respectively. **B–E:** *V. bonariensis*. All from *ROG 11609*. **B.** Corolla limb (4 mm diam.), abaxial (lower) corolla lobe slightly the largest). Scale bar 1 mm. **C.** Dissected corolla, showing venation and the two pairs of stamens, the abaxial pair considerably the larger. Scale bar 1 mm. At right, enlargements of: antrorse to patent moniliform hairs (0.3 mm long) abundant between anthers and mouth; retrorse straight hairs (0.2 mm long) mainly below the attachment of the filaments, mostly in a short dense abaxial band extending nearly to top of ovary. **D.** Gynoecium, c. 3.5 mm long, reaching just above top of calyx. Note the difference between the abaxial lobe (swollen and papillate, pale but seated on dark green tissue) and the adaxial lobe (pale, reduced in size, presumably non-functional). Scale bar 1 mm. **E.** Floral diagram (bract as usual showing abaxial side of flower). Ovary 4-ovulate, placentation not indicated. Drawn by R.O. Gardner.

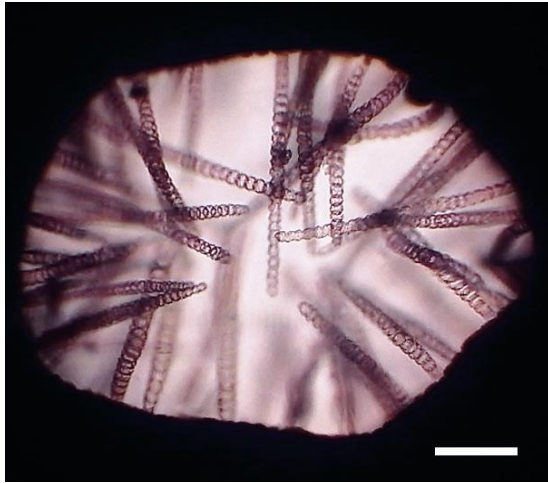


Fig. 4. Both species have moniliform hairs (0.3 mm long) on inside of upper part of corolla tube. This example from *V. bonariensis*, ROG 11647. Scale bar 0.1 mm.

The characters

Although these two taxa have been distinguished only recently they bear the mark of being proper, old-fashioned, reproductively separated 'good species'—their differences are not just in one or two features but carry on through the plants' organs, in their leaves, flowers and fruits.

Leaves

Herbarium-based accounts of the two species have not made effective use of foliar characters, probably because the leaves shrink and contort too much in drying (a process that starts the moment the plant is taken from the ground). Live material though shows significant shape differences, as illustrated here by comparison of the mid-stem leaves (Fig. 5) and leaf-spectrum scans (Fig. 6; see Note 1). There are also differences in the degree of elaboration of the subpetiolate base of the leaf blade, that

is, its degree of widening into a pair of auricles (Fig. 5). Hand-lens examination will also show differences in the indument. This is largely composed of simple, pointed hairs, but *V. bonariensis* also has stalked gland-hairs (Fig. 7) on its leaves and stems, while *V. incompta* lacks these. The simple hairs on the leaf of *V. bonariensis* are more robust than those of *V. incompta* and give the former a relative scabridity (Figs. 8, 9).

Flowers and bracts

The corolla tube of *V. bonariensis* is nearly twice the length of that of *V. incompta*, and similarly for the diameter of the corolla's limb. The diameter of the tube, at the anthers, is considerably wider in the former too (1.25 mm versus 0.75 mm). In the herbarium though, shrinkage of the corolla can obscure these differences. The bract and calyx show differences in their indument—again, *V. bonariensis* has stalked gland-hairs, while *V. incompta* lacks these (but does have sessile glands; Figs. 10, 11). Other differences between the bracts of the two species, in size and in the comparatively robust cilia (marginal hairs) of *V. bonariensis*, are shown in Fig. 12. Overall, it is the relative size of the bract and calyx that provides the most convenient way of identifying dried fertile material.

Fruit

The fruit is composed of four oblong-shaped 'nutlets'. These are identical in shape and ornamentation in each species but differ significantly in size (Figs. 13, 14). Note that an occasional nutlet is sometimes shorter than its companions, presumably because its seed has not been fertilized, or because its embryo has been aborted.



Fig. 5. Mid-stem leaves of *V. bonariensis* (left) and *V. incompta* (right). ROG 11647, -648 respectively. Scale bar 5 cm.

Key

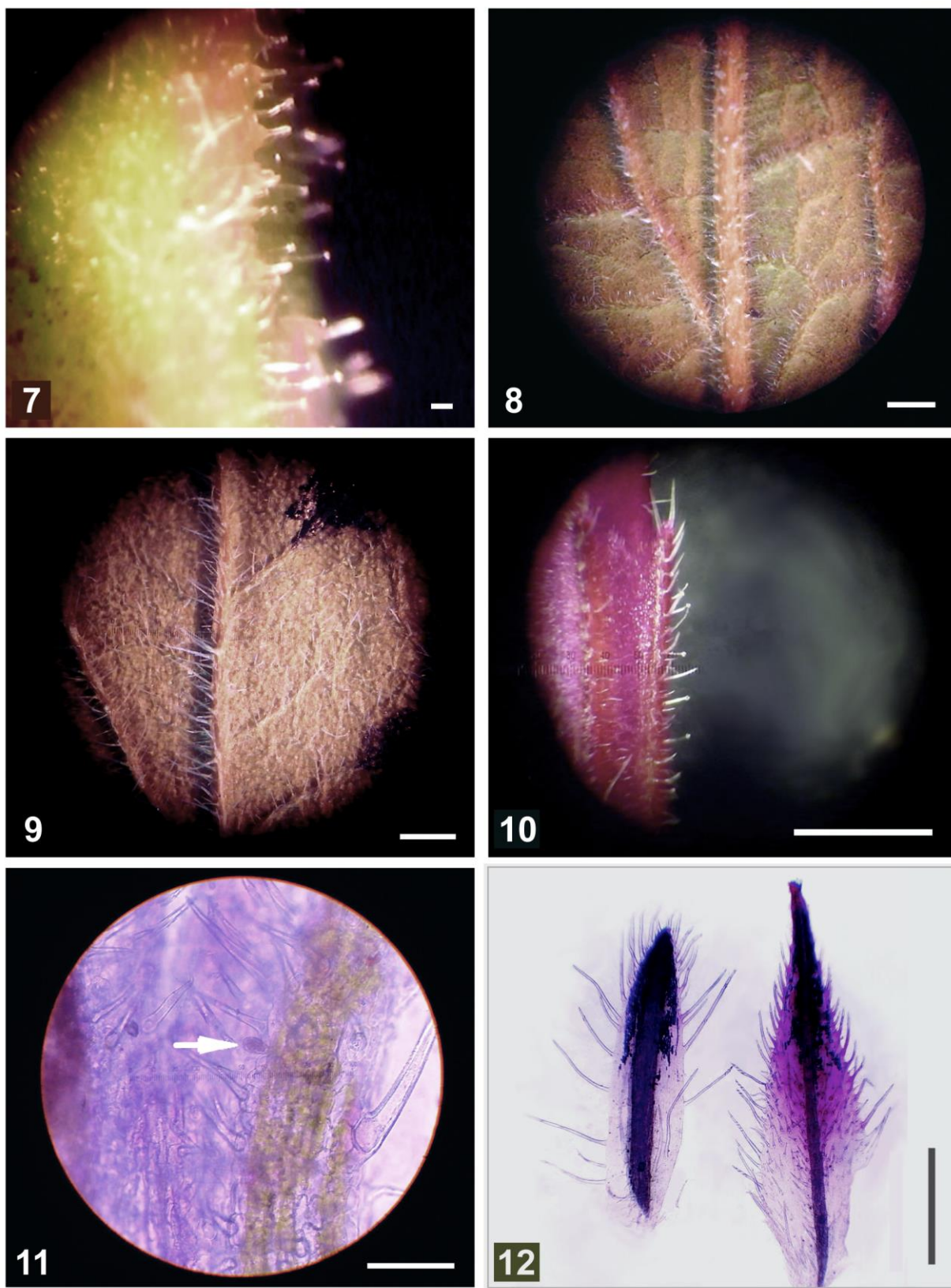
—Use mid-stem leaves and, for comparison between bract and corolla lengths, live material.

Leaves: relatively narrow, c. 5x longer than wide, the width across the basal auricles nearly that of the blade. *Inflorescence:* cluster of spikes to c. 2 cm long, these congested, largely in light contact with one another, and aggregated terminally to form a dome-shaped head. *Flowers:* bracts 2.5 mm long, exceeded by the calyx and less than half as long as the corolla tube; stalked gland-hairs (to 0.4 mm long) scattered among the hairs of the bract and calyx; corolla tube (in life) 6–9 mm long, the corolla limb nearly 5 mm diam. *Fruit:* nutlets 1.5 mm long *Verbena bonariensis*

Leaves: c. 3x longer than wide, the width across the basal auricles about half that of the blade. *Inflorescence:* groups of spikes to c. 5 cm long, relatively loosely arranged. *Flowers:* bracts 3.5 mm long, slightly exceeding the calyx and at least half as long as the corolla tube; stalked gland-hairs lacking from among the hairs of the bract and calyx (but sessile subspherical glands sometimes present); corolla tube (in life) 4 mm long, the corolla limb 2.5 mm diam. *Fruit:* nutlets 1.25 mm long *Verbena incompta*



Fig. 6. Leaf spectrum (scans of flattened fresh leaves, one from each opposite pair) L-R in ascending sequence up stem until base of inflorescence is reached (several dead leaves at stem base omitted). *V. bonariensis* (upper row) ROG 11647. *V. incompta* (lower row) ROG 11648. Scale bar 5 cm.



Figs. 7–12: **7.** *V. bonariensis*, stalked gland-hairs on stem, 0.3 mm long. *ROG 11609*. Scale bar 0.1 mm. **8.** *V. bonariensis*, mid-leaf (dry), underside, showing relatively stout scabrid hairs. *ROG 11647*. Scale bar 1 mm. **9.** *V. incompta*, mid-leaf (dry), underside, showing relatively slender hairs. *ROG 11648*. Scale bar 1 mm. **10.** *V. bonariensis*, stalked gland-hairs on calyx. *ROG 11609*. Scale bar 1 mm. **11.** *V. incompta*, sessile gland on bract (arrow). From an unvouchered plant at Unitec, Carrington Rd, Mt Albert. Scale bar 0.1 mm. **12.** Bracts (outer face view) of *V. bonariensis* (left) and *V. incompta* (right). Note the bristle-like cilia of the former species. (Stalked-gland hairs not visible here because they do not occur on the margin itself). Unvouchered (from same populations as *ROG 11462*, *11609*, *11647*, *11648* respectively). Scale bar 1 mm.



Figs. 13 & 14: 13. *V. bonariensis*, mericarps 1.5 mm long. Unvouchered (from same population as *ROG 11462*, *11609*, *11647*). 19 May 2022. Scale bar 1 mm. 14. *V. incompta*, mericarps 1.25 mm long. Unvouchered (from same population as *ROG 11648*). 18 May 2022. Scale bar 1 mm.

Representative specimens

V. bonariensis

AK 217183, A.E. Esler, 6 Jan 1975, Hillsborough Cemetery, naturalized on waste land around graves.

AK 143409, E.B. Bangerter, 4 Jan 1978, Brown's Bay, roadside.

AK 149487, A.E. Wright, 20 Feb 1978, Waitakere Ranges, Anzac Valley Rd, under straggling manuka at roadside.

AK 362315, A.E. Esler, 23 Dec 1980, Onehunga, disturbed waste land.

ROG 11609 (AK), 5 Nov 2022, Hillsborough Cemetery, abundant flowers, at 1 pm with mild sweet 'verbena' scent and scanty nectar.

AK 385964, *ROG 11647*, 23 Dec 2022, Hillsborough Cemetery, locally conspicuous on and alongside graves close to Hillsborough Rd, seedlings plentiful in cracks in paths; very few plants elsewhere in cemetery.

V. incompta

AK 94207, T.F. Cheeseman, Nov 1919, North Shore, Birkenhead.

AK 134570, A.E. Wright, 25 Nov 1973, Mt Wellington lava fields [Merton Rd].

AK 143624 & 290423 E.B. Bangerter, 1 Jan 1978, North Shore, Wairau Rd, between road & Wairau Creek with *Daucus carota*, *Foeniculum vulgare* and other tall adventives.

AK 385963, *ROG 11648*, 23 Dec 2022, N side of Mt Roskill, among kikuyu grass, *Melilotus* and clovers.

ROG 11653 (AK), 29 Dec 2022, Oakley Creek, on dry weedy clay slope among *Piptatherum miliaceum*.

Acknowledgements

The collections made by Alan Esler first got me interested in these plants. I am also grateful for up-to-date information from Peter de Lange and Marley Ford.

Note 1: The leaf spectrum. "[Kew botanist Ronald Melville] has drawn attention to the serial changes in leaf-form that distinguish one species from another... and calls it the leaf spectrum. It would be a welcome development in taxonomy if it became standard practice to describe not only the reproductive phase of the plants [but also] to illustrate or graph the leaf spectrum..." (Davis & Heywood 1963: 159).

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