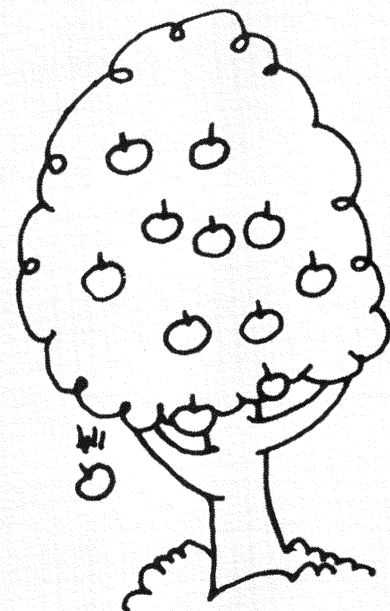




TREE FRUITS in the Home Garden

Virginia Cooperative Extension Service
Extension Division
Virginia Polytechnic Institute
and State University

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CONSIDERATIONS FOR GROWING TREE FRUITS

First, be sure you want to grow fruit. Then, follow these suggestions:

1. *Plan wisely.*
 - (a) Adjust the size of your planting to your needs and the amount of attention you can give to it.
 - (b) Allow for adequate spacing between trees.
 - (c) Use the best site available.
 - (d) Select the best varieties for your purpose.
 - (e) Buy the best trees you can get from a reliable nursery.
2. *Plant carefully.* Give the same attention to preparation of soil, handling of nursery stock, and the actual planting operation you would to raising a prize rose or camellia.
3. *Manage properly.* Follow proven practices of good orchard management.
4. *Protect effectively.* Set up and follow a good program of orchard sanitation and pest control.

CONTENTS

	Page
PLANNING THE HOME FRUIT PLANTING	3
Size of Planting	3
Tree Spacing	3
Site Selection	3
Variety Selection	4
Buying Trees	4
SETTING THE ORCHARD	5
Time of Planting	5
Soil Preparation	5
Handling Nursery Stock	5
Planting the Trees	5
ORCHARD MANAGEMENT	5
Cultural Practices	5
Fertilization	6
Pruning	7
Special Training	9
Thinning	10
Rodent Control	11
Tree Fruit Spraying	12
Sanitation	13

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TREE FRUITS IN THE HOME GARDEN

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Success with a home fruit planting depends upon how well it is planned and how well the plans are carried out. No longer can trees be planted and good quality fruit harvested with little or no effort. Relatively less care is required in the culture of sour cherries and pears than any of the other tree fruits, but even these cannot be expected to be good quality fruit, year after year, if left unattended. Proper attention must be given to insect and disease control, pruning, fertilization, soil management, and other necessary practices.

This publication is designed to aid those with little or no knowledge of fruit growing. Further information may be obtained by contacting your Extension Agent.

PLANNING THE HOME FRUIT PLANTING

It is desirable to locate your fruit planting as close to your home as possible. Where space is limited, fruit trees may be set in almost any location suitable for ornamental plants. Consider the mature size of the tree when designing the planting.

Dwarf fruit trees lend themselves admirably to ornamental plantings. They come into bearing earlier than standard-size trees, occupy less space, and can be more easily pruned and sprayed with equipment normally available to the average homeowner. Most nurseries now carry dwarf and semidwarf apple trees of several varieties. Dwarf pear, peach, and cherry trees of a few varieties are offered for sale by some nurseries. Certainly, in any planting where space is at a premium, dwarf trees should be considered.

Size of Planting

Space, site, size of family, and available time determine size of the planting. Cover the range of fruits insofar as family preference, adaptability, and space permit. Never attempt to plant more than you can care for properly. It is better to have a small home orchard well attended than a large one neglected. The information in Table 1 should help you determine the size of your planting.

Table 1 — Space Requirement, Yield, Bearing Age, and Life Expectancy of Tree Fruits

Fruit	Minimum Distance between Plants	Approximate Yield per Plant	Bearing Age	Life Expectancy
	feet	bushels	years	years
Apple—standard	30	8	6-10	35-45
Apple—semidwarf	20	4	4-6	20-25
Apple—dwarf	12	1	2-3	15-20
Pear—standard	25	3	5-8	35-45
Pear—dwarf	12	½	3-4	15-20
Peach	20	4	3-4	15-20
Plum	20	2	4-5	15-20
Quince	15	1	5-6	30-40
Cherry—sour	20	60 qt.	4-5	15-20
Cherry—sweet	25	75 qt.	5-7	20-30

Tree Spacing

How far apart must the trees be set? This is an important factor, and to a large extent it influences selection of site and varieties. Table 1 shows the minimum desirable distances between fruit trees in Virginia. They can be set farther apart if space allows, but, for best results, should not be set closer than the minimums indicated. To maintain a bearing surface low enough for necessary pest control, trees should not be crowded.

Site Selection

Importance of selecting the best site possible for fruit planting cannot be overemphasized. Good air drainage is essential. Cold air, like water, flows downhill. For this reason, fruit buds on plants set in a low spot are likely to be killed. Frost pockets, low wet spots, and locations exposed to strong prevailing winds must be avoided.

A deep, well-drained soil of good fertility should be selected. A fertile, sandy loam or sandy clay loam is suitable for most tree fruits. Adequate drainage of moisture is the most important soil characteristic. Poor soils may easily be improved by proper fertilization and cultural practices. Improving a soil with poor internal drainage is difficult and expensive. A fertile soil is desirable: a deep, well-drained soil is vital.

Variety Selection

Give special attention to the selection of varieties for the home garden. They must be adapted to your soil and climatic conditions. If possible without sacrificing too much yield or quality, select varieties with the fewest insect and disease problems.

Table 2 lists some varieties of tree fruits suitable for planting in Virginia. The varieties are listed in the order of ripening, and the list includes only those varieties of proven merit under Virginia conditions.

Several varieties of the same kind of fruit maturing at different times may be planted to prolong the season. The value of certain varieties for special uses such as freezing, canning, and preserving should be considered. Some varieties may be purchased in season from commercial growers more economically than you can grow them yourself.

Cross pollination is necessary for satisfactory fruit set in many tree fruits. Varieties that are cross-fruitful and that have overlapping bloom dates should be selected.

To be certain of adequate cross pollination,

Table 2 — Some Suggested Varieties for the Home Fruit Garden * (Listed in Order of Ripening)

APPLES	PLUMS (Japanese)
Lodi c	Early Golden c,d
Jerseymac c,d	Methley c,d
Paulared c,d	Shiro c,d
Summer Rambo c,d	
Grimes Golden c,d	PLUMS (European and Prunes)
**Jonathan (red strain) c,d	Mohawk c,d
Golden Delicious c,d	Richards Early Italian Prune c,d
**Delicious (red strain) c,d	Iroquois c,d
**Winesap c,d	Stanley c,d
**Stayman (red strain) c,d	Shropshire (Damson) c
**Rome Beauty (red strain) c,d	Oneida c,d
CHERRIES (sour)	NECTARINES
Montmorency c,f	Pocahontas d
**CHERRIES (sweet)	Cherokee d
Napoleon (Royal Anne) c,d	Cavalier d
Vernon c,d	Redgold d
Ulster c,d	PEACHES
Hedelfingen c,d	Earlired c,d
Windsor c,d	Sunhaven c,d,f
Hudson c,d	Redhaven c,d,f
PEARS	Triogem c,d,f
Moonglow c,d	Washington c,d,f
Magness c,d	Glohaven c,d,f
Maxine c,d	**Sunhigh c,d,f
Seckel c,d	Cresthaven c,d,f
Orient c	Georgia Belle (white) c,d
Kieffer c	White Hale (white) c,d
	Redskin c,d,f
	Tyler c,d,f
	**QUINCE
	Orange c

* Principal uses: c—cooking; d—dessert; f—freezing.

** In Eastern Virginia where mildew, blight, brown rot, bacteriosis, fruit cracking, and poor color can be serious due to climatic conditions, these varieties are difficult to grow.

plant at least three varieties of apples. Don't confine your selections to Summer Rambo, Winesap, and Stayman. These varieties will not cross pollinate. Golden Delicious is used by many commercial growers as a pollinizer for other varieties of apples in their orchards.

At least two of the recommended pear, plum, and sweet cherry varieties should be planted. Inasmuch as Japanese and European-type plums are not generally effective as pollinizers for each other, two varieties of the same type should be planted. Windsor is a good pollinating sweet cherry variety. Sour cherries cannot be used to pollinate sweet cherries because they do not overlap in bloom.

All of the sour cherry, peach, and nectarine varieties listed are sufficiently self-fruitful to set satisfactory crops with their own pollen.

Apricots are not recommended for planting in Virginia. The buds of currently available varieties respond to the first warm days of early spring and are usually killed by frost or low temperature common to most areas. Unless protection can be provided, a crop can be expected no more frequently than once every 4 or 5 years.

Buying Trees

Obtain the best nursery stock available. Buy only from reputable nurserymen who guarantee their plants to be true to name, of high quality, and packed and shipped correctly. Beware of "basement bargains." High prices do not necessarily mean high quality, but good, well-grown nursery stock is not cheap.

One-year-old trees are usually preferred. A common mistake made by many homeowners is to select oversized or ready-to-bear nursery trees. Experience has shown that younger trees bear almost as soon, are easier to keep alive, and develop into more healthy, vigorous trees than do the oversized stock. The older trees cost nurserymen more to grow and are sold for higher prices, but are usually worth less.

For peaches, nectarines, and apricots, a 4' tree, 1/2" in diameter, is considered the ideal size for planting. Vigorous, 4 to 7', 1-year-old whips about 3/4" in diameter are preferred for apples. Pears, quince, plums, cherries, and apples may be planted as 1- or 2-year-old trees. Either will be satisfactory as long as the trees have attained sufficient size and have good root systems.

When purchasing apple trees on dwarfing rootstock, be sure to specify the rootstock desired. Three are currently suggested for planting in Virginia. EM-IX is very dwarfing, has a rather weak root system, and must have mechanical support. Trees on EM-VII and MM-106 attain a

size about two-thirds that of the same variety on seedling rootstock.

SETTING THE ORCHARD

Time of Planting

Virginia climatic conditions are such that good results can be obtained regardless of whether the trees are planted in fall or early spring. Planting about a month after the first killing frost in the fall or about a month before the last killing frost in the spring is generally recommended. The important thing to remember is that trees should be dormant and that the soil should have proper moisture content to be in good working condition.

Soil Preparation

Preparation of the soil where fruit trees are to be planted should be as thorough as preparation of the soil for a vegetable garden. If the places selected for trees are in a lawn, it is best to spade the soil deeply over an area of several square feet where each tree is to stand. Where the trees are to be set, dig the holes wide enough to prevent the need for crowding or bending the roots.

Handling Nursery Stock

Roots of nursery stock should never be allowed to freeze or dry out.

When your order arrives, unpack the bundles immediately and inspect the trees. The roots and packing material should be moist. Check to see if the bark is withered. Withered bark indicates the trees have been allowed to dry out in storage or in transit.

If trees cannot be planted immediately, they may be held dormant in the original packing in refrigerated storage for a week or two. If refrigerated storage is not available, trees should be taken out of the bundle and heeled-in carefully in a trench of moist soil in a shaded location.

Planting the Trees

Tree roots must be kept moist at all times. Keeping roots in a container of water for several days until the tree is planted is an excellent idea.

Prune the roots of young trees only where necessary to remove broken and damaged ones or to head back some that are excessively long. Should a tree be so badly scarred or damaged that there is doubt of its survival, it is wise to discard it.

Dig the hole a little deeper and wider than necessary to accommodate the roots, leaving the soil loose in the bottom of the hole. Set the tree at approximately the same depth it grew in the

nursery. Never set it so deep that the union of the scion and rootstock is below ground level when the hole is filled.

Then begin filling the hole with pulverized topsoil, shaking the tree gently to filter the soil among the roots. Tamp firmly and thoroughly with the foot or a well-padded stick. The addition of water when the hole is about three-fourths full will aid in packing the soil around the roots and increase chances for the tree's survival. After the water has completely soaked in, finish filling the hole, leaving the soil loose on top.



Figure 1 — Give the roots plenty of room.

ORCHARD MANAGEMENT

Cultural Practices

Young fruit trees should be mulched or cultivated until they begin to bear. Weeds must be eliminated so they will not compete for available moisture and fertilizer. Cultivation must be shallow to avoid injury to roots near the surface. The cultivated or mulched area should extend a little beyond the spread of the branches.

The use of mulch in the home fruit garden pays in many ways. It keeps down weeds, adds humus to the soil, conserves moisture, and keeps the soil cool during hot months.

Many materials may be used, including grass clippings, hay, straw, pine needles, peat moss, sawdust, and shavings. Where sawdust is used, a layer 2" deep may be sufficient; for more bulky materials, at least 5 or 6" should be applied.

Temporary nitrogen deficiency may occur when mulch material low in nitrogen begins to decay. This can be overcome by the addition of nitrogen fertilizer. Usually about $\frac{1}{4}$ lb. of ammonium nitrate or $\frac{1}{2}$ lb. of nitrate of soda to each 100 sq. ft. of mulched area will be enough.



Figure 2 — A good mulch — low in cost, high in value.

The use of black polyethylene plastic as a mulch has given good results. Holes may be punched in the plastic to allow for moisture penetration. Although it does not decay and add humus to the soil, neither does it cause a temporary nitrogen shortage.

When trees are planted in rows, the area between the rows may be allowed to grow in sod or used for interplanting with low-growing vegetables or strawberries. There is no objection to this practice in the home orchard, provided ample plant nutrients and moisture are available for proper development of the fruit trees. Under sod culture, frequent close mowing during the growing season is desirable. This reduces competition for necessary moisture and plant nutrients, and also aids in disease and insect control.

Fruit trees, especially those on dwarfing rootstock, are becoming prominent in home landscape designs. They respond to the same general care and are no more difficult to handle under average lawn conditions than are ornamental trees and shrubs normally used.

Under lawn culture, fruit trees can be given more attention than is usually convenient under other systems of culture. Equipment and materials for watering, pruning, spraying, and other cultural practices are essentially the same as those required for ornamental plantings.

It is good practice to apply a mulch or cultivate lightly for the first year or two, or until the tree has become firmly established. Lawn grass, if kept closely clipped, may then be allowed to grow around the base of the tree.

Chemicals for weed control should be used with extreme caution in the home garden. Careless use can result in severe injury to fruit trees and nearby ornamental plantings. See your Extension Agent for latest recommendations.

Fertilization

As a rule, no fertilizer is recommended or needed at the time of planting. After the young tree becomes established and growth begins, apply $\frac{1}{4}$ to $\frac{1}{2}$ lb. of a 16 or 20% nitrate fertilizer in a circle around the tree, about 8 to 10" from the trunk.

Usually fruit trees show no increased growth or fruitfulness from the use of any nutrient element except nitrogen. Other elements are used by the tree; however, only in special cases are they deficient in the soil. Deficiencies are more likely to occur on light, sandy soils.

Because there are many soil types and varying levels of natural fertility, it is difficult to make one fertilizer recommendation which will apply equally well in all areas of Virginia. A rule of thumb practiced in many commercial apple and peach orchards is to apply about $\frac{1}{4}$ lb. of a 20% nitrogen fertilizer, or its equivalent, for each year of the tree's age. If nitrate of soda is used (containing 16% nitrogen), about one-fourth more would be needed. Only about two-thirds as much ammonium nitrate (33%) would be necessary.

Where a good mulch is applied regularly, the use of chemical fertilizer to supplement natural fertility of the soil is usually unnecessary. Overfertilization with either organic or inorganic materials should be avoided. Excessive vegetative growth will result, usually accompanied by delayed fruiting and possible winter injury.

Where poor growth results from the use of nitrogen only, other elements may be needed. Contact your local Extension Agent for fertilizer recommendations which will apply specifically to your locality.

Fertilizer may be applied either after the leaves have fallen or in early spring about 3 or 4 weeks before active growth begins. On light, sandy soils, it is best to delay application until early spring. The usual method of application is to scatter fertilizer evenly under the tree, starting about 2' from the trunk and extending to just beyond the tips of the branches.

Terminal growth and general vigor of the individual tree should be observed closely. Where growth the past year was short, increase the amount of fertilizer slightly. If growth was excessive, reduce the amount or withhold it entirely. Remember that both pear and quince are highly susceptible to fire blight and excessive

growth will make this disease more prevalent.

Mature, bearing peach, nectarine, and sweet cherry trees should produce an average of 10 to 15" of new growth annually. From vigorous, young, nonbearing trees, about twice that amount can be expected.

In general, 8 to 10" of terminal growth is considered adequate for mature, bearing apple, pear, quince, plum, and sour cherry trees. About twice that amount is sufficient for young, nonbearing trees.

Pruning

The general purpose of pruning fruit trees is to regulate growth, increase yields, improve fruit size and quality, and reduce production costs. Pruning is necessary to shape the trees for convenience of culture and for repair of damage.

The suggestions for pruning fruit trees are concerned with training to produce a strong framework and maximum yield of high quality fruit. For information on training to special forms to suit a particular need in the garden, contact your local Extension Agent.

Most pruning is done during the dormant season, preferably just before active growth begins in the spring. At this time, pruning wounds heal faster, flower buds can be easily recognized, and injury from low winter tempera-



Figure 3 — Shoot thickness is as important as shoot length in judging vigor of trees. (Photo courtesy of W. P. Judkins)

ture is avoided. Summer pruning may be done to help train young trees to the desired shape, remove watersprouts and other undesirable growth, and maintain smaller tree size. It should be remembered, however, that all pruning has a dwarfing effect. For maximum yield of high quality fruit, prune only as necessary to establish a tree with a strong framework capable of supporting heavy crops annually without damage and to maintain a tree sufficiently open to allow penetration of sunlight, air, and spray material for good fruit development and pest control.

Although pruning procedures vary according to the type, age, and variety, all newly planted fruit trees should be pruned in the spring before growth starts. This is necessary to bring the top into balance with the root system, some of which may have been lost in transplanting, and to stimulate lateral bud development from which to select good scaffold limbs.

Apple trees are usually trained to the modified leader system. This allows the "leader" or main trunk to develop without checking its height until the scaffold limbs have been established. Usually, the scaffold limbs are well established by the end of the third year, at which time it may be necessary to cut back the leader.

If 1-year-old unbranched whips are planted, pruning will be confined to heading at the desired height — about 30 to 35" for spur-type and semi-dwarf trees. If young trees are branched when they come from the nursery, the usual practice is to head the leader to the desired height, cut back about one-half the terminal growth of any wide-angled side branches suitable for developing into scaffold limbs, and remove the rest.

When the topmost buds on the leader grow out to 4 or 5", remove all except the terminal shoot. This encourages growth of buds in the lower portion of the tree, thus providing a greater number of shoots from which to select scaffold limbs. The selection may be made during the first summer with removal of the undesired shoots, or all may be left to grow throughout the season with the selection being made during the dormant season pruning.

A well-trained mature tree will usually have from 6 to 10 scaffold limbs. They should be 8" apart vertically, evenly distributed up and around the leader, with the lowest scaffold not less than 18" from the ground and with no scaffold originating from the trunk directly above another. To provide a strong framework which will support heavy crops of fruit, each scaffold should form an angle of about 65° with the trunk of the tree.

Limb spreaders may be used to aid in the establishment of a strong framework of scaffolds and encourage earlier production. They are especially useful in training varieties like Red Delicious that have a tendency to form branches with narrow angles, growing more upright than spreading. Steel wire of about $\frac{1}{8}$ " diameter or wooden strips with finishing nails in each end are inserted between the selected scaffold limb and the main stem of the tree, thereby spreading the limb to form a desirable crotch angle of about 65° . This should be done early, while the limb is still pliable enough to be trained in the desired position.

After the frameworks of scaffold limbs have been selected, there will probably be little pruning necessary until the trees come into bearing. You may have to remove watersprouts, branches competing with desirable scaffolds, and, in some cases, make a light corrective pruning effort. Heavy pruning should be avoided.

In general, pruning of the bearing apple tree consists of: removal of watersprouts, diseased, broken, and insect-injured branches; thinning out weak, low-growing, and shaded branches; opening up the top by judicious removal of higher branches to allow sunlight to filter through the center of the tree; and heading the tree at a height of 18' or less.

Pear trees are trained along the same general lines as those recommended for apples. The average young pear tree tends to become tall and leggy. Tipping or heading back the long shoots slightly will encourage the development of side branches. Heading back after the framework has been developed is undesirable because of the tendency of the tree to throw out soft terminal shoots, which are highly susceptible to fire blight. It is best to limit pruning to thinning-out cuts.

Sweet cherry trees are trained to the modified leader system recommended for the apple. Special attention should be given to the selection of scaffold limbs because sweet cherry is subject to winter injury and splitting at the point where the limbs join the main stem of the tree. It is essential that the crotch angles be as wide as possible to ensure a strong framework.

Newly planted trees should be headed to a height of about 40". If wide-angled lateral branches are present when the trees are set, select those suitable for scaffold limbs and head them back slightly, leaving the leader several inches longer than the laterals. Four to six main scaffold limbs, 8" or more apart vertically and evenly distributed around the trunk, are desirable. The lowest scaffold limb should be not less than 18" from the ground.

After the first year, avoid heading back as



Figure 4—A young apple tree with limb spreaders in position.

much as possible. Cutting back the leader and upright-growing scaffold limbs to strong outward-growing laterals may be necessary to keep the tree low for convenience in spraying and harvesting. Pruning the mature sweet cherry is usually limited to removal of diseased and damaged branches.

A *sour cherry* tree, with no strong side branches at the time of planting, should be headed to about 24" above the ground. Selection of laterals can be made at the beginning of the second year's growth. If it has some good laterals when planted, remove those lower than 18" from the ground. Select about three permanent lateral or scaffold limbs along the leader. They should be 4 to 6" apart and not directly over one another. Do not head them back inasmuch as this tends to stunt terminal growth.

In the following years, select side branches from the leader until there is a total of 5 or 6 scaffold limbs well distributed above the lowest branch along 3 or 4' of the main stem. The leader is then usually modified by cutting to an outward-growing lateral. After fruiting begins, pruning consists mainly of thinning out excessive and crowded growth each year to allow sunlight to filter through the tree.

The *plum* may also be pruned in a manner similar to the apple. European and prune types generally develop into well-shaped trees, even if little pruning is done. Thinning out excessive growth constitutes the bulk of pruning after heading back to 30 to 36" at the time of planting. Varieties of the Japanese type are usually a little more vigorous, and may need some heading back as well as thinning of excessive growth after they come into bearing.

Peach trees are usually trained to the open center system. Newly planted trees should be headed to about 30" in height, just above a lateral branch or bud. If the tree is branched when it comes from the nursery, select 3 or 4 laterals well spaced up and around the trunk for the permanent scaffold limbs. The lowest limb should be about 18" and the highest about 30" from the ground. Cut these back to 2 buds each, and remove all other laterals.

If no desirable laterals are available, head the tree to the desired height and cut out all side branches to one bud. A number of shoots will develop during the season from which you can select scaffold limbs. Selection can be made during the summer with the removal of all undesired shoot growth, or it can be delayed until just before growth begins the second season.

Once the scaffold system of the young peach tree is established, prune as little as possible. Remove all strong, upright shoots growing in the center of the tree, and lightly head back terminal growth on the scaffold limbs to outward-growing laterals. This aids in the development of an open center tree.

As fruit is borne on wood of the previous year's growth, it is necessary that the peach be pruned annually to stimulate new growth and maintain production near the main body of the tree. Pruning of the mature peach tree consists mainly of moderate thinning and heading back to outward-growing laterals to keep the tree low and spreading. A height of 8 or 9' is usually preferred.

Nectarine trees and *apricot trees* are trained in the same manner as peach trees.

The *quince* can be trained to an open center like the peach, or cut to 10 or 12" above the ground

and induced to form a bush-like tree. Slow, crooked growth is characteristic of the quince and little pruning is needed. As fruit buds develop on the ends of the current season's growth, cutting back the main limbs to stimulate moderate shoot growth is occasionally done. For the most part, all the pruning necessary is to remove dead branches and limbs which interfere with one another.

Special Training

The foregoing suggestions for pruning fruit trees are concerned with training for maximum production of high quality fruit. In addition, many home gardeners prune for decorative purposes.

Numerous training systems, based on the art of espalier, originating in France and Italy about 400 years ago, have been devised. Some are quite elaborate, requiring considerable time and patience as well as detailed knowledge of the plant's growth and fruiting characteristics for success.

The easiest espalier system is the horizontal cordon. Apples, pears, and plums adapt well to this system. The trees are usually supported by a wall, a fence, or a wire trellis. Training to the four-tier cordon or four-wire trellis is relatively easy. An espalier system can serve to separate yard areas and to provide an effective way of producing a large volume of high quality fruit in a limited area.

Trees trained in this fashion should be on dwarfing rootstock. Otherwise, they tend to grow too large and are difficult to hold within bounds. Spur forms of various apple varieties on dwarfing rootstock, such as EM-IV, EM-VII, and MM-106, are especially suitable for trellising.

A simple four-wire trellis may be constructed by setting 8' posts 2' in the ground, spacing them 12' apart, and running wires through the posts at heights of 18, 36, 54, and 72". Plant two unbranched whips of the desired variety 6' apart between each two posts.

Before growth begins in the spring, cut off the whip just above the first bud below the point where the whip crosses the lowest wire. Usually, three or more shoots will develop near the point of the cut. Retain the uppermost shoot and develop it as the central leader. The other two can be developed into main scaffold branches to be trained along the lower wire, one on each side of the central stem. Remove all other growth.

The two shoots selected for scaffold limbs should be loosely tied to the wire as soon as they are 10 to 12" long. Twine, plastic chain-link ties, or other suitable material may be used. Tie the

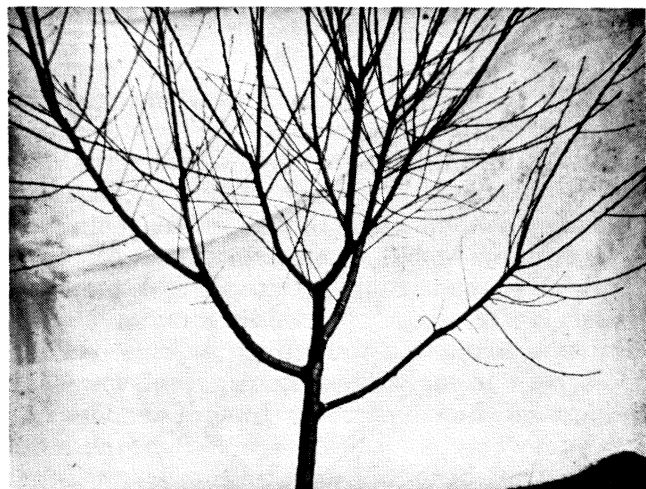
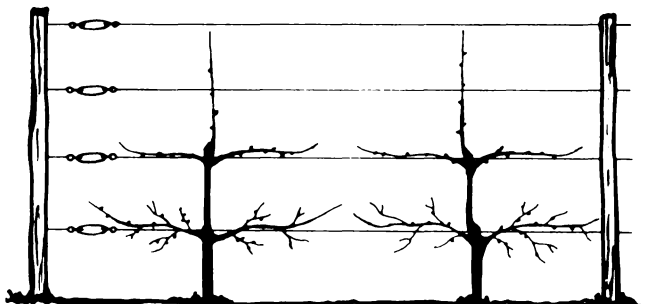


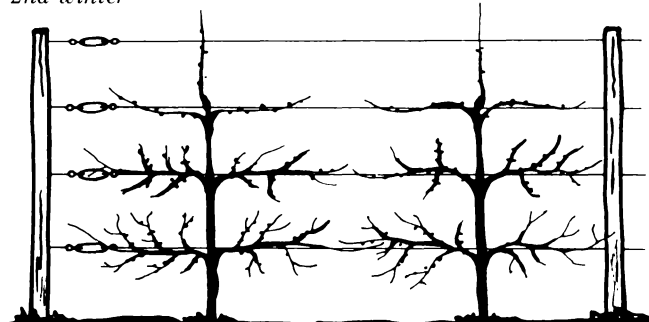
Figure 5 — A 2-year-old peach tree with the scaffold limbs well established.



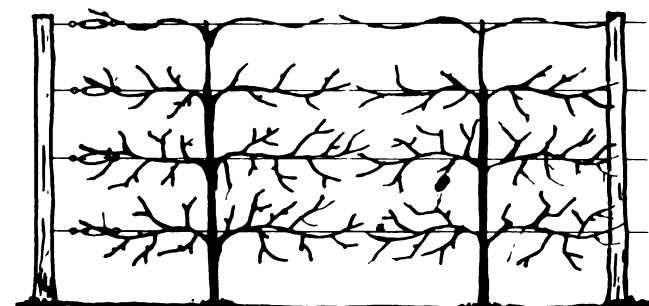
1st winter



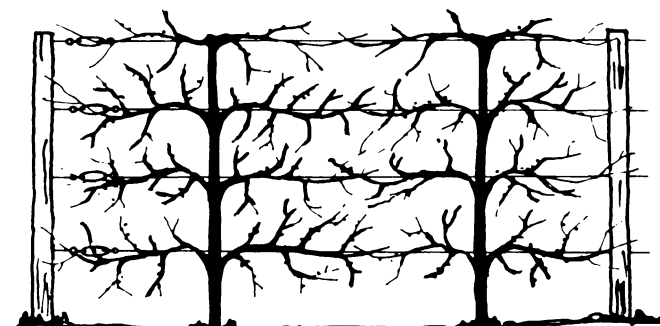
2nd winter



3rd winter



4th winter



5th winter

Figure 6 — Training fruit trees to the four-wire trellis system.

shoots so that they are nearly horizontal. This reduces the vegetative vigor and induces flower bud formation. If the end of the shoot is tied below the horizontal, however, new growth at the end will stop and vigorous shoots will develop along the upper side. At the end of the first season, the lateral branches on the lower wire should be established and the central leader should have grown above the second wire.

During the dormant pruning at the end of the first winter, cut the central leader off at a bud just below the second wire. Repeat the process of the previous spring by developing two scaffold branches to tie to the second wire and allow the central leader to grow above the third wire.

This process is repeated during the next two seasons, at which time a total of eight scaffolds, four on each side of the tree, should be firmly established. The leader should be bent to form one of the scaffolds rather than being cut off at the level of the top wire.

By the end of the fourth season, the trees should be in heavy production. All pruning is then done during the spring and summer months. After new growth in the spring is about 2" long, cut it off and also remove about one-fourth of the previous season's growth. Terminals of the scaffolds are left untouched.

About the first of August or as soon as new growth reaches 10 to 12" in length, cut it back to two or three buds. Repeat about a month later, if necessary. This encourages fruit bud formation and prevents vigorous growth from getting out of bounds.

This system of training may appear complex at first. However, with a little experience, it will be easier and more interesting to do, and the yields will be greater than those of conventionally trained trees having the same bearing surface.

Thinning

Quite frequently, peach and apple trees set more fruit than they can mature to a desirable size. By thinning (removing excess fruit), this difficulty can be overcome. Thinning not only allows for an increase in size of the remaining fruit on the tree, but also improves fruit color and quality, reduces limb breakage, and promotes general tree vigor. Thinning induces regular annual bearing in certain apple varieties, such as Golden Delicious, Yellow Transparent, and York Imperial, which otherwise have a tendency to bear heavy crops every other year. Perhaps one of the greatest benefits from thinning fruits is that it permits more thorough spraying or dusting for effective disease and insect control.

Peach thinning is a standard practice in



Figure 7 — Red Delicious on MM106 rootstock trained to the four-wire trellis system.

commercial orchards. Experimental results indicate that the sooner peach trees are thinned after bloom, the earlier the ripening and the larger the fruits at harvest. It is doubtful that final size of the fruits of any variety will be greatly increased by thinning if it is delayed much after the pits begin to harden.

It is generally recommended that peaches be spaced 6 to 8" apart. When thinning by hand, grasp the stem or branch firmly between your thumb and forefinger and pull the fruit off with a quick motion of the second and third fingers.

Many growers use the pole method of thinning peaches. A 4 or 5' section of bamboo or other light wood is used. A piece of $\frac{3}{4}$ " garden or spray hose about 15" long is forced tightly onto the end of the pole, leaving some 8 to 10" of the hose extending beyond the end of the pole. A snug fit is necessary so the hose will remain in place while being used.

Many modifications of this tool are used. One of the most common is a 30" section of plastic pipe, 1" in diameter.

Remove peaches by striking the limbs about 18" from their tips with the flexible part of the hose, using sharp, firm blows. This dislodges any loosely attached fruits. With a little practice, you

should be able to remove individual fruits by this method.

Apples should be thinned as soon as possible after the fruit has set. If full benefits are to be obtained, thinning should be completed within 20 to 25 days after full bloom.

In hand-thinning apples, use the same general technique used in hand-thinning peaches. A distance of 6 to 10" between fruits is recommended. With varieties of Delicious apples, where greater size of individual fruits is important, the greater spacing is preferred. The center apple of a cluster is usually the largest and the best apple to leave.

Thinning *plums* is usually limited to the large Japanese varieties. The primary concern here is to facilitate insect and disease control. Plums are usually thinned by hand to about 4" apart.

Chemical sprays are used by many commercial growers to thin apples and peaches. If you wish to use them in your planting, contact your local Extension Agent for recommendations.

Rodent Control

Mice may cause serious damage to the home fruit planting. They chew off the bark at ground

level or below and often completely girdle a tree, causing it to die. Most of this damage takes place during winter. Keep mulch pulled away from the base of the tree, and examine it frequently for the presence of mice.

In many home and commercial plantings, mice are controlled by placing poison bait in their runways. These poisons and complete directions on how to use them may be obtained from many spray material dealers.



Figure 8 — An effective guard against rabbit injury to young trees.

Mice may also be controlled by trapping. This can be successful where only a few trees are involved.

Rabbits are responsible for the loss of thousands of young fruit trees each year. Perhaps the most satisfactory method of preventing rabbit damage is the use of a mechanical guard.

Galvanized screen or "hardware cloth" with a $\frac{1}{4}$ " mesh is frequently used. A roll 36" wide may be cut lengthwise, forming two 18" strips. By cutting these strips into pieces 14" long, guards 14 by 18" are obtained.

Roll or bend the strip around the trunk of the

tree so that the long side is up and down the trunk and the edges overlap. Twist a small wire loosely about the center to prevent the strip from unrolling. Push the lower edges well into the ground. This metal guard will last indefinitely and can be left in place all year.

Tar paper, building paper, sheets of magazines, and aluminum foil can also be used in a similar manner, but must be removed in the early spring to prevent damage to the tree. Perforated plastic guards are also available. Like the metal guards, these can be left in place year round.

Other methods of rabbit control have been successful. Ordinary whitewash has given good results in some instances. A repellent wash recommended by the USDA, containing equal parts of fish oil, concentrated lime sulfur, and water, is used by some commercial growers. Also, rabbit repellents under various trade names are available. All these materials may be applied with a paint brush to the trunk of the tree from the ground up into the scaffold limbs.

Tree Fruit Spraying

The *spray schedule* followed by commercial growers involves many different materials which must be applied at critically timed intervals. This schedule is therefore impractical for the home fruit gardener.

There are several all-purpose fruit sprays on the market. These preparations contain necessary materials for the control of most insects and diseases encountered in the home fruit planting. Using such sprays according to directions usually yields satisfactory results.

The home gardener who wishes to mix his own spray material should contact the local Extension Agent for up-to-date information on the materials to use, how to mix them, and when to apply them for effective disease and insect control.

Several types of hand-operated sprayers suitable for use in the small planting are available. These include the wheelbarrow-type force pump, trombone-type force pump, knapsack sprayer, and compressed-air sprayer. A more recently developed spray gun, which can be attached to the garden hose and operated by water pressure, has proved satisfactory for trees up to 12 or 15' high.

To be successful with your spray program, spray at the proper time and do it thoroughly. Leave no portion of the tree unsprayed. To make the job easier and to ensure adequate coverage, thin out excessive growth and remove all dead

and weak wood. Cut old trees back to 20' or less, if possible. Train younger trees so they reach a height of no more than 18'.

Semidwarf and dwarf trees should be considered when making your planting. Their smaller size makes the task of spraying much easier. Early maturing varieties are less likely to be seriously affected by insects and diseases because of the shorter growing season. This factor should not be overlooked in the selection of varieties.

When special problems in insect and disease control arise, contact your Extension Agent. If he cannot help you with your problem personally, he will be glad to direct you to someone who can.

Sanitation

Adopt good orchard sanitation practices. The destruction of harboring places for insects and diseases plays a large part in the control program. Conditions which encourage mice should be eliminated.

These are some practices to include in your orchard sanitation program:

1. Collect and burn debris.
2. Remove and destroy all dropped fruit.
3. Rake and burn apple and cherry leaves.
4. Scrape loose bark from trunks, crotches, and main limbs of apple trees.
5. Prune out and destroy all dead or diseased limbs, branches, and twigs.

Keys to Proper Use of Pesticides

1. Read the label on each pesticide container before each use. Follow instructions to the letter; heed all cautions and warnings, and note precautions about residues.
2. Keep pesticides in the containers in which you bought them. Put them where children or animals cannot get to them, preferably under lock and away from food, feed, seed, or other material that may become harmful if contaminated.
3. Dispose of empty containers in the manner specified on the label.

SEE YOUR DOCTOR IF SYMPTOMS OF ILLNESS OCCUR DURING OR AFTER USE OF PESTICIDES