cutting yield equivalent to that normally obtained when rooted cuttings are potted after approximately 6 months. This earlier potting procedure features the advantages of reducing the production time on a major portion of the crop, as well as reducing the transplant loss sometimes experienced with rooted cuttings which have remained in the cutting flats for an extended period of time.

Presently, we are using a commercial formulation of 16,000 ppm IBA powder (which was evaluated in Experiment 1), as crystalline IBA is no longer available to us for formulation of our own IBA solutions. The re-setting of unrooted, callused cuttings after 15 weeks also continues as our standard practice, yielding good results.

Vegetative Propagation of *Gevuina avellana* Mol.

Brent McKenzie
New Zealand Institute for Crop & Food Research Ltd., Invermay Agricultural Centre, Private Bag 50034, Mosgiel

INTRODUCTION

Gevuina avellana Mol. belongs to the Protaceae, and is related to *Macadamia,* producing similar nuts with edible kernels. This plant is a source of cosmetic oils and the timber is used for joinery and turning. Several common names are used for the plant, including Chilean nut and Chile hazel. The latter gives rise to the mistaken belief that the plant belongs to the genus *Corylus. Gevuina avellana* grows to form an attractive native tree in the Valdivian forest in Chile. It is known in Great Britain as an ornamental and is grown in the milder areas of Cornwall and Devon.

Our research shows that this plant has been grown in New Zealand since the 1940s, although poor types with small nuts have meant that it has only been grown as an ornamental. Tolerance of frost to -8C makes *G. avellana* hardier than *Macadamia,* thus making it of interest as a potential new crop for New Zealand. Roasted nuts are sold in Chile at prices of about NZ$7 per kg (Crop & Food Research, 1993, Halloy et al. 1993).

We have introduced several new accessions of *Gevuina* into New Zealand from South America. These are being screened for hardiness and will be compared with plants grown from trees already in the country. Once plants attain fruiting size, the quality and size of nuts can be compared. To provide plants for trials, and to be able to grow plants once an elite cultivar has been selected, trials were conducted to assess the feasibility of propagating *Gevuina* by stem and leaf-bud cuttings.

MATERIALS AND METHODS

Propagation trials were carried out in a twin-skin polycarbonate-covered greenhouse at Invermay Agricultural Centre, Mosgiel. Thermostatically controlled heating cables embedded in sand provided a mean basal cutting temperature of 22C. Air temperature was maintained at a minimum of 18C. Misting was controlled by an electronic leaf sensor. No artificial lighting was supplied.

At the time of taking cuttings, most plants were growing under glass in pots to produce cutting material. This tended to force plants into growth and produce another batch of cuttings in a season, whereas plants outside, had one main growth flush in spring. Cuttings were taken from a total of 13 accessions, although the number of cuttings varied depending on the number of stock plants available. Some cutting material was from second generation plants. Parent lines within each accession were also maintained so that any variation within each accession can be identified. This is particularly relevant when an accession has been obtained as seed, as there can be genetic variation between seedlings.

Cuttings were from either apical or axillary shoots and varied in length from 140 to 160 mm. They were dipped for 5 sec in 5000 ppm indolebutyric acid (IBA) potassium-salt formulation and stuck in plastic pots or trays. The medium was 1 peat : 1 sand (v/v).

When cuttings were trimmed to length in the past, excess material was discarded. The high rooting percentages obtained, and the manner in which roots were formed, suggested that this material should be tested as cuttings. It was made into leaf-bud cuttings, by cutting stems 10 mm above and below the nodes, leaving stem sections about 20 mm long. The leaflet of each cutting was trimmed depending on size. Cuttings were then treated in the same way as above. Care was taken to ensure that the small stem sections were secure in the medium, but that the buds were not covered so that rotting could not occur.

Cuttings were taken in summer (Feb.) and winter (June), with one accession in spring (Sept.). The internodal cuttings were taken in winter (June).

Phytophthora has caused problems in the past, so cuttings and parent plants were treated with Aliette (80% fostetyl-aluminium) at 5 g/litre as a drench.

A comparison was made between the rooting ability of stem and leaf-bud cuttings, both taken in winter, as well as the length of time from sticking to potting, in stem cuttings taken in both summer and winter. No comparison was made between the rooting ability of apical and axillary stem cuttings.

RESULTS AND DISCUSSION

The results of these trials confirmed that *G. avellana* can be rooted from stem cuttings. In addition, propagation from leaf-bud cuttings was also successful. Significant root structure on stem cuttings had developed after 18 days in previous work. In this trial, from a sample of 143 cuttings taken in summer (Feb.), three accessions showed sufficient root development for potting to occur after 34 days. The percentage of rooted cuttings was 24% in accession 557, 64% in accession 63, and 100% in accession 545 (average 62% rooting for this sample). Unrooted cuttings, or those with insufficient roots for potting, were restuck. These were potted on 27 April 1994 and 5 July 1994.

For stem cuttings taken in winter, root development was noted from 22 days, but growth was slow and time to potting (78 days) was longer than for cuttings taken in summer. This longer root growth period for winter cuttings may be illustrated by a more recent batch of cuttings; of 492 cuttings taken on 5 May 1994 from 11 accessions, only 15 (3%) had developed sufficient roots for potting by 6 July 1994 (62 days).

Table 1 compares leaf-bud cuttings and stem cuttings taken in winter and early spring. Leaf-bud cuttings rooted well, but with a lower rooting percentage than

stem cuttings. Subsequent growth was equivalent to that of a stem cutting. More care is required with leaf-bud cuttings. It seems to be important to allow buds to break into growth before potting. Some very small buds have not yet broken into growth. The days to rooting indicates when good roots had developed. Potting occurred on 2 Sept 1993 (at 78 days) for all accessions except 1339, which was done on 24 Nov. 1993 (at 76 days).

Table 1. Leaf-bud cutting and stem cutting comparison (winter and early spring).

Accession	Date cut	No. cut	No. rooted and (%)	Days to rooting	Cutting type
293/6-93	16/6/93	7	7(100)	24	stem
293/6-93	16/6/93	7	6(86)	25	leaf-bud
277/6-93	16/6/93	3	2(66)	28	stem
277/6-93	16/6/93	3	1(33)	30	leaf-bud
294/6-93	16/6/93	10	10(100)	22	stem
294/6-93	16/6/93	22	19(86)	25	leaf-bud
1339/9-93	9/9/93	15	15(100)	30	stem
1339/9-93	9/9/93	21	14(66)	33	leaf-bud

It appears that both the physical stage of development of the cutting material and the time of year that the cuttings are taken are important factors. Of 87 softwood cuttings made on 26 Nov. 1993, 57 collapsed and died within a 3-week period of sticking. No root development had occurred.

CONCLUSIONS

- *Gevuina* can be successfully grown from leaf-bud cuttings and apical and axillary stem cuttings.
- The period from sticking to potting was shorter during summer months.
- Losses can occur with rooted leaf-bud cuttings if potting is carried out before bud break.
- Cuttings taken from semihardwood material during summer can make good root growth from 18 days on, with the potting stage usually reached at about 35 days.
- Further work needs to be carried out to determine optimum times for leaf-bud cuttings.

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