Grevillea species and cultivars provide a diversity of habit, and a range of color and form of flowers and foliage

Rootstocks for "Difficult" Plants: Rhododendrons, Azaleas and Grevilleas

Michael S. Reid, *Wesley P. Hackett and Jason S. Julian*

The introduction of non-native plants into new areas of cultivation is often restricted by the specific environmental requirements of the plants. Many species and cultivars with potential horticultural marketability are unable to be grown in areas with soils and/or water that have high pH and salt concentrations. Grevilleas and rhododendrons represent two such examples. We have now completed the third and final year of a project aimed at providing nurseries with an economically viable means of producing rhododendrons, azaleas and grevilleas grafted on rootstocks able to tolerate high-pH soils. We were successful in producing plants of a range of beautiful *Grevillea* species and cultivars grafted on tolerant *Grevillea robusta* rootstock. Evidence of incompatibility with some cultivars and species suggests that this approach will not be successful with all genotypes. Difficulty in production of rooted stock materials of the selected high pH-tolerant *Rhododendron* rootstock limited our success in creating grafted rhododendron and azalea plants. We were successful in developing *in vitro* cultures both of rhododendron and grevillea which might be used in the future for micrografting of desired rootstock/scion combinations.

Grevilleas

Native to Australia, most of the species and horticultural cultivars of *Grevillea* are adapted to the impoverished acidic soils of that continent, and do poorly under the high pH and/or nutrient rich conditions common in horticultural practice. In contrast, the largest species in the genus, *G. robusta* (the 'silky oak') is very tolerant of a wide range of environmental conditions, and is used throughout the world as an ornamental and shelter-belt tree. We therefore chose *G. robusta* as the tolerant rootstock for testing the grafting of showy grevillea species and cultivars. While the use of clonal rootstock is preferred when grafting, we were unable to obtain satisfactory rooting of *G. robusta* cuttings using a range of standard techniques. Toward the end of our study we were able to obtain better rooting by using cuttings of juvenile (seedling) plants, and this approach warrants further examination. For our study we used seed propagation to provide adequate numbers of rootstock plants. Seeds of *G. robusta* are inexpensive and readily available from commercial propagators. Seeds were germinated in flats and transplanted into liners prior to testing grafting procedures.

A dozen different cultivars and species were used in producing over 400 grafted *Grevillea* plants, using four different grafting treatments. The most successful procedure was found to be using a wedge/cleft graft, wrapping the graft union with Parafilm, and covering the scion and union with a plastic bag. The inclusion of a rootstock leaf within the bag decreased the time required for graft take, but the increased humidity in the bag also led to more frequent foliar disease, which was the most significant factor associated with unsuccess-

Incompatibility between scions and the G. robusta rootstock caused wilting and death of the young leaves, and chlorosis and death of older leaves.

ful unions. Four of the tested scions were found to be compatible with the *G. robusta* rootstock and produced successful plants that will be tested in landscape plantings. Four scions were not compatible, and although the plants started to grow they rapidly developed symptoms of incompatibility – wilting and drying of young foliage, and/or yellowing and necrosis of older leaves.

Grafted plants of four of the cultivars varied in their behavior after successful formation of the graft union. Some plants grew successfully and others showed a range of symptoms of incompatibility. This variability in response may be related to the genetic variability associated with the use of seedling rootstocks and suggests that a compatible genotype might be selected as a cutting-propagated rootstock.

Rhododendrons and Azaleas

Rhododendron occidentale obtained from a serpentine (high pH) site was tested as a rootstock for grafting rhododendron and azalea cultivars. The rootstock plant has been growing successfully for some years in the high soil pH conditions of a Davis garden. Unfortunately, this species is difficult to root and the major focus of research in this part of the project was in refining techniques for rooting cuttings in order to build up a block of clonal stock plants. Despite these

Cultivar/Species	% Take	Avg. Time to Take	Compatibility
G. robusta	100	15 days	yes
G. Red Hooks	97	28 days	no
G. Ivanhoe	57	26 days	no
G. Ruby Clusters	76	32 days	yes
G. Constance	46	30 days	yes
G. Robyn Gordon	88	26 days	yes
G. speciosa oleoides	55	26 days	partial
G. Superb	53	36 days	partial
G. Mason s Hybrid	38	30 days	partial
G. Poorinda Royal Mantle	50	35 days	partial
G. Murray Valley Queen	19	36 days	no
G. asplenifolia	19	29 days	no

A range of grevillea species and cultivars grew successfully after grafting onto G. robusta seedling rootstocks. However, four of the eight were only partially successful.

problems, a reasonably reliable protocol for rooting cuttings of the rootstock was developed and a single grafting trial was conducted. Grafts that were placed under mist for two weeks after grafting appear to have had greater success and fewer instances of scion wilting than those that were placed under plastic bags and provided with shade.

Micrografting

As an alternative to traditional bench grafting, we established rootstock and scion materials in *in vitro* culture for use in testing the possibility of a micrografting approach to producing plants grafted onto pH tolerant rootstocks. Although time did not permit the production of any micrografts, procedures for establishing and subdividing *G. robusta*, grevillea cultivars, and *R. occidentale* in culture were developed. Initial explants from both *G. robusta* and *R. occidentale* produced good shoots for subdivision, but secondary explant shoots were thin and numerous. Time did not permit rooting trials of micrografting attempts with micropropagated plants of either genus. However, with refinements in media composition and subdivision techniques, micrografting may eventually be a viable means of producing grafted grevilleas and rhododendrons.

Future work

The successful grafted grevilleas and rhododendrons are now being established in a range of landscape settings to see how they perform in comparison to own-rooted plants of the scions. Observation over the next few years will indicate the potential for this approach, and our selected rootstocks, in making these plants a more common component of the California garden.

Michael S. Reid is a Professor, Wesley P. Hackett is Professor Emeritus and Jason S. Julian is a Graduate Student in the Department of Environmental Horticulture at the University of California, Davis.