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Tree Fruit in the Home Garden

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Planning the Home Fruit Planting

It is desirable to locate the 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 as well as orchards. They come into bearing earlier than standard-sized trees, occupy less space, and can be more easily pruned and sprayed with equipment normally available to the average gardener. Most nurseries now carry dwarf and semidwarf apple trees of all varieties. Dwarf pear, peach, and cherry trees of a few varieties are offered by some nurseries, but are not recommended because trees may not survive more than five years due to disease and incompatibility problems.

Size of Planting Space, site, family size, available time, and pollination requirements determine the size of the planting. Choose fruits based on family preference, adaptability, and available space. Never attempt to plant more than you can care for properly. The information in the table below should help you determine the size of your planting.

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. The table below shows the minimum desirable distances between fruit trees in home orchards. 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.

Table 1. Space requirement, yield, bearing age, and life expectancy of tree fruits

Fruit	Minimum Distance Between Plants (feet)	Approximate Yield Per Plant (bushels)	Bearing Age (years)	Life Expectancy (years)
Apple - standard	30	8	6-10	35-45
Apple - semidwarf	18	4	4-6	30-35
Apple - dwarf	8	2	2-3	30-35
Pear - standard	25	3	5-8	35-45
Pear - dwarf	12	1/2	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	18	60 qt.	4-5	15-20
Cherry - sweet	25	75 qt.	5-7	20-30

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Site Selection The importance of selecting the best site possible for fruit planting cannot be over-emphasized. Good air drainage is essential. Cold air, like water, flows downhill. For this reason, fruit buds on plants set in a low spot are more likely to be killed than those on a slope. Frost pockets; low, wet spots; and locations exposed to strong, prevailing winds must be avoided. South-facing slopes encourage early bud development and can sometimes result in frost damage. Select late-blooming varieties for this location.

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

Variety Selection Give special attention to the selection of varieties. 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.

Several varieties of the same kind of fruit maturing at different times may be planted to prolong the harvest 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, 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. Because Japanese and European 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 are different species.

Table 2. Some suggested varieties for the home fruit garden (listed in order of ripening)

APPLES	**PEARS**
Lodi 1c,2	Harrow Delight 1c,d
Jerseymac 1c,d,2	Moonglow 1c,d
Ginger Gold 1c,d	Harvest Queen 1c,d
Paulared 1c,d,2	Maxine 1c,d
Gala 1d,2	Seckel 1c,d
Summer Rambo 1c,d	Orient 1c
Grimes Golden 1c,d,2	Kieffer 1c
Jonathan (red strain) 1c,d,2	
Golden Delicious 1c,d	**PLUMS (EUROPEAN)**
Delicious (red strain) 1c,d,2	Earliblue 1c,d
Winesap 1c,d,2	Blue Bell 1c,d
Stayman (red strain) 1c,d,2	Stanley 1c,d
Rome Beauty (red strain) 1c,	Shropshire (Damson) d,2,1c
Granny Smith 1c,d,2	
Fuji 1c,d,2	**PLUMS (JAPANESE)**
	Early Golden 1c,d
SCAB-IMMUNE APPLES	Methley 1c,d
Redfree 1d,2	Shiro 1c,d
Prima 1d,2	
Liberty 1d,2	**NECTARINE**
Priscilla 1d,2	Redgold 1d
Jonafree 1d,2	Flavortop 1d
Sir Prize 1d,2	Fantasia 1d
CHERRIES (SWEET)	**PEACHES**
Napoleon (Royal Anne) 1c,d	Jerseydawn 1d
Vernon 1c,d	Redhaven 1c,d,f
Ulster 1c,d	Loring 1c,d,f
Hedelfingen 1c,d	Redkist 1c,d,f
Windsor 1c,d	Earnies Choice 1c,d,f
Hudson 1c,d	Cresthaven, 1c,d,f
	Biscoe 1c,d,f
CHERRIES (SOUR)	Encore 1c,d,f
Montmorency 1c,f	White Hale 1d
	Carolina Belle 1d
	Summer Pearl 1d
	Raritan Rose 1d

1 - Principal uses: c - cooking; d - dessert; f - freezing.

2 - 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.

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 four or five years.

Apple Rootstocks

Apples, like other tree fruits, will not produce trees with the same characteristics from seed. If you plant a seed from a Red Delicious apple, the fruit would likely be small, unattractive, and of poor quality. Therefore, fruit trees are propagated vegetatively by either budding or grafting scion wood of the desired cultivar on a rootstock. The rootstock and scion variety maintain their respective genetic identities, but are joined at the graft union and function as a unit.

Traditionally, apple trees have been propagated on rootstocks from apple seeds. More recently, increasing use is being made of vegetatively propagated or clonal rootstocks which have inherent advantages over seedlings. Three major considerations in rootstock selection are:

Size control Probably, the most widely accepted reason for the use of clonal rootstocks is tree size control. By proper selection of rootstock, one can determine mature tree size. For example, the same variety of apple will produce a 16- to 18-foot tree on the rootstock Malling Merton (MM)111, down to a dwarf tree of 7 to 8 feet on a Malling (M)9 rootstock. Intermediate sizes can be attained by other rootstocks, such as M.26 and M.7. Unfortunately, many apple trees offered to consumers are labelled as dwarf trees, but the buyer has no idea of how dwarfing the rootstock may be.

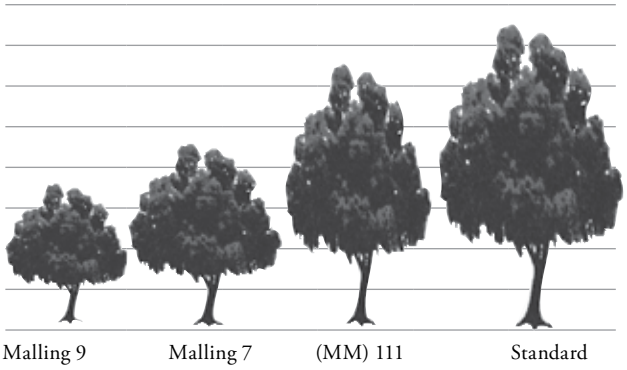

Figure 1. Effect of different dwarfing rootstock on the same apple variety.

Precocity The earliness at which a tree produces fruit is also directly affected by the rootstock. Trees on seedling rootstocks usually do not begin fruiting until they are 7 to 8 years old. Trees on M.9 rootstock will often produce crops in two to three years. Other rootstocks are intermediate in this regard. Usually, the more dwarfing the rootstock, the earlier the tree will bear fruit.

Stability A major consideration in selecting apple rootstocks is the degree of anchorage provided. For example, trees on M.9 rootstock are very small, but because of brittle roots, must be provided some type of support. This can consist of a post, a trellis, or other means of holding the tree upright. The semidwarfing M.7 rootstock may require support for the first few years, but some varieties can grow without support. The more vigorous MM.111 rootstock does not require support and is thus like seedlings.

Buying Trees

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

Usually, 1-year-old trees are preferred. A common mistake made by many gardeners 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 nurseries more to grow and are sold for higher prices, but are usually worth less than younger trees.

For peaches, nectarines, and apricots, a 4-foot tree 1/2-inch in diameter, is considered the ideal size for planting. Vigorous 4- to 7-foot, 1-year-old whips about 3/4-inch 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: M.9EMLA (virus free) is very dwarfing, has a rather weak root system, and must have mechanical support; M.7EMLA (virus free) which produces a tree 70 to 80% as large as a mature tree from seedling and requires support for most varieties; and MM.111EMLA (virus free) which produces a tree 80 to 90% as large as a mature tree from seedling, does not require support, and is nearly problem-free.

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 bloom in the spring is generally recommended. The important things to remember are that trees should be dormant and the soil should have proper moisture content.

Handling Nursery Stock Fruit trees are usually purchased as containerized plants from local nurseries and garden centers or as bare root trees from mail-order companies. Both types of trees can give good results. Mail-order companies usually offer a larger selection of varieties.

Mail-order trees should be inspected upon arrival to make sure the roots and packing material are moist. If trees cannot be planted immediately, they can be stored in the original packaging for a week or two in an unheated basement or garage. Do not expose to freezing temperatures, which may damage roots; or high temperatures, which may induce bud break. Check the roots frequently and moisten if necessary. In the absence of a cool storage place, trees can be heeled in carefully in a trench of moist soil in a shaded location. It is a good idea to soak the roots in a bucket of water for a few hours before planting.

Planting the Trees Preparation of the soil where fruit trees are to be planted should be as thorough as preparation of the soil for a vegetable garden or ornamental planting. If the places selected for trees are in a lawn, it is best to remove the turf and spade the soil deeply over an area of several square feet where each tree is to stand.

Dig the hole only as deep but wider than necessary to accommodate the root ball.

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.

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 the soil firmly and thoroughly with your foot or a well-padded stick. The addition of water when the hole is about 3/4 full will aid in settling 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.

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.

There are several concerns with use of mulch around fruit trees. Both organic and inorganic mulch (i.e., black plastic) provide habitats for voles. Organic forms of mulch also release nitrogen throughout the season, which affects the grower's ability to control when and how much nitrogen is available. If trees are mulched, the mulch should be removed in the fall.

Fertilize young trees three times. Apply fertilizer about two weeks after planting, and again six and 10 weeks after planting. Apply 0.03 pounds of actual nitrogen each time (i.e., 1/3 pound 10-10-10, 0.2 pound nitrate of soda, or 0.1 pound ammonium nitrate).

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 1/4 pound of ammonium nitrate, 1/2 lb. of nitrate of soda or 2 pounds of 10-10-10 to each 100 square feet of mulched area will be enough.

The use of black polyethylene plastic as a mulch has given good results. Holes may be punched in the plastic to allow 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 landscape designs. 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 a good practice to cultivate lightly for the first year or two or until the tree has become firmly established. Lawn grass, if kept closely clipped, may be allowed to grow around the base of the tree in the third year, but fertilizer should be applied at twice the usual rate.

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 local Extension agent for the latest weed control recommendations.

Fertilization

Before planting, test your soil pH. If your soil is acidic, it should be limed to adjust the pH to a level between 6.0 and 6.5. As a rule, no fertilizer is recommended or needed at planting time. After the young tree becomes established and growth begins, apply nitrate fertilizer in a circle around the tree, about 8 to 10 inches 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 in light, sandy soils.

Because there are many soil types and varying levels of natural fertility, it is difficult to make one fertilizer recommendation that will apply equally well in all areas. A rule of thumb practiced in many commercial apple orchards is to apply about 1/4 pound of a 16% nitrogen fertilizer, or its equivalent, for each year of the tree's age from planting. For peach orchards, the amount of fertilizer should be doubled.

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 after the use of nitrogen only, other elements may be needed. Contact your local Extension agent for fertilizer recommendations specific to your locality.

Fertilizer may be applied either after the leaves have fallen or in early spring about three or four weeks before active growth begins. On light, sandy soils, it is best to delay application until early spring. When trees are grown in a lawn area, delay fertilizing the lawn until after trees are dormant to avoid late-summer growth on the trees.

The usual method of application is to scatter fertilizer evenly under the tree, starting about 2 feet 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 trees of peach, nectarine, and sweet cherry should produce an average of 10 to 15 inches of new growth annually. From vigorous, young, nonbearing trees, about twice that amount can be expected. In general, 8 to 10 inches 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, improve fruit size and quality, control tree size, and reduce production costs. Pruning is necessary to shape the trees for convenience of culture and for repair of damage.

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 temperature is avoided. Summer pruning may be done to help train young trees to the desired shape, remove water sprouts 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 stimulate lateral bud development from which to select good scaffold limbs.

Young, Nonbearing Apple Trees

The objectives of training, directing, or modifying growth into a desired form include early fruit production, development of an optimum tree structure for supporting future crops, and producing quality fruit. These objectives can be met by maintaining a proper balance between vegetative and potential fruiting wood. Excess shoot growth will delay the onset of fruiting. However, excess pruning of young, nonbearing trees will also delay the beginning of fruit production in the life of that tree. Training should be emphasized in the development of trees, with pruning used as a tool in the training process to redirect limbs, stimulate branching when desired, or to remove growth that is in an undesirable location. Pruning should not be used to invigorate growth in an attempt to compensate for poor fertilization, poor weed control, or drought conditions.

Future pruning of an apple tree is greatly affected by early training. Much of the pruning of young, bearing trees is the result of errors made in training in the early life of the tree. Thus, it is imperative that training begin early. A delay for the first 3 to 4 years will result in a poorly-developed, weak tree. Correction of such a problem, usually with heavy pruning, will only further delay and decrease fruit production.

Limb Spreading An integral part of a tree-training program is limb-spreading. Limb orientation affects vigor in various ways (Fig. 2). An upright or vertical limb produces the longest shoots near the apex and tends to exhibit high vegetative vigor. As limbs are oriented away from vertical, they exhibit reduced vigor of shoots near the apex, more uniform branching along the shoot, and

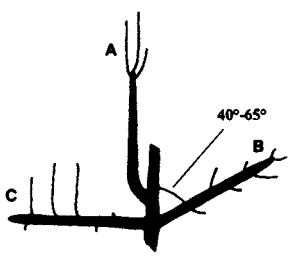

Figure 2. Limb orientation affects vigor: (A) dominate vertical growth, (B) healthy growth with optimum branch angle, and (C) water sprouts where branch angle is too great.

favor development of fruiting spurs. Fruits hang along the limb and are less prone to rub. A limb orientation around 60 degrees from vertical is desired. Horizontal orientation of limbs results in the development of vigorous watersprouts along the upper surface of the limb, at the expense of potential fruiting spurs.

Thus, correct limb-spreading (near 60 degrees from vertical) can be used to develop a proper balance between vegetative and fruiting growth (Fig. 3). Steel wire about

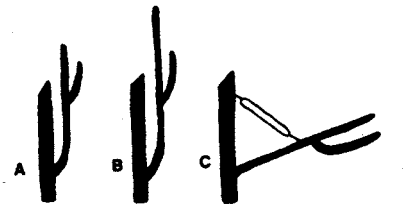

Figure 3. Use limb spreaders to insure proper limb orientation.

1/8" thick or wooden strips with finishing nails in each end are inserted between the selected scaffold limb and the main trunk of the tree. Limb-spreading should begin early, as many cultivars, such as Red Delicious (particularly spur-types), naturally develop narrow crotch angles. If these narrow crotch angles are not widened (greater than 35 degrees), a situation can quickly develop in which bark is trapped between the trunk and scaffold (bark inclusion). This bark inclusion prevents layers of annual wood from growing together and creates the potential for splitting. If these narrow crotch angles with bark inclusions are allowed to develop, later attempts at limb-spreading may result in splitting of the crotch. Two objectives exist for limb-spreading: 1) development of a strong, wide crotch angle (greater than 35 degrees) free of bark inclusion and 2) limb orientation at 60 degrees from vertical to balance vegetative and fruiting growth. To derive the benefits of limb-spreading, the crotch must be physically strong, to undergo spreading without splitting.

Poor pruning practices are not a wise substitute for proper limb-spreading in the training of upright scaffolds. Improper pruning cuts will not change the crotch angle, improve limb position, or aid in the control of vegetative vigor. Scaffolds should be spread and lower laterals removed if necessary.

Pruning Schedule

Scaffold Selection for Spacing Scaffold selection can begin in the early summer, especially on cultivars developing narrow crotch angles. Shoots developing below the lowest desired scaffold should be removed. Generally, in the first year, 4 to 6 good scaffolds can be selected that are evenly distributed and not directly above one another.

The vertical spacing between scaffolds can vary from 3 inches to 12 inches depending on the ultimate size of the tree. Limbs with crotch angles less than 35 degrees should be spread or removed. Hardwood toothpicks and clothespins can be used if training is done in early summer while shoots are soft. Short pieces of #9 wire can also be used. Shoots undesirably located can be completely removed at this time.

At Planting (Fig. 4) Trees must be pruned at planting. Pruning forces the growth of laterals from which future scaffolds will be selected. Head trees to a height of 30 to 35 inches. If feathered (branched) trees are planted, they should be headed to a strong bud to stimulate growth of the central leader. Feathers desirably located can be retained as scaffolds and should be headed by a third. Undesirable feathers should be removed.

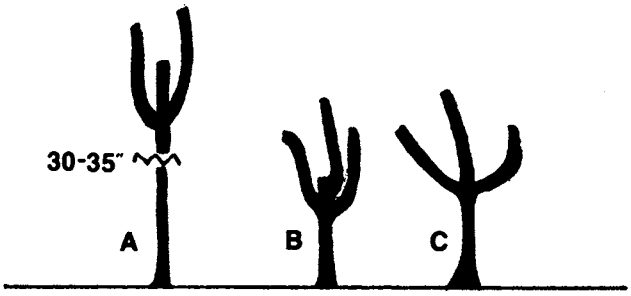

Figure 4. Pruning the first growing season: (A) pruning at planting (B) resulting regrowth, and (C) branch angles after spreading.

First Year Dormant Season (Fig. 5) Select shoots to be retained as scaffolds if this was not done earlier. Spread selected scaffolds before any pruning is done. Spreading changes the shape of the tree and may influence pruning decisions. Remove only branches with narrow crotches or branches that are too low. The central leader should be headed to maintain dominance and induce branching. This is done 3 to 5 inches above the point where the next tier of scaffolds is desired. Refrain from heading scaffolds unless they need to be shortened or stiffened. Generally a year-old shoot naturally branches in the season after development. Spreading that scaffold will encourage uniform branching. However, a scaffold will often exhibit excess vigor and upset the balance of the tree.

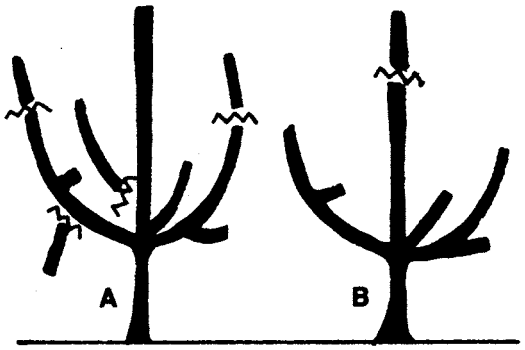

Figure 5. Pruning done during the first winter after planting: (A) tree before pruning with cuts marked and (B) after pruning.

Second Growing Season Limbs not previously trained can be easily spread early in the growing season when wood is flexible. Fruit developing on the central leader should be removed to prevent the leader from bending. Retain all branches with wide crotch angles.

Second Year Dormant Season (Fig. 6) Some of the scaffolds that were selected and spread in the first year may turn up and resume vertical growth. Longer spreaders can be used to spread the limbs back to the desired orientation. The smaller spreaders can be moved further up into the tree. Again, scaffolds should be spread before pruning. The central leader should be headed again to maintain vigor and stimulate branching. Typically, only one or two pruning cuts are required the second winter.

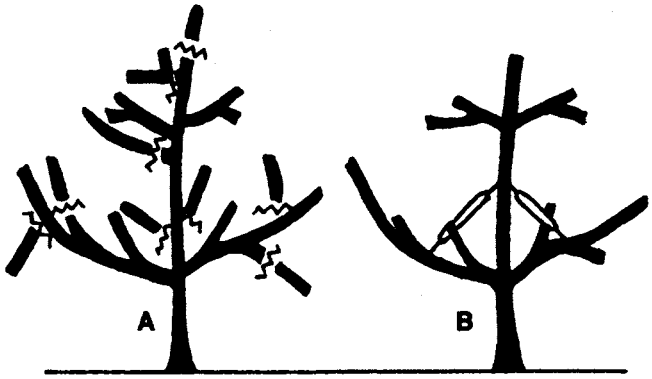

Figure 6. Pruning the two year old tree: (A) before pruning and (B) after spreading and pruning.

Succeeding Years Continue training and pruning following the previously discussed principles of central leader dominance and proper scaffold selection and training. Scaffolds should be maintained in a 60 degree orientation. A conical tree shape should be maintained. Thus, the upper scaffold should be shorter than the scaffold below it.

In the third year, upper scaffolds can be shortened with the use of thinning cuts to remove shoots at the junction with a lateral scaffold or trunk. Thinning cuts are less invigorating than heading cuts, improve light penetration, and can redirect the limb. Remove crossing branches and vigorous watersprouts. Shoots growing up into the tree should be removed. Weak watersprouts can be spread to induce fruiting.

Once the desired tree height is reached, the tree can be maintained by annually cutting back to a weak lateral on the central leader. This will maintain vigor in the top center of the tree while maintaining desired tree height. In the top half of the tree, remove branches with a diameter half the diameter of the trunk at the point of attachment.

Bearing Apple Trees

When pruning is underway, older, bearing trees should be pruned first. Young, nonbearing apple trees and stone fruits should not be pruned until after February 1 to minimize chances of winter injury.

The balance between vegetative and fruiting growth is influenced by the crop load, fertilization, and pruning. Fruiting may be poor because vigor is too high or too low. Low vigor can be the result of inadequate fertilization, no pruning, excessive cropping, or shading of fruiting wood. Good fruiting wood requires moderate vigor and exposure to good light levels.

Light is the source of energy that produces the crop. Bearing wood that is shaded is low in vigor and produces small, poorly colored fruits. Good light exposure is necessary for the development of flower buds as well as optimum size, color, and sugar content of the fruit. Studies have shown that a typical tree canopy is composed of different layers or zones in respect to light exposure. As shown below, an outside zone of leaves and fruit receives a high proportion of direct light and light levels above those required for good growth and fruiting; a second zone receives adequate light exposure; and a third, inner zone receives inadequate light exposure and is unproductive.

The relative proportion of these zones in a tree is influenced by tree size and shape. As tree size increases, the percentage of the tree that is shaded and unproductive (third zone) increases. Trees that have wide tops and narrow bottoms also have a high percentage of shaded areas in the tree canopy. Trees should be cone-shaped, or larger at the bottom than the top, to maximize adequate light exposure.

Good light exposure in the tree canopy can also be maintained by a good pruning program. Ideally, pruning should remove unproductive wood and develop a uniform distribution of vigor and light exposure throughout the tree. Proper pruning can also help to maintain desired tree size and shape.

Pruning should be done on a regular basis and consist of moderate cuts made throughout the tree to distribute vigor and provide good light penetration. Heading cuts should only be used where branching is desired or in areas where vigor is low. Drooping or low-hanging branches should be removed or pruned to a lateral that is positioned above horizontal. Remove crossing, dead, or damaged limbs. Watersprouts should be removed unless one is needed for the development of new bearing surface. Watersprouts can be easily removed by hand as they develop in the summer.

Without regular annual pruning, trees often become overly thick, and irregular bearing may occur. Spray penetration is reduced, and problems such as scale may develop in the dense areas of the tree. With this type of tree, make many thinning cuts throughout the tree with emphasis on the upper, outer portions of the tree. This will open up areas into the tree canopy as well as re-establish good tree shape.

Avoid heading cuts to outward-growing limbs unless necessary. Such cuts result in weak limbs and an umbrella shape that creates a sucker problem. Remove no more than 2 large limbs per year. If large amounts of pruning are required, it should be spread over a 2 to 3 year period. In addition, such pruning should be preceded and followed for 1 to 2 years by a reduction or elimination of nitrogen application depending on soil type, variety, and grower experience.

The excess vigor that can result from severe pruning can decrease fruit quality. The effect is much the same as from excessive nitrogen application, and may include excessively large, poorly colored, soft apples which will not store well. Vegetative growth competes with fruit for calcium; thus, under conditions of excessive vigor, cork spot may develop.

Hedging and topping should only be used to maintain tree size when trees are at or near desired size. Such pruning is often used in an attempt to reduce tree size. Misuse can result in a disruption of vigor and loss of yield which may take several years to control. Hedging and topping (mainly heading cuts), especially of one-year shoots, induce masses of shoots close to the plane where cutting takes place. This localized invigoration of shoots can shade and weaken inner areas of the tree.

Pruning Other Fruit Trees

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

Most pruning is done during the dormant season, preferably just before active growth begins in the spring. At this time, pruning wounds heal quickly, flower buds can be easily recognized, and injury from low winter temperature is avoided. Summer pruning may be done to help train trees to the desired form and maintain small 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.

Pear Pear trees are trained along the same general lines as those recommended for apples. Heading back 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.

Cherry 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.

A sour cherry tree with no strong branches at the time of planting should be headed to about 24 inches 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 16 inches from the ground. Select about three permanent lateral or scaffold limbs along the leader, 4 to 6 inches apart and not directly over one another. Do not head them back, since 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 feet 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.

Plum 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 inches 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 Peach trees are usually trained to the open-center system. Newly planted trees should be headed to about 30 inches in height, just above a lateral branch or bud (Fig. 7). If the tree is branched when it comes from the nursery, select 3 or 4 laterals that are well-spaced up and around the trunk for the permanent scaffold limbs. The lowest limb should be about 18 inches and the highest about 30 inches from the ground. Cut these back to two buds each and remove all other laterals.

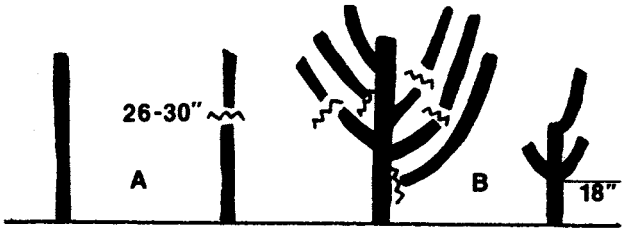

Figure 7. Pruning peach trees after planting: (A) cut unbranched tree 26-30 inches above soil line, (B) cut branched tree to 30 inches, cut three to four sided braches in half and remove all others, leaving nothing below 18 inches.

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 or delayed until just before growth begins the second season (Fig. 8).

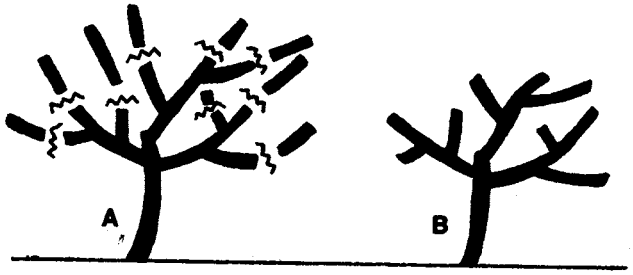

Figure 8. Pruning peach trees the winter after planting: (A) before pruning and (B) after pruning.

Once the scaffold system of the young peach tree is established, fairly heavy pruning is required to develop a low spreading tree (Fig. 9). 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.

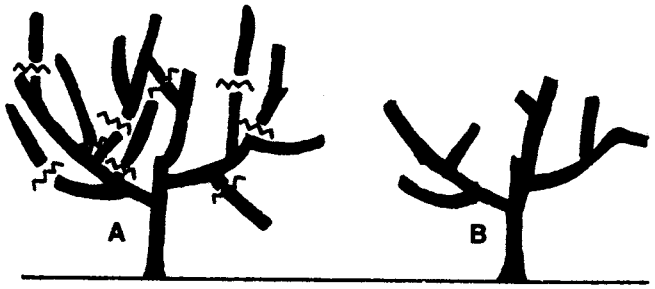

FIgure 9. Pruning peach trees the second winter after planting: (A) before pruning and (B) after pruning.

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 (Fig. 10). 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 feet is usually preferred.

Pruning Summary

When pruning fruit trees for best production, remember these basic concepts:

Pruning invigorates and results in strong growth close to the pruning cut. Pruning reduces the number of shoots, so remaining shoots are stimulated. However, total shoot growth and size of the limb is reduced. Pruning always reduces yield.

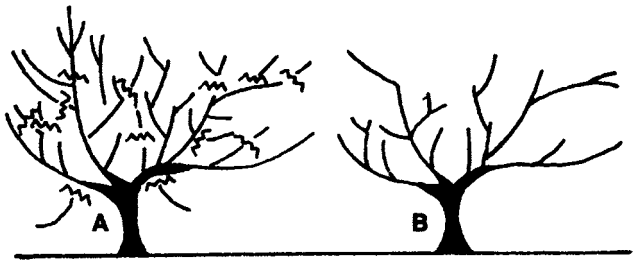

Figure 10. Pruning the third winter consist of thinning and heading back: (A) before pruning and (B) after pruning.

Two types of pruning cuts are heading back and thinning out. Heading is cutting off part of a shoot or branch to stimulate branching and stiffen the limb. Thinning cuts remove the entire shoot or branch at its junction with a lateral, scaffold, or trunk. Thinning cuts are less invigorating, improve light penetration, and can redirect the limb.

Limb position affects vigor and fruitfulness. Vertical or upright branches, typical in the tops of trees, produce the longest shoots near the end of the limb and tend to be excessively vigorous and not very fruitful. Fruit are often of poor quality and subject to limb rub. Limbs growing slightly above horizontal are more apt to develop a uniform distribution of vigor and fruitfulness. Light distribution tends to be even, and because fruit hang along the branch, they are less prone to limb rub. Limbs growing below horizontal tend to develop suckers along the upper surface. Excess sucker growth will result in shading. Hangers, or limbs developing on the underside of branches or scaffolds, are heavily shaded and low in vigor. Fruit developing on such wood is of poor size and color.

Invigoration from pruning is, in part, a nitrogen response. Pruning alters the balance between the tree top and root system. Removal of part of the top increases the amount of nitrogen available for the remaining growing points. Thus, a pruning program should be developed along with a good fertilization program. Severe pruning and/or excess fertilization can disrupt the vigor of the tree and decrease fruiting.

Rodent Control

Mice may cause serious damage to the 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.

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 1/4-inch mesh is frequently used. A roll 36 inches wide may be cut lengthwise, forming two 18-inch strips. By cutting these strips into pieces, 14 inches long, guards 14 by 18 inches are obtained.

Roll or bend the strip around the trunk of the tree so 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 (Fig. 11).

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 available, but

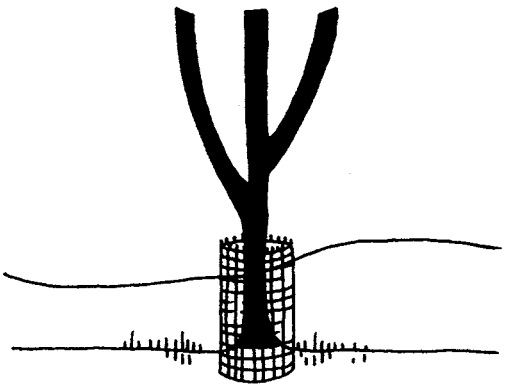

Figure 11. Protect the tree trunk form rabbits with galvanized screen.

are not recommended because they do not allow enough air movement around the tree. However, there are plastic meshes, like the metal ones, that are acceptable.

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 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, from the ground up into the scaffold limbs.

Tree Fruit Spraying

For significant insect or disease problems, it may be necessary to follow a spray program. Information on the use of chemicals for such a program is available from the Extension office.

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 feet or less, if possible. Train younger trees so they reach a height of no more than 18 feet.

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

Sanitation

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

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

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

Apple Varieties of Yesteryear

Arkansas Black Twig, Baldwin, Fall Cheese, Miliam, and Roxbury Russet are apple varieties not found in the modern supermarket, yet in the opinion of some apple connoisseurs, the dessert quality of these and other old-time apple varieties is superior to that of most of those in popular demand today.

Most of the old varieties are no longer grown because they had serious cultural problems such as poor storage, disease, bitterpit, alternate bearing, and nonuniform ripening. Many of the old varieties lost favor with the commercial grower because of low productivity, lack of attractiveness, susceptibility to the ravages of insects and diseases, and poor shipping quality. Before growing an old variety, you should taste the fruit and talk to experts to determine the problems you are likely to have.

There is increasing interest in growing old fruit varieties. Individuals, historical organizations, and government-supported institutions are getting involved. Some commercial nurseries now propagate one or more of the better-known varieties, and there are a few that specialize in antique fruit varieties of all types. North American Fruit Explorers (1716 Apples Road, Chapin, IL 62628 *http://www.nafex.org*), a nonprofit association of fruit gardening enthusiasts, actively promotes the culture of old fruit varieties. It is a valuable source for anyone interested in locating information on sources of bud wood, characteristics of varieties, and successful cultural practices.

Among the old-time apple favorites available from private and commercial sources are some that have occupied a prominent place in Virginia history. Perhaps the most widely known is the Albemarle Pippin. Although seldom found in the orchards of Virginia, it is of some importance in western states under the name Yellow Newtown. Still found in some of the old orchards on both the eastern and western slopes of the Blue Ridge are such varieties as Arkansas Black Twig, Baldwin, Ben Davis, Esopus Spitzenburg, Fallawater, Gano, Golden Russet, Gravenstein, Grimes Golden, Horse Apple, King David, Lady Apple, Limber Twig, Lowery, Maiden Blush, Milam, Mother Apple, Northern Spy, Roxbury Russet, Smokehouse, Virginia Beauty, Winter Banana, and Wolf River. Many of the less well-known but equally good varieties, such as Bellflower, Father Abraham, Fall Cheese, and Winter Cheese, may be found in private collections and at renovated historical sites.

Whether from a sense of nostalgia, a desire to preserve some of our history, or pride in having an antique to display, many of the old apple varieties have been saved from extinction. Some have already been around for centuries; hopefully, they can survive a few more. They are too good to lose.

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