

FRUIT TREE RAISING IN ENGLAND TODAY

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Vegetative propagation only. Fruit trees and rootstocks in England are propagated entirely vegetatively. Seedling rootstocks faded away with Hatton's (1) publication of his classical trials in the twenties. Today the fruit tree raisers and growers are eager to exploit the latest findings of rootstock research just as they did the scion variety, but with more certain assurance. Today our growers demand trees on dwarfing rootstocks and at this moment there is a lively interest in the most dwarfing, in our country where winter killing frosts are no hazard. For apples, East Malling is now releasing the very dwarfing '3431', as 'M.27', which is considerably more dwarfing than 'M.IX', virus-free 'Quince C' for pears, selected St. Julien for plums and peaches, and growers are knocking on the door for our dwarfing rootstocks for sweet cherries.

Form of tree. Considerable attention is given to the form of tree grown. Low working, leading to scion rooting, has resulted in loss of rootstock control; now a minimum working height of 6 inches is the rule. Because of the incidence of collar rot (*Phytophthora spp.*), apples are now recommended to be worked at 12 inches and this demands long straight rootstocks. High-working is sometimes used for plums to provide stem-canker resistance but it is not common. Sweet cherries are still high-worked to lessen their susceptibility to bacterial canker (*Pseudomonas morsprunorum*). A number of East Malling mazzards resistant to bacterial canker are now going into field trials and scion varieties from the John Innes Research Institute, resistant to the disease, will shortly be in extended trials, the aim being to obviate the necessity for high-working and to facilitate low-working of bush trees having overall resistance. Twelve-inch high-working of apples ensures elevation of the lower strong maiden laterals into a usable position, enabling the tree to form good basic branches in the first year, thus avoiding the need to manipulate in other ways.

Plant health and pedigree. Our Ministry of Agriculture has three schemes of special interest to fruit tree raisers. The first is that relating to purity, health and vigour of a range of apple, quince, plum and cherry rootstocks as seen in the season of growth. The next is a 'mother tree' scheme to register approved trees as sources of scion-wood, whilst the most recent, now in its first year, involves continuous assessment of health and maintenance of supervised isolation of both rootstocks and varieties. The high standards set in this special stock scheme doubtless deter many small nurserymen and, in fact, only eight raisers are at present involved.

Rootstock propagation. The etiolation method of layering is now confined to the propagation of mazzard cherry rootstocks such as 'Malling F12/1' and its successors. Only really skilled work will provide the continuously high productivity of this technique and thus it tends to be confined to subjects not amenable to simple methods of propagation. Plum rootstocks are best propagated by hardwood cuttings, but a few layer beds remain in use. Apples and quinces are generally propagated by simple stooling. Output per acre is very variable due to differing attention to detail. At East Malling we regard 40,000 budable-grade apple rootstocks per acre as average but some raisers fall far below this through inattention to the basic requirement of harvesting while dormant, non-brutal cutting to maintain high shoot production, and moderate but well-timed earthing. Quinces are notoriously prolific on stools, good crops rising up to 100,000 per acre. However, even with good cropping, layering systems involve much heavy hand labour and are becoming relatively more costly year by year and this has led to a deep interest in other methods of propagation.

Hardwood cuttings. Hardwood, rather than softwood cuttings or root cuttings, have been chosen as the practical alternative to layering. Mist propagation of essentially bare-root material with overwintering difficulties and slowness to attain budable size, does not appeal to us. Neither do root cuttings because of slow development and the danger of mixtures and virus contamination inherent in nursery collection. Hardwood cuttings are amenable to 'factory-like' methods, economical size attainment where most readily grown, and they have an ideal straight axis form which can be compactly bundled, treated and mechanised. East Malling has pioneered this hardwood cutting work on this basis and we are still examining the behaviour of cuttings and their response to treatment. This has ranged from a demonstration of the value of vigorous hedge plants as a source of cuttings, cutting at the shoot base, specific periods of collection and auxin treatment, and planting in heated bins to obtain the necessary rooting before transference to the open field. Perhaps the most important lesson we have learnt is that no traditional technique can be taken for granted but that an open re-consideration of all factors involved is vital. The recent discovery of the significance of depth of dipping hardwood cuttings (2) is a typical example, for not only does this have immediate practical implications but it is also leading to a deeper understanding of the mechanism of auxin stimulation of cuttings. The widespread interest in rapidly multiplied trees for intensification of close planting may lead to a demand for the 'cheap tree' for a short life, and hardwood cuttings may well be exploited for this purpose.

Replant diseases. Suitable soils in nursery areas are increasingly difficult to acquire and when high cost buildings have been installed there is added reason to recrop the local land. This has often led to a

lowering of tree quality and output due to replant diseases and nurserymen are seriously considering rehabilitation of such used soil by partial sterilization. One raiser has already contracted each year to have a substantial proportion of his land treated with chloropicrin; experiments at East Malling having shown that the normal maiden growth can be restored, or even improved, in this way. Our Ministry of Agriculture undertakes the testing of soils and advises on their likely response to treatment.

Mechanical aids and herbicides. Mechanical aids are less advanced in England than in the United States. Tree lifters are widely used and large growers are beginning to use blowers to clear between lined-out roses and this also has possible potential for cleaning out partially unearthed layer beds. Overhead spray booms are now fairly common but, in general, the development of high clearance tractors has been very slow in England. The use of herbicides, pretty well an essential accompaniment of mechanization, has come into wide use. Simazine and Paraquat are the most popular chemicals.

Jacketed cold stores. Hitherto the temperate English climate has not encouraged the use of stores or cellars, but with the need to use our limited skilled labour for a longer period, a number of jacketed cold stores have been built by every large scale raiser, after the pattern of those in Denmark. They are proving a tremendous success and their owners say that jacketed stores are the most worthwhile investment they ever made. Not only does the jacketed store help planning generally by extending the season, but material may be fully prepared for the planter and be ready on hand when the weather is right; scionwood can be held over from autumn to spring and scions can be prepared and accumulated during inclement weather for speedy grafting later. Most growers run their stores at 29° to 33°, but nearer the lower temperature is safer for holding over from season to season.

LITERATURE CITED

1. Hatton, R.G. 1921. Results of researches on fruit tree stocks at East Malling. *J. Pomology*, 2, 1-10.
2. Howard, B.H. and Nahlawi, N. 1970. Dipping depth as a factor in the treatment of hardwood cuttings with indolyl butyric acid. *Rep. E. Malling Res. Stn for 1969*, 91-94.

MODERATOR SHUGERT: Thank you very much, Bob, for a great presentation. The next speaker on our program is one of our very fine members from the Western Region; he is from the state of