PROPAGATION TECHNIQUES OF *CORNUS KOUSA* AND *HAMAMELIS TAXA*—1940s VS. 1980s

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It has been said that with the advent of antibiotics the science of medicine emerged from the dark ages. It may also be said that plant propagation underwent similar advancement when root-inducing substances, polyethylene plastic film, mist, and fog systems, together with other new technology came into being.

In earlier years, those involved with plant propagation and other skilled horticultural occupations in the United States were mostly immigrants from Europe. In Europe, practical horticultural knowledge had evolved through the ages by trial and error and was handed down from one generation to the next. The skill and ability that propagators had was acquired through long apprenticeships which usually started when they were young boys. Craftsmanship which they had to offer was usually basic in aspect, highly work intensive, but productive.

Much of the great progress in plant propagation made during recent years can be credited directly to this great organization, The International Plant Propagators' Society. This association has brought together those involved with the scientific investigation of plant propagation and those concerned with the more practical aspects of commercial plant production, and all have benefitted greatly.

OLDER METHODS OF SEED TREATMENT

Throughout the years botanical institutions such as the Arnold Arboretum received seeds from many parts of the world. Such seeds often had dormancies that were not understood. At the Arboretum in the older days the method of treating seeds that had barriers to germination was basic. They were sown in shallow clay pots called seed pans which were then placed on a greenhouse bench. If they had not germinated by autumn they were transferred to an out-of-doors cold frame where they would spend the winter. To prevent heaving and to discourage rodents they were covered with a mulch of coal ashes. In spring when the seed pans were returned to a warm greenhouse, germination would take place in some as the winter had satisfied the necessary cold requirement. If germination did not take place and the seeds still appeared sound they remained in the greenhouse for the summer. In autumn they would again be placed out-of-doors for a second cold treatment.

William H. Judd, the Arboretum's propagator at that time, had been trained in England and was following the method of treating seeds that he had learned there. These treatments, though cumbersome, no doubt led to the germination of some seeds both dormant and doubly dormant, whose barriers were not understood at that time.

SEED TREATMENT NOW

With the advent of polyethylene plastic film, the treatment of seeds with dormancies has been revolutionized. Seeds requiring periods of stratification can now be processed in a simple, efficient, and relatively work-free manner. The seeds are combined with about two or three times their volume of damp stratifying medium and the combination is put in a polyethylene plastic bag which is bound at the mouth with a rubber band to make it vapor tight. Polyethylene film has the property of being air permeable yet vapor proof, with the result that oxygen is available to the contents by diffusion. A properly sealed bag will not require attention during pretreatment no matter how long the period might be. Bags needing only one stage of treatment by cold are placed in a 40 °F refrigerator for the required time. Those needing two stages of treatment to overcome double-dormancy are placed on a greenhouse bench to undergo warm stratification after which they are transferred to a refrigerator to fulfill the second requirement. These procedures are not only simple, foolproof and effective, but so much less labor intensive than the older methods of treating seeds. A card file arranged in chronological order, if checked each week, will assure that the various movements of the seed bags are accomplished at the proper time.

PRETREATMENT OF *CORNUS KOUSA* SEEDS

Preparing Cornus kousa seeds for germination is a simple matter. When prepared as described above and placed in a 40 °F refrigerator for three months, they will be ready to germinate. However, seedlings vary greatly in character, with some being far more desirable than others. Softwood cuttings root readily and therefore vegetative propagation of selected clones by cuttings would be far more satisfactory.

PRETREATMENT OF HAMAMELIS SEEDS

Hamamelis seeds are doubly-dormant and require two stages of pretreatment to be prepared for germination. Five months of warm followed by three months of cold treatment has been satisfactory. However, the warm period can be modified by lengthening if it

then leads to sowing at a more favorable time, such as during the lengthening days of spring.

PROPAGATION OF *HAMAMELIS*—THEN AND NOW

On checking a number of old and very old references concerning the vegetative propagation of *Hamamelis* species, we found that through the years grafting, budding, and layering were the recommended procedures.

In August of 1973, I attended the Annual Meeting of the International Plant Propagators' Society, Region of Great Britain and Ireland, held at Berkshire College of Education, Early, Reading, Berkshire. A paper was presented pertaining to the budding of *Hamamelis*. In the discussion that followed, we learned that in Britain at that time this subject was propagated by budding and grafting using *H. virginiana* as understock. We also learned that seeds and seedlings of *H. virginiana* previously imported from the United States were becoming unavailable in Europe, and there was much concern about the future propagation of *Hamamelis* in Britain.

Fortunately, this is not a serious problem, for experience at the Arnold Arboretum with 22 taxa indicates that all *Hamamelis* can be rooted from cuttings in high percentages, which can them be induced to survive the first winter.

PROPAGATION OF *HAMAMELIS* BY CUTTINGS

A hybrid of *Hamamelis japonica* × *H. mollis* appeared at the Arnold Arboretum some years ago and was named *Hamamelis* × *intermedia* 'Arnold Promise'. It was put on the Arboretum's distribution list, and that gave us an opportunity to work on the propagation of *Hamamelis* by cuttings. Grafting and budding were avoided because of understock problems that can arise.

In our first attempt, cuttings taken on 28 June 1961 led to the rooting of 118. They were potted on 15 September and later transferred to our cold storage unit for the winter. When it came time to plant them out, they were all dead.

Some plants that propagate by softwood cuttings present a survival problem during the first winter. They go into dormancies from which they never recover. Among these are the various taxa of *Hamamelis*.

First winter loss was averted when the cuttings were not disturbed after they had been rooted in plastic flats. When rooting had taken place, the cuttings were left undisturbed in the flats and hardened off. In autumn the flats were transferred to our cold storage unit, where the temperature is maintained at about 34 ° F.

In about 3 or 4 months the flats were returned to a warm greenhouse where new growth soon appeared.

In recent years the Arboretum has imported new *Hamamelis* hybrids from Europe. Plants which arrived were always grafted. At the earliest opportunity, we rooted these from cuttings and always with a high percentage of success when they were processed as described above. Softwood cuttings collected in June and semi-ripe wood gathered throughout July have all rooted in high percentages. Root-inducing formulations containing IBA at the rate of 8 mg in a gram of talc were used. Wounding the cuttings on one side was tried and discontinued as the roots arose only from the bases of the cuttings.