



The Home Fruit Garden

By Carl E. Chaplin

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The climate and soils of Kentucky are suited to the growing of a wide variety of fruits. However, a large number of people do not grow them, a frequent excuse being that they can buy them cheaper. This is true *only when the grower does not properly care for the planting*. A properly cared-for fruit garden will pay big dividends in money-savings, health, and high-quality produce, and will also bring much personal satisfaction.

High-quality fruits

Tree ripened fruits in general are much better than commercial, green-picked products. Tree-ripened peaches, for example, gain as much as 300 percent in quality during the last few days of maturation. Moreover, many of the varieties of fruits grown in commercial orchards do not have the high quality possible in varieties better adapted to home use. This is because the commercial fruits have to withstand packing and shipping.

Improved diet

Fruits have long been recognized as "protective" foods. Fresh fruits and vegetables have been known for several hundred years as preventives of scurvy. We now know that Vitamin C, contained in large quantities in many fruits, is essential to health, and that many yellow-fleshed fruits are good sources of Vitamin A. Fruits act also as a tonic in keeping the digestive system in order, and aid in the digestion of other foods.

Economic value

It is difficult to figure the monetary value of a home-fruit supply, since the labor required to grow and preserve the fruit, the initial cost of plants, spray material, equipment, and the like, must be taken into account. However, considering the high cost of commercially canned or frozen fruit, it is evident that a large saving can be made.

* The author is indebted to the University of West Virginia and the University of Illinois for several illustrations used herein.

Personal satisfaction

Fruit growing for some people has values beyond the values of the harvested product. After a day in the office or factory, it is restful and relaxing to work in the fruit garden. Farmers too, may get satisfaction in growing quality fruits. For some, fruit growing might well become a hobby. Another sort of satisfaction comes to the housewife who sees her well-stocked shelves and knows that her family's health will not suffer through lack of fruits in the diet.

Size of planting

The size of planting for a home fruit garden is limited by space, site, size of family and the amount of time available. The planting should never be greater than the grower can care for properly. In most cases it should be only large enough to insure plenty of fruit for the family. Equipment and labor become problems if the project is too large. However, if a ready market is available for surplus production, and if the grower has adequate equipment and gives the plantings good care, a larger planting would be quite profitable.

The planting should cover the range of fruits insofar as space, adaptability, and personal likes and dislikes are concerned. Where space is limited, there may be room only for a few dwarf fruit trees and a bed of strawberries (see pages 30 and 34).

A study of Table 1 will be helpful in computing size of the fruit garden.

Site

When enough land is available so that a choice of location can be made, there are several things to consider: It should be near the house. It should be well drained, as most fruit plants cannot stand "wet feet." It should preferably be higher than surrounding areas and have a slope of 2- to 10-percent so that cold air, like water, will flow down hill and away from the planting. If the fruit plants are in a low place, the fruit buds are likely to be killed. This is especially true in the spring. It should also be a fertile site if possible. Fruits thrive best in fertile soil, but they will give good returns on average soil. This is especially true of strawberries and other small fruits. If the soil lacks or-

Table 1.—Space Required, Life Expectancy, and Average Yields of Fruit Trees, Brambles, and Berries

Fruit	Average years, planting to first fruiting	Years of life expectancy	Estimated production at full bearing	Planting distance in feet
Apple (st) (1)	4-6	35-45	10-15 bu per tree	35-40
Apple (dw) (1) (3)	2-4	15-20	3-6 bu per tree	18-20
Pear (st) (1)	5-8	35-45	10-15 bu per tree	30-35
Pear (dw) (1) (3)	3-4	15-20	1-2 bu per tree	18-20
Peach	2-4	15-20	3-6 bu per tree	20-25
Plum	4-6	15-20	3-5 bu per tree	25-30
Sour cherry	3-5	15-20	60-80 qt per tree	25-30
Sweet cherry (1)	3-5	20-30	60-100 qt per tree	30
Grape	3	20-30	10-20 lb per vine	10 x 10
Strawberry (June)	1	3-4	25-50 qt (100 ft of row—400 sq ft)	2 x 4
Strawberry Everbearers (3)	3-4 months	2	25-30 qt—200 plants	1 x 1
Raspberry (Red) (2)	1	5-12	25-50 pt—100 ft	3 x 7
Raspberry (Black) (2)	1	5-12	25-50 pt—100 ft	4 x 8
Raspberry (Purple) (2)	1	5-12	25-50 pt—100 ft	3 x 7
Blackberry	1	5-12	25-50 pt—100 ft	3 x 7
Gooseberry	3	10-20	4-6 qt per plant	8 x 5
Currant	2	10-20	4-6 qt per plant	8 x 5
Blueberry (3)	2-3	20-30	4-8 qt per plant	6 x 8

1. Requires more than one variety for cross pollination.

2. Separate red from black and purple raspberries by 200 ft because of disease hazard.

3. For special treatment required, see pages 32-34.

ganic matter, it can be improved by heavy applications of barnyard manure and by plowing under green-manure crops.

SELECTION OF VARIETIES

Quality

Select only those varieties that have proved their merit through the test of time and are of high quality. Many varieties not suited for commercial production are good in the home garden.

Succession of ripening

Several varieties of the same kind of fruit maturing at different times should be planted to prolong the season. For instance, different varieties of peaches mature from early until late in the season, so that fresh fruit is available for as long as three months. Everbearing strawberries make it possible to have fresh fruit all summer. Fresh apples may be had practically the year around by planting the proper varieties.

Special uses

Such characteristics as adaptation for freezing, canning, or for jams and jellies, should be taken into consideration. For example, early peaches are not as good for canning as midseason and later varieties. Some varieties, such as Redhaven and Halehaven, do not turn brown when frozen and exposed to air. Some strawberry varieties freeze better than others, while another variety may make a better preserve, or is more tasty eaten fresh. Those that are firm, have good flavor, and are well colored throughout usually freeze well; those that are softer and sweeter may be preferred when eaten fresh or for jam.

Winter hardiness

The ability to withstand cold is important in fruits prone to winter injury.

Disease resistance

If a plant disease is a problem in a particular area, disease-resistant varieties should be selected. Bartlett pears, for example, cannot be successfully grown in Kentucky because of fire blight. However, there are varieties that are resistant enough to be grown successfully in this area. Red stele of strawberries is a

fungous disease that can ruin strawberry production where it is present unless resistant varieties are planted.

The following table lists varieties of fruit, in the order of ripening, recommended for Kentucky. The considerations listed above, namely, quality, succession of maturity, adaptability, cold resistance, and disease resistance were taken into account:

RECOMMENDED VARIETIES

- | | |
|------------------------------------|---------------------------|
| (R) red | (2) Fire blight resistant |
| (Y) yellow | (3) Red stele resistant |
| (W) white | (4) best eaten raw |
| (1) Use red sports where available | |

APPLES (1)

- | | |
|---------------|---|
| <i>Early</i> | Transparent (Y) or Lodi (Y) |
| <i>Summer</i> | McIntosh (R), Wealthy (R), Polly Eades (Y),
Jonathon (R) |
| <i>Fall</i> | Stayman Winesap (R), Turley (R), Delicious
(R) (4), Golden Delicious (Y) (4), Rome
Beauty (R) |

PEARS (2) Tyson (4), Maxine, Waite, Kieffer

PEACHES Mikado (4), Red Haven, Golden Jubilee, Hal-
haven, Georgia Belle (W), Elberta

PLUMS French Damson, Green Gage, Stanley Prune,
Italian Prune

CHERRIES

- | | |
|--------------|------------------------------|
| <i>Sweet</i> | Gov. Wood, Napoleon, Windsor |
| <i>Sour</i> | Early Richmond, Montmorency |

GRAPES

- | | |
|--------------|----------------------------------|
| <i>Black</i> | Fredonia, Concord, Sheridan |
| <i>White</i> | Portland, Niagara, Golden Muscat |
| <i>Red</i> | Caco, Lucile, Lindley, Delaware |

STRAWBERRY

- | | |
|--------------------|---|
| <i>June</i> | Blakemore, Temple (3), Fairfax, Tennessee
Beauty |
| <i>Everbearing</i> | Gem or Superfection |

RASPBERRY

<i>Black</i>	Morrison, Logan, Cumberland
<i>Red</i>	Latham, Indian Summer (everbearing)
<i>Purple</i>	Sodus or Cardinal

BLACKBERRIES Early Harvest, Eldorado, Brainerd (trellis)

GOOSEBERRIES Downing, Poorman, Glendale

CURRANTS Red Lake or Wilder

CHOOSING NURSERY STOCK

Reputable nursery

Order plants only from reputable nurseries. That is the best insurance that plants will be true to name, well-grown, free from insects and diseases, and packed and shipped correctly.

Size and age of trees

Buy only vigorous trees. One-year-old stock, if well grown, is usually the best, not because it costs less, but because the trees establish themselves sooner, have not been pruned in the nursery, and can be shaped by the grower with a minimum of cutting (see Fig. 3).

Small fruit plants should be ordered with the same attention to securing well grown, vigorous plants.

When to order

Get plant orders in early so that they will be filled as specified. If ordering is delayed, the supply of some varieties may be exhausted, only second grade material be left, or the order may arrive too late for the best planting time. Specify on the order blank the time of shipment preferred. Fruit trees are best planted in the fall, hence this order should be made during the summer. Small fruits do best when planted in the spring. Therefore, order them in early or mid-winter.

Care of stock

Immediately upon arrival of the stock, it should be inspected. Check to see if the proper varieties and numbers were sent. Also, check on the sizes, development, and the condition of the plants. They should come packed in a damp material, such as sphagnum moss, peat moss, or wood shavings. If planting is contemplated

within two or three days, they may be wet down and stored in the package in a cool, sheltered place. If the planting cannot be done for a longer time, the plants should be heeled in.

Heeling in

Select a well-drained place and dig a trench of sufficient size to contain the roots of the plants. If the plants are in bundles, they should be separated enough so that the roots are fanned out in order that fine soil can be packed around them, thus eliminating air pockets. Slant the trees to the southwest so that the sun will not shine directly on the exposed trunks and cause sunburn. Firm the soil well, and mound soil around the plants to furnish good drainage. When the soil is dry at heeling-in time, the plants should be watered before mounding. Stock will keep in good condition for an indefinite period of time when properly heeled in.

Strawberries should be separated and heeled in with their crowns flush with the surface of the ground. A small ridge may be made to furnish good drainage.

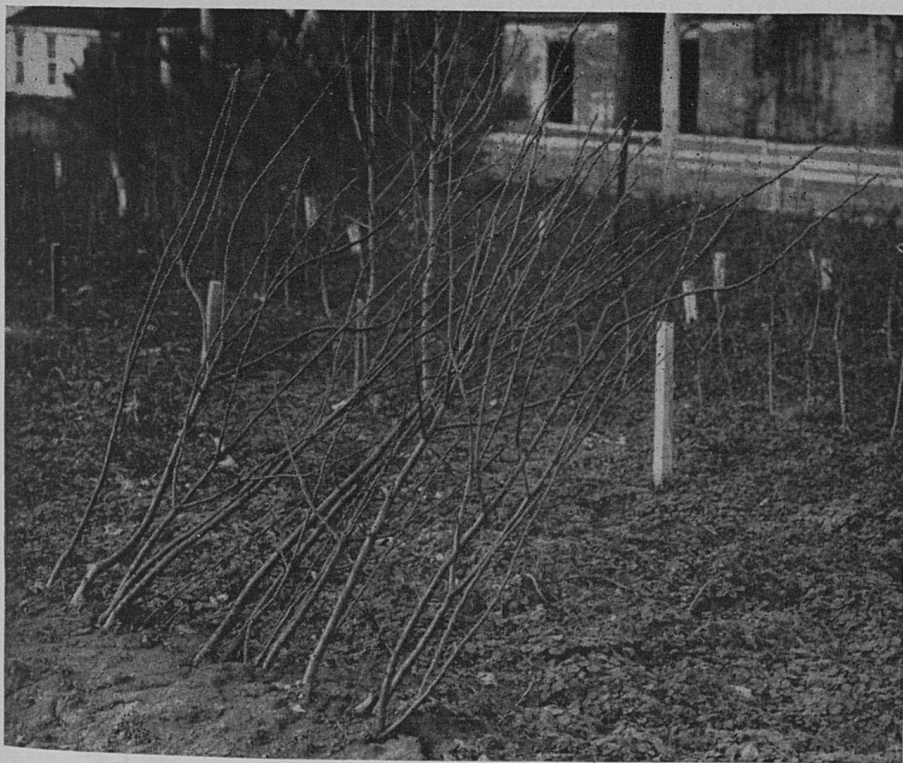


Fig. 1.— If planting of nursery stock must be delayed more than three days, it should be heeled in.

ESTABLISHING THE FRUIT GARDEN

Preparation of the Soil

Tree fruits

Since fall planting is recommended for fruit trees, the soil must necessarily be prepared in the fall. The land may be prepared in September and sowed to a cover crop, such as barley or rye, to prevent washing. The trees may then be planted at any time during dormancy.

Small fruits

The recommended time for planting small fruits is in the early spring. The soil should be plowed the preceding fall and left in the rough. Spring plowing is satisfactory, but the ground is often so wet at that time that plowing cannot be done until the best time for planting is past. Fall-plowed ground works down to a good bed with a minimum of effort. It can be disked or harrowed when it is still too wet for plowing.

Land that has been in sod may require special treatment. (See Grub Control, page 18.)

Planting

Importance of a plan

A planting plan showing the location of the different varieties is essential. If this is not done, trees are almost sure to lose their identity as far as the grower is concerned. The plan may be put in a notebook, used also for making a record of various things to be done in the fruit garden. A copy of the plan drawn on an inside wall of the garage or barn will insure against its loss.

When the plan is made, stakes should be put down where the plants are to be set.

Tree fruits

The roots of trees should be kept moist and protected from the drying effects of the air at all times during planting. This may be done in several ways. They may be kept in water or covered with burlap or straw, but perhaps the best way is to lay each one near where it is to be planted and then cover the roots with moist soil.

The hole should be dug large enough so that the roots can be fanned out without crowding, and deep enough so that some top soil can be put in the bottom of it.

All broken roots should be cut off with a slanting cut on the under side so that it will shed water better and heal more quickly. Roots that are twisted together should be separated, or one removed.

Fruit trees, with the exception of dwarfs, should be set slightly deeper (1 to 2 inches) than they were in the nursery.

In planting dwarf trees, care must be taken to see that the graft union is above ground. If it is below, the part above the union may throw out roots and destroy the dwarfing effect of the root stock. Incline the tree slightly in the direction of the prevailing wind so it will not blow over.

After the tree has been adjusted to the proper depth and the roots are fanned out, they may be covered with fine soil and packed well with the feet so that no air pockets are left to dry them out. A small mound may be left around the trunk over winter for protection and water drainage. It should be removed in the spring, and the soil slightly dished so the tree may receive more water.

Small fruits

Brambles and bush fruits should be planted in the same manner as trees. Strawberries should be set with the crowns flush with the surface of the soil. If planted too deeply they will not do well; if planted too shallow the roots will dry. Otherwise, use the same good practices described for tree fruits.

Soil Management

A fruit garden is a long-time project and special attention should be given to the management of the soil before and after establishing the planting. A plentiful supply of organic matter is essential for best plant growth. If the soil is lacking in this regard, it should be built up by heavy applications of manure, by green manure crops, or by a combination of both. Organic matter greatly improves the structure, increases aeration and the water-holding capacity of soils, and supplies nutrients for the growing plants. There are several methods of soil management

that will accomplish the desired aim of maintaining soil fertility. The grower may follow the one that best suits his conditions.

Tree fruits

Sod and Mulch.— For the home gardener, this is probably the best method of maintaining soil fertility around fruit trees. The mulch should extend as far as the limbs and should be from 6 to 8 inches or more deep. The mulch conserves moisture, keeps the soil cool, and adds organic matter. However, it may be a harboring place for mice, and special care should be taken to combat this pest (see page 18). Where mulches are used, the amount of fertilizer should be increased about 50 percent (see page 14). Mulches of any organic material may be used to good advantage with any of the other systems of soil management. Grass clippings, hay, straw, strawy-manure, sawdust, corn cobs, and the like are all good mulch materials.

Sod and cultivation.— Fruit trees may be planted in permanent sod with cultivation around the trees or in strips along the rows. The cultivated area should extend slightly beyond the ends of the branches. The sod crop may be grass or legume or both. Bluegrass, orchard grass, Ladino clover, lespedeza, and the like are good sod crops.

Cover Crop and Cultivation.— A cover crop, such as rye or barley, is planted in September and allowed to stay on the soil during the winter. It protects the soil from erosion and furnishes some protection to the tree roots. The cover crop is disked down in the spring before it competes too heavily with the trees for water and nutrients. As it decays, it furnishes the needed organic matter. The soil is then cultivated until time for another cover crop.

Cover Crop, Green Manure and Cultivation.— After a cover crop is disked down in the spring, as described above, the ground is cultivated until about June, when a green-manure crop of cowpeas or soybeans is planted. Each is a legume and has the capacity of taking a large part of its nitrogen from the air. After this crop is plowed under or disked down and incorporated in the soil, the cover crop again follows for winter protection.

Intercropping.— While the trees are small the grower may want to conserve space by growing other crops between the rows.

This is permissible as long as they do not interfere with the trees' growth. When the trees get so large that intercropping is no longer feasible, one of the above systems of soil management may be initiated.

Small fruits

The maintenance of soil fertility is of even greater importance with small fruits. A heavy mulch (6 to 10 inches) should be maintained in the bramble plot (see Fig. 11, page 27). This may completely cover the area, or areas between rows may be left bare. Organic matter may be added to strawberry plots by the use of barnyard manure and by green manures if enough land is available for rotation.

Irrigation

If an adequate supply of water is available, irrigation will pay better in quantity production of large, high-quality fruits than any other practice. This is especially true of the small fruits. Excellent results may be had by the use of an ordinary lawn sprinkler.

Fertilizing

The fertilizer needs of fruit plants, grown on different types of soil and on soils of varying degrees of fertility, are impossible to pin down to one recommendation. Some types of soil high in organic matter and available nutrients may need very little added fertilizer, while another soil may need heavy applications. The plants themselves are the best indicator of their needs. If they show vigorous growth and dark green foliage, their fertilizer requirements are being met. If they are unthrifty with pale foliage, they need high-nitrogen fertilizer.

Fruit plants grown on soil of average fertility need nitrogen more than any other nutrient. However, too much nitrogen will throw the plant into a highly vegetative state and cause it to be unfruitful. Since the requirements of the various types of fruits are different, they will be considered separately.

Fruit trees

Barnyard manure is probably the best fertilizer that can be used for fruit trees. It not only furnishes nutrients, but also adds

organic matter to the soil. It may be supplemented by chemical fertilizers if the tree's condition seems to warrant their use.

Fruit trees grown under any of the systems of soil management, with the possible exception of manure mulches, will need nitrogen fertilizers. Ammonium sulphate or ammonium nitrate is commonly used. The amount will depend upon the fertility of the soil and the age of the tree. On a soil of average fertility, use about $\frac{1}{4}$ pound per year of tree age. Thus, a tree five years old would receive $1\frac{1}{4}$ pounds, and a tree 20 years old would receive 5 pounds. This amount can be adjusted up or down according to the tree needs. Where a strawy-manure mulch is used, the amount probably will be less, but where a hay, sawdust or other organic mulch is used, the amount will probably be $1\frac{1}{2}$ times the normal requirement. The fertilizer should be applied in the early spring just as growth starts. It should be spread evenly from near the trunk to the ends of the branches or slightly beyond. Sometimes it may be advantageous to apply half of the fertilizer in the spring and the other half about mid-summer.

It is good practice to fertilize green manure and sod cover crops so that they will make good growth and thus add more organic matter to the soil. They will need a complete fertilizer.

Brambles

When bramble crops are mulched as indicated above, they will need fertilizer, also. If a strawy manure is used, they may need very little, but if other organic mulches are used, a nitrogen fertilizer will have to be added. The usual recommendations for brambles grown without mulches is 200-400 pounds per acre. This is 14 to 28 pounds per 100 feet of row. This amount may have to be increased when any mulch other than manure is used. Bramble canes should be about as large as the thumb and have a healthy green color. If it is lacking, the nitrogen needs to be increased. The same kind of fertilizers used for fruit trees may be used.

Strawberries

Strawberries require a soil rich in available nutrients. Manure plowed under in the fall preceding planting is one of the best fertilizer practices that can be followed. Six hundred to 1000 pounds per acre of a complete fertilizer, such as 6-8-6, should be

worked into the soil before planting. This will supply the plants with adequate nitrogen and other nutrients for the production of new plants. Strawberries should never have nitrogen applied in the fall or spring preceding cropping. After cropping, a complete fertilizer may be added. About 500 pounds of 6-8-6 per acre should be used, depending on the soil's fertility. Many growers have observed beneficial results from applying a fertilizer high in potash and phosphorus in February preceding cropping. It may be used at the rate of about 1,000 pounds of 0-10-10 per acre, spread on top of the row.

PEST CONTROL

The commercial program for insect and disease control involves so many different materials and specialized directions that it is not practical for the home-fruit gardener. However, if he should wish to follow the regular commercial schedule, it may be obtained by requesting Circular 487 from the College of Agriculture and Home Economics. Or, see Circular 353, "Sprays for the Home Fruit Garden."

One-package sprays

Several all-purpose fruit sprays have been developed for the home gardener. They are formulations consisting of fungicides and insecticides and are about 80 percent as effective as the commercial programs of control. These sprays are suited for use on practically all fruits. Satisfactory control of insects and disease should result if the directions on the package are followed as to both amounts and times of spraying. The one-package plan has the great advantage of being simple and easy to use. These are summer sprays only, and a few other sprays will have to be applied for certain insects and diseases. Table 2 on page 16 lists the sprays that should be applied in addition to the all-purpose sprays.

Spraying equipment

There are many types of sprayers on the market that are practical for the home fruit gardener. The wheelbarrow type shown in Fig. 2 is suitable for most plantings. While trees are small, or if dwarf trees are planted, a 3-gallon knapsack sprayer is satisfactory.

Table 2.—Spray Schedule for Tree Fruits, Grapes, and Brambles

Spray material in 10 gal water	Time to apply	To control	Apple	Pear	Peach	Fruits Plum	Cherry	Grape	Brambles
Liquid lime-sulfur 1.2 gal	Late winter or early spring before growth starts	Scale, leaf curl, anthracnose	X	X	X	X	X	X	X
Liquid lime-sulfur 1½ pt or ferbam 25 tbs	When fruit buds are in cluster, showing pink	Scab	X	X					
DDT (50%) 10 oz or parathion (15%) 5 oz ¹	July 1 August 1 September 1	Peach tree borer			X				

Use all-purpose sprays according to package directions for the remainder of the season to control curculio, Oriental fruit moth, scab and brown rot.

¹ These sprays must be applied every year. Thoroughly soak the trunk and main limbs.

Table 3.—Control Measures for Strawberry Pests

Insect	Material	When applied	Symptoms
Crown borer	1% parathion dust or 5% chlordane plus 5% DDT dust	Early bloom and general bloom	Plants die; worms in crown of plant
Strawberry weevil	1% parathion dust or 5% chlordane plus 5% DDT dust	Early bloom and general bloom	Blooms cut off
Mites and aphids	1% parathion dust	When insects appear, but not within three weeks of harvest	Bronzing of foliage and tiny insects on under side of leaf
Cattfacing insects	1% parathion dust	Early bloom and general bloom	Tarnish plant bug and other sucking insects found



Fig. 2.— Both the wheelbarrow and the knapsack type of sprayer are generally satisfactory, but for the larger gardens the wheelbarrow type is more practical.

Strawberry insect control

There are certain insects that sometimes cause considerable damage to strawberries. This information probably applies more to the commercial grower, but occasionally the home-fruit gardener may have infestations of sufficient severity to merit control measures. A 1-percent parathion dust is efficient in controlling all of the insects concerned. *Extreme care must be used in handling this material since it is very poisonous to humans.* Always stand to windward when using the dust and take care not to inhale it or get it on the skin. Always wash thoroughly after using it. Do not apply this material later than within three weeks of harvest.

Sanitation

Destroying harboring places of insects and diseases is a large part of the control program. Some of the things that should be done:

1. Scrape all loose bark from trunks, crotches and main limbs of apple trees in winter or early spring. This destroys many codling moth larvae.
2. Collect and burn all debris.
3. Screen or plug all cavities in apple and pear trees. This will prevent codling moths from emerging.
4. Thin out and destroy all damaged fruit as soon as discovered.
5. Collect and destroy all dropped fruit at frequent intervals.
6. Rake and burn leaves of apple and cherry trees to destroy scab and leaf spot.
7. Separate black and red raspberries by at least 200 feet.
8. Cut off and burn handles or stubs of raspberries at planting time.
9. Remove and burn old fruiting canes immediately after harvest.
10. Clip leaves of strawberries after harvest, collect, and burn.

Grubs and wireworms

If the plot of ground has been in sod within three years previous to planting, grubs and wireworms may cause serious damage to strawberries. The soil may be treated to control these pests. Apply 10 pounds of actual chlordane per acre to the plowed ground in the fall or spring and disk it in. It is effective for several years.

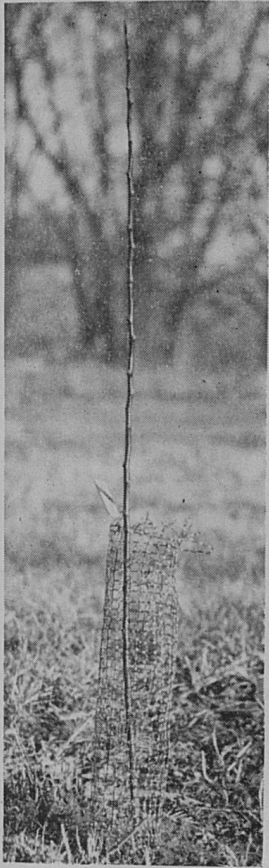
Mice

Mice may become very troublesome in the orchard. They chew the bark off at ground level or below, and often completely girdle a tree, causing its death. Most of this damage takes place during the winter. Therefore, control measures should be started in the fall and continue throughout the winter.

There are several ways of combating this pest:

Baiting with poisoned oats or other material is one. Locate the runways beneath the mulch or grass under the tree and place poisoned bait in them.

Trapping can be very successful where only a few trees are involved. Use ordinary baited mousetraps in the runways.



Rabbits

Rabbits may cause considerable damage to young trees and bush fruits by stripping off the bark and clipping off small limbs. This damage may be controlled by wrapping the trunks of small trees with heavy wrapping paper or by placing an 18-inch band of hardware cloth around the tree trunk or bush (see Fig. 3). This should be done in the fall as most rabbit damage occurs during the winter. The approach graft shown in Fig. 4 is a way of saving trees that have been partially girdled.

Fig. 3.— An 18-inch band of hardware cloth around the tree trunk will protect it from rabbit injury.

THINNING FRUITS

Peach and apple trees often set more fruit than they can mature to a desirable size. This can be remedied by thinning or pulling off the excess fruits. All of the nutrients are then utilized in producing fewer but larger and better fruits. The total production may be as great or greater on the thinned tree than on the unthinned one.

There are several approaches to thinning. One is the distance method in which an effort is made to space the fruits from 5 to 10 inches apart. Another method is the leaf-fruit ratio. It takes about 40 to 50 leaves to mature a peach or apple to a good size ($2\frac{1}{4}$ - $2\frac{1}{2}$ inches). The best method is the one by which the total load of the tree is calculated and thinning is done accordingly. By observation one will soon learn about how many bushels of fruit any one tree can mature to the desired size. A mature peach tree should average five bushels of fruit. There are 1,250 peaches



Fig. 4.— The approach graft will save trees that are partially girdled.

($2\frac{1}{4}$ - $2\frac{1}{2}$ inches) in 5 bushels. Therefore, one should leave only slightly more than that number on a mature tree. When thinning, an effort should be made to pull off damaged fruit, break up clusters and space the load as uniformly as possible over the tree.

Apples are thinned in somewhat the same manner. Clusters should be reduced to one fruit, and that spaced uniformly over the tree 6-8 inches apart as nearly as possible.

There has been much discussion as to the proper time to thin the fruit crop. Apples and peaches have three periods in which some of the fruit drops from the tree. The June drop is the last one and many workers feel that thinning should follow this drop. The grower would then know how many to take off. If there has been a heavy bloom, with good weather during bloom so that bees worked in the orchard, the chances are that the drops

will be relatively light and early varieties could well be thinned earlier to good advantage. Since the early varieties mature over a shorter period, the early thinning gives them a better opportunity for sizing by cutting competition for nutrients.

PRINCIPLES OF PRUNING

Of the thousands of fruit trees planted in home gardens every year, very few have been pruned correctly. The pruning a tree receives the first five years of its life largely determines whether it will produce large crops of fruit during a long lifetime, or whether it will break down under large crops and be productive for only a relatively short time. To be able to prune intelligently, one must understand the basic principles.

1. Pruning has a dwarfing effect but a certain amount must be done to establish a strong framework and keep the tree symmetrical. During the first few years of the tree's life it must be properly pruned so that it has the right number and spacing of main branches. This practice dwarfs the tree and delays fruitfulness to a certain extent. However, since a tree is expected to produce heavy crops for many years, it must be prepared for this task by proper shaping while young. The snipping off of small branches at this time will not have nearly the adverse effect that corrective pruning later would have (see Fig. 8). *However, any cuts in addition to the basic ones tend only to dwarf the tree and delay its fruitfulness.*

2. Wide-angled branches form strong crotches. In selecting the main branches, care should be exercised to select those with wide angles, 35° - 45° (Fig. 5). Narrow-angled branches are not joined at the crotch with strong woody tissue, but are weakened by the inclusion of bark in the angle. When the tree bears heavily, these branches may split off under the load (see Fig. 7).

3. Pruning increases vigor but not total growth. The laterals from a branch that has been headed back are longer and more vigorous, and thus more good, fruiting wood is formed. However, the total growth is not as much as on the unpruned limb. *Do not over-prune.* After the tree has been shaped by early pruning, the job consists mainly of pruning to keep it within bounds, removing broken and diseased limbs, some thinning out of limbs



Fig. 5.— Here is an excellent example of the modified central-leader type of apple tree. The picture on the right is a closeup view of the tree on the left. It was set as a one-year whip and is shown at the beginning of the second year in the orchard. Note the good strong crotch angles and the way they are spaced along the central leader.

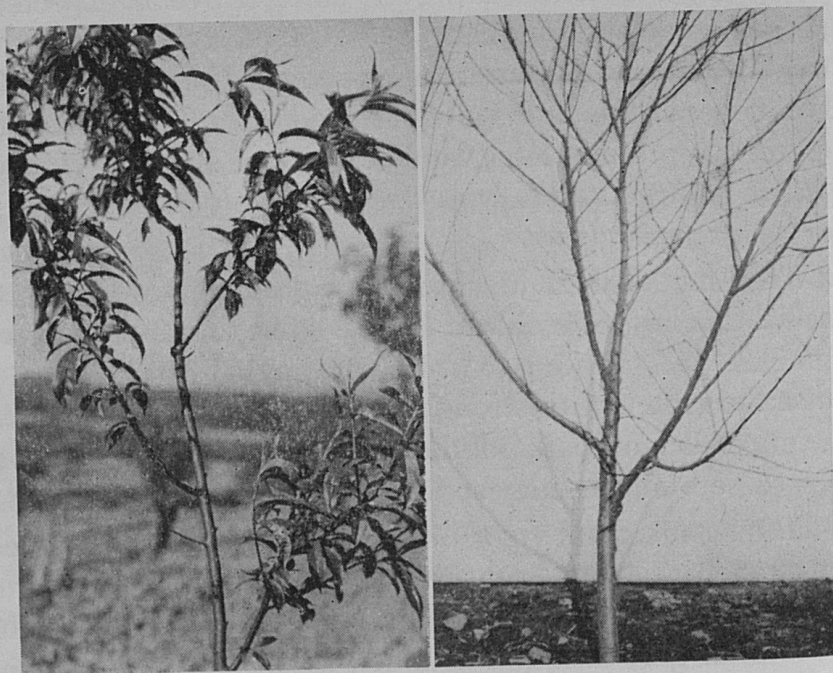


Fig. 6.— The Elberta peach tree on the left shows good distribution of main limbs at the beginning of the second year in the orchard. The tree was not headed back intentionally; a larva of the Oriental fruit moth killed the tip of the central leader. The tree on the right shows good development and spacing of the main branches of a 2-year-old Golden Jubilee peach tree.



Fig. 7.— The tree on the left has not been pruned properly. It is now too late to fully correct the mistakes that have been made. There are too many branches arising from the same point. They will crowd and shade each other out. The angles are acute, and when the tree bears a heavy crop, it will split like the one shown on the right.

that become too thick, removal of water sprouts, and removal of limbs that rub together.

4. Upper branches compete with lower branches and shade them out. When selecting framework branches, never select one directly over another because the top one receives more light and manufactures more food and therefore will grow faster. The lower one will be shaded and starved so that it will not make a satisfactory growth.

5. Pruning improves fruit size and quality, as more light is admitted to the tree and better fruit color results. More complete spray coverage is possible on pruned trees and better insect



Fig. 8.—This 5-year-old tree has not been pruned correctly and now needs corrective pruning. The black marks indicate limbs to be removed. The removal of this amount of wood is a serious shock to the tree. It will be dwarfed and bearing will be delayed. The first scaffold limb is almost as vigorous as the main leader and will have to be cut back so that a double trunk and weak crotch will not result.

and disease control is accomplished. There is less competition among fruits for water and nutrients, and larger fruits are borne on pruned trees.

6. Pruning is best done in late winter or early spring. Winter injury may result when the pruning is done in the fall. This is especially true near large wounds. Also, by waiting, the grower can ascertain the amount of fruit-bud killing, and prune accordingly. If a large percentage of the fruit buds were killed, the tree may be pruned very lightly, but if most of them survived, the pruning should be heavier.

The scope of this publication does not permit the giving of



Fig. 9.— This tree has a weak crotch; undoubtedly the trunk will split and break long before the tree's useful life expectancy has expired. It probably looked much like the one in Fig. 8 at the same age. If it had received the proper training, or the corrective pruning indicated in Fig. 8, the crotch would have been strong and the tree's useful life prolonged.

detailed instructions on the pruning of all fruits, but the pictures will illustrate principles and practices to be followed.

The tree shown in Fig. 5 is the type of tree recommended for all types of tree fruits in Kentucky. The modified central-leader type of tree has four to six main branches distributed up and down and around the central leader. Never select a main branch directly above another main branch because the upper one tends to shade out the lower one. The leader is removed above a vigorous side branch after the desired number of main branches have been selected. This may take as long as three or four years. Keep the top branches longer than the lower ones so that they may maintain the lead. If lower branches become too vigorous, and threaten to lead over the top ones, they should

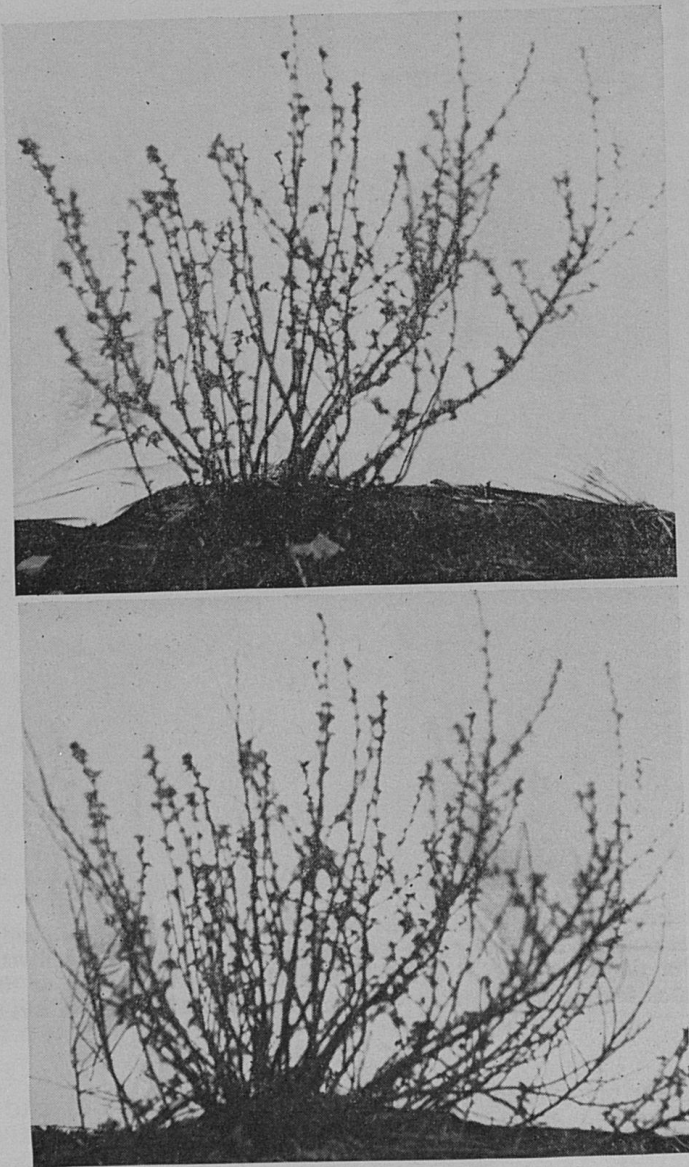


Fig. 10.—The pruning of bush fruits is relatively simple. Remove canes that are too close to the ground. All canes that are 4 or more years old should be removed and six or eight of the new canes should be left. With this type of pruning, a currant or gooseberry bush of 25 to 30 canes can be maintained.

be pruned back. The main branches of apple trees should be spaced approximately 8 inches apart.

Pear trees may be pruned the same as apple trees. Peaches, cherries, and plums may be trained in the same manner, but the main branches may be spaced closer, about 6 inches.

BLACK AND PURPLE RASPBERRIES require both summer and dormant pruning. The summer pruning consists of pinching off



Fig. 11.— Black raspberries before and after pruning.

the growing tips of the new canes as they reach a height of about 2 feet. This makes the plant stocky and causes side branches to grow, greatly increasing the fruit-bearing surface. The following spring, all of the lateral branches should be cut back to approximately 10-12 inches (see Fig. 11). The number of canes to be left per hill will be determined by the vigor of the plants. Ordinarily, 4-6 canes per hill will be adequate.

RED RASPBERRIES are commonly grown in the hedgerow system. The row should be kept 18-24 inches wide. *Do not pinch off the tips of red raspberries in the summer, as they do not respond favorably to this practice.* In the spring take out the weak and dead canes. Approximately 10 canes for each 4 feet of row may be left. Immediately after harvest, the old canes should be removed and burned to help in the prevention of disease.

BLACKBERRIES are pruned in a similar manner to black raspberries. However, the canes may be allowed to become slightly higher before summer pinching.

GRAPES.— Prune in early spring after severe cold weather is past. Don't prune while the wood is frozen because frozen canes are brittle and the vines may be damaged. Bleeding occurs if pruning is done in late spring, but there is no evidence that such bleeding is harmful.

If the young vine has not made vigorous growth the first season, cut it back again, leaving only two or three strong buds on the best cane. These produce shoots that will be used the following year to form the permanent trunk or trunks of the mature vine.

One of the most satisfactory systems of training is the Kniffin System. This requires a trellis of two wires. A stout post of durable wood, 8½ or 9 feet long, firmly braced and thoroughly tamped, is set at each end of a row. The intermediate posts should be not less than 7½ feet long, set about 20 feet apart (spaced for two vines between) and about 2 feet deep. Stretch No. 10 or No. 11 galvanized iron wire along the row, one close to the tops of the intermediate posts, and the other 2 feet lower. Staple these to the posts, but not tightly to the intermediates, and leave the wires on the end post long enough to be released easily for restretching.

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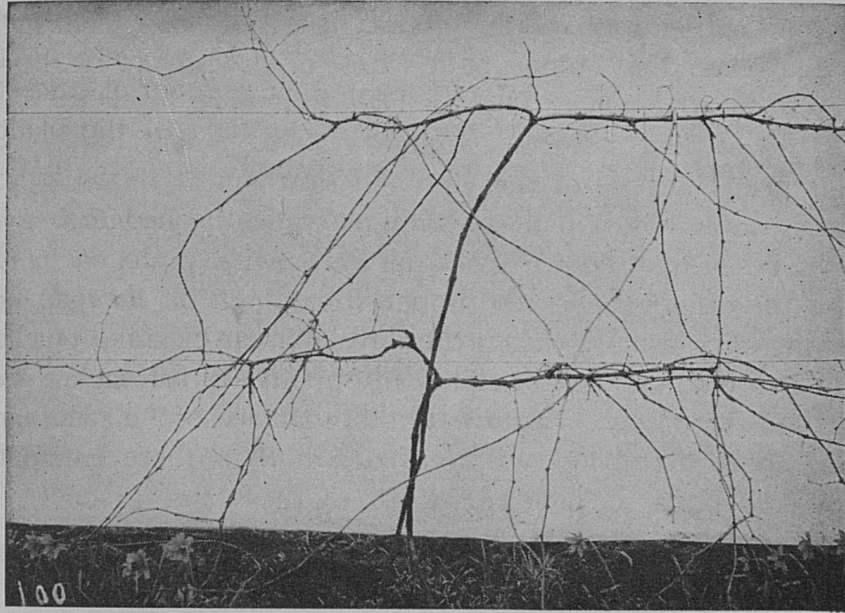


Fig. 12.— Two-trunk Kniffin system: a vine in winter before pruning.

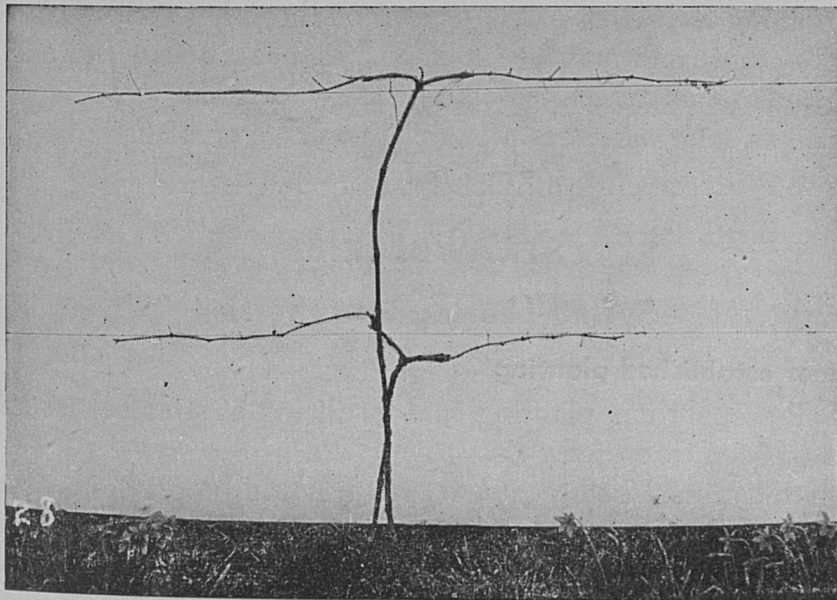


Fig. 13.— Same vine after pruning. The same method of pruning is used with a single-trunk vine.

One form of the Kniffin system requires two upright main trunks, one extending only to the lower wire, the other to the upper. Another form of this system uses only one trunk with branches extending out on both wires; otherwise the treatment is practically the same. There is little difference in yield.

In developing a 2-trunk Kniffin system, choose two strong shoots near the base of the vine and tie them at intervals to a stake so that they will make straight trunks. Have the trellis ready. When one shoot reaches the lower wire, pinch off its tip. When the other reaches the upper wire pinch off its tip. This pinching-back usually causes the development of side branches. Train two of these side branches in opposite directions on each wire, and tie loosely. Remove all other shoots. In the spring, a strong shoot usually grows from each bud of these horizontal canes, and upon the first few joints of these spring shoots the flowers and fruit are produced.

The next year, examine the head of the trunk and the base of the arm to find, on each side, the best well-matured cane of medium size and length. Save these four canes, and prune out the old wood and the other canes of the current year's growth. Cut back the canes to be saved to 6 to 10 buds each, and train them along the wires. One or two of the other canes near the head of the trunk may be "spurred," that is, cut back to one or two buds, from which shoots are likely to grow in the spring, for use as renewal canes a year later. One trunk may be used instead of two in the 4-arm Kniffin system.

STRAWBERRIES

Spring-bearing Strawberries

Care of established planting

Soil preparation, planting, and fertilizing of strawberries have already been discussed.

As mentioned before, strawberries should be planted as early as possible in the spring, preferably in March. Early planting means that runner plants form early and are much more productive than those formed later. All blossoms of the newly-set plants should be picked off as they appear. If they are allowed to develop, runner formation will be slowed down and a poor row will result.

Cultivation must be done the first year to keep weeds out and to keep the soil loose so that new runner-plants may root easily.

Chemical weed control

The most promising chemical for weed control in strawberries is Crag Herbicide 1. Two to three applications during the first year seem to keep the weed population down about 80 percent with no malformation of strawberry plants. The patch must be free of weeds when the material is applied. It kills weed seeds as they germinate, but has no killing power until it comes in contact with the soil where soil microorganisms activate it.

Crag Herbicide 1 should be used at the rate of about 3 pounds per acre. It is sprayed on the ground under low pressure (a knapsack sprayer may be used). Any amount of water above 30 gallons per acre may be used, as thorough coverage is important. The first application may be made any time after 10 days of planting, but it should not be used more often than once a month. A suggested schedule is to make the first application about a month after planting, following it with another about six weeks later. Other applications may be made if needed.

Mulching

Strawberries should be mulched with straw during the winter to protect the plants from freezing-injury. The straw should be applied about the time the temperature is expected to reach 20°F. This is usually about December. Approximately 2 inches, or 1½ tons per acre, should be scattered over the plants. If the straw is piled loosely during the fall, weed and grain seeds will have opportunity to germinate. They are often troublesome in strawberries the fruiting year.

Rejuvenation

If the patch is healthy, it can be fruited again, and perhaps even a third time. There are several methods used in rejuvenating a bed of strawberries. One consists of merely mowing off the leaves after harvest. They should be raked off and burned. Another, and perhaps a better method if one has water available for irrigation, is to narrow the row down to 4 to 6 inches with a plow or rototiller. The remaining plants will form a satisfactory



Fig. 14.— Mulching strawberries is necessary for protection during the winter months.

new row if they get sufficient water. The procedure for the remainder of the season is the same as that described for the first year.

Everbearing Strawberries

Until recently the Experiment Station has not recommended everbearing strawberries for Kentucky because they were not productive enough during the summer months; in fact, they were called "never-bearers" by many people. A new method of culture, however, now makes everbearers very successful. It was reasoned that the everbearing plants had been unproductive because they used most of their food and energy in the production of new plants, and if the forming of runners were prevented, a larger crop would result.

The new method consists of close planting, removing runners, mulching, and irrigation. First-year production records of 7,000 to 13,000 quarts per acre have been obtained with this system at Lexington. Irrigation is essential most years. Directions are as follows:

Ground preparation

Apply manure if available; plow, preferably in fall; prepare good bed and plant in *early* spring.

How to plant

Plant with crown flush with surface of ground, hole large enough for roots to be fanned out. Firm soil around roots. Water if necessary.

Set in beds with plants 1 foot apart in each direction. Beds should be 4 rows wide with a 2 foot alley between them.

Culture

Cultivate for approximately one month.

Remove bloom until about the last of June, or until a strong, sturdy crown is developed. Then let fruit develop.

Remove all runners throughout the season.

About one month after planting, mulch with 1 to 1½ inches of any kind of sawdust. Plots should be entirely free of weeds at this time.

Hand weed as necessary.

Pick fruit every other day.

Irrigation is necessary most years, even during average summers. The method of culture described above is not satisfactory unless it is practiced. Irrigate often with a medium amount of water rather than soaking the soil less frequently. Morning or midday is the best time to water.

Size of plot

If moisture conditions are favorable, 200 plants should furnish enough fruit during July, August, September and part of October, or until frost, for the average-size family.

Varieties

Gem, Superfection, and Brilliant are superior to any of the other varieties tested at Lexington.

BLUEBERRIES

The blueberry is a delicious fruit with which many people are unfamiliar. It grows wild in great abundance in some of the northern and eastern states, and in lesser degree in the moun-

tainous regions of eastern Kentucky. However, the wild fruit is very small compared to cultivated varieties.

Blueberries require a high organic acid soil (pH 4.5-5.5) with a fairly constant water level of about 18 inches. There are many soils in Kentucky of sufficient acidity for blueberries, but they are deficient in organic matter and liable to be droughty. These conditions can be overcome with sawdust mulches and applications of acidifying materials to soils that are too sweet. The outline below gives the salient points in blueberry culture for Kentucky:

1. Varieties—Pemberton, Dixi, Stanley, Jersey, and Concord.
2. Soil acidifying—none, if soil has pH of 4.5-5.5.
Aluminum sulphate—1 pound per 100 square feet for each pH point above 4.5, *or*
finely ground sulphur, 1½ pounds per 100 square feet for each pH point above 4.5.
3. Planting distance—4 by 8 feet.
4. Mulching—6 to 8 inches of sawdust over entire area.
5. Weeding—as needed.
6. Fertilizing—½ pound ammonium sulphate per plant after first year.
7. Spraying—none.
8. Production—4-8 quarts per plant.
9. Pruning—light; thin out weak branches and an occasional old stem.

DWARF APPLES AND PEARS

Dwarf apple and pear trees have a very important place in the home-fruit garden and may even become important commercially, as they are in Europe, in years to come. The same varieties grown on standard trees are produced on dwarf trees. The dwarf apple tree results from the effects of a special rootstock (Malling) upon the top of the tree.

Malling rootstocks were developed in England and a number of them are used. They vary in their dwarfing effect. Malling IX is the most dwarfing rootstock and produces a tree from 5-7 feet tall. Malling VII produces a tree about 10-12 feet tall and is semi-dwarfing. Other semi-dwarfing Malling rootstocks in

the order of size of tree produced are numbers V, II, and I. Trees grafted on Malling I grow to about $\frac{1}{3}$ to $\frac{1}{2}$ the size of standard trees.

Dwarf pear trees are produced by grafting or budding the desired variety on certain strains of quince. They grow to a height of 8-10 feet.

The variety desired is grafted to a piece of the dwarf root. Thus, the top of the tree is dwarfed due to the special root system which is not as extensive as that of a standard tree. Dwarf trees may have to be supported, due to small, shallow root systems. This can be done by sinking a post near the trunk of the tree when it is planted. A good material for securing the tree to the post is a length of old garden hose with a wire through it.

When the tree is planted, precautions must be taken to have the graft union above ground. If it is below, the part above the union may root and thus destroy the dwarfing effect.

There are many advantages to dwarf trees:

1. They fruit sooner than standard trees (3 years).

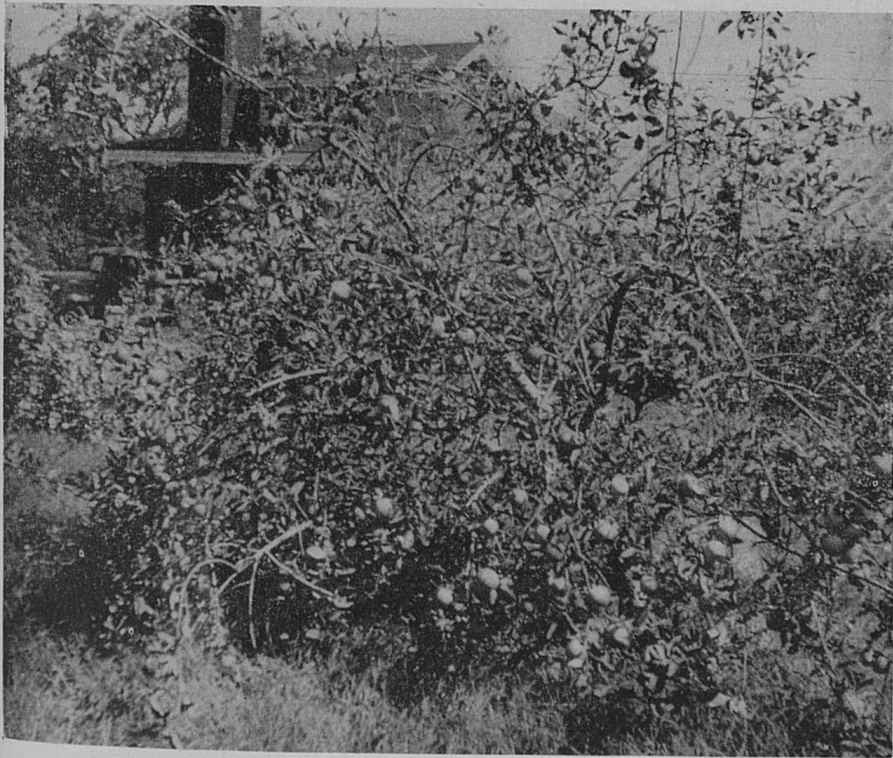


Fig. 15.— A dwarf apple tree—Turley on Malling VII.

2. They bear 3 to 6 bushels of fruit. With several trees, there will be enough fruit, but not so much that it becomes a problem as sometimes happens with standard trees.

3. The fruit is usually larger and more highly colored than the same variety on standard root stocks.

4. Probably the most important advantage is the small size of the tree, which greatly simplifies all operations.

Dwarf trees can be sprayed or pruned easily and otherwise cared for from the ground, or from a small stepladder. Standard trees become so large that it is virtually impossible to adequately spray them without expensive power equipment. As a result, the fruit is often full of worms and disease.

Dwarf trees are planted at only half the distance of standard trees.

There is now a new type of dwarf apple tree on the market that looks quite promising. It is called the Clark Dwarf. The dwarfing effect results from a special section budded into the trunk. This type of dwarf tree is formed by grafting a scion of Virginia Crab to a regular rootstock. This is allowed to grow until August or September of the same year when the Virginia Crab section is budded with the special Clark dwarfing bud. This is allowed to grow a year and is then budded with the variety desired. The Clark dwarfing part forms a knot-like section. This dwarfs the tree, probably by slowing down the passage of nutrients.

Lexington, Kentucky

June, 1953