

## FIRST TECHNICAL SESSION

### PROPAGATION OF COTONEASTERS

BASIL S. FOX

*University College of Wales,  
Aberystwyth, Wales*

Cotoneasters being rosaceous plants closely related to *Sorbus* and *Crataegus*, it is fortunate that they pose far fewer problems for the propagator than either of the other two genera. We have no great difficulty in propagating them and are, therefore, concerned with the most effective method to use. It may seem too elementary to start by impressing the importance of securing material from correctly named plants. Cotoneasters are notorious for bad labelling, and it applies most especially to cultivars in the Watereri group; also hybrids are frequently seen bearing the label, *C. frididus*.

**Undesirable Methods of Propagation.** I can think of no excuse whatever for the practice of grafting or budding these plants when raising them for general planting, and the use of *Sorbus* or *Crataegus* stocks is indefensible. It is very likely also that, in the past, seedlings of the early cultivars have been distributed under the cultivar names — adding to the confusion, but people may more innocently collect seed from freely hybridising species that are not grown in isolation. The same applies to plants raised from imported seed-bearing collector's numbers; these should be vegetatively propagated.

**Cotoneasters from Seed.** Our only native British cotoneaster is *C. integerrimus* and this is struggling for survival, whilst *C. microphyllus* is the only introduced species which has become naturalised. This apparent lack of ability to establish themselves in the wild seems odd when self sown seedlings abound in our gardens.

Seed of all species requires after-ripening because of dormant embryos. It is necessary for the seed to be in a moist medium, and be subjected to low temperatures for a period of time. In addition to this, some species have an exceptionally thick seed coat that must be softened so that the seed can imbibe the moisture essential for after-ripening.

In considering the suitability of a species for propagation by seed, first see how it compares with vegetative methods. It is important that resulting seedlings be true to type and, therefore, the best seed source would be a group of plants of the species required that are themselves true, and are growing in isolation from other species.

A number of cotoneasters are apomicts, these will be safe to collect from, even when they are close to other species. Although a headache to the hybridiser and taxonomist, apomixis is a great help to the propagator.

**Treatment of the Seed.** The fruits should be collected from the selected plants as soon as they are ripe. This early collection is of great importance. The procedure, in its simplest form, is to crush the fruits into a mush, then mix them with an equal quantity of silver sand. First add water to this mixture to make sure that it is really moist then carefully drain off any surplus so that air is not excluded. It is then stored in thick polythene bags which must be made mouse proof and placed at the foot of a north-facing wall or hedge. This is more or less aiding the natural process and is similar in effect to the old fashioned method of stratifying seed in pots in a bank of clay. Given normal winter conditions this will be sufficient to stimulate the thin-coated seed species into growth. There is an element of doubt with this method and it is helpful to place the bags in a refrigerator at 0° to 5° C towards the end of the winter up to sowing time in April or May.

With species having thicker coated seeds and where more certain results are required, the seed coats can be softened prior to the breaking of dormancy by warm moist conditions, or better by treating with concentrated H<sub>2</sub>SO<sub>4</sub> for 1.5 hours (1,2).

This last treatment, of course, requires the cleaning of the seed, which might be considered desirable in any case. This done by pulping the fruits, sieving and washing, then finally putting them in a bucket of water where the seed sinks to the bottom.

Dr M. A. Hall, University College of Wales, Aberystwyth, has been working on the use of ethylene in the germination of seeds. A small test on some *C. dammeri* seed that had not responded to normal after-ripening showed about 8% germination, whereas nothing happened in the control.

**Seed Sowing.** Instead of treating the seeds as just described, they may also be sown directly into cold frames shortly after collecting. By this method it may well be 18 months before germination takes place, during which time the seed is open to attacks by mice.

Where seeds have been treated so that dormancy has been overcome, they may be sown in frames in April, or smaller quantities may be sown in pans. The density of sowing for clean seed can be calculated, but where the fruits were pulped and mixed with sand a complete covering of the surface with sand and seed gives a fair distribution, however, inaccuracies must be allowed for. Cotoneaster seedlings do not seem to suffer from being crowded.

When germination takes place, care must be taken to watch for damping off, though this applies mostly to seedlings raised in containers in a propagating house. If coarse grit is used as a final covering, damping off is not so prevalent; however, it is advisable to give an application of Captan as a precautionary measure. Seedlings may be pricked off right away, but if left until the following spring,



they become woody and easier to handle. A short list of species that I consider most conveniently raised from seed includes:

|                       |                        |                        |
|-----------------------|------------------------|------------------------|
| <i>C. acutifolius</i> | <i>C. frigidus</i>     | <i>C. obscurus</i>     |
| <i>C. bullatus</i>    | <i>C. harrovianus</i>  | <i>C. salicifolius</i> |
| <i>C. dielsianus</i>  | <i>C. horizontalis</i> | <i>C. simonsii</i>     |
| <i>C. distichus</i>   | <i>C. lacteus</i>      | <i>C. splendens</i>    |
| <i>C. franchetii</i>  | <i>C. multiflorus</i>  | <i>C. tomentosus</i>   |

**Vegetative Propagation.** This is the only means of reproducing cultivars, it also enables one to maintain the best forms of the species. Cultivars are likely to suffer setbacks in the form of viruses, but whilst they remain vigorous and healthy they are worth perpetuating this way indefinitely.

**Cuttings.** All cotoneasters can be raised from cuttings, and it is a stroke of good fate that most of the really garden-worthy ones are easy to root

The treatment of cuttings depends to a considerable extent on both the number of plants required, and the purpose for which they are grown. With this in mind, I would like to describe how we propagate cotoneasters at Aberystwyth where a collection of a range of species, varieties and cultivars is kept. Apart from this the more ornamental forms are used extensively for general planting on the University campus and quite large numbers are used as ground cover on the many steep banks of its sloping site

First the production of ground cover plants. The ones we find most useful are: *C. 'Skogholm'*, *C. microphyllus*, *C. conspicuus*, *C. dammeri* var. *radicans*, *C. prostratus* and *C. horizontalis*. To a lesser extent, *C. microphyllus* 'Cochleatus', *C. adpressus*, *C. praecox* and many others. *C. horizontalis* is best raised from seed but the others we find can be managed best by cuttings under mist. The cuttings can be taken in June, July, and August though possibly July is the best month. Tip cuttings are used, being made 10 to 15 cm long and trimmed up approximately 4 cm. They are quick-dipped in IBA in 50% alcohol at either 2,000 ppm or 4,000 ppm, according to the type of growth. *C. microphyllus* roots the most readily and hardly merits hormone treatment.

The cuttings are inserted 35 to a seed tray in a rooting medium of 1 loam, 1 peat, 1 grit. The trays are placed under mist with a bottom heat of 21° C and when rooted are transferred to a cold frame where they are kept cool and shaded for a time. The cuttings are not weaned in the true sense, though in doubtful cases, the trays are placed on the floor of the mist unit and kept under observation for a few days before being transferred to a cold frame. One of the most critical periods is when the freshly made cuttings are placed under mist, when they must be shaded with special care for the first few days.

The plants are then overwintered in a cold frame or, in some cases, on open standing ground, and are planted into nursery rows the following April; normally they are fit to plant as ground cover the following spring. The plants are lifted and balled in rootainers; this is most important with us as heavy rain on newly-planted steep slopes can otherwise wash the soil out of the roots. Instead of lining in the nursery in April plants could be transferred to containers. We find with cuttings that it is most important not to starve plants during the growing season as this can have a long lasting effect; rooted cuttings must never get a check during the growing season. *C. conspicuus* is perhaps the most awkward, taking much longer to root than the others; also the tips occasionally die back causing delay in the plants growing away. An alternative treatment for this subject is to transfer them when rooted into peat pots. This means an early start with the cuttings, for plants that suffer root disturbance late in the season may suffer in the cold during the winter; we consider it advisable to complete all the potting of cuttings by mid-September if they are to overwinter satisfactorily without heat. It has been shown that the time of taking cuttings not only affects the rooting response but is also concerned with the ability of the rooted cuttings to overwinter (3).

**For general planting.** Here we require smaller numbers of plants and put the cuttings in "4 in Long Toms" for ease of handling, particularly where species of different rooting potential are propagated together. The size of cuttings for smaller-leaved kinds is 10 to 15 cm and the larger-leaved ones, such as those in the Watereri group, up to 20 cm. Where cuttings can be taken with heels quickly and efficiently I believe this to be a distinct advantage. An experienced eye can quickly find branches bearing shoots of the right length and the arrangement of shoots in cotoneasters makes it an easy job. Again, a quick-dip of either 2,000 ppm or 4,000 ppm of IBA in 50% alcohol is used and the cuttings are put on an average of 10 to a pot depending, of course, on the size of the cuttings into a medium of equal parts sphagnum peat and coarse grit. With slow rooting cuttings the pots can be surfaced with grit as well.

When the cuttings are reasonably rooted but before they suffer from lack of nutrients which is, in practice, when the first roots reach the bottom of the pot, they are potted individually in 3-in pots, or into polythene containers of similar size. These plants are overwintered in cold frames, and then, in April, lined in the nursery or in some cases planted in their permanent positions. Where the potting of rooted cuttings continues into September, care must be taken that the plants get sufficient warmth to establish themselves before being placed in cold frames.

I consider that with young, rooted plants great care must be taken that they get no check in growth whatever during any period



they would normally be growing. If such care is taken, then tremendously vigorous plants can be produced, though these could be an embarrassment in the nursery trade. On the other hand, the effect of starving a plant can last for years and such plants are overtaken by much younger vigorous ones. The same applies to containerised plants packed close together and becoming drawn.

**Forms that are not so easy to root.** Remarks on the rooting of cuttings have so far referred to propagation under mist but there are some forms that do not respond too well to this treatment. Some of these, such as *C. multiflorus*, are not easy under any conditions but others, such as the hairy-leaved *C. integerrimus*, do better in a cold frame. Where clonal material is not required, both of these may be raised from seed. The best cold frame for these awkward cuttings is a north facing one, the cuttings being taken with a heel. The presence of a tip is not important with cold frame cuttings and can even lead to wilting. There must, however, be a substantial leaf area and active buds in the axils of the upper leaves. The best time for inserting these is mid-September, great care in watering and shading is necessary for the first month and again in March and April.

I am not aware that wounding of cuttings has any advantage, and know of instances where such cuttings have failed. Regarding the use of rooting compounds other than IBA, both NAA and IAA have beneficial effects with cotoneasters, as have the proprietary brands of rooting powders. Both talc and charcoal-based powders have given good results, but I prefer quick-dip methods using 50% alcohol for speed and ease of application.

**Neglected species.** In trying to arouse interest in neglected species, the plant propagator is the obvious starting point; I should like to take this opportunity to mention some that I feel could be used much more widely than they are:

*C. multiflorus* for its graceful form, free flowering, and early fruiting. *C. hebephyllus* var. *fulvida* for its free flowering and very large dark red fruits. *C. splendens*, and the cultivar 'Sabrina', for their low spreading arching branches and profusion of large shiny orange-red fruits. *C. turbinatus* for its unusual upright form, being evergreen and its freedom of flowering. *C. obscurus* for its fruits of an unusual dark red and its fine autumn foliage effect. Lastly, a mention for *C. divaricatus*, a fairly popular plant but not grown enough, for its pink flowers, bright red fruits later turning to dark red as the foliage colours superbly in the autumn.

## LITERATURE CITED

1. Barton, L. V. and W. Crocker. 1948. Twenty years of seed research. Boyce Thompson Institute for Plant Research. Chapter 8
- 2 Boyce Thompson Institute for Plant Research, Contributions of 1934 Vol 6, pp. 323-338.
- 3 Sykes, J T 1963. The use of mist propagation to determine the rooting response of cotoneaster and diervilla species. *Proc. XVth International Horticultural Congress for 1962.* pp. 403-409.

C. E. SALTER: Are there certain clones of cotoneaster — especially *C. horizontalis* — that do not produce berries?

B.S. FOX: I have never found this. It is a good thing to grow several kinds of cotoneaster when you are using them for ground cover to ensure good fruit set. It must be remembered that when raising them from seed they may not flower for a while because they are going through a phase of juvenility, but the advantage of raising from seed is that you get denser, more compact plants. Some of the hybrids I have raised do not get their full fruiting potential for about 5 years.

KELVIN LAWRENCE: There is a plant distributed as *Cotoneaster congestus* 'Nanus.' Is this a truly named compact form?

B S FOX: I believe so. This is the one originally distributed by Will Ingwersen at *C. cooperi*; *C. congestus* is a difficult species as all the plants in cultivation are triploids and is therefore difficult from seed. In spite of the smallness of its leaf it is quite a vigorous plant and in time will cover a wide area.

J B GAGGINI. In Scandinavia *Cotoneaster praecox* and its cultivars are grown and fruit well. What is your opinion of this species?

B S FOX: Some taxonomists regard this as a species, others a variety of *C. adpressus*, (*C. a. var. praecox*). Unfortunately, we find it very susceptible to scale insects. It is a very free fruiting variety and there are some excellent forms of it in Spetchley Gardens near Worcester.

A.R. CARTER: What do you use against scale insects and have you found any disease in the wilting of the tips?

B.S. FOX: White oil spray is quite effective on outside plantings. The wilting is, I think, purely physiological.

D. KNUCKLEY: Do you get a lot of fasciation on *Cotoneaster microphyllus*?



B.S. FOX: Not a lot but it is always present. One factor which is of interest is that we find fasciation occurring in certain definite areas where a number of plants show the effect; for example, *Forsythia*, *Olearia nummularifolia* and *Cotoneaster microphyllus* are all affected in one small area of the garden.

D. KNUCKLEY: We find this fasciation a feature of *C. microphyllus* where it has naturalised on the tin mine country in Cornwall.

J KELLY: Is there any advantage of laying cuttings of *C. congestus* flat on the propagating bed?

B.S. FOX: We have not had any difficulty in rooting cotoneasters, but in propagation generally one finds some plants that give better response when the cuttings are inserted at an angle of 45° .

### **SOME PLANT PROPAGATION TECHNIQUES CURRENTLY BEING USED IN JAPAN**

**D. W. ROBINSON**

*Kinsealy Research Centre  
Malahide Road, Dublin, 5, Ireland*

Because Japan extends over many degrees of latitude (the four major islands stretch for 31° to 46° N) and experiences a great range of climate, tree and shrub production methods vary in different regions. As in western Europe, plant nurseries occur in many parts of the country but three very concentrated areas of production are: Angyo, Saitama Prefecture, 15 km north of Tokyo, Yamamoto near Kawanishi City, Hyogo Prefecture and Kurume, Fukuoka Prefecture in Kyushu. All three areas are composed of a large number of small nurseries providing trees and shrubs, firstly for the local markets (Tokyo and Osaka respectively in the case of the first two areas) but more recently for all of Japan. Farm size is very small. In 1965, 69% of holdings had less than 1 ha of cultivated land. Most of the nurseries visited were less than 1 ha in size and were intensively cultivated.

In some important respects Japanese nurseries differ from those in the West. A smaller number of plant species are propagated but many plants are sold as mature specimens. This difference is due to the contrasting concepts of the function of a garden in the two areas. The object of a garden in Japan is to represent quiet natural beauty in a small area around the home to counteract the noise and tension of urban life. The main aim appears to be to create in a few square yards the impression of being high up in the mountains. For this purpose, rocks, shrubs and trees are arranged with great skill to leave no trace of artificiality.

Because of the emphasis on established natural beauty, the Japanese favour native plants: they do not usually plant small shrubs and trees and watch them grow but prefer to plant mature