Lidbetter, J., T. Slater, P. Cain, M. Bankier, and **S. Vujovic.** 2002**.** Grafting *Eriostemon australasius*. RIRDC Publication No.02/140.
Navarro, L. 1990. Shoot-tip grafting in vitro of woody species and its influence on plant age, pp.117–123. In plant aging: Basic and applied approaches. Pikenum Press, New York, New York.
Pniewski, T., J. Kapusta, and **A.B. Legocki.** 2002. In vitro micropropagation of four lupin species. Acta Physiol. Plant. 24:417–424.
Senthil, G., B. Williamson, R.D. Dinkins, and **G. Ramsay.** 2004. An efficient transformation system for chickpea (*Cicer aretinum* L.). Plant Cell Rept. 23:297–303.

"Long John" Grafts©

Allen Gilbert
Gilbert & Cosgrove P/L, 49 Coolangatta Road, Adventure Bay TAS 715

INTRODUCTION

Usually when short scions (graft pieces) are grafted to any fruit tree or rootstock the scions used have only leaf buds evident. When the graft "takes" it will only produce leafy shoots, which form branches. It can then take from 3 to 5 years or more before that branch will be large enough or mature enough to produce significant amounts of fruit. This is especially so if spur pruning is the method of pruning used.

I have found that by using a different technique, selected scions with flower buds already formed on them can be encouraged to produce lots of fruit in the same season that they are grafted to the tree. The new approach I will describe developed from the success I achieved by using short scion pieces with flower buds attached, and grafting them onto apple trees. These produced some fruit on those graft pieces in the same season that the grafts were done, but I found that the longer pieces resulted in a heavier crop in the first season.

THE "LONG JOHN" TECHNIQUE

The technique of using long scions (20–100+ cm) together with a plastic sleeve has developed as a result of experiments over a period of 15 years. It was originally used for grafting a 'Granny Smith' apple scion (*Malus domestica* 'Granny Smith') onto an established green/purple fruited 'Northern Spy' (*M. domestica* 'Northern Spy') apple tree in July 1998. In this first attempt, I used an unpruned single 1-year growth scion (lateral) over 1 m long that contained leaf buds but no flower buds or spurs. The graft piece was positioned almost horizontally on the tree and was covered with a plastic sleeve, moisturised inside, sealed at the top end, and open at the base to allow air circulation. The warming aspect of the sleeve and the length of scion used is the reason I started calling these longer scions "Long Johns."

The attached scion formed spurs with flower buds along its entire length in its first season of growth (1998–1999). During the 1999–2000 season it produced many green apples that had developed from these formed flower buds. The weight of the apples bent the branch downward and it was easy to pick from the ground and the grafted branch stayed bent in the same position even after the fruit was picked adding to the low-profile shape of the tree. This low-profile shape is also characteristic of the little or no pruning approach I have been developing (Gilbert, 2001).

I have also grafted lengthy unpruned single scions on plums, prunes, cherries and pears with great success. It is worth noting, however, that if the attached scion is pruned at the tip before or after grafting occurs, flower bud and spur formation

along its length will be compromised and results will be unsatisfactory. If the selected scion has flower buds then it is wise to remove the plastic sleeve after grafting just as the flowers start to open. This allows bees and other pollinating insects to pollinate the flowers and the scion to produce fruits during the same season as the graft was done. Integral to the success of this method is a nonpruning or very minimal pruning system of the attached scions.

Also significant to the success of grafting these very long scions, is the use of a plastic sleeve to cover the scion and graft area to prevent the scion from dehydrating and drying out. I cover the entire graft piece to below the graft area with a thin plastic sleeve open at the base and sealed at the top and moisturised with water inside the sleeve.

The plastic sleeve used is made from a section of tubular packaging plastic that is sealed at one end with masking tape. Any recycled plastic can be used to make these sleeves. Bubble-plastic can also be used as sleeve material and will enhance callus formation to a greater extent than single layer sheet plastic material. Water is squirted into the tube then the sleeve is placed over the graft piece leaving the base open for aeration. The sleeve can be pinned at the base with an ordinary sewing pin or mapping pin to prevent it blowing away. This is especially important as the longer grafts are more susceptible to damage as a result of wind movement. If the graft piece is very exposed to sunlight or high UV light then it will be necessary to either place a paper bag over the plastic sleeve or use white paint to partially paint the outside of the sleeve. This will ensure only filtered light is allowed to penetrate the sleeve, preventing sunburn.

The use of a protective sleeve has several effects upon the inserted scion. The graft piece is kept protected from the weather, the humidity prevents it from drying out and dying, and the warmth inside the sleeve enhances the ability of the graft to knit quickly (i.e., callus formation is enhanced).

THE ELONGATED WHIP AND TONGUE GRAFT

To attach lengthy scions I have found that an elongated whip and tongue graft is best, providing the graft area is triple wrapped with budding tape to secure the scion at that point and prevent any movement at the graft union. The wrapping tape is left on for 9–10 months before removal to ensure that the tissue is fully healed all around the graft wound area. An elongated whip and tongue graft is created by making the sloping cuts used on the rootstock and scion about 100 mm or longer. This allows better contact with cambium layers (the cambium layer is situated just under the bark layer and is responsible for producing healing growth tissue) necessary for grafting to occur. To create the "tongue" of the whip and tongue graft a horizontal cut is made across the original sloping cuts made on the scion and rootstock and split for 10–20 mm. One horizontal cut is made half way along the original sloping cut of the rootstock or scion piece and the other cut one-third of the way along the other sloping cut so as to make sure the whip and tongue fits neatly together.

Because the scions are very long it may be an advantage to secure the scion in place or rest it on another limb or support to prevent damage from wind. If the scion is moved too much by wind the graft will not "take" and the operation will be a failure.

CONTINUING EXPERIMENTATION

Later experiments involved the use of long scions (over 1 m) chosen from 2- to 4-year-old branches that had already formed flower buds and short flower bud spurs along their length, to ensure fruit production from the "Long John" scions during their first season of growth. Some of these grafts were made on espalier trained fruit trees.

On one espalier apple tree I tried to create instant fruiting limbs. Two selected scions over 1 m long were cut from donor trees, one an improved selection of *M. domestica* 'Golden Delicious' named *M. domestica* 'Jim Riley' and the other an old heritage cultivar named *M. domestica* 'James Grieve'. The grafting onto a *M. domestica* 'Snow Apple' tree was carried out in August. By the end of November the flower buds on the scions had started to open slightly and the sleeve was removed to allow bees to pollinate the flowers. Pollination was successful and each "Long John" scion piece produced one 10-L plastic bucket of fruit in late summer. These branches were then left unpruned and the following year (2nd), they produced another bountiful crop. In the following year (3rd) they were also left unpruned and produced another similar crop.

One advantage of placing "Long John" grafts onto an espalier tree is that you get instant limbs with spur systems already formed that are suitable for a nonpruning or very minimal pruning regime. Pruning the traditional way, it may take 3 or 4 years to train a limb or graft scion to that same length using harsh spur pruning methods.

To take the technique further, there is no reason why an aged or misshapen tree could not be cut back substantially, even to a stump, then allowed to grow 20 or 30 long thin branches. These thin regrowth branches could then be grafted onto (using "Long John" grafts) during the following winter. Each scion could be a different cultivar giving you a range of fruits maturing over a long time period or they could be all of one cultivar. Multi grafting is one way to save rare heritage cultivars and it is also a method of producing a tree with many types of fruit.

"Long John" branches can also be grafted to the cut limbs to achieve an instant fan-shaped espalier. One way of dealing with suckers growing from a tree rootstock is to graft a "Long John" scion to the sucker to utilize the rootstocks potential, and to slow tree growth and reduce further suckering from the root system.

CONCLUSION

I believe the "Long John" grafting technique has potential for commercial use as well as for home gardeners interested in quick production from fruit trees or in multigrafting espalier grown trees. Scions are easily collected from the many heritage cultivars still around in back gardens as I have found on Bruny Island. Scions from these can easily be added to a collection grafted onto a single tree. The "Long John" grafts can be used on potted plant specimens with ease to produce instant "formed" plants suitable for small garden areas. With stone fruits the use of a compatible rootstock will enable apricots, peaches, plums, prunes, nectarines, and almonds to be grafted to the one tree. I am continuing to work on the "Long John" grafts improving the technique and developing its potential.

LITERATURE CITED

Gilbert, A. L. 2001. All about apples. Hyland House, Melbourne.