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Growing Tree Fruits for On-the-Farm-Market
Michigan State University
Cooperative Extension Service
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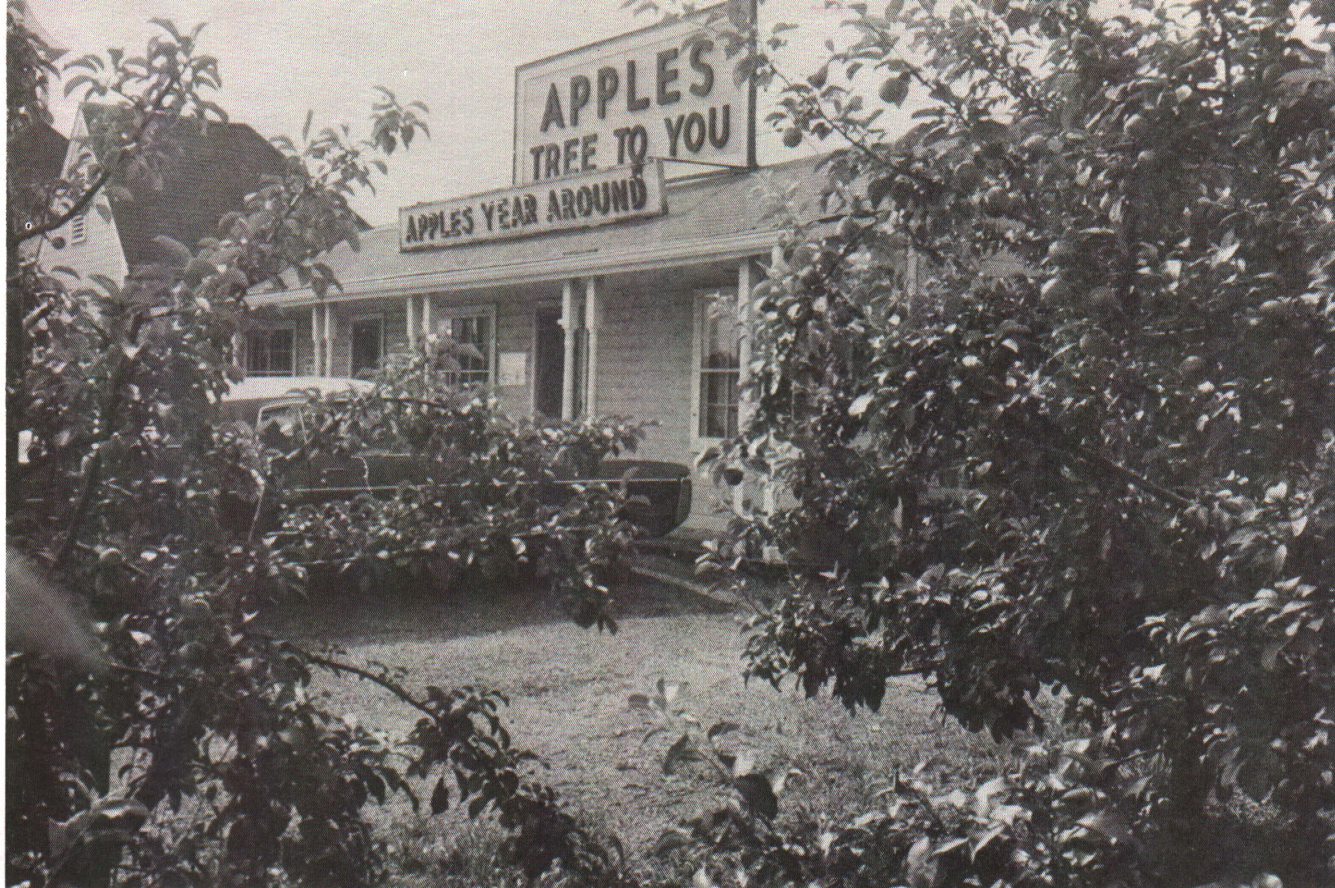
Growing Tree Fruits for On-the-Farm Markets

EXTENSION BULLETIN E-927, MARKETING SERIES, FEBRUARY 1976
Cooperative Extension Service, Michigan State University



INSIDE:

*culture, varieties, rootstocks,
orchard management,
for small-scale producers*



By Robert F. Carlson, Department of Horticulture

Fruit growing on a relatively small and intensive scale is becoming more prevalent, especially for fruit to be marketed at the farm by pick-your-own systems and roadside stands. Increasing quantities of fruit are grown on small, efficient farms near the larger cities where people can go to buy or pick their own fruit.

Tree fruits (apples, peaches, cherries, plums, etc.), small fruits (strawberries, raspberries, grapes, etc.) and various vegetables can profitably be grown on relatively small acreage, given the necessary knowledge, equipment and time. These crops can be produced for different local markets on farms of 25 to 100 or more acres. Usually a family endeavor, they are occasionally operated by a part-time employee.

Attention to many details is necessary for a successful small fruit farm and market, regardless of location, size and management. This publication offers the latest information on culture, varieties, rootstocks, and general orchard management important to the production of fruit on a small, intensive scale.

FRUIT SITE SELECTION

A good fruit site is the most important factor essential to growing quality fruit. Choice fruit land is scarce, expensive and often unavailable. Be very selective about the condition of the planting site.

On an excellent or good site, the land is higher than the surrounding area and should slope (about 5 to 10%) to provide air movement in two or more directions. This provides some protection against late spring frosts when fruit trees are in tender blossom stages. Even on calm nights, cold air moves from higher elevations to the lower areas of the field, and results in warmer air temperatures at the higher elevation.

Soil type is very important for a good fruit site. A well drained, clay or sandy loam soil is ideal for apples and a well drained, sandy loam for peaches. In some cases, even with a good site and soil, the land may be wet and need drainage.

The land should be in good workable condition, relatively free of large stones and clay hardpan near the surface. Land not cleared can also be prepared and used if location and soils are ideal for fruit tree growth and fruiting.

Some mediocre fruit sites that do not have all good qualities can be made suitable. The soil structure can be improved by cover cropping, deep tilling, etc. If land slope is insufficient, frost protection systems can be provided.

When evaluating a new orchard site: 1) Ask for local assistance, such as from the Cooperative Extension Service; 2) Seek fruit site indexes, often available from the Soil Conservation Service; 3) Obtain temperature, rainfall, and soil records (Soil maps describing type and conditions are available); 4) Ask neighbors about past records and per-

formance of the farm; and 5) Walk over the land and check soil by digging samples in several locations. Be critical and examine all aspects of the prospective fruit site.

READY-MADE ORCHARDS

Established orchards are sometimes available and may be bought. When situated on good fruit sites, ready-made production is at hand which eliminates three or more years needed to get new trees into production. These orchards often have an established market for the fruit, or one can be developed.

The location of a new or established orchard close to population centers or on a well traveled highway is very important for marketing at roadside, pick-your-own fruit and other local sale outlets. Fruit can be grown and shipped some distance from the orchard to the market, but it is more convenient to have orchard and roadside market near each other.

DEVELOPING THE FRUIT FARM

No two orchards have the same conditions, nor can two fruit sites be developed into orchards with the same characteristics. Each must be developed according to specific local characteristics.

Likewise, there is no set standard for how small or large a farm should be for adequate production and profit. Size of the farm is no measure of success or failure. How well the farm is managed determines whether or not the venture is a success. Other factors involved in selecting or developing a fruit farm depend on local conditions such as development costs, available labor, type of market, location, etc.

In laying out or mapping the fruit location, make certain that ample space is allowed for parking cars and moving traffic in and out of the area. As much as 5 to 8 acres should be available for buildings, road, and parking areas. This will vary with size of orchard and market.

If the soil and site is ideal, the first hurdle has been made. Next in importance is how the land is developed, planted, and managed.

Land Preparation

Land recently cropped with corn, grain, etc. may be prepared for planting fruit by: disking or plowing in the fall or early spring prior to planting, or strip-disking where the tree rows are to be located and later worked for a year or two between the rows. If herbicide has been used on previous crops, allow one year before planting the fruit crop.

When existing orchard is removed from land to be replanted, a two-year land preparation period is usually needed. This will permit removal of tree stumps and roots, working up the old established sod, and reduce soil borne organisms, such as nematodes. Soil fumigants are available and can be applied to soil at specific times and conditions.

With good management, trees can be planted in sod. However, old hay fields with heavy, thick sod should be plowed and tilled for one year before planting fruit trees. When preparing land that has been out of cultivation, it helps to grow green crops (rye, sudan, buckwheat, millet, etc.) and plow them in to improve nutrition and soil texture. Pre-planting application of lime to the soil also may be necessary to correct acidity and provide magnesium. A soil pH of 6 is a good average.

Become familiar with prescribed pest and weed control programs essential to fruit production. Know current usage of pest control chemicals, especially when near population centers.

Detailed Orchard Planning

Due to the high cost of land, trees, labor, and management, plan the orchard for efficiency and high productivity. Quality fruit is the result of diligent tree care, a regular pest control program, and careful harvesting.

Of prime importance also is the choice of fruit varieties which will be in current and future demand. Obtain trees from a reliable nursery. Trees of different fruit varieties should be grafted on the best available rootstocks. Select rootstocks suitable to planting density desired.

For best management and economy, plant the maximum number of trees per acre (see Orchard Planting Systems, p. 6). Because land is expensive, early full production is needed per unit of space and operating cost input. Compactness and efficiency go together. Planning a fruit orchard should not be a hasty decision, but carefully calculated on paper a year or two before planting. Examine and plan day-to-day, and season-to-season chores; e.g. tree nutrition, irrigation, spray program, training and pruning, fruit thinning, harvesting, etc.

Fruit Crops to Plant

The fruit grower who retails most of the fruit at the farm usually can diversify by growing both fruits and vegetables. The major fruit crops to grow depend on the site and soil. Apples are usually the big item for a roadside market, however if the soil is a sandy loam and well situated, peaches, nectarines, plums, tart and sweet cherries can be part of the farm market operation. Grapes, brambles,

strawberries, and bedding plants may also fit into this category.

If suitable land is available, various vegetable crops can be part of a successful roadside market. This will provide a variety of crops to harvest and sell from May to November. If you have little or no production experience, plant only one or two crops, such as apples and strawberries. Other crops may be added later.

SUGGESTED FRUIT TREE VARIETIES

Apples

There is a wide range in ripening season for apples. The order of ripening for a few from July to November are: Lodi, Quinte, Vista Bella, Jerseymac, Viking, Tydeman Red, Paulared, Jonamac, McIntosh, Spartan, Empire, Rhode Island Greening, Delicious, Idared, Golden Delicious, Northern Spy, Mutsu, and Rome Beauty. Detailed descriptions of these varieties are given in Extension Bulletin No. E-881, "Tree Fruit Varieties for Michigan." The varieties (in order of ripening) currently most in demand are Lodi, Jerseymac, Viking, Tydeman Red, Paulared, McIntosh, Spartan, Delicious, Idared, Golden Delicious, and Rome. Spur-type varieties should be planted if available because they are more compact and dwarfing than regular varieties.

Apple Rootstocks — For the smaller orchard, where a maximum number of trees are grown per acre, use the dwarfing rootstocks M.9, M.26 and M.7. The dwarfing interstem tree also can be used. These are described in Extension Bulletin E-851, "Rootstocks for Fruit Trees." When considering different rootstocks, examine the various planting systems described in the above bulletin.

The dwarfing interstem has recently become popular because smaller trees can be developed by this system. However, in choosing interstem dwarf apple trees, it is extremely important to be certain of the plant materials used. A satisfactory interstem tree of any variety is MM 111 as the root system and M.9 as the interstem (6 to 8 inches long). Plant the tree with both graft unions above-ground. Well propagated trees that are free standing, small and productive are shown in Fig. 1.

Pears

The Bartlett pear variety makes a good roadside market product. It is good to eat out-of-hand and for home canning purposes. The new Spartlet variety also has similar qualities and in addition has larger fruit and can be held in storage for 3 to 4 months. It matures mid-September in Michigan.

Peaches and Nectarines

Peaches and nectarines are more difficult to grow than apples. Use the best available land the most



Fig. 1. Experimental high density orchard of Jonathan and Golden Delicious using various dwarf interstems planted 6 x 15 ft. (484 trees/A) in 1956 in East Lansing. These trees produced over 1,000 bu/A in sixth year. All trees are free-standing. The dandelions should be eliminated with herbicides since they compete with apple bloom for bee pollination.

frost free site, preferably one with sandy loam and high elevation for air flow. Peach and nectarine trees are subject to injury from low winter temperature, frost in early spring, and trunk and branch canker. Thus, they require excellent care to be productive for 10 years or more. The fruit produced is in demand and will bring good prices at the retail market.

Although there are many peach and nectarine varieties to choose from, only a few of the well tested sorts should be grown. For the roadside market, select varieties which ripen progressively from early to late.

Suitable varieties might be: Garnet Beauty, Redhaven, Cresthaven, Redskin, Loring, Redkist, and Madison. Suggested nectarines are: Nectared 4 and Nectared 6. There may be other varieties adaptable to your area which are available from local nurserymen.

Peach trees budded on Halford or Siberian C seedling rootstock are best for most growing conditions.

Cherries

Both sweet and tart cherries can successfully be grown for farm marketing. Like peach trees, cherry trees also require good sites for annual production and long tree life.

Sweet Cherry — Trees are of vigorous growth and no satisfactory dwarfing rootstock is yet available. However, trees trained properly from the time of planting can be maintained in low posture for easy picking. Sweet cherries require cross pollination so two or more varieties which coincide in bloom must be planted for satisfactory fruit set. These are listed in most nursery catalogs.

Suggested sweet cherry varieties, in order of ripening, for pick-your-own or roadside sale markets are: Vega (light red), Emperor Francis (red), Schmidt (black), Gold (yellow), Napoleon (yellow-red), and Hedelfingen (dark red). Sweet cherry trees should be budded on Mazzard rootstock.

Tart Cherry — Trees do not grow as large as sweets and can easily be trained for pick-your-own. These are often referred to as "pie cherries" and are home processed by canning or freezing. They ripen in mid-July just after sweet cherries. The main variety is Montmorency, which is self fruitful so does not need a pollinizer; it is budded on Mahaleb rootstock.

Plums

Plums are attractive, very tasty, and fairly easy to grow. Plum varieties come in two types; the small European kinds and the large Japanese. Both are



Fig. 2. Dwarf Stanley plum trees on sand cherry rootstock. These trees can be spaced 6 ft. in the row and 15 ft. between rows. Order at least 2 years in advance of planting because they are not normally stocked by nurseries.

suitable for fresh marketing—the European kinds are used mostly for canning.

The leading canning variety is Stanley with Bluefre second in demand. Both are yellow fleshed at maturity. Bluefre has larger fruit. Although fairly self fruitful, cross pollination will insure better yield, and therefore two varieties of each type should be planted in the same orchard.

Of the large fruited Japanese plums, Formosa, Santa Rosa, and Burbank are suggested for smaller plantings.

Myrobalan seedlings are used for plum rootstocks, but if smaller trees are needed, plum varieties can be budded on sand cherry or Nankin cherry seedlings (Fig. 2). Before purchasing trees, check with your local nurseryman to find out what varieties are available and on what rootstocks these are budded.

Apricots

Apricots are an added attraction for a roadside market. However, they are difficult to grow and should be used only in a limited way. Apricots flower before peach and often are hurt by spring frost. Varieties for Michigan are Goldcot and Curtis.

ORDERING FRUIT TREES

Good fruit trees are expensive to buy and require considerable training and care to become productive, so losses are considerable if incorrect varieties are purchased. For best results, select a reliable nursery in your area and thoroughly study the available information on varieties.

Order fruit trees 2 to 3 years in advance of planting. The leading nurseries are prepared to take advance orders. This way the grower can provide buds of some varieties if the nursery does not have that particular kind. Fruit tree planting is a long term investment, so make certain that the best trees are planted. When ordering, state by name both variety and rootstock required. To insure good tree growth and fruiting, purchase only best quality trees guaranteed to be true to name of both variety and rootstock.

CARE OF NURSERY TREES — PLANTING

Getting the trees off to a good start requires good handling from the nursery to the permanent location in the orchard. This means that they should be well packed when shipped or well covered when picked up at the nursery. Never expose roots of nursery trees to freezing or drying conditions. The tops of trees can tolerate frost but roots cannot. If trees cannot be planted immediately, heal the roots into loose damp soil or peat moss.

Most fruit trees in Michigan are planted in early spring (March, April). The soil should be well prepared prior to planting. Avoid planting under wet soil conditions. Various methods can be used for tree planting, such as the soil auger, hand digging, or tree planting machines.

Make sure that the tree is set at the proper depth, especially dwarf and semi-dwarf apple trees. Such trees should be set with the graft union 2 to 4 inches

above ground level. Trees having dwarf rootstock are propagated with a rather long shank to facilitate deep planting, provide good tree anchorage, and reduce suckering.

Stone fruit trees can be planted with graft unions slightly below the soil line.

After the tree has settled in the ground, level the ground around the tree base. Do not leave a depression around the tree base because this can result in a wet condition near the tree trunk. On a soil with high clay content, place sand and/or gravel around the tree base to help stabilize the tree and provide better aeration and drainage.

ORCHARD PLANTING SYSTEMS

Currently there are three systems to choose from when planting an apple orchard—trellis, single-staked, and free-standing.

Trellis

For the “pick-your-own” apple system, the trellised orchard is most convenient because trees are small so that no ladders are needed for pruning or picking. The trees are trained into rather narrow (2-foot) hedges no taller than 6 to 7 feet. Trees on M.9 rootstock or on interstem lend themselves to hedge trellis plantings (Fig. 3).

In making the trellis, use 7- or 8-foot cedar or steel posts and 14-gauge wires. Set the posts about 40 feet apart in the row at planting or one year after plant-

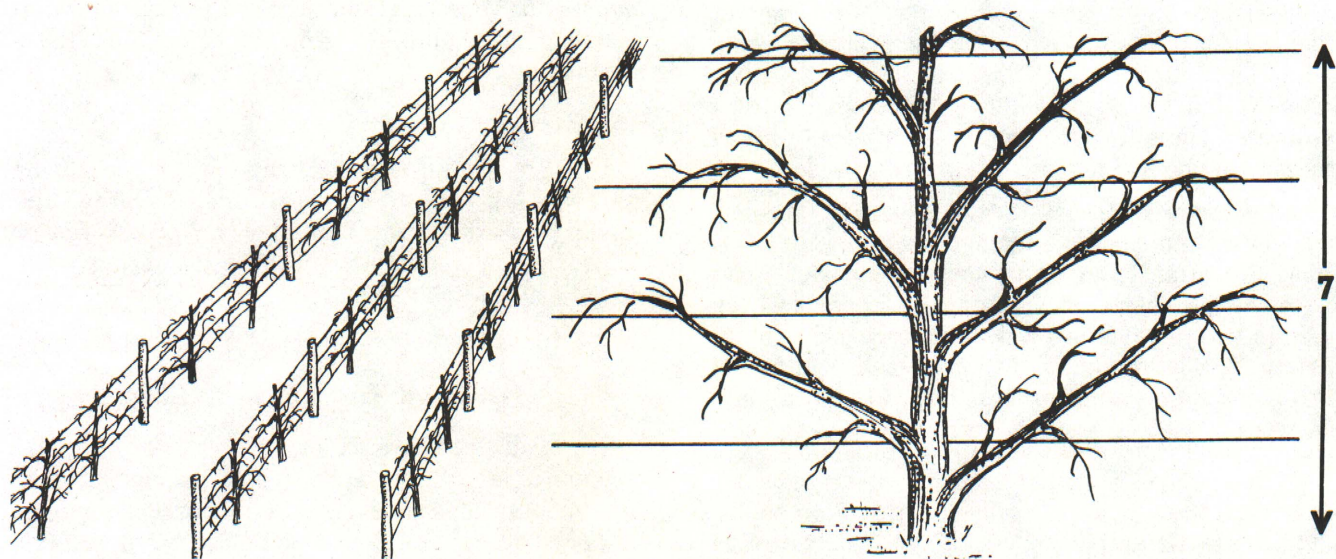


Fig. 3. Trellis arrangement (left) and tree training of apple on the trellis system. Branches of trellised trained trees should be tied to 3 or 4 strand wires at 45° angle for best light exposure and productive fruiting surface.



Fig. 4. Golden Delicious apple on M.9 rootstock (5 x 12 ft.) trained by bringing up a central leader along a steel fence post for support. In the tree at left there is a broken tie and the leader branch (arrow) is bent down due to fruit load. This is easy to correct by re-tying with plastic tie.

ing the trees. The end posts must be well anchored so that the wires can be pulled tight. Three wires about 18 inches apart on the posts are usually enough for supporting trees and branch training. Plastic cord is also now available and may be used rather than wire.

An average tree spacing for the trellised orchard is 6 x 14 feet (518 trees/acre).

There are various ways of training tree branches on the trellis wire. One is to select six, strong, wide-angle branches and train them horizontally in opposite directions on the three wires. Or, the branches can be trained onto the wires obliquely at a 45° angle. This tends to be more fruitful and easier to train. Either will require 4 to 6 years to develop into full productive trees.

Single-staked

The single-staked tree is more convenient to manage because it is easier to get around and requires less detailed pruning, training and general tree management than the trellised tree. For single-staked trees, M.9 or M.26 rootstocks are best. The trees are allowed to spread more than in the trellis

training, and therefore can be set at an average of 6 x 18 feet apart, or 403 trees/acre.

Various kinds of stakes or posts can be used for staking the trees. The 8-foot cedar post is most commonly used. These are often set in the hole as the tree is planted. Do not use posts treated with "penta" or "creosote" preservatives unless they have been treated a year in advance and weathered; otherwise, they may be toxic to trees. The post should be placed 4 inches from the central leader tree trunk. Various kinds of plastic ties can be used to secure the trees to the posts. The tie should not be tight and it should be one which does not scar the trunk (Fig. 4).

Steel fence posts can also be used for tree support. These can be put in at any convenient time without disrupting tree growth. Some bark rubbing will occur on scaffold branches next to the steel post but this is not serious. These posts also can be re-used or set in as tree support only when a tree is tending to lean (Fig. 5).

Free-standing

Because of expensive land, trees and materials (costs of orchard establishment) free-standing trees



Fig. 5. Closely spaced spur type Delicious apple on M.9 rootstock trained on steel fence posts. Gravel was placed at the base of trees to discourage mice and to improve tree anchorage. Note branches tied outward with plastic ties (lower arrow).

probably are most practical. Budded on M.26 or M.7, such trees are efficient and productive.

An average tree spacing for most apple varieties on these 2 rootstocks is 8 x 18 feet, or 302 trees/acre. This can vary in each direction by about 2 feet depending on soil fertility, variety vigor, tree management, etc. Free-standing trees are trained with modified central leaders to a height of about 8 feet at maturity. Shape the tree with strong wide branches on the lower part of the leader and shorter stocky ones toward the top (Figs. 6 & 7).

Planting systems for stone fruits — Since peach, cherry and plum trees are difficult to train for trellis systems and high density plantings, these will do best spaced rather closely as free-standing trees. Sweet cherry trees should be spaced at 18 x 22 feet, 110 trees per acre. Peach, nectarine, plum, and tart cherry trees will do well planted 14 x 18 feet, 172 trees per acre.

To insure good tree form and annual fruiting, train and prune stone fruit trees into a modified central leader form. At maturity, these trees may require occasional heading back of scaffold branches to encourage growth of younger fruiting branches near the center of the tree. Prune stone fruit trees in late winter or early spring to reduce cold temperature injury to the trees.



Fig. 6. Free standing trees on M.26 or M.7 should be trained with spreading branches on a modified central leader.

TREE CULTURE AND CARE

The early care and training of trees is of utmost importance and will pay off in higher yields of quality fruit during the life of the orchard.

The most efficient orchard by today's standards is one with small, compact, fruitful trees. To achieve this, attention to a series of related factors is necessary. The rootstock and the variety produce the major effects on tree size. The second and third main factors are type of soil and amount of pruning and tree training. Of course, tree nutrition plays an important role in tree size. Each factor must be integrated with the others. Amount of pruning also plays a role in amount of fertilizer needed. Less fertilizer is needed when considerable pruning is done. Nutrition also has to be adjusted to compensate for fruit size and color. Often tree nutrition is best determined by leaf analysis. However, if foliage is of good green color and annual shoot growth is 12 or more inches, the trees are doing well.

Fertilizing the Orchard

The amount of fertilizer to apply per tree will vary with soil type and age of the tree. A 1-year-old, well grown nursery tree will require very little fertilizer the first year, especially if the soil is a rich loam. The second year, apply a small amount of nitrogen around each tree, such as $\frac{1}{2}$ pound of 33% nitrogen fertilizer per tree at least 2 feet away from the trunk. Increase this amount gradually each year basing amounts on tree growth and production.



Fig. 7. Spur type free-standing Delicious on M.26 rootstock. These branches are self-spreading due to early fruiting of this combination.

Some soils may require fertilizers other than nitrogen.

In general, encourage fruit trees to grow rapidly and produce strong bearing surface during the first 3 years in the orchard. During this time, minimal pruning is required, but rather careful tree training and selective pruning should be done.

Generally, it is best to cultivate between the rows the first year. Then, seed with Kentucky Blue or fescue grasses or allow a natural sod cover to establish itself. In either case, mow the sod at regular intervals to conserve moisture and improve appearance.

For efficient orchard care of high density tree plantings, smaller tractors, sprayers, mowers, etc. are essential. These are becoming available.

Young trees should be protected against mice and rabbit injury. Tree guards can be placed around the base of the trees. Hardware cloth of $\frac{1}{4}$ -inch mesh is best for this purpose. In the fall of the year, apply poison bait as described in MSU 1976 *Fruit Pesticide Handbook*, Extension Bulletin E-154 (\$1.00).

HANDLING VIGOROUS APPLE VARIETIES

Varieties like standard Delicious, Northern Spy, Mutsu, Winesap, and others tend to take a long time to come into bearing. In the meantime, they grow large. This condition is accentuated if they are budded on the vigorous rootstocks such as MM 106 and 111.

To alleviate this vigorous non-productive condition, certain management practices can be pursued. Newly formed branches on a "whip" (1-year-old tree) can be spread by attaching clothespins on the central leader and bending the new branch into the handles of the pin (Fig. 8). Thereafter, spread scaffold branches outward by using wooden spreaders of different lengths (Fig. 9).

The central tree leader should be maintained until the tree is 6 to 8 feet tall. At that time, the central leader can be topped, allowed to fruit out, or spread or bent over to one side (Fig. 10).

Another method of inducing fruiting and dwarfing is to score the trunk of young trees until they start to fruit. This can be started the second growing season. Scoring is cutting a complete ring through the bark around the lower part of the tree trunk (Fig. 11). Use a jack-knife or linoleum knife. The best time for this is 10 to 14 days after petal fall, usually the last week in May or early June in Michigan, depending on the season. Scoring will encourage fruit set the same year and the following year, reduce tree vigor, and aid in annual bearing.

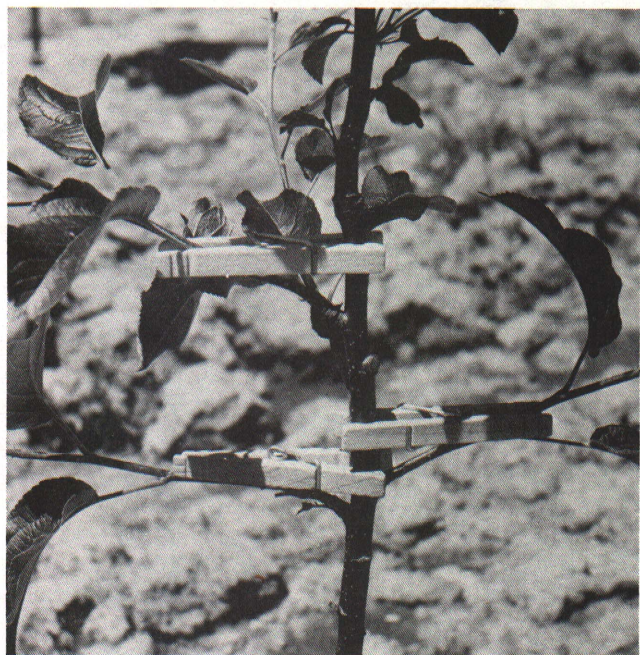


Fig. 8. Clothespins can be used to train and position branches the first year in the orchard and establish wide spreading branches. This is especially useful on vigorous upright growing varieties.



Fig. 10. When young trees have reached 6 to 8 ft. in height, the top of the central leader should either be removed or encouraged to "fruit out" by placing a spreader (arrow at upper center) between it and a side branch. Some varieties tend to form triple shoots (arrow at lower left). Two of these should be removed.



Fig. 9. (Left) This 4-year-old Delicious tree has an upright growth from poorly trained branches. No central leader trunk was developed causing the branches to move to the right in response to a prevailing southwest wind. (Right) Same tree corrected by pruning and placement of wooden spreaders in the tree.



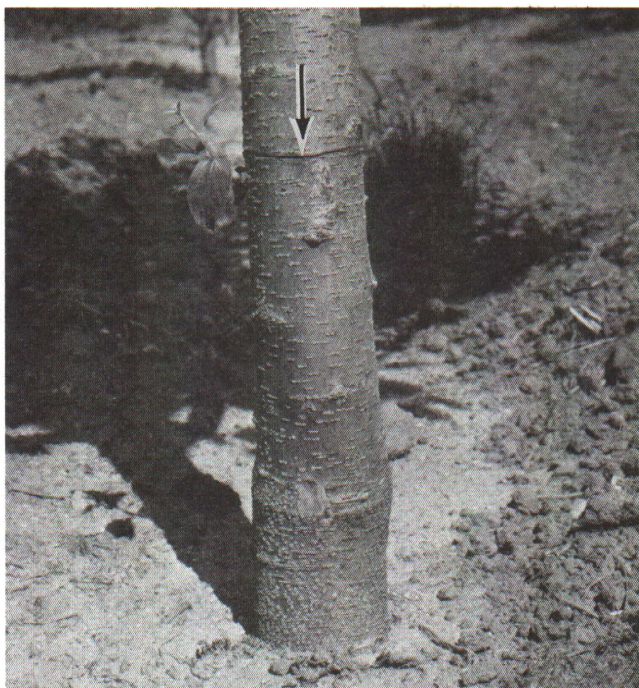


Fig. 11. Four-year-old Northern Spy apple tree on M.7 that has been scored (arrow) on the trunk to slow down growth and induce fruiting of this vigorous variety. Scoring is done 10 to 14 days after full bloom and can be started in second year on varieties slow in coming into bearing.

Tree growth may be limited and fruiting promoted by regulating fertilizer applications. If the soil is in good fertile condition, fertilizer applications can be withheld until the trees come into regular bearing.

Summer pruning in late June or in July tends to reduce tree vigor and provide more light to the interior of trees. Various approaches to summer pruning have been suggested, depending on age, vigor and size of trees. Cut some of the currently growing shoots 2 to 4 inches from the base, or remove at the base. If trees have crowding branches, remove one or two of these in the summer.

TREE TRAINING

Train trees during the first year in the orchard and in succeeding years as follows:

1. At planting, remove all poorly formed or broken branches (in some cases, all the branches) to form a single whip. Cut the top of the tree to encourage further branch formation on the central leader. A "whip" tree should be topped at 25 inches from the ground.

2. Varieties with sharp crotch angles and upright growing scaffold branches such as Delicious and Northern Spy can be spread by clamping a clothespin on the trunk above the branch and forc-

ing the young tender branch into the pin handles. This is most effective for spreading new branches the first year.

3. Select three to five strong wide angle branches the first year and remove the rest. Do not tip any of these possibly permanent branches.

4. In the second and third year, select two or more branches to fill out the bearing tree. Leave any fruiting spurs which have developed on first branches and on the leader. This is where the early crop is produced.

5. At the end of the fourth year in the orchard, the tree should have the form of a modified spindle bush; that is, wide and strong at the bottom, tapering to a narrow cone at the top, similar to a Christmas tree.

6. Most varieties should be in good fruiting the fifth year. Then, the main scaffold branches can be shortened by cutting back to a side branch lateral to "hold" the trees in allotted space (Fig. 12).

7. The program for the fruiting years of the tree is corrective pruning and branch renewal. Remove older non-productive branches allowing younger branches to take their place.

8. The free-standing, spindle-type tree is relative easy to maintain, the main concern is to keep the tree open for light. This is accomplished by keeping stronger branches at the bottom and tapering with weaker branches toward the tree top.

HARVESTING THE FRUIT

The fruit is the end produce of much planning and hard work. Handle it with care. Instruct those picking the fruit that even a squeeze of the hand on the fruit will injure fruit surface.

When removing fruit from branches, hold it firmly and twist slightly when pulling off the fruit. Then place it (do not drop) gently in basket, box or picking bag.

The quality of fruit depends not only how it is grown, but also on careful harvesting and handling. This also entails proper maturity at harvest and subsequent cold storage.

SUMMARY ITEMS

Selection of good land and a proper site for fruit production is of utmost importance. It should have a good soil, some slope and be conveniently located for the retail market.

Existing orchards can be improved in productivity while new plantings are brought into bearing. Heavy pruning to renew fruiting branches is beneficial when combined with improved nutrition and spray programs.



Fig. 12. Dormant 18-year-old trees of McIntosh on M.7 rootstock. The row at the left has been pruned with the lower scaffold branches remaining to keep fruiting surface low for easy picking and pruning. These trees have been held to a spread of 10 ft. by controlled pruning.

When planning a new orchard, take advantage of latest information on varieties, rootstocks, planting systems, pruning and training techniques, and varied cultural practices.

Plan ahead in ordering trees and learn how these trees will perform in your area. Sound advice on laying out the new orchard can save money and time.

Look ahead to what is needed in labor, equipment, materials (spray, stakes, wires, etc.) and general orchard management. Also, smaller compact orchard equipment is essential.

SUPPLEMENTARY READING MATERIAL

Available: Bulletin Office, Michigan State University
P.O. Box 231, E. Lansing, MI 48824

1. Budding and Grafting Trees E-508
2. Compact Fruit Tree, Vols. 1-8, 1958-1975

3. Developing Dwarf Apple Trees SIA-17
4. Fertilizers for Fruit Crops. E-852
5. Frost Protection with Sprinkler Irrigation E-327
6. Leaf Analysis for Fertilizer Requirements. E-449
7. Nematodes and Their Control. E-701
8. Pruning and Training Dwarf Fruit Trees. E-951
(Revised)
9. Pruning Young Trees. E-850
10. Rootstocks for Fruit Trees E-851
11. Sour Cherry-Tree Vigor as Related to
Higher Yields and Better Fruit Quality. RR-223
12. 1976 Fruit Pesticide Handbook, \$1.00. E-154
13. Strawberry Production. E-782
14. Tree Fruit Varieties for Michigan E-881
15. Trickle Irrigation—Simplified Guidelines for
Orchard Installation and Use. RR-248
16. Weed Control for Hort Crops, 1976. E-433
17. Fruit Varieties Journal—A publication of the
American Pomological Society, published four
times annually. 103 Tyson Building,
University Park, PA 16802.