GRAFTING AUSTRALIAN NATIVE PLANTS

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This paper deals with the results of a large number of experimental grafts using Australian native plants. (Tables 1, 2, and 3). Because of the large number of grafts made, methods were adapted or developed to produce grafted plants as quickly as possible. The three main methods involved used very young seedlings or tender shoot growth. The advantage of these methods was that an adequate supply of relatively homogeneous scion material was easily produced or gathered.

The three grafting methods were:

1. **Grafting at the Cotyledon State.** The method described by McKenzie (2) for grafting *Clianthus* spp. was used. When grafting Proteaceae spp. special care had to be taken to observe strict hygiene as these plants were very susceptible to fungal disease in the first few months.

Grafting at the cotyledon stage was possible with some Myrtaceae plants. Some species produce a hypocotyl (tissue below cotyledons above soil surface) which is sufficiently robust to graft if care is taken. Some *Eucalyptus* species, most *Eremaea*, *Beaufortia*, and *Regelia* species produce quite sturdy and relatively thick hypocotyls.

The two species *(Kunzea ambigua* and *Leptospermum phylicoides)* used as stock for the above genera are, by contrast, rather thin and spindly when very young. They, therefore, have to be grown to a much larger size (60 to 80 mm) to obtain stem diameters which match the scions, and are at the semi-mature stage when grafted.

Teflon tape was used as a grafting tape in all three methods. It was strong, easily torn longitudinally into strips 1 to 3 mm wide, did not need to be tied, and was cheap. It was, however, somewhat difficult to handle.

After the graft was made, the plants were kept in a humid atmosphere for up to 5 weeks. This was achieved by covering each plant with a small throw-away plastic medicine glass. These were quite inexpensive and, being translucent, allowed plenty of light to reach the newly-grafted plants. The medicine glasses were changed daily.

Mist was used for some species without ill effect after the first week. The grafts were finally unwrapped and slowly hardened off.

2. **Grafting Growing Tips.** Stock plants were grown in separate tubes to the required stem diameter. An actively-growing green tip was taken from the other plant and the scion was shaped to a wedge. A top wedge graft was made and the graft was bound with Teflon tape. The plants were then treated in the same way as those above.

3. **Cutting-Grafts.** The method used was a side cutting-graft, an adaptation of the method described by Burke (1). A side wedge graft was prepared and bound with Teflon tape. This was buried in the cutting medium so that the graft itself was covered, but the leafy tops of both the scion and stock were above the medium.

The cutting-grafts were placed under mist until the stock had rooted. The young plants were then potted into individual pots so that the graft union was well clear of the soil.

In all three methods the material used was small and quite difficult to handle. It was found that a large lens on a stand or a jewellers binocular loupe worn over the eyes was most useful in cutting and positioning the scion.

RESULTS AND DISCUSSION

The following points have become evident (Tables 1, 2, 3):

(a) Many combinations of stock/scions proved to be unsatisfactory as grafted plants. For a plant to be useful the growth rate should be similar or better than the normal rate attained by the scion growing on its own roots. A number of grafted plants survived for some time but their growth was extremely slow — these were marked x on the tables.

(b) The classic symptom of incompatibility — a clean break at the graft union — can occur at quite a late stage, sometimes several years after grafting.

(c) Using juvenile material, incompatibility may be suppressed for a time. It may then show up as one or more of the following symptoms, months or even years later:

(i) Clean break at the graft union.
(ii) Slow or stunted growth, or general malaise.
(iii) Gross disparity between stock and scion stem width.
(iv) Tendency of stock to produce shoots continually.
(v) Abnormalities in the union, in particular a furrow appearing right around the stem bark at the graft union, indicating discontinuity of growing tissue beneath the bark.

In general, the following combinations look very promising.

TABLE ONE PROTEACEAE

STOCK SPECIES	SCION SPECIES	NUMBER GRAFTED	NUMBER SURVIVING	AGE OF OLDEST PLANT	COMPATIBILITY
Banksia ericifolia	*B coccinea*	1	0	4	X
	B.nutans	1	1	36	+?
	B.violacea	1	1	48	+?
	B.occidentalis	4	0	6	X
	B.sphaerocarpa	2	0	18	X
	Dryandra praemorsa	1	0	6	X
	D.polycephala	2	0	6	X
Banksia integrifolia	*B.baxteri*	4	0	4	X
	B.benthamiana	3	1	48	+?
	B.brownii	10	5	55	+?
	B.burdettii	2	0	10	X
	B.coccinea	2	0	10	X
	B.grandis	2	2	36	+
	B.laevigata subsp.laevigata	1	1	42	+?
	B laevigata subsp.fuscolutea	13	7	45	+?
	B.lanata	2	1	18	?
	B.laricina	24	1	22	X
	B.lehmanniana	2	2	40	+
	B.leptophylla	2	1	18	?
	B.lindleyana	1	0	8	X
	B.littoralis var. littoralis	3	1	36	?
	B.littoralis var. seminuda	3	3	24	?
	B.media	1	0	30	X
	B.micrantha	1	0	18	X
	B.occidentalis	35	30	48	+
	B.oreophila	1	0	5	X
	B.pilostylis	4	1	38	?
	B.praemorsa	2	0	24	X
	B.prionotes	2	0	12	X
	B.scabrella	9	1	18	X
	B.speciosa	7	0	18	X
	B.sphaerocarpa	2	0	18	X
	B.telmatiaea	2	0	12	X
	B.verticillata	3	3	39	+
	B.victoriae	3	3	60	+?
	B.violacea	3	3	24	+
B integrifolia	*B.sceptrum*	4	0	9	X
	B.solandri	20	18	18	+
	Dryandra polycephala	8	0	15	X
	D.praemorsa	2	0	8	X
	D.speciosa	2	0	5	X
Banksia lehmanniana	*B.burdettii*	1	0	4	X
	B.oreophila	1	0	4	X
Banksia marginata	*B.grossa*	1	1	18	?
	B.lanata	3	2	18	?
	B.laricina	3	1	18	?
	B.nutans	1	0	12	?
	B.oreophila	2	0	5	X
	B.praemorsa	1	0	4	X
	B.sphaerocarpa	1	0	6	X
Banksia saxicola	*B.scabrella*	2	1	24	?
	B.leptophylla	5	2	24	?
	B.incana	1	0	12	?
Banksia robur	*B.oreophila*	2	0	5	X
Banksia serrata	*B.baueri*	1	0	12	?
	B.baxteri	2	0	5	?
	B.burdettii	38	15	36	?
	B.caleyi	1	0	18	?

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STOCK SPECIES	SCION SPECIES	NUMBER GRAFTED	NUMBER SURVIVING	AGE OF OLDEST PLANT	COMPATIBILITY
	B.candolleana	1	1	24	?
	B.chamaephyton	1	0	4	?
	B.elderiana	1	0	4	X
	B.lehmanniana	1	1	24	?
	B.menziesii	7	4	30	?
	B.leptophylla	1	0	4	X
	B.incana	1	0	4	X
	B.pilostylis	2	1	18	?
	B.prionotes	1	1	36	+?
	B.speciosa	12	9	36	+?
	B.victoriae	6	2	28	+?
Banksia spinulosa var. spinulosa	*B. brownii*	2	0	12	X
	B. burdettii	3	0	6	X
	B. elderiana	3	2	30	+?
	B. laevigata sub-sp. fuscolutea	3	1	24	?
	B. lindleyana	2	0	8	X
	B. littoralis var littoralis	2	0	4	X
	B. nutans	2	0	15	X
	B. occidentalis	2	0	4	X
	B. pilostylis	2	0	15	X
	B. praemorsa	5	2	36	?
	B. prionotes	3	0	4	X
	B. sphaerocarpa	2	0	18	X
	B. verticillata	2	0	8	X
	B. victoriae	1	0	4	X
	B. violacea	2	0	6	X
	Dryandra praemorsa	8	5	60	+
	D. polycephala	2	0	5	X
	D. proteoides	3	0	8	X
	D. quercifolia	1	0	5	X
Banksia spinulosa var. collina	*B. ashbyi*	2	0	3	?
	B. brownii	3	2	56	+?
	B. laricina	1	1	60	+?
	B. laevigata sub-sp. fuscolutea	2	0	18	X
Banksia verticillata	*B. coccinea*	2	0	12	X
	B. scabrella	1	0	10	X
	B. micrantha	1	0	8	X
	B. oreophila	1	0	6	X
	B. elderiana	1	0	6	X
Grevillea robusta	*G.dryandri*	2	2	36	+
	G.candelabroides	2	2	36	+?
	G.petrophiloides	5	0	24	X
	G.wilsonii	2	2	36	+
Grevillea barklyana	*G.petrophiloides*	3	0	12	X
Grevillea 'Clearview David'	*G.asparagoides*	1	1	36	?
	G.eriostachya	2	0	15	X
	G.flexuosa	2	0	12	X
Grevillea banksii	*G.petrophiloides*	5	0	12	X
	G.'Misty Pink'	1	1	36	+
Grevillea rosmarinifolia	*G.petrophiloides*	3	2	30	?
	G.wilsonii	3	2	15	+
Hakea laurina	*H.francisiana*	5	0	18	X
	H.coriacea	2	0	20	X
	H.multilineata	7	0	24	X
Hakea nodosa	*H.coriacea*	3	1	18	?

TABLE ONE PROTEACEAE

STOCK SPECIES	SCION SPECIES	NUMBER GRAFTED	NUMBER SURVIV-ING	AGE OF OLDEST PLANT	COMPATI-BILITY
Hakea salicifolia	*H.francisiana*	29	15	18	+?
	H.multilineata	5	4	18	+?
	H.bucculenta	200	180	48	+
	H.coriacea	100	80	48	+
	H.francisiana	500	460	48	+
	H.grammatophylla	20	10	36	?
	H.lorea	6	3	30	?
	H.multilineata	300	275	48	+
	H.victoriae	6	0	14	X
Hakea sericea	*H.francisiana*	5	3	30	+?
	H.multilineata	2	1	30	+?

TABLE TWO MYRTACEAE

Astartea fascicularis	*Chamelaucium uncinatum*	6	0	18	X
	Darwinia leiostyla	3	0	12	X
	Verticordia chrysantha	2	0	12	X
Calytrix sullivanii	*Chamelaucium uncinatum*	3	1	18	X
	Darwinia leiostyla	2	0	8	X
Darwinia citriodora	*Chamelaucium uncinatum*	20	15	36	+?
	Actinodium cunninghamii	3	1	24	?
	Darwinia carnea	4	4	24	+
	D. collina	2	2	16	+
	D.hypericifolia	6	4	26	+
	D.leiostyla	20	18	36	+
	D.macrostegia	30	26	36	+
	D.oldfieldii	3	2	36	+?
	D.oxylepsis	10	9	36	+
	D.nieldiana	5	3	18	?
	D.purpurea	3	3	16	?
	D.squarrosa	4	3	18	+
	D.virescens	3	2	18	?
	Verticordia chrysantha	5.	4	36	+
	V.densiflora	2	2	16	?
	V.mitchelliana	5	3	36	+?
	V.monadelpha	4	3	30	+?
	V.nitens	10	0	13	X
Darwinia fascicularis	*D.macrostegia*	1	1	18	?
Darwinia grandiflora	*D.leiostyla*	2	1	24	?
	D.macrostegia	2	2	24	?
Eucalyptus gummifera	*Eucalyptus ficifolia*	10	5	36	?
Kunzea ambigua	*Beaufortia squarrosa*	3	0	8	X

TABLE TWO MYRTACEAE

STOCK SPECIES	SCION SPECIES	NUMBER GRAFTED	NUMBER SURVIV-ING	AGE OF OLDEST PLANT	COMPATI-BILITY
Kunzea ambigua	*Eremaea beaufortioides*	2	1	24	?
	Kunzea affinis	2	2	24	+
	K.baxteri	3	3	28	+
Leptospermum phylicoides	*Beaufortia squarrosa*	3	0	6	X
	B.sparsa	6	0	6	X
	Eremaea beaufortioides	4	0	5	X
	E.pauciflora	3	0	4	X
	E.fimbriata	3	0	4	X
	Kunzea affinis	5	5	30	+
	K.baxteri	15	13	30	+
	K.pulchella	3	3	24	+
	Chamelaucium uncinatum	10	0	12	X
	Melaleuca scabra	2	0	8	X
	Verticordia chrysantha	4	0	6	X
	V.mitchelliana	2	0	6	X
	Regelia velutina	5	0	6	X
Regelia ciliata	*Eremaea beaufortioides*	2	1	24	?
	Beaufortia schaueri	1	0	15	X
Regelia megacephala	*Beaufortia orbifolia*	2	0	6	X
	Regelia velutina	2	1	18	?
Thryptomene saxicola	*Actinodium cunninghamii*	*3*	*0*	*18*	*X*
	Chamelaucium uncinatum	5	0	12	X
	Darwinia leiostyla	*5*	*1*	*30*	+?
	D.macrostegia	5	0	10	X
	Verticordia mitchelliana	3	1	18	+?
	V.monadelpha	2	1	18	+?

TABLE THREE
GRAFTS OF OTHER PLANT FAMILIES

PAPILIONACEAE					
Clianthus puniceus	*Clianthus formosus*	3000	?	60	+
RUTACEAE					
Boronia clavata	*Boronia megastigma*	5	3	24	?
Correa alba	*Eriostemon verrucosus*	2	0	26	?
C 'Marions Marvel'	*E. australasius*	3	0	6	X
C. 'Dusky Pink'	*E. verrucosus*	1	0	15	?
	Correa 'Fat Fred'	1	1	18	+

Banksia grandis, *B. solandri*, *B. occidentalis*, and *B. verticillata* on *B. integrifolia* rootstock.

Hakea bucculenta, *H. francisiana*, *H. coriacea*, and *H. mullilineata* on *H. salicifolia* rootstock.

Kunzea spp. on *Kunzea ambigua*, and *Leptospermum phylicoides* rootstock.

Most *Darwinia* species and, perhaps, some *Verticordia* species on *Darwinia citriodora* rootstock.

Clianthus formosus on *Clianthus puniceus* rootstock.

It is, perhaps, surprising that so few of the trials produced satisfactory plants. A most important point, however, is that grafted plants should be grown for a number of years before a claim of success is justified.

LITERATURE CITED

1 Burke, O 1983 Grafting Australian native plants. *Austral Hort* , 7 11.

2. McKenzie, D M. 1981. Grafted desert peas. *Austral. Plants* Dec, p. 282.

INFLUENCE OF DAYLENGTH ON THE PRODUCTION AND QUALITY OF CUTTINGS FROM FUCHSIA MOTHER PLANTS

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INTRODUCTION

Investigations into the reaction of fuchsias to daylength have been carried out by many workers including Roberts and Struckmeyer (6), Sachs and Bretz (7), Heide (4), Guttridge (3), Canham (2), Zimmer (9,10,11). In these investigations flowering was of primary interest. It was found that different fuchsia cultivars showed different reactions, and that different cultivar groups showed differences in flowering.

Most of the fuchsia cultivars offered for sale are long-day plants. In the literature these are named *Fuchsia* × *hybrida* or *Fuchsia*-hybrids, in spite of the fact that they mostly originate from *Fuchsia magellanica* and thus ought to be named *Magellanica* hybrids.

This large group should, however, be divided into two smaller groups, the larger being the obligate or qualitative long-day plants, and the smaller being the facultative or quan-