

hand. This goes also for the other members up here who helped work out the program and decided on the facilities for us. Walter Van Vloten, I know, spent quite a bit of time on this. He decided on the recommendation of the Vancouver Airport Inn as having the most suitable facilities for our meeting; I think he made a very good choice. All the other members from this area that helped develop this program also deserve considerable credit.

I have known the moderator of our first session for quite a few years. We were graduate students together at Michigan State University. We are certainly happy to have him out here with us. He is Canadian; actually he is sort of a renegade member in that our boundary line goes to the other side of his province, but he claims that his conditions there in Saskatchewan are more similar to those of the East. So he went to the East and he conquered the Eastern Region and has become President. But he still is, I think, a Western member despite his conquering the East. So, Stu Nelson, we'd like to have you go ahead and get the program started.

MODERATOR NELSON: Thank you, Bob. Ladies and gentlemen, it is a real pleasure to meet with the Western Region. This is my first time to meet with your group; it is a particular pleasure for me that you have chosen to meet in Canada this year.

At this time we will call on the first speaker, a chap from British Columbia who has been a nurseryman, and propagator, as well as an orchardist, I believe; he certainly has a "grass-roots" approach to the fruit tree rootstock situation. I'd like now to introduce John Traas.

TYPES OF ROOTSTOCKS USED IN FRUIT TREE PRODUCTION

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My earliest recollections of fruitgrowing date back fifty years. That was when Antwerp was bombed in 1918 and I was sheltered under one of the big fruit trees in my father's orchard. They were old and, of course, on seedling rootstocks. Ten years later, another remarkable feat happened when my father bought his first pears on quince. They were the most miserable looking trees I have ever seen but that was the beginning of a period when nurserymen began to grow trees on controlled understock. Some people called them dwarf, but that does not mean that they had to be below quality, as happened when my father bought his first shipment.

Many things have changed since then—the time when people planted trees thirty to forty per acre has long passed, and nowadays three to four hundred per acre is not uncommon! This is the time of wide variation of types, with many specific

characteristics on different soils, under different climates and in different countries. It is with this in mind that we will attempt to look at this subject from three different points of view. First, what it means to the fruitgrower; second, what it means to the nurseryman; and third, what it means to the plant propagator.

Today, the modern fruitgrower has access to a number of magazines, periodicals, and books; if he belongs to a fruitgrower's association, he can exchange his practical experiences with those of other members. Fifty years ago he had to rely mostly on his own skill and intuition. Today he is more demanding, more informed, and certainly more choosy when he buys trees from the nurseryman.

If the grower plants 400 or more apple trees per acre, he wants trees on 'E.M. IX' roots. This gives him full production by the fifth year. Of course, he must pay a price for this quick production, either by staking every tree or by growing them in a hedgerow on a wire. People who prefer fewer trees per acre, but still want to retain high density planting, look for trees with a bit more vigour, which we find in 'M. 26', 'E.M. VII', 'E.M. IV', or 'M.M. 106'. We are not going to elaborate on all details of these stocks, presenting only a general outline.

In the more vigorous group, the apple-grower can do two things: he can plant very close on "spur" types, or "non-spurs" at a rate of 225 trees per acre. The modern fruitgrower looks in this vigour range for 'E.M. II', 'M.M. 104', 'M.M. 111', or 'Alnarp 2'. Rarely will people plant clonal rootstocks which compare in vigour with seedling rootstocks. Some modern growers have ten-year old spur types on seedling roots which are not at top capacity yet. This could be an indication that fruiting on a seedling rootstock takes longer than fruiting on a controlled growth understock. There are countless instances of trees in full bloom on seedling rootstocks—which have not yet passed the juvenile stage—with the result of a total fruit drop in June. Several old-country varieties are known for this bad characteristics; on dwarfing understock they give far earlier production. It is, therefore, no surprise that the modern fruitgrower has something specific in mind when he orders trees from the nurseryman. This results in a more diversified plant plan for different customers—different customers on different soils—different customers under different climatic conditions. There was a time that the fruitgrower was satisfied with any tree as long as there was a root under it—this time has long passed, and all for the better.

Let us now see how the nurseryman, hemmed in between the demands of the fruitgrower, and the sometimes restricted supply from the plant propagator, makes a living.

VERY DWARF

When the nurseryman contemplates his plans for a new growing season, he considers, of course, the possibilities of selling the plants he will grow. Therefore, he certainly does not want to bank too heavily on 'E.M. IX', the true dwarf. The root system is brittle, the trees fall over very easily in the nursery row, and the size of the tree is smaller than the other rootstocks. On top of this, the demand from the fruit grower is not heavy enough to go overboard on 'E.M. IX'.

DWARF (MEDIUM WEAK)

The next one in the vigour range a relatively new rootstock, is 'M. 26', a cross between 'E.M. IX' and 'E.M. XVI'. The large, shiny leaves show some similarities with the very vigorous growth of 'E.M. XVI', although the vigour is considerably less than that of 'E.M. VII'. Material is not plentiful yet and, therefore, 'E.M. VII' becomes his next choice.

SEMI-DWARF (MEDIUM)

This older rootstock type is still in demand, but not as heavy as ten years ago, despite some limiting factors. It performs very well with grafts of 'Golden Delicious', and, according to Dr. R. F. Carlson, also on spur types of 'Red Delicious'. It is, however, susceptible to collar rot. 'E.M. VII' is the first one in this range of semi-dwarf understocks.

In the same vigour range is 'M.M. 106', one of the promising types of the Malling Merton series, having superb growth, good anchorage, and early production. In some locations the susceptibility to collar rot is one of its limiting factors. Another factor which decides the choice of rootstocks for the nurseryman to offer is that some fruitgrowers prefer the compact trees—the so-called spur types, many of which are available as sports of 'Red' and 'Golden Delicious'.

SEMI-VIGOROUS (MEDIUM-VIGOROUS)

When the fruitgrower demands more vigorous trees, there is a choice of understock between 'E.M. IV' and 'M.M. 111'. 'E.M. IV' (or 'Holstein Doucin') is an old timer with several characteristics which warrant condemnation, but several superior aspects which make a reassessment desirable in this era of high density planting. The poor characteristics are a tendency toward leaning, great susceptibility to foliar deficiency, susceptibility to woolly aphid in the stoolbed, suckering, and virus infection of the plants. When clean material is available and if the fruitgrower should decide to grow trees in a

hedge row, either on wire or stakes, the enormous productivity of trees on this stock will most certainly be a factor in giving 'E.M. IV' a place in trials. The more so because it is one of the very few stocks which seem to be resistant to collar rot.

Automatically the nurseryman turns to 'M.M. 111' as his only other choice in this vigour range. It is rather strange that this new type from East Malling was hardly known or grown eight years ago. The absence of virus, combined with great drought resistance and, as an extra bonus, the early and dependable productivity makes this the most wanted type at the moment. According to the statistics, production is just under the top producers—'M.M. 106' and 'M.M. 104'. So far, it also claims the honour of being less susceptible to collar rot than the other stocks.

VIGOROUS

Following the classification of Prof. H. B. Tukey, the next group from which the nurseryman can choose is the vigorous group, including three worthy of consideration—'E.M. II', 'Alnarp 2' and 'M.M. 104'. To begin with 'E.M. II', this is a very good understock, but it takes quite a time to develop good anchorage, due to the asymmetrical root system which makes leaning of young trees not uncommon. It is a "dry" rootstock (which is not easy to bud). There are many satisfied fruitgrowers who had good results with this stock and are pleased with its performance, production-wise.

We spoke of a dry rootstock; 'Alnarp 2' from the Agricultural Research Station at Alnarp, Sweden, is the easiest to bud. It is relatively unknown, but fairly winter-hardy, and is available only in limited quantities.

During the last ten years, nurserymen have turned to 'M.M. 104' in increasing numbers. The best cropper, providing the best anchorage, and at the same time an early cropper, it is no wonder that many people have bought this understock as a finished tree. The susceptibility to collar rot is one of its limiting factors, although many satisfied fruitgrowers praise this understock very highly. It is not certain if collar rot is a primary or a secondary disease. Some claim that frost damage, coming first, makes invasion of the collar rot fungus easier. Incidentally in Europe collar rot in rootstocks is no problem, and when the plants were introduced from East Malling Research Station, immunity to collar rot was claimed.

VERY VIGOROUS

The very vigorous group, consisting of 'M.M. 109', 'M. XXV', 'Robusta #5, and seedlings, have decreased in importance because high density planting, using such stocks, is hardly feasible.

It has been the fruitgrower who has changed the pattern of the nurseryman by insisting on a specific variety grown on a specific rootstock. How much the clonal rootstocks have influenced the industry is shown by the fact that one of the largest nurserymen in the U.S.A. offers over twenty apple varieties in nine types, giving close to 200 combinations.

Time prevents me from elaborating on the clonal plum rootstocks which are a refined improvement over seedlings, especially for high density peach plantings. We also mention quince as dwarfing understock for pear, which could make high density planting for pears a distinct possibility. It would be good if a winter hardy quince could be found to give this point more impact. Close contact between fruitgrowers, nurserymen, and scientists can prevent a lot of mistakes; the more so because no one has found all the answers yet.

Finally, in what position does the plant propagator find himself? As a new Canadian from Europe, it took some adaptation for me to drop a cultural practice which was so contrary to the one we found here. The western countries of Europe, especially, grow high density trees on 'E.M. IX'. More than 90% of all trees sold in Holland are grown on this rootstock. A prominent Belgian plant propagator, who grows two and a half million plants a year, has two million plants of 'E.M. IX'. England has large acreage on 'E.M. II', 'IV' and 'VII', but has changed considerably over the last ten years to the new Malling Merton series, especially 'M.M. 106', '104', and '111', while this continent uses Malling Merton understocks to a far greater extent than does Europe.

It is the correlation between the demand of the fruitgrower and the willingness of the nurseryman to adapt to this new demand which is the guideline for the propagator. A more desirable thing would be that through close contact between the plant propagator, the scientists, and the plant breeders, a more reliable and, if possible, a more restricted choice of types would be feasible. One of the limiting factors so far has been the constant changing of types adaptable to different climates; another limitation has been the distribution of cleaner foundation stock but with undesirable characteristics or with the appearance of new latent viruses.

How much the plant breeder and propagator are subject to the changes of modern environment is clearly illustrated by the plant breeding of black currants at the Wageningen University, Holland. Twenty years ago, the most important characteristic was a long vine which was easy to pick; several promising varieties were discarded because of a lack of this feature. Now, with the mechanical shaking devices, emphasis is still placed on production but, just as important, on uniform ripening and on easy mechanical harvesting. Several older varieties returned to prominence lately because of this situation.

The same applies to the plant propagator. While fifty

years ago all trees were sold on seedling rootstocks, there has been a gradual changeover in the last ten years to size-controlling rootstocks, with a sudden upswing in the more dwarfing understocks. The switch to high density plantings and to growing trees in hedgerows made this changeover necessary.

The demand for the smaller trees on a large scale is relatively new and the industry is still in a transition period. During our 12 years in Canada, the demand has switched from 'E.M. VII' to 'E.M. II' to 'M.M. 104' and '106', and now to 'M.M. 111'. The changes are not always gradual but sudden and this brings tension to the nurseryman who cannot supply trees on a recommended rootstock overnight. It also brings disappointment to the fruitgrower who cannot get what he wants. Several modern fruitgrowers, especially those with capacity to raise their own trees successfully, buy the latest recommendations directly from the plant propagators.

Summarizing, we can say that the transition is as confusing to the orchardists as it is to the nurseryman and as complex for the plant propagator as it is for the plant breeder who introduces new, promising additions to our already large range of rootstock types. We feel that a very sound policy is to stick to a rootstock which has given good results for the individual fruitgrower. The more material that is released, the more we need close cooperation between orchardists, nurserymen, and plant propagators. In closing, we express the hope that we, as plant propagators, may play our part in this important facet of the fruit industry.

MODERATOR NELSON: Thank you, John. I would like at this time to call on Mr. Herbert Frost, who is going to speak on "Growing Trees on Malling Stocks". Mr. Frost is from Frost Nurseries, Granite Falls, Washington. Mr. Frost:

GROWING APPLE TREES ON MALLING ROOTSTOCKS

HERBERT H. FROST

*Frost Nursery
Granite Falls, Washington*

Our nursery is located 40 miles northeast of Seattle, Washington, in the western foothills of the Cascade Mountains, where the soil and climate conditions are excellent for growing hardy trees. The soil is upland sandy loam with a pH of 5.5 to 6 and is rich in organic matter. The ground is prepared two years in advance of planting, with two green cover crops deeply plowed under. We add 400 lbs. of 10-20-20 commercial fertilizer per acre.

At this time we are growing apples on 'E.M. IX' and 'E.M. VII' understocks. The reason we have confined our growing to these two is that we sell primarily to retail stores; 'E.M. IX', a dwarf of 8 to 10 feet, and 'E.M. VII', a semi-dwarf—12 to 15