

DWARFED FRUIT TREES

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Dwarfed Trees

Dwarfed, or compact, fruit trees have become part of the fruit industry the past decade. Approximately one-half of the apple trees planted each year are of the compact sort.

Very dwarfed or compact fruit trees are not recommended for planting in orchards intended for commercial fruit production. Others are of semi-dwarf form which require no support and these are recommended for commercial use.

As compared with an average, well developed standard tree, (Fig. 1) the smaller sized, compact trees have several advantages for the commercial grower and the home gardener:

1. They begin to bear at an early age.
2. They can be conveniently pruned and sprayed.
3. Small hand dusters and sprayers can be used effectively for insect and disease control when grown in the garden or around the home.
4. The fruit is easily harvested from the ground or with short ladders.
5. Under favorable conditions the fruit is highly colored and above average size for the variety.

How Dwarfed Trees Are Produced

A dwarfed tree is produced by grafting or budding a desired variety onto a special type of root system,

commonly known as the "rootstock," which restricts or "dwarfs" the growth of the scion variety grafted upon it.

The rootstocks are produced either by layering, known as the stool-bed system, or by hardwood or softwood cuttings. In the case of the stool-bed method, the plants are mounded with soil during the growing season; this encourages roots to form on the base of the shoots. The mound is removed the following spring and the rooted shoots cut at the crown of the mother plant. These vigorous shoots are lined out and budded in August the same season (Fig. 2).

Hardwood cuttings of clonal rootstocks are taken in November and treated with rooting compound and placed in propagation beds with bottom heat. These are then ready for lining out in early spring and budding in August (Fig. 3). Sixty to seventy percent nursery stand can be expected with this method. The softwood method of propagating clonal rootstocks, is still experimental. Detailed methods of budding and grafting fruit trees are described in Extension Bulletin 508. The variety bud should be 14 inches above ground level on the rootstock so that the tree can be planted 12 inches deeper in the orchard.

Apple, apricot, pear, peach and plum are the only common fruits which can be dwarfed successfully at present, as no satisfactory dwarfing rootstocks have

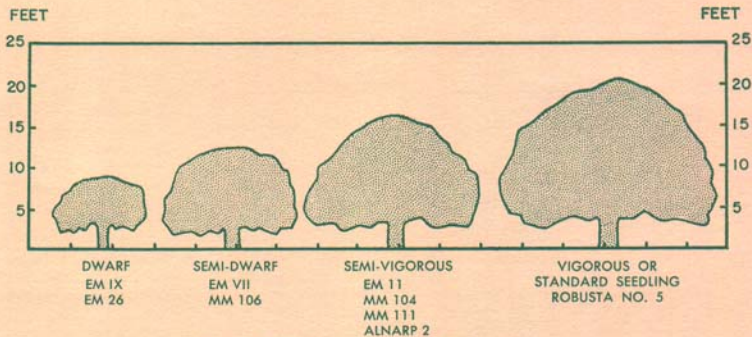


Fig. 1. Relative size of apple trees on different rootstocks.

been found for the cherries and nectarines. Standard trees of most stone fruits are small, however, as compared with standard apple trees, and it is possible to restrict their growth by pruning.

Dwarfed Apple Trees

The preferred rootstocks now used for dwarfing apple varieties were selected at the East Malling Research Station, Kent, England, and are generally termed East Malling (EM) or Malling Merton (MM) rootstocks. They differ in the size of trees produced and in adaptability to soil and climate. They are designated EM II, EM VII, EM IX or as MM 104, MM 106, and MM 111.

EM IX is the most dwarfing rootstock and commonly produces a tree from 5 to 7 feet tall with a spread of 3 to 6 feet. This particular rootstock requires support. To prevent blowing over, the head should be formed by starting the lower limbs at about 6 to 12 inches from the ground. EM IX furnishes an excellent rootstock for apples to be trained as espaliers or cordons on a trellis, wall, or fence, and thus suited mostly for small plantings.

EM VII and MM 106 produce the next smallest tree, commonly permitting the variety to grow to 10 to 12 feet in height, about the size of a small sour cherry tree. These are referred to as "semi-dwarf".

Other commercially important rootstocks are EM II, MM 104 and MM 111. These rootstocks permit the variety to grow to about two-thirds the size of a standard apple tree. MM 104 does not tolerate wet soils, and should not be planted where water tends to stand for a period in the spring. MM 111 is drought tolerant, and is also suited to droughty soil conditions.

Other Apple Rootstocks

East Malling 26 is a promising rootstock which produces a tree larger than EM IX but smaller than EM VII. It is a rootstock worthy of trial. EM 26 is also brittle rooted and thus will require staking. Another rootstock, Alnarp 2 (A2) similar to EM II, is more cold resistant, and merits trial in areas where cold injury may be a problem.

Robusta No. 5 is a vigorous (non-dwarfing) rootstock. However, it is hardy, tolerates heavy soils and thus may be very satisfactory for certain areas.

Dwarfed Pear Trees

Dwarfed pear trees are produced by budding the desired variety onto specially selected strains of Angers quince. Commonly grown varieties attain a height of 8 to 10 feet on the quince rootstock. Their value at the present time is for the home gardener.

The Provence Quince is also suitable for commercial varieties; it is currently being tested.

How to Order From the Nursery

Dwarfed trees may be purchased directly from the nurseryman's supply, or the trees may be contracted from the nurseryman two or three years in advance of planting. The advantage of contracting a certain nurseryman to bud the desired variety on specific rootstocks is to be able to specify the variety, strain, and rootstock, or to supply the buds from selected trees to assure a certain strain of a variety for planting. A deposit is often required with the order at the time the contract is made.

Regardless of how ordered, the grower should make sure that he obtains *certified trees*; certified as *true-to-strain*, *true-to-variety*, and *true-to-rootstock*. Furthermore, each tree or bundle of trees should bear a label stating the name of the strain, variety, and rootstock; for example, Vance Delicious/EM II.

Certain variety/rootstock combinations are better than others, such as Jonathan and Red Rome on EM II, or MM 106; McIntosh and Golden Delicious on EM VII for heavy soils and on EM II and MM 111 for sandy soils. The spur-type Delicious grows slowly, and hence is more favorable on EM II, MM 104, or MM 111. Northern Spy and Rhode Island Greening come into production early on EM II and MM 106.

Planting Trees

Trees should be planted in late March or early April. The hole should be dug large enough to hold the roots without crowding. Set the tree in the ground 12 to 14 inches when possible but always be sure the bud union is 2 inches above the ground line. As soil is tamped in the hole, place the roots in their natural horizontal position so that the tree will be well anchored. In areas where prevailing winds are strong, lean the tree 10 degrees into the wind. If the roots are dry, soak the tree overnight before planting. During the first two years, water the trees when the soil becomes unfavorably dry, using 2 to 4 gallons per tree.

Spacing the Trees in the Orchard

High production with smaller trees can be obtained only by planting more trees per acre. For the more vigorous varieties such as Delicious, Northern Spy and Stayman Winesap on EM II or VII, a permanent tree spacing of 20 x 25 feet (87 trees per acre) or 20 x 30 feet (72 trees per acre) may be favorable.

With less vigorous varieties such as Jonathan and Golden Delicious on EM II or MM 106 high production is obtained with spacings of 12 x 24 feet (152 trees per acre). Furthermore, to obtain high produc-

Fig. 2. EM VII clones rooted by the stool-bed method.

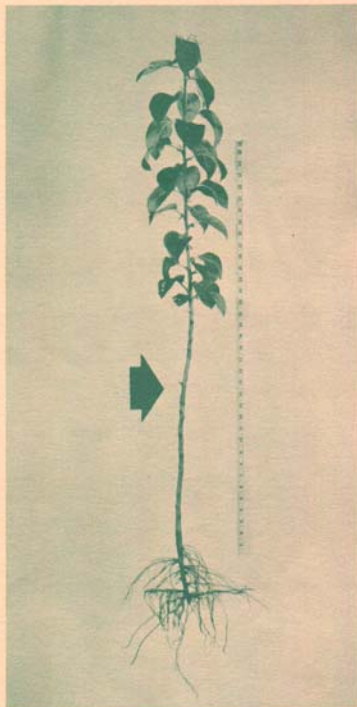
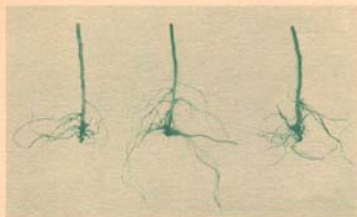


Fig. 3. MM 106 clone rooted by the hardwood method and budded (arrow) 14" high the same year.

tion during the first 10 to 12 years when the trees are small, a planting plan of 10 x 30 feet or 10 x 25 feet with the idea of later removing every other tree leaving the planting 20 x 20 or 20 x 25 feet is worthy of consideration. The exact planting scheme depends on the topography of the site, the preference of the grower, and on the scion/rootstock combinations of the trees.

Tree Labeling

Individual trees, or at least rows of trees of the same variety and rootstock, should be labeled. The label should be large enough so that it can easily be

found and read, and further, it should be permanent. Large metal labels with stamped letters are very permanent. Quarter-inch plywood labels painted and lettered are practical and contain the row and tree number, the variety and rootstock, and the planting year (Fig. 4).

Culture and Pruning of Dwarfed Trees

For good fruiting the fourth and fifth years after planting, the trees require continuous care. This includes proper fertilizing, spraying, pruning, and control of competing grass and weeds. Beginning with the second year, terminal growth should average 18 to 30 inches to provide vigorous bearing branches by the fourth year. Clean cultivation the first 3 to 4 years is recommended. A mulching program is also a good practice.

Suggested fertilizer practices for fruit trees are given in Extension Folder F-224, while commercial procedures for pest control are given in Extension Bulletin 154. Weed control measures for orchards are described in Extension Folder F-241.

Pruning young dwarfed trees is similar in principle

to pruning standard sized trees in that it should be held to a minimum, pruning only enough for proper training. Light selective pruning of young trees will give early bearing while heavy pruning will delay bearing. Detailed pruning practices are described in Extension Folder F-321.

Newly set trees should be headed 30 inches from the ground-line. If the trees to be set are already branched, select the best 2 or 3 well-spaced branches and remove the others. Head the leader to 14 inches above the top lateral branch and cut back the lateral branches 18 to 24 inches in length. In the succeeding years, select 4 to 6 more well-spaced branches on the central leader. Remove as few potential spur-bearing branches as possible. After the tree is bearing, an occasional main branch can be removed. Eliminate any branches which interfere with easy access to the fruit, but continue to keep the trees compact and well balanced to provide maximum bearing surface.

Different systems of training are shown in Fig. 5.

Fruit Thinning

Blossoms on two- and three-year-old trees should be removed at the time of *pink* or at *full bloom* before they begin to develop into fruit so as not to stunt the growth and development of the trees. A defruiting spray of 15 ppm NAA (a-naphthaleneacetic acid) and 2 pounds of Sevin in 100 gallons of water applied at late petal fall will remove most of the fruit on such varieties as Jonathan and Red Delicious. In the fourth year, all of the blossoms and fruit should be removed from the upper 2 to 3 feet of the terminal leader to prevent retardation in height of the trees (Fig. 6). This practice should be continued until the desired height is attained. The remaining portions of the tree should be thinned, spacing the fruits 4 to 6 inches



Fig. 4. A tree label with wire for attaching to the tree guard, showing the row and tree number, the variety and rootstock names, and the year planted.



Fig. 5. Close spacing of trees (6 x 15 feet), showing (left) free-standing trees with a 5-inch interstem on EM VII on seedling rootstock, and (right) trellised trees on EM IX rootstock. All trees are six years old.



Fig. 6. Golden Delicious on MM 104 rootstock in its fourth year, showing how the fruit was removed from the top-portion of the tree to allow the tree to grow in height, and prevent bending of the central leader.

apart with only one fruit per spur. After 7 or 8 years, when the trees have reached full size, chemical thinning may be worthy of consideration to encourage annual bearing. (See the Fruit Spraying Calendar, Extension Bulletin 154).

Dwarfed Apple Trees for the Home

Favorable dwarfed apple trees for planting around the homes are the so-called "Clark dwarf" and those on rootstock EM IX. The rootstock EM IX produces a tree 5 to 7 feet in height and requires a trellis or a stake for support. The "Clark dwarf" tree is dwarfed by using a dwarfing interstem piece rather than a dwarfing rootstock. EM VII used as a 6-inch intermediate stem piece will also control tree size of most varieties (Fig. 7).

The trees develop to a height of 6 to 8 feet, the



Fig. 7. A tree trunk showing a 5-inch interstem on seedling rootstock which provides a well-anchored tree.

ultimate height depending upon the variety and care during the first five years after planting. Trees of these types are sprayed easily with a small hand sprayer or with a spray unit attached to the garden hose.

The program of pest control for home grown fruit is given in Extension Folder F-17. Fruit trees should be sprayed, fertilized and pruned annually in order to harvest quality fruit. The cultural practices outlined in this folder apply to dwarfed trees grown for commercial purposes and those grown around the home.

Other Dwarfed Fruit Trees for the Home

Dwarfed pear trees with Quince A rootstock and with Old Home as an intermediate stem piece are available, along with those budded directly on other quince rootstocks. Peach and plum varieties budded on Nankin cherry make small and fruitful trees which develop in size to about $\frac{1}{2}$ that of standard trees. Tart cherries such as Montmorency, North Star, and Meteor can be grown also in the garden. The latter two varieties are naturally dwarfed to some extent. Dwarfed sweet cherry trees are not yet available. Apricot varieties budded on St. Julien A plum rootstock grow into half-sized trees.

A complete list of fruit varieties suggested for Michigan is given in Extension Folder F-116.

