

8 EDWARD VII., A. 1908

on a dwarf or slower growing tree than itself the result is that the stock tends to dwarf it, as a sufficient quantity of crude sap does not pass through it to maintain the natural vigour of the top; and as a lessening in vigour tends to the development of fruit buds, this kind of stock is often used for the purpose of inducing fruitfulness in a variety and for dwarfing the tree. The Paradise stock of Europe is an example of this kind of stock. There is, however, often such a difference in the growth of the stock and the variety grafted on it that the result is not satisfactory. It is quite possible that the stock may have the effect of making the tree hardier, as if growth is checked the wood may ripen better; although the results obtained by top-grafting 92 varieties at the Central Experimental Farm on hardy stocks showed that there was not a sufficient increase in the hardiness of tender varieties to enable them to withstand a test winter. In top-grafting trees, great care should be taken that the stock is a vigorous growing variety, as, if it is not, the union may be bad, or the top outgrow it and the tree will become top heavy and finally break down. While good results have been obtained by top-grafting on crab apple stock, it is not very satisfactory and should not be used unless in exceptional cases, as the union is often bad or the grafted part outgrows the scion. Some of the best varieties for stock on which to top-graft are McMahan, Hibernal and Haas, and Tolman in the best apple districts.

Dwarf or slow-growing stocks are not recommended for use in any but the coldest parts of the country; although experiments with Paradise and Doucain stocks have shown that good results can be obtained with some varieties by their use in the best apple districts, at least for a time. The stocks used in root grafting and budding in the districts where the best apples can be raised successfully are usually obtained from apple seeds which are procured at cider mills or anywhere else where they can be got easily and in large quantities, and no pains are taken to learn what varieties produced the seeds. Stocks grown from this kind of seed, while quite satisfactory as a rule, are not desirable in the coldest parts of the country where root-killing is liable to occur, as individual trees vary much in hardiness, and one might graft a hardy variety on a tender stock without knowing it. At Ottawa, what stocks are required for root-grafting are usually grown from seeds of the Martha and other hardy vigorous crabs. Seeds from the hardiest varieties of both apples and crab apples are more likely to produce hardy stocks than if seeds were obtained promiscuously.

For the very coldest parts of Canada where the apple can be grown at all, the berried crab, *Pyrus baccata*, will probably make the most satisfactory stock for root-grafting or budding. It is perfectly hardy at Indian Head, N.W.T., where the winters are very severe, having endured the climate there. The seeds from which the stocks are to be grown for root-grafting or budding should be treated in the manner already described under the heading 'Seedling Varieties.' It is important to cultivate the young trees thoroughly the first season if it is desired to use them for root-grafting during the following winter. Only the strongest should be used for this purpose, and the others left to grow for another season, when they may be used for budding, if propagation is done that way, or for root-grafting as before. They will not be large enough for budding the first season. If it is known that a hardy variety is growing on its own roots, hardy stocks may be obtained if pieces of the roots are cut off and scions grafted on them.

There are many of the best apples which will not succeed in certain parts of Ontario and Quebec when grown in the ordinary way, as they are either root-killed, or sun-scalded so badly that they die from the effect of it. Experiments conducted at the Central Experiment Farm go to prove that by top-grafting these varieties on hardy stocks some will grow well and produce fruit of fine appearance and quality for a time, but when a test winter comes they succumb. To obtain these stocks it is necessary, first of all, to have hardy roots. This may be effected to a large extent by raising seedlings from the very hardiest apples or crab apples. A variety is then grafted or budded on them, which forms a straight, clean trunk which does not sun-scald, and on this variety is top-grafted the kind that does not succeed when grown