THE CULTIVATION OF *VALDIVIA GAYANA* J. RÉMY. – A LITTLE-KNOWN HERB FROM SOUTHERN CHILE

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ABSTRACT

Valdivia gayana J. Rémy. is a herbaceous, sometimes sub-shrubby member of Escalloniaceae, a family dominated by woody species. It has a limited distribution in southern Chile and, to the knowledge of the authors, has not been cultivated in gardens outside Chile before. It is an unusual species in many senses and the collection and cultivation from seed at the Royal Botanic Garden Edinburgh is described here and suggestions for propagating the plant from cuttings are made.

INTRODUCTION

Valdivia gayana J. Rémy. was first introduced into cultivation in the UK through the famous Veitch Nursery of Exeter and London who exhibited a flowering plant at the Royal Horticultural Show in London in 1863, where it received a commendation. There is a note in the *Gardener's Chronicle* about this. It is also cultivated in Chile in specialist collections.

DISTRIBUTION AND DESCRIPTION OF THE PLANT

Valdivia gayana is an endemic monospecific genus in Escalloniaceae with a very restricted distribution in Region XIV of Chile in South America 39°–40°S. It grows from sea level to 600m (Cano, 2010). The climate in this region is characterised by high rainfall, which mostly falls in autumn and winter, with hot summers when rain can also occasionally fall. *V. gayana* occurs in deep shade in a forest type known as *siempreverde* (translated as 'evergreen'), with tree and shrub species *Drimys winteri*, *Amomyrtus luma* and *Eucryphia cordifolia*, and the conifer *Saxegothaea conspicua*. Herbs and ferns found growing with *Valdivia* include *Blechnum corralense*, *Pteris semiadnata* and *Hymenophyllum* spp. (Gardner *et al.*, 2006). The presence of filmy ferns indicates how permanently damp and shady the habitat is. Rocky ground or outcrops are also a feature of the habitat and *Valdivia* is found with its roots growing over the rocks (Fig. 1).

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Fig. 1 *Valdivia gayana* can be found growing over damp rocks with ferns. Photo: Martin Gardner.

Fig. 2 *Valdivia gayana* flower. Photo: Andrew Ensoll.

Valdivia is a low-growing herb, which can have a thin trailing woody stem when mature, forming rosettes of toothed obovate-lanceolate leaves (Gardner *et al.*, 2006). Its common name, *planta de León*, is thought to be a reference to the sharply toothed leaves which may be considered to be like lion's teeth in a similar fashion to the leaves of *Taraxacum*, or dandelion. Lilac-pink tubular flowers appear from the centre of the rosette from short racemes (Fig. 2). Indehiscent fruits (meaning that they do not open) form in February and March, at the end of the southern hemisphere summer. Gardner *et al.* (2006) give a good description of the plant, its distribution and conservation status.

SEED COLLECTION

Seed was collected in April 2012 by Peter Baxter and Martin Gardner from Corral, Grota de la Aguada in the province of Valdivia (Fig. 3). The collection notes describe the growing conditions of the plants from which the seed was collected: *Cave in coastal bedrock. Plants mainly confined to innermost face which is ca 5m into the cave. No other angiosperms present – only liverwort, filmy ferns and ferns.*

This seed will be referred to in this paper as 'the 2012 seed'. This seed was sown in two batches in April 2012 and September 2012 and the methods used are described below.

Seed was also collected in January 2013 from Parque Nacional Alerce Costero, Nacimiento del Estero Los Peucos by Tom Christian, Martin Gardner and Vanezza

Morales. The collection notes describe the growing conditions of the plants from which the seed was collected: *Along a 100m stretch of east-facing rock ledges within a forest dominated by* Caldcluvia paniculata, Amomyrtus luma, Drimys winteri, Nothofagus nitida, Tepualia stipularis *and* Podocarpus nubigenus *with a ground flora of* Blechnum magellanicum, Lophosoria quadripinnata *and* Chusquea *sp.*

Fig. 3 Grota de la Aguada where *Valdivia gayana* seed was collected in April 2012. Photo: Martin Gardner.

SEED SOWING AND GERMINATION

The 2012 seed was sown shortly after arrival at the Royal Botanic Garden Edinburgh (RBGE) in April 2012 and germinated after six months in the RBGE Fern Growing Room, a controlled-climate environment maintained at a temperature of 20°C with 60–70 per cent humidity and 15 hours of light per day. Two batches of seed from this 2012 collection were sown, one in April and one on 7 November 2012. The April sowing germinated in early October 2012, and the November sowing germinated in early December (Fig. 4). It is notable that the two sowings were made seven months apart, but germination was separated by one month. This has caused the authors to speculate on whether there is a dormancy factor or a mechanism in the seed whereby the embryo needs to mature and which causes germination to occur at a time after seed is produced. Both batches of the 2012 seed were kept in the same conditions before and after sowing.

Seed was sown onto a mix regularly used for sowing fern spores. This spore-sowing mix consists of 30 per cent John Innes No.1, 35 per cent milled pine bark – 'growbark' – with a diameter of 2–7mm and 35 per cent sphagnum moss peat.[4] Growbark is a product which is available from Melcourt Industries along with the other pine bark products referred to in this paper (Melcourt Industries Ltd, 2009). The ingredients were sieved separately to remove any pieces larger than 2mm and break up any lumps. The media were then combined and mixed thoroughly. A low-nitrogen preplanter product[5]

4. This is the only growing mix in which sphagnum moss peat is used in the Research Living Collections at RBGE. Horticulturists at RBGE try to keep use of peat to an absolute minimum. This is because peat bogs form part of a vulnerable habitat in Britain and Ireland and harvesting from these habitats is unsustainable.
5. At the time of writing a similar product is available from Scotts Professional, manufacturers of fertiliser and growing media.

Fig. 4 *Valdivia gayana* seedlings. Photo: Kate Hughes.

was added after sieving and mixing at a rate of 5ml in 10l of mix for its slow release of macronutrients, N:P:K ratio 3:16:9.

Pots filled with the mix were sterilised with boiling water, placed in clean sealed bags and stored until ready for use. Prior to sowing, the surface of the mix was 'fluffed up' with tweezers in order to increase the air content so that the young roots could penetrate more effectively. This was then tamped down lightly and the seeds sown on top. The seeds of *Valdivia* are minuscule, almost dustlike, and therefore were not covered with substrate. The pots of seed were then placed into poly Ziploc bags and sealed to prevent the entry of sciarid flies and fungal spores and the exit of moisture.

Seedlings were pricked out four weeks after germination, in December 2012, when the true leaves had formed and they were easy to handle. They were pricked out into 3cm 'finger pots' (Fig. 5) with a more open mix, known at RBGE as 'fern mix', containing higher proportions of potting bark, propagation bark and growbark and less John Innes No.1 than the sowing mix. Perlite and charcoal were added to open up the mix and keep it fresh, along with slow-release fertiliser and dolomitic limestone to provide calcium and magnesium for a constant supply of nutrients (Fig. 6). Dolomitic limestone also raises the pH of the medium slightly. The seedlings were placed back in the growing room in which they had germinated with a propagator cover over them. They were then hardened off by opening the vent on the cover when new leaves were seen and there were signs of root growth. This was over a period of four weeks and eventually the cover was removed altogether. It is important to acclimatise the recently pricked out seedlings to a more open environment where they will grow.

Fig. 5 Seedlings pricked out into 3cm finger pots. Photo: Andrew Ensoll.

Fig. 6 Growing media mix known as 'fern mix'. Photo: Kate Hughes.

HARDENING OFF AND THE DEVELOPMENT OF MATURE PLANTS

In March 2013, by which time the roots had filled the finger pots. they were potted on into 10cm square black pots containing the fern mix described above with gravel chips added. After a short time in the Growing Room they were moved to the gravel benches of a temperate glasshouse heated to a day temperature of 15°C and a night temperature of 11°C. This glasshouse was also painted with whitewash shading for the months May to September. They grew quickly and were potted on into round plastic pots (approximately 2l in capacity) in June 2013. Flower buds appeared on the plants in these 2l pots in July 2013 (Fig. 7).

FINAL PLANTING POSITIONS

Mature plants were distributed to the Temperate Glasshouse at Edinburgh (minimum temperature 8°C) (Fig. 8) and to Benmore Botanic Garden in Argyllshire. Twelve plants were taken there and planted in two different locations. Some were planted in the Fernery, an historic structure dedicated primarily to the cultivation of ferns which can experience light frosts in winter, and an outdoor position on rocky and shallow soil in the dappled shade of trees and shrubs (Fig. 10).

The plants have grown well in all of these positions, surviving outside minimum temperatures of –3.5°C in November 2013 (Peter Baxter, pers. comm.). Peter Baxter, Curator of Benmore, reports that the plants are growing well and that those growing outdoors seem to flower better than those indoors. However, it is worth noting that the winter of 2013–2014 was relatively mild in Scotland and in future years the plants could experience much lower temperatures for prolonged periods; the authors therefore do not believe that their hardiness has been fully tested.

Fig. 7 Flower buds appearing on plants in 2l pots in July 2013. Photo: Andrew Ensoll.

Fig. 8 *Valdivia gayana* in the Temperate Glasshouse at RBGE. Photo: Kate Hughes.

Fig. 9 *Valdivia gayana* growing in the Fernery at Benmore. Photo: Peter Baxter.

Fig. 10 *Valdivia gayana* planted in open ground at Benmore. Photo: Peter Baxter.

IRRIGATION AND FERTILISER

Plants are watered with tap water as necessary to keep the substrate moist. The growing mix is extremely free-draining with high levels of bark, so in warm weather irrigation is required daily. Mains water was used from May onwards through the summer months.

Once the true leaves had developed the seedlings were fertilised regularly with a balanced liquid feed at a fairly weak dilution rate of 1:200. A generous availability of nutrients along with constant moderate temperatures may have contributed to their fast development. It would be interesting to know how quickly plants progress from seedling to flowering stage in the wild.

PESTS AND DISEASES

Whitefly (*Trialeurodes vaporariorum*) and botrytis mould (*Botryotinia cinerea*) are the most damaging organisms to *Valdivia*. Whitefly suck the sap from the leaves, weakening them and leaving a sticky honeydew on which the mould can then establish. Whitefly is most effectively removed with the application of a neo-nicotinoid chemical. A product called Gazelle SG was used.

Botrytis was observed to establish on spent petals and spread into living shoots, so old flower heads were removed as soon as this was seen. Botrytis can be avoided by ensuring that plants are watered carefully, avoiding any splash on the leaves. Air movement in the glasshouse is also essential to reduce botrytis, and so a 'Hot Box' fan heater was installed in the glasshouse in which the *Valdivia* were growing. This ensures constant air movement and heats the air slightly, which means that botrytis spores do not have an opportunity to settle and establish. *Valdivia* plants can tolerate plenty of moisture at their roots but no moisture on the leaves. If care is taken to ensure good ventilation, problems are less likely to occur.

VEGETATIVE PROPAGATION

Leaf cuttings have been known to root in the past at RBGE (Fig. 11), however the authors do not know if they thrived, as these plants are no longer alive. Gardner *et al.* (2006) describe the method for propagation by leaf cuttings.

CONCLUSION

Flower spikes were observed on the larger plants in June 2013 and at the end of September 2013 the first flowers opened fully. Plants have flowered more or less continuously throughout the winter of 2013–2014 with many beginning to form seed in spring and early summer.

The successful cultivation of *Valdivia gayana* is dependent on warm, stable and buoyant growing conditions, a free-draining but moisture-retentive substrate, and high

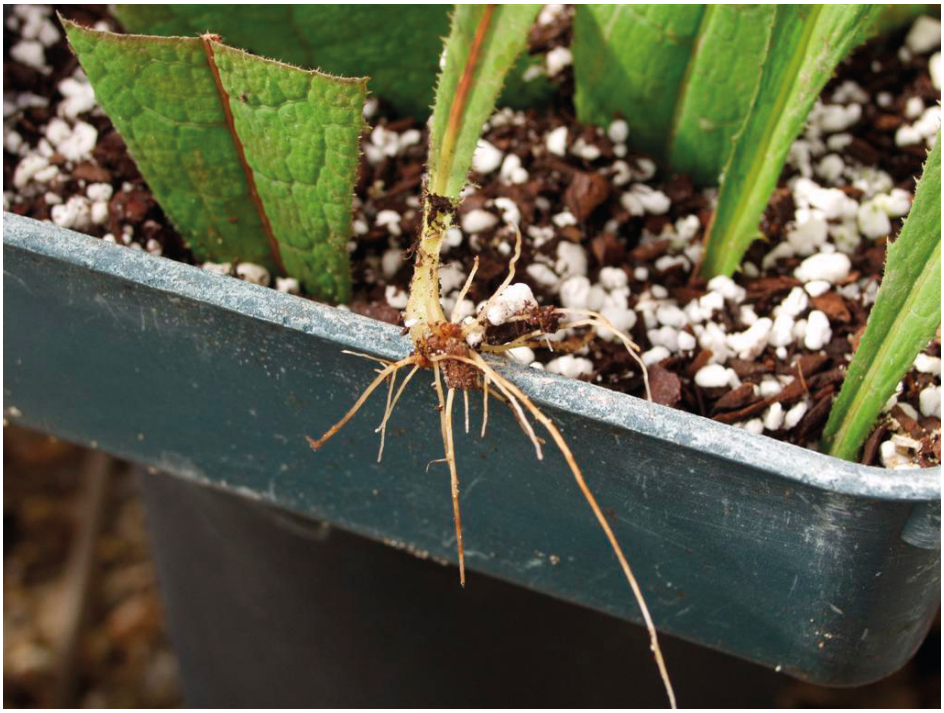

Fig. 11 Rooted leaf cutting. Photo: Martin Gardner.

availability of nutrients. However, we feel there is more to learn about the growth requirements of *Valdivia*. Subsequent sowings of seed have been made and sowing and germination times will be carefully noted to see if there is anything more we can learn from these unusual plants about their seed development and germination.

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