DWARF FRUIT TREE ASSOCIATION
NEWS LETTER

INFORMATION ABOUT SMALLER THAN STANDARD FRUIT TREES

No. 21 January, 1962 Edited by R.F. Carlson

FIFTH ANNUAL CONFERENCE-DWARF FRUIT TREE ASSOCIATION
March 6 and 7, 1962, Hill Top Orchard, Hartford, Michigan
-Tentative Program-

March 6 - Meet at Hill Top Orchard at 2:00 p.m. Two or three orchards will be visited during the afternoon-weather permitting. 6:00 p.m.-meet at Chicken-nook Restaurant, St. Joseph, for get-together-dinner. Following dinner, 7:30 to 9:30 p.m., will be an informal discussion when everyone can have his say pro or con about smaller fruit trees, etc.

Very important: To accommodate everyone for dinner Tuesday evening, we need to know how many will come. Make your dinner reservation by writing a card, saying that you will be there for dinner, to: Ray Klackle, Belding, Michigan.

March 7 - 9:30 p.m. - Short 5 minute progress reports from fruit growing areas from several states with introduction of out-of-state guests. Persons making these reports will represent fruit growers, nurserymen and horticulturists.

10:00 to 11:00 a.m. - Dr. A. P. Preston from East Malling England will discuss fifty years of experience with fruit tree rootstocks in England. He will deal with pruning, spacing, soil and fertility requirements, production and the adapt-ability of rootstocks in commercial plantings.

11:00 to 11:45 - Questions to Dr. Preston from the floor.
12:00 noon - Lunch available.

1:00 p.m. - Question and answer session - If you have a question, write it out and mail it to Room 303, Horticulture Building, MSU, East Lansing, Michigan. All the questions will be answered.

2:00 p.m. - Dr. H.B. Tukey will summarize the main points of the meetings.
2:15 p.m. - Pruning demonstration in orchard pruned in various ways since 1957.
The final program and list of motels will be issued in the next News Letter.

SELECTED ROOTSTOCKS FOR COMPACT FRUIT TREES, HIGH YIELDS AND QUALITY FRUIT*

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Today, most of our fruit growers are looking ahead and planning for higher yields per acre of quality fruit. They are also looking ahead toward more machanization and more efficiemt orchard operations. The smaller more compact fruit trees fit right into the present and future development of the American fruit industry.

COMPACT FRUIT TREES

The terms "dwarf", "semi-dwarf" and "standard" fruit trees often are used when speaking about smaller trees. Another term "compact" is being used now when talking about smaller trees for commercial orchards. The term "compact" is more descriptive because we are interested in more fruit per unit area of the tree and unit area per acre. The auto industries do not call their small cars dwarf or semi-dwarf, but rather they call them compact cars. Similarly, the smaller fruit trees are compact trees. In this paper the term "compact" will be used rather than semi-dwarf.

COMPACT TREES ARE DIFFERENT

By this time, most fruit growers know the difference between compact trees and standard trees. However, we shall briefly review how they are produced. Standard trees are the varieties budded on seedling rootstocks and the compact trees are the varieties budded on vegetative rootstocks. These latter rootstocks are increased by layers in a propagation stoolbed and they are not increased by seed-propagation.

Vegetative rootstocks are usually more uniform than seedling rootstocks. They are also a little more difficult to raise than seedling rootstocks, hence a little more costly per individual budded tree. The vegetative rootstocks reduce the size of the varieties and bring the trees into bearing two or three years earlier than seedling rootstocks.

VEGETATIVE ROOTSTOCKS

Of the East Malling vegetative rootstocks EMII and EM VII are the most important for the commercial fruit grower. The EM XI rootstock is recommended mostly for the back-yard.

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*Paper presented at the annual meeting of the Missouri State Horticultural Society, Columbia, Missouri, January 3, 1962.

Then there are the Malling Merton rootstocks which are beginning to show promise in this country. Four of these are now being tested here at East Lansing and also elsewhere. The MM 104 is vigorous, but productive. The MM 106 comes into bearing first and is well anchored and productive. The MM 109 is showing promise for certain varieties. The MM 111 has shown some irregular characteristics so far. More time is needed for testing adaptability requirements in reference to soils and varieties, etc.

A limited number of trees are available of the MM sorts and we suggest they be planted in small numbers along with the same varieties on the EM stocks for orchard comparison.

Alnarp 2 is another rootstock, with some dwarfing and with high resistance to low temperatures. A2 is strongly anchored and induces bearing at an earlier age than seedling stocks. It merits trials in areas where winter hardiness is required.

INTERSTEM APPLE TREES

An interstem tree is made up of three parts; the variety, the interstem, and the rootstock. The latter two parts will determine the size of the tree depending on the material used for the interstem and the rootstock. If EM VIII or IX is used as an interstem, the resulting trees are small and productive, however, these trees need a rigorous training program to produce fine productive trees. Instead of a seedling root, one of the most vigorous EM clones could be used for rootstock for the interstem tree. For example, Red Delicious/EM IX/ EM XII.

Although, interstem trees are not yet recommended for general orchard plantings, they show promise in test plantings at East Lansing. Jonathan tested with several interstem materials averaged in the sixth year 968 bushels per acre and Golden Delicious averaged 1355 bushels per acre from 484 trees per acre spaced 6 x 15 feet. EM VII and K 41 used as interstems make semi-dwarf trees, come into bearing early, and are strongly anchored.

SUGGESTED VARIETY/ROOTSTOCK COMBINATIONS

The fruit grower does not buy fruit trees without careful deliberation on which variety is going to "pay off" in the future. Today it is just as important for him to carefully consider the kind of rootstock for each variety planted. Fortunately for the grower, there are only a small number of rootstocks to select from at the present time.

Of the East Malling series of rootstocks, only two are used extensively in Michigan. These are: EM II and EM VII. The relative tree-size produced by these rootstocks depend on the scion variety and the soil type that they are grown on. Comparing them in a general way to standard trees EM II will produce a 3/4 size and EM VII a $\frac{1}{2}$ size tree. EM VII is easy to propagate, but EM II is a little more difficult in the propagation beds. EM VII will tolerate both a heavy and a light orchard soil, whereas EM II requires a well drained soil at all times or the medium soil type.

Since there are a dozen or more varieties of apple grown commerically, a few examples of variety/rootstock combinations are described here.

Jonathan: This variety is slow growing, comes into production early and could be handled nicely on seedling rootstock. However, more uniformity of trees in the orchard can be had on clonal rootstock. Jonathan/EM II makes a handsome precocious, productive and compact tree. On the other hand, Jonathan/EM VII is a smaller tree, with more "fruiting out" of the leader causing irregularly shaped trees. If the latter combination is selected, more trees should be planted per acre. At this time, Jonathan/EM II is preferred.

Red Delicious: Generally, this variety is more vigorous, slow in coming into bearing and is in need of dwarfing. Red Delicious/EM VII comes into production the fourth year, however, being "top heavy", many of the trees tend to lean with the prevailing wind and will need staking for a few years. Red Delicious/EM II makes a larger tree and comes into production in the fifth year or earlier if scored. This combination rarely requires staking. On well drained lighter soil, use Red Delicious/EM II and on heavier soil types use Red Delicious/EM VII.

Spur-Type Red Delicious: The tendancy of these spur-types to grow slower and fruit early indicate that they should be budded on a less dwarfing rootstock or perhaps on uniform seedling stock. Until more is known about certain spur-type/rootstock combinations, it is suggested that they be budded on EM II or seedling rootstock.

Golden Delicious: Golden Delicious/EM VII is a precioUous and productive combination and is preferred over G.Del/EM II. A spacing of 15 x 25 feet or 116 trees per acre with G.Del/EM VII will give higher and earlier yields per acre.

McIntosh: Since color in McIntosh is of prime importance, it should be on a rootstock which will keep the tree open allowing maximum penetration of light to the fruit. EM VII will do this. McIntosh/EM VII then, is preferred to McIntosh/EM II although the latter is more productive. However, planting more trees per acre of McIntosh/EM VII will bring the yield up comparable to the yield of McIntosh/EM II.

Red and Northern Spy: This variety is late in coming into bearing and definitely needs a dwarfing rootstock for early production and for a smaller manageable tree. Spy/EM VII is a suitable combination providing the trees are budded high in the nursery so that they can be planted deep in the orchard. Even so, a certain number of the trees may need staking for the first six years. Spy/EM II is also used, but here the tree should be scored in the fourth year and every other year following petal fall to keep the trees smaller and in fruiting condition.

These previously mentioned combinations are but a few of the commercial interest, however, they will serve to bring across the important fact that the grower needs to be aware that certain varieties will perform best on certain rootstocks. Much is yet to be learned about scion/rootstock combinations, however, each year more information is obtained.

SPACING FOR ACREAGE YIELDS

The semi-dwarf or compact trees do not outyield standard trees on a tree for tree basis. However, by spacing the compact trees closer for more units per acre, the total acreage yields are higher.

In determining the tree spacing, you should consider the fertility of the soil, the natural vigor of the variety, and the vigor of the rootstock your trees are budded on.

For example, Jonathan/EM II on an average orchard site should be spaced 18 x 28 feet, and Jonathan/EM VII 16 x 26 feet with 86 and 104 trees per acre respectively. Red Delicious/EM II should be 20 x 30 feet.

For high acreage production the first 10 years, you may want to consider interplanting. For example, a spacing of 14 x 20 feet (156 trees/acre) for eight or ten years, would give early acreage yields. At the time the trees start to crowd every other tree in the 14-foot spacing could be removed leaving a spacing of 20 x 28 feet or 78 trees per acre. Many other combinations of spacing should be considered before planting an orchard.

PLANT CERTIFIED QUALITY TREES

You should know your nurserymen. Be cautious about buying "bargin trees". Find out who propagated the trees. Buy only certified well propagated trees. In other words, the nurserymen who sells quality trees will guarantee (1.) that the variety is true to name, and (2.) that the rootstock is true to name. Each bundle of trees should bear a label stating not only the variety name, but also the rootstock name. The label should read: Jonathan (Anderson Strain)/EM II.

One-year old branched trees are the best and most economical trees to buy and plant. The fruit grower wishing to plant more of his favorite variety may want to contract for them in advance. He can do so by supplying the budwood to his nurseryman two years ahead of planting. In this case, the grower should also specify the rootstock he wants his varieties budded onto.

PLANT THE TREES CORRECTLY

A well propagated compact tree should have a 10-inch rootstock portion between the bud-union and the roots. Such trees will be well anchored because they can be set 5 to 8 inches deeper in the orchard than they were in the nursery.

In planting the trees, make the holes large enough to allow spreading the roots into natural positions. Fill in the soil gradually and at the same time lift up the roots into a horizontal position. This will provide better support of the entire tree. Do not fill in soil and tamp the roots down along the stem portion in the hole. The bud union should be 2 to 3 inches above the ground line.

If the soil is dry, soak water thoroughly at the base of the trees. On the other hand, if the soil has ample moisture at planting time, no need to water. Later in the season the trees should be checked for moisture needs.

FERTILIZER REQUIREMENTS

Following the setting of the trees some form of fertilizer could be added around the trees. This depends on how fertilie the soil is at the time of planting. Since vigorous growth is very essential the first four years, nitrogen is most important and should be available in the soil for good vigorous growth.

How much and what analysis fertilizer to apply depends on the soil type and its state of fertility. This can be determined by having the soil tested prior to planting. The amount of growth and appearance of the foliage made the first year is also a measuring stick on how to fertilize for the second and third years growth. The compact trees should make 18 to 24 inches of terminal growth annually until they come into production.

After the trees come into production the nutrient requirements are best determined by foliar tissue analysis. Foliar analysis service is now generally available for growers desiring to know how to most economically fertilize their trees.

YOUNG TREES NEED TRAINING

The newly planted tree needs to be trained so that it will shape up to be a compact tree which will bear fruit from the ground to the top and from the tip of the branches to the center of the tree. A few correct cuts made each year will accomplish this end.

If the tree has several branches at planting time, select the 2 or 3 best branches and remove the rest. Head the central leader in proportion to the length of the laterals. If no branches are present, head the whip 30 inches from the ground.

Each year select more branches spaced four inches apart in a whorl on the central leader. Prune only moderately each year until the trees come into bearing. Over-pruning can delay production as much as two years with some varieties. For example, Red Delicious, Northern Spy and Winesap, being slow in coming into bearing, , can further be delayed in fruiting by over-pruning the first four or five years.

PRUNING BEARING TREES

After the trees are in production pruning should be done with three objectives in mind: 1. Prune to improve color of the fruit. 2. Prune to facilitate adequate spray cover and ease of harvesting. 3. Prune to keep the trees in bond according to the spacing and according to the height desired.

Compact trees tend to open up early allowing light to penetrate, consequently, little pruning is needed. If the trees appear to have too many laterals, one or two can be removed each year. However, remember this, when a branch is removed, some fruiting surface is permanently lost and the added vigour is transferred to the other laterals moving the bearing surface away from the center of the tree. If the laterals appear to be too closely spaced on the modified leader, remove one of them, if not, a branch can be headed back 4 to 6 feet to thin out crowding conditions.

Similarily, when an occasional branch gets out-of-bonds, laterally or vertically, it can be headed back to conform with the rest of the branches. This must be done when the trees start to "hedge up" in later years in order to allow efficient movement in the orchard.

ACREAGE YIELDS FROM COMPACT TREES

With the annual increase in land values, the fruit grower needs to be more concerned about yields per acre rather than yields per individual trees. Compact trees correctly spaced will give high acreage yield in addition to uniform and well colored fruit.

Records of a 16-year semi-dwarf orchard at East Lansing bear this fact out (Table I). This orchard was planted 15 x 20 feet (144 trees/acre) in 1945 and eight years later every other tree in the 15-foot spacing was removed leaving 72 trees per acre. The yield were from 10 trees of each variety/rootstock combination to 1952 and from then until present from 5 trees.

Note that McIntosh on EM VII outyielded McIntosh on EM II during the first 4-year yield period. However, during the second and third 4-year yield periods, these two combinations became comparable. The opposite was the case with the Cortland variety. Cortland/EM II outyielded Cortland/EM VII during the three 4-year yield periods. The Cortland is a slow growing variety with terminal bearing habit indicating that it needs to be on a more vigorous rootstock. The Jonathan variety comes in the same catagory.

SUMMARY

1. Select a good site with a fertile well drained soil for the compact apple trees.
2. Buy quality trees from a nurseryman who can guarantee that both the variety and the rootstocks are true to name.
3. Know the best variety/rootstock combinations suitable for your orchard site.
4. Plant the trees correctly in a well prepared soil with the bud-union 2 to 3 inches above the ground.
5. Train the trees properly the first year by leaving 2 or 3 lateral branches and heading the leader back accordingly.
6. Space the trees in the orchard to obtain quality fruit and maximum yields per acre. The vigor of the variety and the rootstock must be considered.
7. Clean cultivate the orchard the first three years and then seed down with a suitable cover.
8. Fertilize according to the need for good growth until the trees come into bearing, and later according to need for good fruit production.
9. Prune the trees with a purpose to keep them compact and in high production.
10. Sound effective management of orchard practices is very important for success with compact apple trees.

Table I. Annual Yields in Bu./Acre From a Semi-Dwarf Orchard Planted in 1945 at East Lansing with 4-year Averages!

	1949-1952			144 Trees/Acre	
Variety/Rootstock	1949	1950	1951	1952	Ave.
			Bushels/Acre		
McIntosh/EM II	101	352	244	522	305
McIntosh/EM VII	216	392	381	718	427
Cortland/EM II	220	430	244	763	414
Cortland/EM VII	111	271	201	727	314
N. spy/EM VII	3	207	569	573	338
	1953-1957			72 Trees/Acre	
Variety/Rootstock	1953	1954	1956	1957	Ave.
			Bushels/Acre		
McIntosh/EM II	522	243	766	432	491
McIntosh/EM VII	513	95	656	608	468
Cortland/EM II	600	94	794	648	534
Cortland/EM VII	414	52	518	389	344
N. Spy/EM VII	169	167	623	389	337
	1958-1961			72 Trees/Acre	
Variety/Rootstock	1958	1959	1960	1961	Ave.
			Bushels/Acre		
McIntosh/EM II	956	468	1332	1008	941
McIntosh/EM VII	883	720	1145	936	921
Cortland/EM II	875	1296	929	1152	1063
Cortland/EM VII	423	792	583	1008	701
N. Spy/EM VII	842	403	1008	1008	815

Dwarf Fruit Tree Assoc. Financial Report

1961 Expenditures

Portable Loud Speakers	$ 97.51
Printing News Letters	212.64
Postage	158.02
Supplies, paper, envelopes	87.64
1961 Speaker, Dr. Roberts	260.00
Incorporation State Filing	7.00
Lodging for Paul Sheppard	9.36
1962 Speaker, Dr. Preston	250.00
Bank Charges	3.23
Total Expenditures	$1085.40
1961 Bank Balance	469.48
	$1554.88

1960 Balance Forwarded	$ 550.30
1961 Income from Dues	1004.25
TOTAL	$1554.55

1962 Membership Dues Now Payable

The annual dues ($2.00) can be paid at the March 7th meeting or mailed in now to: Room 303 Hort. Bldg., MSU, East Lansing, Michigan

Dept. of Hort., Michigan State University
East Lansing, Michigan