

noon, for a week when they should average 27° C. Under normal conditions the beds may then be left for about three months by which time roots averaging 7 cm in length will have formed and the polythene sheeting can be removed. This is done by opening the ends of the beds for two hours per day in the early morning for a week, followed by a complete removal for two hours per day for a further week after which the polythene is removed completely. Polythene sheeting is used only once. Attempts to use it for a second time have led to poor results possibly due to the rapid oxidation of polythene in the intense solar radiation at high altitudes on the Equator.

As soon as the polythene is removed the young plants are fed with a weekly application of NPK 25 / 5 / 5 at the rate of 120g in 120 litres of water per 30 metres of bed.

**Shade.** Once the plants have made about 20 cm of top growth the shade is gradually thinned over a period of two months and the plants are then hardened off for a further period of two months before being planted out in the field. The whole operation takes from 9 to 15 months depending upon the size of plant required.

**Conclusion.** Bearing in mind the lack of skilled nurserymen this simple method produces cheap and acceptable results in the range of 80 to 90% utilizable plants. The cuttings are handled only once and the presence of fertile soil in the lower part of the sleeve enables the plants to be grown on without the need for transplanting or other operations requiring even a modicum of skill. The nursery manager would need to inspect the beds once per week for aphid or damping-off during the time the plants are under polythene and check that the watering and shade are correct once the plants lose the protection of the polythene. The comparatively expensive costs of transporting plants to the field can be offset to a certain extent by siting nurseries as close to the area of development as possible.

## THE VEGETATIVE PROPAGATION OF CORYLUS

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This subject was chosen for a short talk to this meeting because it is an extremely good example of a group of plants which, although fairly easily propagated by traditional means, can nowadays be produced more intensively by sophisticated, modern techniques.

**Layering.** This system of propagation is a particularly useful method of propagating small numbers of plants but it is extensive in its use of land and stock material. The parent plants should be planted in

well-prepared land at a spacing of at least 2 m square, and allowed one year to establish. The stock is then cut down to a low crown or stool so that in the following year vigorous, strong growing shoots are produced; these will, depending on the species in question, be about 1 m in length. This sort of material has a number of advantages in that the crown of the plant is low, the shoots are flexible and the shoots have a high capacity to root. Simple layering is carried out in spring just prior to bud break; the only important treatment is to ensure that the stem is bent as nearly to a right angle as possible in order to restrict the stem and encourage root production. Layer well away from the stock plant so that the layer lead is low, thus forcing new shoots to develop from the stool.

Under these circumstances well-rooted layer can be lifted in the autumn, the layer leads are trimmed back to the crown and the following spring the process is repeated, using the new shoots which arose from the crown in the previous year.

**Grafting.** Although this system of production is a reasonably intensive system, it has the disadvantage of producing plants which are not on their own roots and which are liable to sucker. One year old seedlings of *Corylus avellana* are used as rootstocks. These are brought into a warm glasshouse and bedded, bare root, into peat during early March and the tap root is stopped to encourage laterals; once root activity has commenced they are grafted with 3 or 4 bus scions of the previous season's material. Use a based whip graft, i.e. head the stock back into the hypocotyl and use a graft about 3 cm in length.

Tie in with rubber strip or suitable material and bed into a peat and grit compost in a grafting case, maintained at 60 to 70° F. Treat regularly with 5% DDT dust against weevils and with a Captan solution to prevent decay due to *Botrytis*. The union develops quickly and as soon as it is well-callused the ties can be removed and the case gradually aired to harden the shoots off. After 5 to 6 weeks the new plants can be bedded out into a frame for the ensuing growing season.

**Division.** This type of production is a very extensive system requiring much stock, usually a certain proportion of saleable stock is used to maintain enough liners. The process can be carried out in the autumn or spring and is usually limited to those types developing a thicket-like habit, e.g. *C. maxima* 'Purpurea'.

**Summer cuttings.** All this group of plants (*Corylus spp*) will regenerate from softish cuttings inserted under mist. Very soft cuttings do not seem to survive well and it is advisable to wait until June when the tip growth is slower and thus somewhat "harder". *C. maxima* types, however, seem to provide problems because of the nature of the buds which are open (i.e. partially developed) and hairy, causing them to deteriorate relatively easily. *C. avellana* types do not present problems as the buds are tight and waxy. Winter survival is

the chief problem as, unless the rooted cuttings can be flushed into growth to produce an integrated new plant, losses can be severe.

**Hardwood cuttings.** Perhaps the most valuable contribution to the propagation of this group of plants has come from Howard's work at East Malling (1, 2) and it is merely a question of adapting his published report on Hazel propagation from hardwoods.

The most significant feature of this technique is the production of stem material of high capacity to regenerate, which is obtained by growing 'stooled' stock plants on a hedge system — thus providing the vigorous growth of correct nutritional status. As the technique, as far as nurserymen are concerned, is new and requires some attention, a start should be made by using only the "basal" cuttings, i.e. that piece including the basal swelling of the stem, as this has the highest capacity to root. Cuttings should be made some 15 cm in length and the base dipped in a 1% solution of IBA in alcohol; this is allowed to dry on and then the cuttings are placed in a "Garner" bin with a bottom heat of 70° F. The operation is conducted at the end of February and the cuttings will require 4 to 5 weeks heat-treatment; the heat is then reduced and as soon as conditions are reasonable, the cuttings are bedded into a cold frame. This is an exceedingly easy technique as *Corylus* appear to be very tolerant of "poor" conditions in the bin as they will withstand the wetter and cooler conditions which are often associated with inexperienced management.

The following plants will respond to this technique:

- C. avellana* 'Aurea'
- C. a.* 'Contorta'
- C. a.* 'Heterophylla' ('Laciniata')
- C. chinensis*
- C. colurna*
- C. axima*

#### LITERATURE CITED

1. Howard, B. H. 1967. Rootstock propagation by hardwood cuttings. A progress report for nurserymen *Rep. E. Malling Res. Stat. for 1966*:202-204
2. \_\_\_\_\_ 1968. Hazel propagation by hardwood cuttings *Rep. E. Malling Res. Stat. for 1967*:93-94