

Intermediate Stocks For Apples

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The present strong interest in three-part apple trees in Maine dates from the winter of 1933-1934 which severely injured nearly half the bearing apple trees of the State, dethroned Baldwin and Ben Davis and made the way clear for McIntosh to assume the lead and for Cortland to come in second.

The three-part tree has a seedling root (rootstock), a variety of apple or crab apple that forms the trunk and basic framework (intermediate stock, shortened to inter-stock), and the scion variety that is budded or grafted into the limbs of the interstock and forms the fruiting top of the tree. So much of the winter damage occurs in the lower branch crotches and in the trunk itself, that the obvious preventive is to jack the head up, so to speak, and substitute a hardier trunk.

Orchard Trials Started

First orchard trials were started in 1936, using chiefly Virginia Crab and Hibernial apple as interstocks, both of these being already pretty well known. In several years of groping about there were added a few of Antonovka, Charamoff, Anis, Izo Crab, Pewaukee, Paragon, Robusta No. 5, and a few wildlings picked up in Maine. Four experimental blocks were planted in 1940, two in central Maine, one in northern and one in southern Maine. Each consisted of 320 trees, of which 80 were Virginia Crab, 80 Hibernial, and 80 each of two common varieties for contrast or compari-

son. In different blocks Cortland, Northern Spy, Baldwin, and McIntosh were the scion varieties. Already the value of the hardy trunk-forming stocks has been demonstrated at the northern situation; McIntosh trees on such stocks live, without them they die. With the passing of the next test winter the suitability of these two stocks to the several scion varieties and climatic situations should be pretty thoroughly explored.

New Selections Tested

In 1941 the scope of the Maine investigations was broadened. The Plant Introduction Garden of the United States Department of Agriculture, at Glenn Dale, Maryland, is active in the collection and nursery testing of potential hardy interstock materials. From annual listings and reports on their nursery behavior in comparison with Virginia Crab, first



Apple tree trunk injured by cold in winter.

selections were made for planting in the spring of 1941, and additions have been made each year since. Four orchard plantings are thus being developed, each being flexible so as to permit the annual additions from this and other sources. In the Orono planting, Rogers McIntosh is the top variety. In another, Cortland; in still another, Baldwin; and in the fourth orchard, Northern Spy is the top variety. The principal objective in these tests is to ascertain the compatibility, the stock-scion relationships.

The correct evaluation of intermediate stock as trunk formers cannot be made in haste. A paper prepared in 1943 by the present authors for the annual report of the Maine Agricultural Experiment Station included a tabulation of 25 stocks and four scion varieties. There were gaps in the data, but so far as tried no instance of incompatibility had been recognized. Tayezhnoie (P. I. 107253) was one of the stocks and Rogers McIntosh one of the scion varieties. The subsequent behavior of this combination, however, indicates that it is no good at all. The bud unions are imperfect and brittle. Trees set in 1941, and top-worked since, set rather heavy crops this year, but the leaves turned color in August and the crop was not properly matured.

Response of Virginia Crab

Virginia Crab appears in the Maine tests to be compatible with Rogers McIntosh, yet there are individual trees of this combination that behave in such manner as to suggest the need of longer observation before recommending it fully. These trees grew well for a time after

they were budded, but they came into bearing early—perhaps abnormally so—and were dwarfed as a result. They have, however, continued to live and bear, and the impression is that they have improved in appearance.

Virginia Crab certainly is not fully compatible with Red Gravenstein, and likely not with Gravenstein. A single tree of Winter Banana / Virginia Crab has behaved much like the Rogers McIntosh except that it seems to grow steadily worse, not better. With 17 other varieties this stock seems to be satisfactory. Baldwin, Richared Delicious, Early McIntosh, and Rhode Island Greening make particularly good vigorous trees on it. Northern Spy/Virginia Crab comes into bearing somewhat early and the tree is more open than Spy on its own trunk, but an all-out recommendation should be withheld for longer observation.

Hibernal

In the more restricted range of varieties worked on Hibernal no incompatible combination has been discovered. The fact that Baldwin on this stock was killed back to the unions may have some significance in alerting horticulturists to possible interstock differences in the transmission of hardiness. It is unlikely that Baldwin on any stock will regain its former status as a commercial apple in the Northeast.

The slow acceptance of Hibernal, in Maine at least, is rather because of its slow growth and tardy development of a good distribution of branches. When, however, it does so develop it makes a very good tree indeed. Quite possibly the importance of rapid development is over-

emphasized and consistent performance in later years may yet prove Hibernial superior.

And now as to the hope of still better trunk-forming stocks. The Orono planting of 1941 included Anis, Antonovka Shafran, Bellfleur Kitaika, Charamoff, Hibernial, Kulon Kitaika, Tayezhnoie, Virginia Crab, and Rogers McIntosh as trunk stocks. In their second, third, and fourth years, as their branches reached buddable size at suitable distance from the trunk (about 18 inches) they were budded with Rogers McIntosh. Trunk circumference measurement and the number of buds inserted were recorded annually for each tree.

Evaluation of Results

Let us consider first the growth in circumference as an indication of the growth of the entire tree. In this comparison Charlamoff, Bellfleur Kitaika, Kulon Kitaika, and Virginia Crab have done especially well, each being now significantly larger than three of the other stocks. Anis and Rogers McIntosh made the poorest showing, Anis having been surpassed by three and Rogers McIntosh by six. In terms of growth increment for one year (1945) Charlamoff led, Bellfleur Kitaika was second.

In the matter of the time in years required to complete the top-working of the several stocks in this comparison, the following simple tabulation shows that five stocks lent themselves more quickly to top-working than Virginia Crab did, and that seven were done more rapidly and earlier than Hibernial. The rating includes the budding of 1944, which was the fourth growing season for these trees



Gravenstein apple trees: left, injured by cold in winter; right, uninjured.

in the orchard. Virginia Crab is given 100. The percentage ratings above 100 indicate quicker completion of the top-working operation whereas ratings below 100 indicate longer and therefore less desirable completion of the top-working procedure.

Variety	Percentage
Antonovka Shafran	118.1
Charlamoff	116.6
Kulon Kitaika	112.6
Tayezhnoie	104.2
Bellfleur Kitaika	101.2
Virginia Crab	100.0
Anis	90.5
Hibernial	83.6
Rogers McIntosh	61.8

Seeing that Bellfleur Kitaika in the nursery screening at Glenn Dale surpassed Virginia Crab in growth and that these two, together with Antonovka Shafran and Kulon Kitaika surpassed Hibernial, their good showing to date under Rogers McIntosh at Orono is but

another indication that they are well in the running. Surely it is not too much to hope that one or more may prove superior. Charlamoff too seems deserving of further testing. And what of the acquisi-

tions of 1942 to 1946 and still later? With so much apparently good material in the first lot, and with more in prospect, orcharding along its northern fringe should indeed take heart.



The Melrose Apple

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The Melrose apple, recently introduced by the Ohio Agricultural Experiment Station, possesses certain qualities which make it very desirable for limited commercial trial. This apple is a cross of Jonathan and Delicious. Its late-harvesting and late-keeping characteristics, coupled with high dessert quality, indicate that it should supplement Stayman Winesap and Rome Beauty in the late-apple group. At Wooster the fruits are picked just prior to or at the time of Stayman Winesap and they keep in cold storage until April. The well-colored fruits remain firm even into May and have been superior to Stayman Winesap in this respect.

Another outstanding characteristic of this new apple is the freedom of the fruits from Jonathan Spot, which is frequently a serious problem with Jonathan, its female parent. Not a single spot has ever

been observed on Melrose fruits since the original tree came into bearing in 1937.

This variety is similar to Jonathan in not being susceptible to scab but the fruits are rather readily russeted.

At Wooster the fruits of Melrose are well-covered with an attractive carmine and a live yellow undercolor. Usually they are intermediate in size between Jonathan and Delicious. The shape of the fruits is well illustrated by the accompanying figure. The flesh is rather fine-grained, firm but not tough, crisp, juicy, and not as tart as Jonathan. The flavor is not sweet as is Delicious but is intermediate between its parents. Melrose seems to be an excellent cooking apple, presumably better for apple sauce or pie than for baking, since the fruit is usually not as large as is desired for a baking apple.

The original tree was planted in the orchard in 1927 and bore its first flowers in 1937. Young trees propagated from