

Walnut Propagation Using Bench Grafting

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INTRODUCTION

The deciduous tree *Juglans regia* (English walnut) is of worldwide importance both for its edible nuts and valuable timber. Australia annually imports the majority of its walnut requirements from the USA and China.

Nurseries attempting to vegetatively propagate walnuts typically experience difficulties. Propagation from cuttings is generally not used because the results are too variable (Lagerstedt, 1981). Grafting and budding are more successful (Harrison, 1978, Graves, 1965), but in Australia, even these methods are often associated with low percentage take and inconsistent results. Similar problems have been reported in other countries (Avanzato and Tamponi, 1988).

This research aimed to develop a successful walnut grafting technique which would enable nurserymen to rapidly supply the local industry with superior cultivars. Work was performed over a period of two years (1988-89) using bench grafting in conjunction with a hot callusing device (HCD) (Lagerstedt, 1981). This device houses the graft union and produces localized heating (27°C) to promote callus development. Other plant parts are maintained at a cooler ambient temperature. For the current work a HCD was used which could accommodate varying rootstock diameters (Deering, 1989). The effects of time of grafting, type of scionwood and length of scion on the percentage 'take' are described.

MATERIALS AND METHODS

One year old black walnut (*J. nigra*) seedlings with a stem diameter of 8 to 12 mm at a point 100 mm above soil level were used as rootstocks. For winter grafting, stocks were lifted, graded and stored in the open with the roots covered with nursery soil. Rootstocks used for spring and late grafting were stored bare-root in sealed plastic bags at 0°C.

One-year-old lateral scions of the cultivar Franquette, with a diameter of 8 to 12mm, were collected from mature trees. Fresh scions were collected within 72 hours of grafting. For spring and late grafting, scions were harvested in June, sprayed with fungicide, and placed in a sealed plastic bag at 0°C.

The experiments investigated the following parameters with regard to their influence on grafting success:

- 1) Time of grafting: May, July, August and October
- 2) Scion type: **Woody scions** were obtained from the proximal half of one-year-old laterals and the internal pith was approximately 40% of the overall scion diameter. **Pithy scions** were obtained from the distal half of one-year-old laterals and internal pith was approximately 60% of the scion diameter.
- 3) Scion length: Multibud scions (3- to- 4 bud scions) and single bud scions.
- 4) Scion treatments: Fresh scions versus cool-stored scions.

Treatments consisted of ten replications and the proportion of successful grafts was analysed by a generalized linear model using Genstat 5.

Rootstock shoots and roots were pruned prior to grafting. The scions and rootstock shoots were surface sterilised with 70% ethanol or 70% methylated spirits. The grafting knife and secateur were also sterilized regularly. A splice graft was used with the slanting cut on the scion made opposite a bud (Figure 1). The cut on the rootstock was made to match the scion and both were tied tightly with plastic grafting tape, leaving the lower scion bud exposed. The exposed cut end of the scion was sealed with grafting wax, and the grafts transferred to HCD for 15 to 30 days. Plants were removed from HCD as soon as scion buds began to swell and elongate, and were planted directly into a field nursery during cool overcast weather. For the rest of the growing season plants were given standard field nursery treatment.

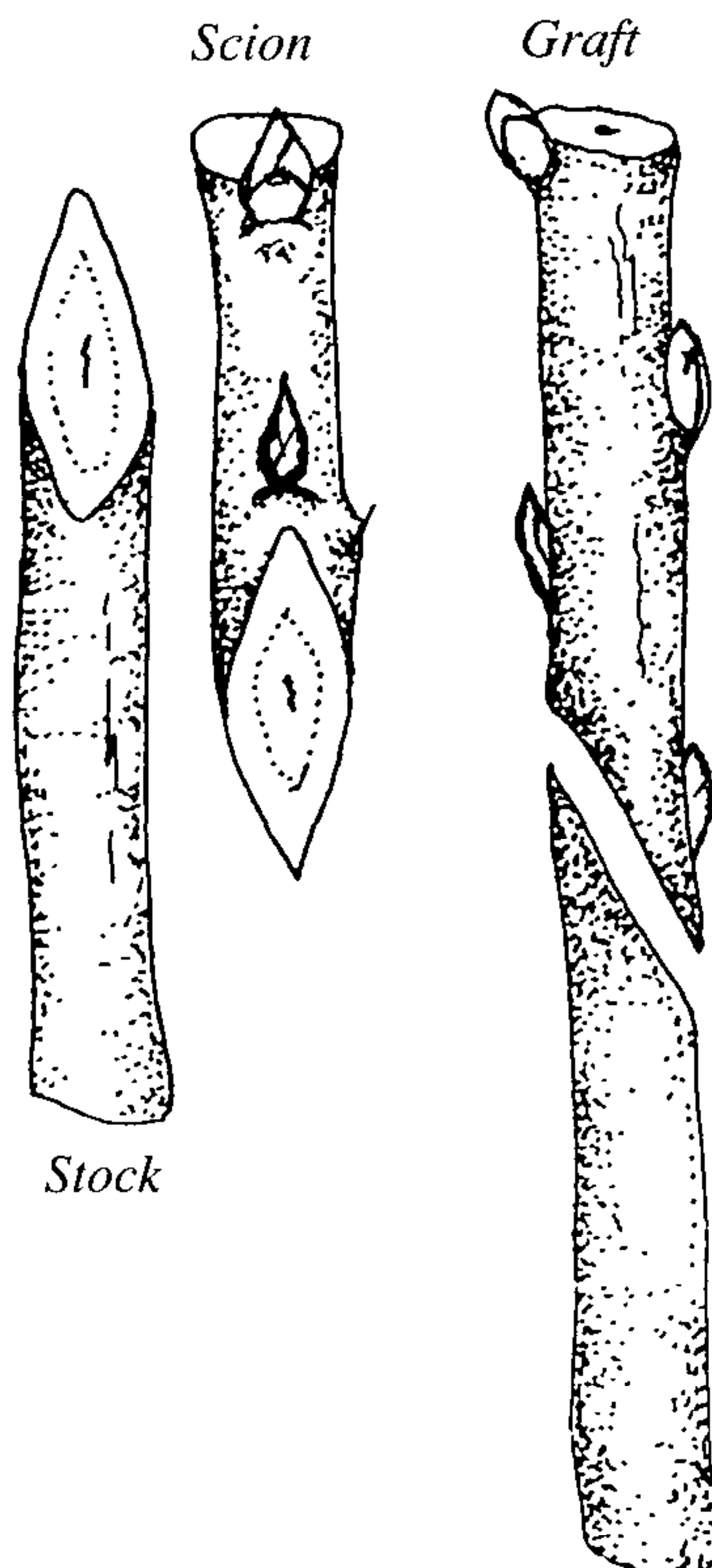


Figure 1. Walnut splice grafting.

RESULTS AND DISCUSSION

Table 1 presents data only for grafting with scions collected and used fresh, i.e. within 72 hours. There was no significant difference between woody and pithy scions. Multibud is obviously better than single bud. However, the rate of success with single-bud scions was such that in the situation where scionwood is limited, use of this type of scion might be warranted. Success rate increases through the dormant period and reaches a maximum in October, which is just before (2 to 3 weeks) natural bud break, i.e. when catkins begin elongation prior to terminal bud swell. Avanzato and Tamponi (1988) also reported highest success with late grafting.

Table 1. Effects of treatments on grafting fresh 'Franquette' scions.

		Successful grafts (%)
Scion type	Woody	59
	Pithy	60
	Significance	NS
Scion length	Multibud	71
	Single bud	47
	Significance	1%
Time of year	May	45
	July	45
	August	65
	October	82
	Significance	1%

Data in Table 2 are for both fresh and cool-stored material. Because no effect of scion type was found in the earlier analysis (Table 1), data for scion type were pooled for the second analysis. Multibud scions were significantly better than single bud scions and later grafting time was the most successful.

Cool storage of scions and rootstocks improved the percentage 'take' (Table 2). Over the period from July to October the percentage 'take' of fresh material increased from 45 to 82% and that of cool-stored material from 67 to 92%. Although cool-stored scions and rootstocks were always superior, perhaps the major benefit of cool storage can be achieved when grafting is done in winter or early spring. Graves (1965) also reported that greatest success was achieved following cool storage of walnut scions at 1°C for 10 weeks prior to grafting.

Use of the HCD in this experiment produced satisfactory grafting results. Where 'Franquette' scion material was tested, both pithy and woody scions could be used successfully. Three- to four-bud scions produced consistently better results than single-bud scions. Grafting was generally best done late in the dormant season but grafting time could be extended and results improved by cool storage of plant material.

Table 2. Effect of treatments on grafting fresh and cool stored 'Franquette' scions.

		Successful grafts (%)
Scion treatment	Fresh scions	64
	Cool stored scions	80
	Significance	1%
Scion length	Multibud	80
	Single bud	64
	Significance	1%
Time of year	July	56
	August	72
	October	87
	Significance	1%

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