DISCUSSION GROUP REPORT
PROPAGATION OF HAMAMELIS AND RELATED PLANTS

CHAIRMAN — BRIAN HUMPHREY

The genera within Hamamelidaceae which can be grown in the British Isles were identified as *Hamamelis, Corylopsis, Disanthus, Fothergilla, Liquidambar, Parrotia* and *Sycopsis.* Other genera rarely grown commercially were noted as: *Loropetalum, Parrotiopsis* and *Sinowilsonia.*

SEED

Genera sometimes or normally propagated by seed are: *Liquidambar, Hamamelis, Corylopsis,* and *Fothergilla.*

Hamamelis and Fothergilla. Hamamelis are normally raised from seed to provide rootstocks for grafting. *H. mollis* is sometimes raised from seed but good practice would dictate that the plants are proved by growing to flowering size before sale. *Fothergilla* is occasionally grown from seed.

Source. Some individuals of *H. mollis* and *H.* × *intermedia* (e.g. 'Arnold Promise') regularly set good crops of seed in the U.K. and Ireland and the need for selection for this characteristic was noted. *H. virginiana* and *H. vernalis* are generally less reliable though with these species some individuals are more prolific than others. Seed obtained by purchase from suppliers was often of poor quality generally due to prolonged dry storage. This may lead to deep dormancy or death.

Collection, Extraction and Storage. Early collection (August) of *Hamamelis* seed while still green and extraction from the capsule manually using a knife was said to result in seed which did not show dormancy. The cost of this method of extraction was high.

Collection normally takes place in the September to November period. Once ripened, the capsules slowly dry on the plant. Eventually, the seed is expelled sometimes with considerable force. *Fothergilla* seed is capable of being thrown 15 ft. Collection is normally carried out while the capsules are closed. The seed is extracted by placing the fruits in a covered box and drying them using artificial heat.

Seed is not normally stored. If storage is necessary, refrigeration in sealed containers is recommended to retain viability.

Pre-treatment. After extraction, depleted moisture content can be replenished by soaking the seed for 24 hours.

"Natural" pre-treatment was frequently practiced by stratifying the seed in sand/peat or similar media for up to one year before sowing.,

Hamamelis, and possibly *Fothergilla*, seem to require a warm period of moist storage followed by a long cold period. This can be provided artificially by stratification in a greenhouse for up to 3 months but normally not more than 2 months. This is followed by 3 or more months of cold stratification at 5°C (41°F) in a refrigerator. This procedure delays sowing the seed until May or June. Fresh seed treated in this way germinates well (60 or 70%) but seed which has been dry stored at room temperature before such treatment still performs badly.

In the case of *Hamamelis*, there were no reports of successful chemical dormancy-breaking pre-treatments.

Liquidambar styraciflua. This species is most commonly raised from seed though selection has produced clones vegetatively propagated.

Source. Almost exclusively from imported seed which normally performs well.

Pre-treatment. It was generally agreed that germination was comparatively easy and that the warm period was less important than with *Hamamelis* and, possibly, not required at all. Four weeks warm storage was recommended by one member of the group. A period of 6 to 12 weeks of cold was suggested as necessary to break dormancy. Late arrivals of imported seed should be kept moist under refrigeration at 5°C (41°F) for some weeks before sowing.

Early results with trials using GA_{4-7} indicated that this may be a useful alternative to the cold treatment.

Seedlings of Hamamelidaceae are reasonably vigorous and can be sown in well-drained open beds given some shading until well established. *Liquidambar* seedlings continue in growth well into the autumn and severe damage can occur unless frost protection is provided at the end of the first season.

CUTTINGS

Hamamelidaceae fall into two main groups for the purpose of propagation by cuttings:

Deciduous.

Timing, preparation and treatment. Taking the cuttings early normally gave better results, though one observation indicated that cuttings of *Parrotia* taken as late as September rooted reasonably well (43%). Forcing of mother plants

to produce especially early cuttings was recommended by some members of the group. Cuttings from stock plants in the open were normally taken in June.

Normal current year's shoots including the base, possibly with a heel, were generally used but single leaf cuttings including a portion of stem and bud were suggested for *Hamamelis* by one member.

Hormone treatments were considered important for all Hamamelidaceae. Some noted that Benlate or captan had been recommended as additives to the growth substance. With *Hamamelis*, 0.8% IBA dust in talc was usual but mixtures of IBA + NAA + 2,4,5-T were thought by some to have advantages over IBA alone.

For *Parrotia*, one commercial firm had used IBA in the quick-dip formulation at between ¼% and ½% strength with excellent results (65% +). *Fothergilla* (*F. major* and *F. monticola*) *treated with 0.8% IBA dust gave 78% rooting. Disanthus* responds to similar IBA levels or ¼% to ½% IBA quick-dip, but results are generally less good, 40% to 60% rooting being usual.

Environment during rooting. Most agreed that mist provided a suitable environment, although thin gauge polythene had been used. One member reported a correlation between the rooting medium and rooting percentage of cuttings of *Hamamelis virginiana* as follows:

Rooting medium	Percent rooting
Moss peat	75
2 parts moss peat + 1 part sand	60
2 parts sand + 1 part moss peat	50

Similar results were obtained for *H. mollis*.

Trials have been carried out into the effects of extended photoperiod and CO_2 enrichment during and after rooting. Results to date are inconclusive.

Overwintering and survival. For the deciduous Hamamelidaceae this was recognized as the most significant problem in successful propagation from cuttings.

The ability to overwinter and survive varied among genera (*Disanthus* particularly difficult) and species within the genera. For example, in one trial *Hamamelis virginiana* gave 100% rooting but only 43% survival, whereas *H. vernalis* gave 80% rooting and 80% survival. It was noted that *Corylopsis pauciflora* generally survived less well than most of the other *Corylopsis* species though initial rooting percentages were quite high. A clone of *Liquidambar*

styraciflua, L. styraciflua 'Worplesdon' was noted as rooting and surviving well.

As with rooting, extended daylength and/or CO_2 enrichment had not, so far, produced a consistent improvement in survival.

There was general agreement that overwintering the cuttings in the boxes into which they had been rooted and potting-off the following spring after growth had commenced, was likely to produce a higher percentage of established surviving plants than the alternative of potting off just after rooting.

Rooting cuttings directly into small containers was suggested as a good method of enhancing survival though low rooting percentages make the system questionable on economic grounds.

Evergreen. These are comparatively easily rooted from ripened cuttings taken in the September-October period; 0.5% to 0.8% IBA dust in talc is normally applied and the cuttings are inserted under thin film polythene or mist, the latter preferably in a polythene-lined house.

Survival and overwintering normally present no special problems.

GRAFTING

This technique of propagation is the standard method for *Hamamelis* and *Liquidambar* species other than *L. styraciflua* and the cultivar *L. styraciflua* 'Worplesdon'.

Grafting in the U.K. and Ireland is always carried out under glass.

For *Hamamelis*, three possible systems may be used:

a) Grafting in winter/early spring using a whip graft.
b) Chip grafting (budding) in late spring of dormant (cold stored) buds collected in January.
c) Side veneer or chip graft (bud) in July/September.

It was also noted that a T-budding or rind (bark) grafting technique could be used if the rind (bark) would lift.

Of these methods, the chip graft (identical in method to chip budding except it is carried out in a closed case or polythene tent under glass) was said by one member to produce a better quality plant than the conventional graft using a normal scion.

Summer grafting was said by some members to cause some check to growth the following spring.

Rootstocks. For Hamamelis any species can be used as all

appear compatible with each other. *H. vernalis* was mentioned as being particularly tolerant of heavy alkaline soils.

Distylum racemosum had been suggested as a rootstock but had been shown to produce inferior plants with poor growth.

Quality of the rootstock was stressed, a young, straight, vigorous rootstock producing a stronger union and a higher percentage of "takes".

Liquidambar spp. and selected clones of *L. styraciflua* were grafted onto potted rootstocks (2 yr. seedlings) of *L. styraciflua*. Whip grafting in early spring under glass normally produced a high percentage of successful takes.

Parrotia persica 'Pendula' was grafted onto the type species which was normally produced from cuttings. This pendulous form could either be whip grafted onto a potted rootstock in the early spring or top-worked using a side graft onto a *Parrotia persica* stem "balled up" and brought under glass in the early Spring.

MICROPROPAGATION

It was noted that some work was in progress but so far no results were available.

CONCLUSION

It was felt that propagation of *Hamamelis* by cuttings may assume more importance in the future. Selection of easily-rooting clones for ornamental value and as rootstocks would increase the importance of cuttings as a standard method of production of *Hamamelis*.

DISCUSSION GROUP REPORT
PROPAGATION OF PICEA

DISCUSSION GROUP CHAIRMAN — BRUCE MacDONALD

The genus *Picea* has considerable economic importance, for example, within forestry, where *P. abies* and *P. sitchensis* are grown. *Picea sitchensis* is also used for wind protection of nursery stock in exposed sites. It may be interplanted with *Alnus incana* in order to give initial protection — the latter being removed when the *P. sitchensis* has grown enough to form a "permeable barrier". *Picea* gives some excellent specimen trees, with the species *P. breweriana* and the cultivar, *P. orientalis* 'Aurea'. There are also the slow growing forms which can be included in the design of rockeries and heather beds, for exam-