Propagation Methods and Policy for the National Collection of *Betula*©

Kenneth Ashburner[1]
Stone Lane Gardens, Stone Farm, Chagford, Devon TQ13 8JU

PROPAGATION METHODS

Nurserymen everywhere have developed their own high degree of propagation skill. The following are the author's own experiences which may prove useful to others.

Seed Propagation. The method described may not be the most efficient for commercial propagation but has proved adequate for a collection of a number of species. Seeds are sown in trays in sterile compost, mostly in March and April under glass rather than overwintered out of doors. This avoids the hazard of "seed rain"— the contamination of sown compost with naturally dispersed seed from surrounding birches growing in the nursery or arboretum. It is very demoralising to rejoice over the germination of some rarity, only to discover sooner or later that the seedlings are nothing more than the offspring of local *Betula pendula* or *B. pubescens* leaning over the garden boundary.

After tamping the compost lightly with a small board, and then sowing, sieved compost is sprinkled over until the seeds just disappear from view. A final light tamping is then all that is necessary. The trays are then placed in soaked benches lined with polythene, upon an intermediate layer of capillary matting.

The author has experienced no particular hazards in raising birches from seed although over soaking the benches can lead to damping off, which is very galling if the seed was collected in some inaccessible part of China. Preliminary watering with fungicide is good practice but panic treatment with Cheshunt compound, or plain copper sulphate, fails to arrest the progress of the fungus once it has got a hold, and can poison the seedlings all too easily if applied to excess.

Pricking out into Jiffy strips rather into plug trays gives excellent results, using a compost boosted with a controlled-release fertilizer. The Jiffies can be potted on and still kept within the glasshouse or tunnel for the most rapid growth or simply be lined out.

Vegetative Propagation. This is used for replicating the best clones, chosen for the beauty of their bark — or less frequently for cut leaves — *B. pendula* 'Dalecarlica' for instance; or for shape and habit such as the exaggeratedly weeping forms of *Betula pendula* 'Tristis' and 'Youngii'.

Grafting. This is the most obvious and probably most convenient method used but is rather a special process in early spring grafting, because from March onwards *Betula* seedlings pour forth sap prodigiously when wounded, and even more so when actually cut across. Unless the rootstock seedlings are dried out the would-be union of stock and scion becomes flooded with sap.

In the old days, potted rootstock seedlings were brought under glass in February, dried, and laid on a heated bench, all within a polythene tent. Grafting was performed when root activity started. The process is now more sophisticated using hot-pipe callusing. There is no need to pot up the rootstocks. They are brought in

[1]Holder of National Council for the Conservation of Plants and Gardens National Collection of *Betula*

bare-rooted much earlier, in January, and then dried out but not to excess. The would-be unions are warmed, and callus is formed, by placing them across the hot pipes. Excessive drying out of the roots can be prevented by laying moist capillary matting over them.

For the National Collection the author uses conventional grafting techniques in February to March, with grafts left to callus on a warmed bench in a polythene tent. The author has experimented with bare-rooted plants but found that the rootstocks were killed by over drying — even though callus had actually formed in spite of this mistake.

Summer grafting in August in the polytunnel has also been attempted. The scions have to be defoliated but there is no bleeding of sap at this time and callusing can be quite quick. Care is needed because depriving the scion of its leaves deprives it of manufactured sugars, so callusing must be quick to enable the stock to come to the rescue. If the callus forms too slowly the scions slowly wither and fail to grow away the next spring.

The author uses plain transverse cuts of stock and scion and has never attempted anything more elaborate — whip-and-tongue or cleft grafting for instance. Cuts should be accurate and knives razor-edged. Rubber ties seem the most convenient, and applying the low-melting grafting wax seems simple and straightforward. It is important to melt the wax in a warm water bath. Melting it over a hotplate makes it too hot and kills the tissues.

As for rootstocks, is it necessary always to use *B. pendula?* The author has successfully grafted *B. ermanii, albosinensis,* and *utilis* cultivars on to *B. ermanii* stocks, raised from seed gathered from trees in the Collection. A particularly yellow clone of *B. alleghaniensis* could similarly be worked on home-produced *B. alleghaniensis* seedlings.

Budding. Budding is undertaken in August. One bud-stick is the equivalent of many scions so budding is particularly useful when propagation material is in limited supply — as for some of the rarer plants in the Collection. After insertion the buds are bound with polythene tape or covered with polythene patches. It is obviously of supreme importance to prevent them from drying out.

Cuttings. The general view of many propagators is probably that *Betula* cuttings are very reluctant to root. It is true that the very resinous and glandular cuttings of the *B. pendula* group seem very difficult and, no doubt, too little experimental rooting of different *Betula* species has been attempted. Cuttings of *Betula davurica, B. nigra, B.raddeana,* and *B. chichibuensis* root easily.

However it is vital that cuttings are young and soft and therefore taken in May, or early June at the latest. Mist or fog must be used to retain the turgidity of this unripe material. Presumably later semi-ripe cuttings, in July say, would root, but they never build up enough food reserves during the remnant of the summer, and so fail the following spring.

PROPAGATION POLICY

Existing clones being grown and sold in the trade have nearly always been chosen originally for their bark qualities. Only a few have been selected because of leaf character or for shape and habit.

There is quite an array of cultivars selected for their bark and there is much confusion over names and forms. For example there is a commonly grown clone of *B. utilis* var. *jacquemontii* which has been named 'Doorenbos' by Piet de Jong in Holland, and yet is often seen in the UK under the name 'Snow Queen'. Not quite so bothersome, but trying nevertheless, is the muddle amongst other cultivars of *B. utilis* var. *jacquemontii,* i.e., the trio 'Inverleith', 'Grayswood Ghost', and 'Silver Shadow'. These are all fine, and the many-veined leaves very handsome — and incidentally anomalous with the majority of *B. utilis* var. *jacquemontii* in the wild. Trying to distinguish them from each other is a headache, especially when samples of each are presented unlabelled. In fact 'Inverleith' differs from the other two in its bract-scales, but such detail is normally not noticed in the horticulture trade.

The problem is lack of records of the origin of the trees from which scions were first taken. It is know that the "mother" tree, of 'Grayswood Hill' grew in the garden of Grayswood Hill, in Haslemere, Surrey, U.K. — but nothing beyond that. The fount of all 'Inverleith' specimens is a superb tree growing in the Edinburgh Botanic Garden. But no one knows the origin of either the Grayswood Hill nor the Inverleith trees — whether they were from the wild or whether they were raised from seed collected in a garden or arboretum. The history of the cultivar *B. utilis* var. *jacquemontii* 'Jermyns' raised at Hillier Nurseries, Hampshire, U.K., is better known regarding where the original seed was collected, and plant raisers should endeavour to keep meticulous records.

Probably the finest barks in *Betula* are found in *B. utilis* var. *jacquemontii, B. utilis, B. ermanii, and B. albosinensis,* which probably explains why so many *Betula* cultivars chosen for their bark have arisen from these species. But there should surely be selections from other species; the very yellowest of yellow birch, *B. alleghaniensis,* for example.

The central problem for breeders with *B. utilis, B. utilis* var. *jacquemontii,* and *B. albosinensis* is that they are all tetraploids — and so is the U.K. native *B. pubescens.* With *B. pubescens* pollen flying around everywhere in the spring, open-pollinated seed from any of these is almost sure to be of hybrid makeup. This is not to imply that the cultivars of *B. utilis* var. *jacquemontii* recently mentioned are themselves hybrids with *B. pubescens.* Their origin still remains a mystery.

There is a certain irony in that, having *B. pubescens* in them, the known hybrids make excellent trees in which the desired bark is probably scarcely altered and remains very good indeed. Their constitution is also improved, and now better able to withstand the west European climate such as late frosts and heavy rainfall. This is certainly true of *B. ermanii.* The hybrids with *B. pubescens* have fine barks, and furthermore are not so precocious in the spring. They take exposure well and there is no sign of the die-back that you can get in wild-origin seedlings.

What is the solution? There is always the fear that someone will raise batches of these hybrids and be tempted to release them as the genuine species, and perhaps even clone some of them. Maybe it has already happened. Certainly if it were to become general practice there would simply be confusion and mayhem and in the end everyone would suffer. Already the *B. ermanii* 'Grayswood Hill' is suspect and not a true representative of the species, and so is the large specimen of *B. ermanii* in Westonbirt Arboretum, Tetbury, Gloucestershire, U.K., with its fluted trunk.

One solution surely is to select cultivars from wild-origin plants that are seen to perform well. This has happened recently with the newly selected *B. ermanii*

'Hakkoda Orange', which seems to thrive without problems. Its bark colour and its origin — Mt. Hakkoda in northern Honshu, Japan — are implicit in its name.

The other solution, if people wish to raise hybrids deliberately, is to state this plainly, and not only state (and record) when and where hybridisation took place, but explain also that while the barks may be good, the hybrid trees lack other valuable characters peculiar to the true species. In *B. utilis* var. *jacquemontii* of wild origin for instance, the young leaves of spring and early summer are superbly glossy, as if lacquered. They are not so in any of the current cultivars. Wild-origin *B. ermanii* are precocious in leaf, and hence vulnerable to late frosts. But the leaves are remarkably tough and damage only results in freak years such as 1989, when the whole winter was mild but ended in a frost of -10°C in late April. The main point is that these leaves are superbly translucent in the spring sun and superior in this way to the later-leafing *B. pubescens* hybrids.

It is also surely very important not to propagate too many cultivars. It may be tempting to do so. It may be difficult to be selective, but it is not difficult to imagine the nightmarish surfeit of names which would otherwise result.

It is possible to control pollination. Ideally it should take place indoors, using specially prepared plants in containers. Complete girdling of branches at the base in May, to a width of 2 to 3 mm can induce the formation of both male and female flowers, ready for the following spring when the pollen can be transferred with a brush. This can all be performed on trees out of doors, but there is the risk of "foreign" pollen in the air. Semipermeable pollination bags, allowing the passage of air but not of pollen, must be tied on to chosen branches bearing female flowers, as soon as these appear. There must be circulation of air, which is why a semipermeable material is used. Unfortunately the initial protection afforded by the bags "softens" the flowers within, and the bags are no barrier to freezing air.

Certainly with some *Betula* species there is no risk of crossing with others. Usually it is because they flower much later in the spring.

Few will wish to grow any hybrids which have not been created deliberately. There is indeed scope for breeding programmes. If presented with a plant that is sold as a selected clone of wild origin purchasers will want to know its history.