

Exploring the horticultural potential of native Australian
flowering shrubs in the *Solanum brownii* group

Adam Marchant, Andrew Perkins, George Orel, Gillian Towler
Royal Botanic Gardens, Sydney



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Summary

The flowering shrubs in the *Solanum brownii* group consist of ten closely related species. They are endemic to coastal temperate Eastern Australia. They have attractive blue or purplish flowers of around three centimetres diameter, and are all prickly to a greater or lesser extent.

We attempted to select for plants with combinations of characters desirable for development as a horticultural ornamental, particularly, large flower size, reduced spiny-ness, attractive leaf form, and attractive growth habit.

Vegetative propagating material was collected from the New England table-land and escarpment, representing four species – *S. neoanglicum*, *S. curvicuspe*, *S. brownii* and *S. nobile*. Two species may have a prospect of being developed into horticultural ornamentals – *S. nobile* and *S. curvicuspe*. *S. nobile* comes from the tableland east of Glen Innes, and *S. curvicuspe* from the rainforest inland from Wauchope. *S. nobile* is the more attractive plant, with oak-shaped leaves, and upright, well-branched habit. Specimens differ widely in their prickly-ness. *S. curvicuspe* has relatively large flowers, and not so many spines. We discovered a previously-undocumented white-flowering form of this species.

At the time of writing (May 2008), flowering in cultivation of our selected plants has happened only sporadically; and we have not had fruit formation and seed set. Discovering how flowering can be induced in cultivation is our current goal in the investigation of these plants

Introduction

The “*Solanum brownii* Group” is a set of species split by Bean in 2001 from *S. brownii*, as well as several previously-named species that this author believed to be closely related. The natural range of the whole group is coastal NSW, extending into south-east Queensland. The plants have attractive blue flowers of around 3cm diameter, and are all prickly to a greater or lesser degree.

The main aim this project was to investigate whether some members of this group had the potential to be developed into garden ornamentals, either directly by selection from wild-sourced plants, or after selective breeding. Subsidiary aims were to increase knowledge of the distribution and abundance of the various kinds, and further investigating their natural affinities.

Activities and outcomes

2003-2004:

Each of the species in the *S. brownii* group has a very short (natural) flowering time, and it is during the time of flowering that field collection is most feasible, as the blue flowers can be seen in the bush. In the first year of this project, we were unfortunately not made aware of the success of our application for a grant from the AFF until it was too late to mount a well-organised collecting trip during that year’s flowering season. Two of our number (Perkins and Towler) however went on a quick expedition in September to a site where they had previously observed some of the target species.

At Mount Banda Banda, in the Willi Willi National Park, north-west of Wauchope, plants of *S. curvicuspe* were found in flower. Significantly, as well as the expected blue flowering plants, one plant was found profusely blooming with white flowers. This had not been observed (or, at least, recorded) previously.



Solanum curvicauspe



S. curvicauspe white form

Propagation material (cuttings) from these plants was returned to Sydney, where there was some initial success in striking the cuttings at the Sydney Botanic Gardens nursery. However, all of these cuttings subsequently perished, possibly as a result of over-watering, and at least partly as a result of the cuttings being of insufficiently mature wood.

2004-2005:

In late September 2004, A. Marchant went on a ten-day collecting expedition, together with Annette Hill (then of the University of New England), accompanied also for the first day by Ian Telford, Curator of the Beadle Herbarium (UNE), and advised by A/Prof. Jeremy Bruhl, Director of that herbarium. The collecting trip was a loop east from Armidale over the escarpment, then north from Wauchope to Grafton, and inland again to Glen Innes.

We collected from large populations of *S. neo-anglicum* on the table-land east of Armidale. This plant has a very spindly and unattractive habit, small flowers, and is not a likely prospect for a horticultural ornamental. However, it propagated easily and grew very well. At Mt Banda Banda, we collected blue-flowering *S. curvicauspe*, but we were unable to locate the white-flowering plant.

S. nobile was collected from several locations in and around the Gibraltar Range between Grafton and Glen Innes. This species is a much more likely prospect for cultivation as an ornamental. Specimens growing on flat, open land were often well-shaped shrubs of 1.5 metres in height, with large oak-shaped leaves and the largest flowers of this group of species.

Cutting material from this expedition was successfully propagated at the University of Western Sydney School of Horticulture.

2005-2006:

It became apparent that a comprehensive collection of living material from the full extent of the range of Bean's *S. brownii* group, as envisaged in the original research proposal, was not feasible – in terms of money, time (potentially months away from the work-place) and logistics (increased demand on fewer vehicles available for field-

work). Additional material – living material, or specimens for herbarium or laboratory study – were solicited from colleagues. This request yielded pressed specimens from more southerly parts of the group’s range, and also revealed that a group at the Mt Annan branch of the Royal Botanic Gardens, Sydney, was conducting experiments on seed germination on *S. cinereum*. This species, unlike the others in the “*Solanum brownii* group”, is widespread and abundant, and generally considered to be a bad weed. Subsequent DNA comparison of *S. cinereum* and other species in the group (and many other Australian and exotic *Solanum* spp.) indicated that this species was phylogenetically well separated from other members in Bean’s group.

Other examination of genetic relationships was done using small samples of material taken from specimens from the Beadle Herbarium. This addition to the material that we had collected covered all but the rarest members of the *Solanum brownii* group, and the excellent state of preservation of the herbarium material allowed successful DNA extraction and analysis.

The plants from the previous season’s collecting expedition were induced to flower by application of potassium sulphate.

2006-2007:

An analysis of DNA sequences from those specimens collected as part of this project, as well as many specimens from other endemic species across Australia, provided by numerous colleagues, formed the substance of a presentation given at the “Solanaceae VI” conference in Madison Wisconsin. This was one of a series of international conferences on Solanaceae held approximately every six years. (Cost of attendance at this conference was borne privately by Marchant.)

Excerpt from the discussion of results pertaining to the *S. brownii* group:

“... sequences from *S. neoanglicum*, *S. curvicauspe* and *S. brownii* form a well-supported clade, consistent with Bean’s (2001) treatment. *S. neoanglicum* has a sequence almost identical with that of *S. curvicauspe*. ... The cpDNA of *S. nobile* Bean, however, does not support a particularly close relationship with (*S. neoanglicum*, *S. curvicauspe* and *S. brownii*). A moderately-well supported ... clade contains Bean’s *Solanum brownii* group with the exception of *S. cinereum*, together with *S. cookii*, *S. stelligerum*, *S. corifolium* and *S. parvifolium*. The last three of these species are in Symon’s (1979) group A, and are classified by Flora of Australia (Haegi *et al* 1982) in section *Graciflorum*, while the other are in *Oliganthes*. Our data suggests that Australian species which are classified in either *Oliganthes* or *Graciflorum* might be better classified together in the same section Our data also suggest that the similarities implied by Bean (2001) between *S. brownii* group members and *S. stelligerum* have a basis in close evolutionary relationship. A close relationship between *S. cinereum* and the remainder of Bean’s *Solanum brownii* group is [however] contra-indicated by our data. Some specimens of *S. nobile* cited by Bean (2001) had been labelled *S. sp. aff. cinereum* – our data supports Bean’s creation of a separate species *S. nobile*, while not indicating that it is closer to the other *Solanum brownii* group members than are other species in the clade described in the previous paragraph.

This work has not yet been published in print form.

Attempts were made to use the DNA fingerprinting technique “ISSR polymorphism” to work with these *Solanum* species. However, despite our regular success with this technique in projects on other plants (including *Ipomoea*, *Camellia*, *Prunus* and *Worsleya*), and despite the success of other molecular genetic techniques (chloroplast

DNA sequencing) with *Solanum*, we did not obtain easily useful ISSR fingerprints. This is likely to reflect real peculiarities of genome organisation in these species.

In November of 2006, a collecting trip by Marchant, Perkins, and T-C Huang re-located the *S. curvicauspe* plant with white flowers discovered in 2003 by Perkins and Towler. No flowers were left, although there were numerous immature fruit. Numerous cuttings from this plant were taken, as well as from other (previously observed to be) blue-flowering plants. These cuttings were struck at the University of Western Sydney School of Horticulture, and later re-located to “Paradise Plants” nursery in Kulnura, under the care of the staff of proprietor Robert Cherry.

Ongoing:

After successful striking, the plants from the Marchant & Hill collecting trip were maintained at the University of Western Sydney School of Horticulture. Surviving plants are from *S. neoanglicum* and *S. nobile*. Flowering was induced in one season by the application of supplementary potassium. In subsequent seasons, without added K, there has been no flowering. Following the dissolution of the School of Horticulture last year, these plants are now being maintained at Marchant’s property near Parramatta, where they continue to thrive (vegetatively).

The differences in growth form, leaf shape, and prickly distribution between the various clones have persisted, despite the identical growing conditions, indicating that they are not as plastic as some of us might have expected. The *S. curvicauspe* plants at Kulnura are also surviving well. Some of these have produced blue flowers (without additional K), but none of the clones cut from the white-flowering plant have produced any flowers at all. Potassium supplementation has not yet been tried on these.

Future prospects:

Two kinds of plants in this study group are still considered to have some potential as horticultural ornamentals. These are *S. nobile* from the northern New England tableland, and the white-flowering *S. curvicauspe* from Mt Banda Banda.



Solanum curvicauspe plants (central pot) flanked by two specimens of *S. nobile*, differing in their degree of spiny-ness

Interest in these plants has been expressed by various people, notably including S. and A. Ainsworth, proprietors of “Eden Gardens” in Sydney.

We have been reasonably successful with cutting propagation (after the failure of the first year’s attempt), but have not had seed available to attempt to germinate. Reports from others working with Australian native *Solanum* species, however, agree that these plants are difficult to get to germinate reliably, and so to get seed propagation (and so cross-breeding) working in this group would likely require more time and effort than may be warranted.

Publications to date

Marchant, A. D. Native Australian *Solanum* species. (invited contribution to) *Australian Plants* 22 (179): 267-270, 274-275.

Marchant, A. D., Perkins, A. J., Towler, G. and Orel, G. 2004 *Solanum brownii* in Horticulture? *Australian Plants* 22 (179): 276-277.