

Craspedia diversicolor Breitw. & K.A.Ford. (Gnaphalieae):

Discovery and conservation management of one of New Zealand's rarest and most endangered plants

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DOI: <http://dx.doi.org/10.53875/capitulum.02.2.02>

ABSTRACT

Craspedia diversicolor (Gnaphalieae), a recently described species from the South Island of New Zealand, is characterised by glomerules (pseudocephalia) having florets with a white corolla and dark red-purple anthers, and rosette leaves being variable from olive-green, grey to dark red, with a very thin, appressed to flocculent, lanate indumentum. The species was once more widespread in the Canterbury Plains but is now restricted to Wakanui Gully in Canterbury on privately owned agricultural land. Only two plants were found recently. After manually cross-pollinating the two plants with a plant we have held in cultivation, we managed to raise 80 seedlings. The majority of those were planted at a reserve where they have meanwhile flowered and produced seedlings. We hope we have saved *Craspedia diversicolor* from the immediate threat of extinction.

Keywords: Asteraceae, Compositae.

INTRODUCTION

Craspedia G.Forst. (Gnaphalieae) is a genus of more than 30 species confined to Australia and New Zealand (e.g. Ford et al., 2007; Castelli et al., 2017). It is characterised by its homogamous capitula crowded together into a dense glomerule (pseudocephalum) borne on an unbranched scape. The species are rosette-forming perennial herbs (except for one Australian species), with the leaves showing considerable variation in form, colour, and indumentum. With the six species in Flora of New Zealand (Allan, 1961) and five species that were described recently as new to science (Breitwieser & Ford, 2022; Breitwieser et al., 2022), 11 species of *Craspedia* are now recognised in New Zealand.

Here we relate the story of the discovery and conservation management of one of these new species, *Craspedia diversicolor* Breitw. & K.A.Ford.

DISCOVERY

About 20 years ago we noticed that a herbarium specimen collected by Ruth Mason in 1967 (CHR 167368) in an area south-west of Wakanui Beach (about 100 km south of Christchurch, Canterbury, South Island) and determined by David Drury as *Craspedia lanata* (Hook.f.) Allan differs from this species by having florets with dark red-purple anthers and rosette leaves with a very thin,



Figure 1. *Craspedia diversicolor* Breitw. & K.A.Ford. **A.** Habit. **B.** Glomerule (pseudocephalium). **C.** Side view of capitulum. **D.** Florets: the closed anther tube is dark red-purple but after anthesis it is striped, with only the colour of the ridges being dark red-purple while the areas in between are pale yellow-green. **E.** Close up of androecium showing the closed dark red-purple anther tube. Photos by: A,B: Rainer W. Vogt; C-E: Ilse Breitwieser.

The power of a herbarium specimen

A fifty year old herbarium record led us to one of New Zealand's most endangered species. This specimen of *Craspedia diversicolor* Breitw. & K.A.Ford. was collected by another female botanist, Ruth Mason (1913-1990), whose special interest in field botany strengthened her dedication to environmental science and conservation

(see A. D. Thomson, Te Ara biographies
<https://teara.govt.nz/en/biographies/5m38/mason-ruth>)



Partial image of Ruth Mason's 10680 specimen, see whole specimen at:
<https://scd.landcareresearch.co.nz/Specimen/CHR%20167368>
 Photo © Landcare Research 2023

Nº 167368

BOTANY DIVISION, D.S.I.R.,
 CHRISTCHURCH, NEW ZEALAND

Craspedia lanata (Hk.f.) Allan

Loc. ½ mile S.W. of Wakanui Beach, Canterbury

Hab. In grass on shingle ridge

Col. R. Mason 10680

Date: 24.11.1967

Det. *R. Mason*

Date: 28/3/69

Remarks:

S.I.R. 620



Figure 2. A. Cover of Mr W. Piercy's 1884 Pressed Plant Book. B. Mr W. Piercy's specimen of *Craspedia*.
Photo © Landcare Research 2023

appressed to flocculent, lanate indumentum (Figure 1). Ruth Mason reported it as local and common. When we visited the site for the first time in 2001, it was covered by exotic grassland. We counted 30 *Craspedia* plants at two close-by sites. However, when revisiting the site in 2013, we found only eight plants and since 2019 there are only two plants there.

In recent years, we searched New Zealand herbaria for similar looking specimens and their localities. Remembering that about 20 years ago I saw a herbarium specimen from the nineteenth century that was collected in the area of Lincoln, Canterbury, where the Allan Herbarium (CHR) is now housed, I thought it would be interesting to compare it with Ruth Mason's specimen (CHR 167368). However, although all ca. 2000 *Craspedia* specimens at CHR are now databased and imaged, I couldn't find this specimen from the Lincoln area and started to doubt my memory. Our herbarium manager had the idea I should search through old Pressed Plant Books: and there it was, the specimen I had vaguely remembered! A Mr W. Piercy collected plants and pressed them in a book that he presented to his

wife A.M. Piercy on 19 October 1884 (Figure 2). One of the specimens in this book was a *Craspedia*, which he had identified as *Craspedia fimbriata* (G.Forst) DC. [= *Craspedia uniflora* G.Forst.] (CHR 653000). I almost couldn't believe it when I studied the specimen: the anthers are still dark red-purple, and the specimen matches Ruth Mason's specimen. Mr Piercy collected the specimen at the Lincoln cemetery. Therefore, we went to the Lincoln cemetery, but since it is nowadays a well maintained, modern cemetery, there is of course no *Craspedia* growing anymore among the graves.

In our search for specimens that are similar to the *Craspedia* from Wakanui Gully, we found only collections from Bankside Reserve in 1969 (CHR 201474), Te Pirita in 1962 (CHR 173458) and the Hinds River in 1965 (CHR 169034), all sites, like Wakanui Gully, about 100 km or less south of Christchurch. We went to these sites, but they are now very weedy, and *Craspedia* has disappeared.

Based on these few earlier collections, we concluded that *Craspedia diversicolor* was once much more widespread in the Canterbury plains. In addition

One of the rarest KIWIS

The solitary terminal glomerule (pseudocephalum) is formed by ca. 60 homogamous, discoid capitula with a total of c. 410 florets. The white corolla is contrasted by an anther tube that is first dark red-purple and later pale yellow-green with dark purple stripes.



Craspedia diversicolor Breitw. & K.A.Ford., Wakanui Gully, south of Christchurch, New Zealand
Photo by Ilse Breitwieser

to the sites where the herbarium specimens were collected, we have meanwhile visited other areas in the Canterbury plains we judged to be potentially good habitats for *C. diversicolor* but could not find any plants. This is not surprising, because the lowland Canterbury Plains have been extensively modified with recent conversions to irrigated dairy farming. Very few remnants of native dryland vegetation remain (e.g. Bowie et al., 2016).

CONSERVATION MANAGEMENT

Craspedia diversicolor is close to extinction. Only two plants of this species are now left in the wild – and their site is on privately owned land and adjacent to a beef feedlot!

The big issue for the conservation management of this species is the degradation of the Canterbury

Plains. At its last remaining site at Wakanui Gully, *C. diversicolor*'s habitat changed after grazing of the coastal margin and steep side of the gully ceased when ANZCO Foods' Wakanui Five Star Beef feedlot was established in 1989. This site, which is now on ANZCO Foods' land, is the best remnant of dry, coastal gully shrubland on the Canterbury Plains. A variety of dryland species still just survive. Conservation volunteers have worked hard, supported by ANZCO Foods, to help with conservation management. ANZCO Foods has fenced off an 8 ha area and recently informed us that it will invest a significant amount of funding into amelioration of the land and planting of many rare and threatened plants, including this *Craspedia*. Te Rūnanga o Arowhenua (representative body of the local indigenous people), who have set up a native plant nursery, will grow plants for this re-vegetation project. However, the two plants at Wakanui Gully are not able to produce seed anymore. So, how would we be able to grow plants for the re-vegetation



Figure 3. A. Author hand pollinating one of the two remaining *Craspedia diversicolor* Breitw. & K.A.Ford. plants at their site at Wakanui Gully, south of Christchurch, New Zealand. **B.** Some of the 80 seedlings of *Craspedia diversicolor* at Manaaki Whenua – Landcare Research experimental nursery, Lincoln, New Zealand. Photos by: A: Rainer W. Vogt; B: Ilse Breitwieser.



Figure 4. Planting of the *Craspedia diversicolor* Breitw. & K.A.Ford. seedlings. **A.** Some of the seedlings before planting at Harris Reserve, Ashburton, south of Christchurch, New Zealand. **B.** Planting of the seedlings. **C & D.** Seedlings in their bee boxes. Photos by: A, C-D: Ilse Breitwieser; B: Jane Gosden.

At the brink of extinction

Only two plants of *Craspedia diversicolor* Breitw. & K.A.Ford. are left. Their last remaining site is at this coastal cliff adjacent to a beef feedlot and the sea is taking each year more and more of the the coast line.

Site of the last two plants of *Craspedia diversicolor* Breitw. & K.A.Ford., Wakanui Gully, south of Christchurch, New Zealand.
Photo by Rainer W. Vogt

project? Since our first visit to Wakanui Gully in 2001 we have grown one of the plants at our experimental nursery at Manaaki Whenua – Landcare Research, Lincoln. Therefore, we hoped that this plant would be genetically a bit more distant to the two remaining plants and maybe cross-pollinating the plants at Wakanui Gully with the pot plant from our nursery might work. In collaboration with conservation volunteers and QEII National Trust, in November 2020 we manually cross-pollinated the two remaining plants at Wakanui Gully with the pot plant from our nursery. We were lucky! In the 2020/2021 season we obtained 18 filled seeds from the two plants at Wakanui Gully as well as 126 filled seeds from our pot plant that we had cross-pollinated with a glomerule from one of the Wakanui Gully wild plants. Our experienced gardener David Purcell managed to raise 80 seedlings (Figure 3). We gave 20 seedlings to the Christchurch Botanic Gardens, kept six for further genetic investigation, and in October 2021 planted the rest at two reserves close to Ashburton (80 km south of Christchurch), hoping that this translocation will lead to new self-sustaining populations. As luck would have it, one of the translocation sites is close to a site where H.H. Allan collected a specimen in 1918 (CHR 10542). I didn't identify this specimen as *C. diversicolor* until after we had planted the seedlings at the reserve. The identification of this specimen gave us therefore a very exciting surprise. The seedlings at the reserves flowered already a month after we planted them and produced numerous offspring. In November / early December 2022, the plants are in full flower and look healthy. We have fenced them in and protected them with bee boxes to shelter them from the dry Canterbury winds and pests like rabbits (Figure 4). We tried cross-pollinating the plants at Wakanui Gully again in 2021, but the plants were in bad condition and produced neither sufficient good pollen for pollination nor seed.

We hope we have saved *Craspedia diversicolor* from the immediate threat of extinction, but because of loss of its habitat in the Canterbury Plains long term survival will probably not be possible without active conservation management.

ACKNOWLEDGEMENTS

I would like to thank Val Clemens and Edith Smith for all their energy and hard work in saving *Craspedia diversicolor* from extinction. I would also like to thank Alice Shanks from QEII Trust and Luke Martin from Christchurch Botanic Gardens as well as my colleagues Kerry Ford, Jane Gosden, Paula Greer, David Purcell, Ines Schönberger, and Rob Smissen. The submitted manuscript benefited from helpful reviews by Andre Messina and an anonymous reviewer.

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