

bulk of the trade is carrying out the entire process in containers.

Roses do very well in Western Australia where dry summers ensure that we have no fungal problems for at least half of the year. Our deep sandy soils have little water holding capacity so permanent irrigation systems are needed to provide regular and frequent waterings. Selection of rootstock to suit this soil type is most important. We use *Rosa fortuniana* rootstock for its vigour in our hot dry summers and its roots thrive in the high soil temperatures that we have.

We have changed from field growing of roses to fully containerized production largely to reduce the pressure of handling all the stock in the winter months. With containerization we have year-round sales. We do most of our promotion for autumn sales and are generally running low on stocks by the beginning of summer. Containerization also results in a high degree of self service by the customers and having the roses in flower is a major help in ensuring customer satisfaction.

We have tried using both the traditional stock bed, and striking directly into 9-inch containers, with variable results. We are now striking cuttings in tube trays and foam cell trays with better results. This also gives much better results when planting out than does the stock bed method. We plant out into the smaller 6-inch pots for budding and then go directly to the buckets. Using the smaller pots also requires much less space.

Open ground produced *R. fortuniana* have very few buds coming away in the first year so must be sold as two-year-old bushes. Containerized production under our conditions gives a most presentable, multistem rose from three to four feet high and in flower in 15 months.

HARD-TO-PROPAGATE WESTERN AUSTRALIAN NATIVE PLANTS

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INTRODUCTION

The flora of Western Australia contains a very large number of species and includes some of the showiest plants in the world. The majority of West Australian wildflowers are no different from any other plants in terms of propagation. It may be argued that all plants can be propagated but considerable difficulty is experienced when attempting to propagate many of

these species in commercial quantities and at acceptable prices. It does not necessarily apply that it is easier in quantity; for example, try making 10,000 *Hemiandra pungens* cuttings. Because of its uniqueness there is much to learn about the flora of Western Australia. It ranges from those species found deep in the Karri forest to those thrashed by the elements on the coastline and to inland species bordering the desert. As further progress is made more and more of these magnificent specimens will be marketed and displayed happily in home gardens.

Consider some of the reasons why more of our native plants do not appear in the majority of garden centres. Lack of identification or promotion of the plant is important. In order to sell a plant to the public one must be able to observe the end product, a fully grown specimen plant and its flowers. It must have appeal to the prospective buyer.

Propagation of our indigenous species by vegetative means has not been widely adopted because of their reputation for being hard to grow. A plant is only hard to grow if you do not know how to grow it! If you do not know then set yourself the task of searching out and eliminating the difficulties.

Plant species grown from seed are notorious for their variability and for delayed flowering. For example, *Kunzea baxteri* grown from seed takes approximately 4 years to flower whereas from cuttings it flowers the first season in the pot to the delight of the buyer. We can overcome delayed flowering by vegetative propagation. Native plants received a bad reputation years ago because it was claimed they were scruffy and had no appeal. Careful selection of plant and flower variants has improved their standing.

To bring a new plant into production growers obtain cutting material directly from the natural site of that particular species. Results of these exercises are usually very poor, leading to impatience on the part of the grower and perhaps even discarding that species because it is too hard to grow. To overcome the problem the grower needs to provide himself with sufficient suitable vegetative plant material. This requires a long term plan whereby a small quantity of material, carefully selected from a parent plant in the field, is propagated and planted in a garden environment where it is evaluated for its horticultural merit. If it has real merit then these plants become the mother plants for future propagation material. Gradually the harsh bush plants are transformed into more manageable, productive and spectacular species. Of course, this process cannot be completed in one season but requires a program over as much as five years.

PROPAGATION

In considering the propagation of plants for commercial purposes one needs to obtain maximum productivity. To achieve this we must be very careful in choosing the plant material. Considerable effort must be made to get clean cutting material and so to reduce the incidence of fungal infection.

Hormone powders are used extensively as an aid to root formation. We have used the propriety hormone powders Seradix 1 and 2, and Pyco 3 and 4. We have experimented with mixtures of indolebutyric acid (IBA) and naphthaleneacetic acid (NAA), both in liquid and powder forms. As a rule we use Pyco 4 for most cultivars.

The medium used for propagation has varied considerably over the years but at this stage we use peat and perlite in the ratios 1:1 or 1:2. We have used these materials directly without sterilisation and obtained satisfactory results but for long term protection steam/air pasteurisation is used. Pasteurisation is performed at 60°C for 30 minutes followed by immediate cooling. This material has been recycled many times (mainly because of the cost of perlite) but each time new peat and perlite is introduced. When the content of decomposed plant material increases too much the mix is used in the tubing process.

To maintain a minimum level of infection in the glasshouses a spray programme using Captan or Thiram is implemented each 7 to 10 days. The cuttings are placed either into flat trays or directly into seedling foam trays (110 units) according to space availability. Mist sprays are used to keep the cuttings moist. Because automatic systems are available it does not mean all problems are solved. It must be remembered that all plants cannot be treated alike. Some of the Western Australian species are from dry areas, others are wet area plants. Some plants can be propagated very moist or even wet but the majority of the dry area plants turn black and drop their leaves under constant mist. Therefore we start them in mist, move them to a no mist area, then to a warm area of the glasshouse, igloo or bushhouse depending upon the time of the year. This is a slow process but ensures a high yield in the long term. In due course the plants are tubed up into larger units.

Over the years, large numbers of the more difficult species have been lost during the potting-on stage. This requires careful timing to reduce losses, but an even better solution would be to eliminate that costly stage by growing the cuttings in individual units.

SPECIFIC EXAMPLES

Legumes, such as the acacias and gastrolobiums, gompho-

lobiums, eutaxias, (that is the bacon and egg family) have some of the showiest flowers. Most plants in this family are normally grown from seed, but because of their lack of appeal without flowers they prove difficult to sell. We can overcome this by producing flowering plants by vegetative means.

Adenanthos species — e.g. *A. cuneatus* and *A. teges* give good results if hardwood cuttings are used.

Billardiera bicolor (syn.: *Marianthus pictus*) This is one of the showiest of the shrubby twiners and bears reddish colored flowers with stripes in the throat during mid-summer. Moderate success is obtained during autumn using the intermediate wood between the soft tips and the old wood.

Banksia spp. and *Dryandra* spp. have for many years been the envy of the gardening enthusiasts. The difficulty with these is probably mainly due to the shortage of seed, but we can overcome this to some extent by growing them from cuttings.

Generally cuttings of large firm tips 5 to 15 cm. long, selected from medium to hard wood strike reasonable well. This material normally appears during autumn to winter. *Banksia* species grown in this manner are *B. occidentalis* and *B. verticillata*. It seems as though the species from the wetter areas in the south strike fairly readily. As a general rule they do not respond to strong hormones. In future years we should see banksias flowering in containers!

Calytrix fraseri. Large tips are taken after flowering, late in summer because they are relatively soft. Place under mist and use a soft wood hormone.

Conospermum, (smokebush) Because seed is very hard to collect, it is better to use large tip cuttings from autumn to mid-winter.

Darwinea spp. (mountain bells) are some of the most sought after species amongst the W.A. flora. The greatest difficulty is producing suitable stock from which a consistent supply of cuttings can be obtained.

Grevillea spp. to date have been regarded as hard to grow. They do not appear to tolerate overmisting. Best results are obtained by pruning the plant harshly, then irrigating to induce a large quantity of soft new growth. This material is soft and easy to propagate.

Grevillea obtusifolia propagates best by using large firm tips in winter. The smaller growing species are easy to propagate but the large, woody species are difficult.

Grevillea bipinnatifida is a difficult species to propagate; even more so than 'Robyn Gordon'. In this case it is important to select the best forms available to grow. Three valuable selec-

tions are greyish-green foliage with orange flowers; grey foliage and red flowers and a green foliated form with red flowers. To date, best results have been obtained in direct units using soft to medium wood about 10 cm. long during summer.

Hakea cuculiata (scallops). Generally, hakaes are not propagated from cuttings but it can be done, primarily to display flowers in pots. Hardwood cuttings are taken around autumn.

Hemiandra pungens is hard to consistently produce. It tends to rot off, an indication that it should be propagated fairly dry. Because it is a vigorous ground cover the harder wood (not tips) yield a greater percentage during winter.

Hibbertia hypericoides. A difficult species to get started. The softest material seems to strike easiest. Other *Hibbertia* species, such as *H. cuneiformis* and *H. stellaris*, from the wetter areas in the south are easier to strike.

Kunzea pulchella. Three selected forms are being propagated; a green foliage red-flowered form during winter to spring, a grey foliage form with cerise-pink flowers from winter to spring, and a grey foliage, red-flowered form during early to mid-summer. Vegetative propagation from these selected forms has been slow but we can now get a high percentage of cuttings to strike using medium to hardwood cuttings about 10 cm long. The main difficulty has been due to continuous misting. This, of course, is a dry area species.

Petrophila linearis (pixie mops) can be grown from medium to hardwood cuttings, approximately 5 to 8 cm long during winter.

Verticordia spp. (Morrison's, or feather flowers) are propagated from firm tips which are produced after flowering. As previously described it is important to produce stock plants from which suitable cuttings material can be obtained.

CONCLUSION

The flora of Western Australia has immense horticultural potential. For many years these unique flowers have been exploited for their value in the fresh cut flower trade and for dried arrangements. It is now urgent that these species be introduced into cultivation.

A plant is only rare if you do not know where to find it and only hard to grow if you cannot successfully encourage it to grow. Basically all plants are equal but there is a need to develop new techniques especially applicable to species adapted to dry areas. Once these techniques are developed a serious promotion and marketing programme is required to ensure that these magnificent species become part of all gardens.