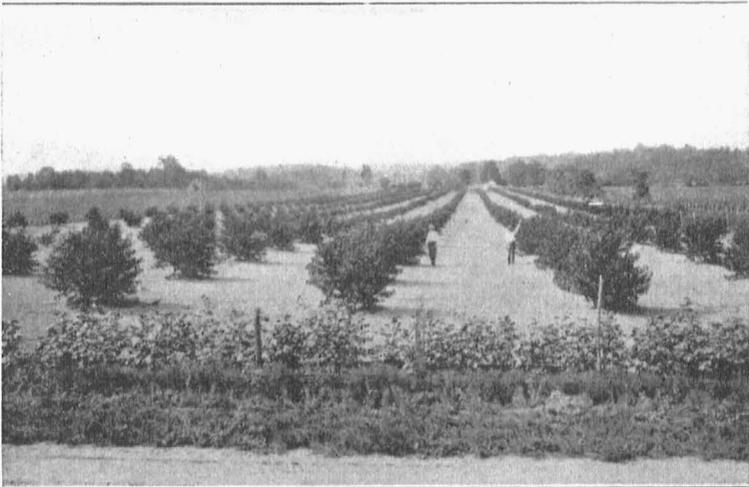


UNIVERSITY OF MISSOURI      COLLEGE OF AGRICULTURE  
AGRICULTURAL EXPERIMENT STATION

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# Missouri Peach Culture

T. J. TALBERT



COLUMBIA, MISSOURI

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# Missouri Peach Culture

T. J. TALBERT

The peach is grown throughout Missouri as a home orchard fruit. Commercial plantings are also found from the northern districts to the southern border. The chief production, however, is largely confined to St. Louis county, Southeast Missouri and the extreme south central part of the state including Howell and Oregon counties.

The more frequent occurrence of winter temperatures of 10° to 15°F. or more below zero makes peach growing in Central and North Missouri generally more hazardous than in the southern and particularly southeastern areas of the state.

With favorable soil and climatic conditions from 3 to 5 years are required for a peach orchard to come into commercial bearing, and 2 or 3 additional years are needed to bring the planting into full production. In mature orchards average yields during good crop years of from 3 to 4 bushels per tree are considered very satisfactory. The bulk of the Missouri crop is harvested during late July, August, and early September.

## WINTER INJURY

Peach trees will withstand without injury considerably lower temperatures than their fruit buds. When buds are dormant and the trees vigorous, there is less likelihood of injury than when opposite conditions of trees and buds exist. Furthermore, low temperatures of short duration may be less damaging than if prolonged for a considerable period. Temperatures several degrees above zero in early winter, following late fall growth, may cause injury to both trees and fruit buds.

Mild or unseasonable weather in January or February may cause peach fruit buds to start growth or swell enough to become tender to cold. If even normal cold weather follows such warm spells, much damage to fruit buds may be done. The total or partial loss of crops through these more or less wide ranges in temperatures is in general more prevalent in the southern peach districts than is the loss from low temperatures in the northern districts.

Spring frosts that occur during blossoming time may also cause great losses to the peach crop. In fact, some districts become unsafe for peach production because the blossoming period of the trees and the prevalence of frosts and freezes occur at about the same time. It is obvious, therefore, that in a district or locality

where the average date of the last killing frost in the spring comes during or after the average dates of peach blossoming, losses to fruit crops may be expected, unless the orchards have advantages through locations less subject to frost injury.

When the wood of trees has been injured by very low temperatures, it is advisable to postpone care until late enough in the spring to determine the extent of injury. Winter injured trees require very careful treatment. If the injury is not severe, the dead parts should be removed and the remainder of the tree pruned thoroughly to stimulate growth. The cutting should not be heavy because the trees may have already lost a considerable amount of their potential leaf-bearing surface. Since the leaves manufacture food for growth, it is important that a sufficient area of leaf-bearing wood be left for good growth. In overcoming winter injury, thorough cultivation and fairly liberal fertilization are generally helpful.

#### LOCATION OR SITE

The site of the peach orchard deserves thought and consideration because the hardiest and best varieties will not succeed in poor locations. Moreover, since winter killing is the greatest disadvantage to peach growing in Missouri, a site should be selected, if possible, that will reduce winter injury to the minimum.

An ideal site should be high enough to allow cold air to drain off readily, and without bare slopes above which will permit cold air to drain down through the orchard. The aspect or direction of the slope is important. North slopes are generally cooler in both winter and summer and possess deeper and more fertile soil than south exposures. Since warm spells in January and February are more likely to start fruit bud growth on south slopes, northern exposures are generally preferred. Slopes in other directions may show differences in temperature and soil fertility but usually not as marked as that of north and south exposures.

#### Choosing Soils

Peach trees may produce profitable crops on a great range of different soil types. They usually thrive best, however, on the light sandy, gravelly, or rocky loams. The trees will not endure wet or water-logged soils. In fact, regardless of type the soil must be well drained. A subsoil of 2 or 3 feet of gravel or sand underlaid with a more compact layer may prove valuable. While peach trees will succeed on poor soil, yet the best results may be secured on fertile, loamy, deep, well aerated soil. In general, peach trees demand a more fertile soil than apples.

### Selecting Varieties

Perhaps no other fruit industry is so largely built upon one variety as the peach. Many varieties meet important needs, but the Elberta peach predominates the industry. For home and nearby markets, a succession of varieties is usually desirable in order that the season of use may be extended over a long period. The list which follows is made up of some of the best varieties for home and commercial requirements. There may be, however, other sorts that for certain districts and special needs are better suited for planting than those listed. The list does, however, include some of the best varieties for general culture throughout the state and particularly in southern districts of south central and southeast Missouri where peach growing is most extensive. Dates of fruit ripening or harvesting are based chiefly on the varieties as they are grown in the southern one-third of the state. Varieties here generally ripen from a few days to a week or ten days earlier than the same kinds when grown in central and north Missouri.

### APPRAISING PEACH VARIETIES

**Mayflower.**—The tree is large, vigorous, hardy and productive. In bud, it is considered one of the hardiest varieties. Mayflower is the earliest reliable variety to ripen its fruit. The fruit is creamy white with a dark red blush. The flesh is greenish white, juicy, tender, sub-acid, and clings to the stone. It is fair in quality, a poor shipper, and ripens in late June. As an early peach for home use and in a limited way for local markets, it may prove worthwhile.

**Greensboro.**—The tree of this variety is hardy and the buds are rather resistant to frost. It is adapted to a wide range of soils and is generally a regular cropper. For limited plantings in the home orchard and for local markets, it has a place. The fruit is medium to large, skin tough and heavily pubescent, creamy white blushed and striped with red, and stands shipping well. It ripens soon after the middle of July. The flesh is white, juicy, tender, sprightly, fair in quality, half clinging to stone. It is a hardy dependable early variety.

**Red Bird (Red Bird Cling).**—The tree is hardy, bears early and abundantly, is a regular cropper, and the fruit buds are resistant to cold. Since the fruit is harvested early, the trees withstand drought conditions in late summer and fall much better usually

than commercial varieties that ripen their fruit later. The fruit is large, bright glowing red, good quality, clingstone, and ripens about July 15. Growers commend it as an abundant and regular cropper, good for handling, adapted to truck trade and a profitable variety.

**Rochester.**—The tree is large, vigorous, hardy and productive. Although yellow peach varieties are considered less hardy in the bud than white ones, yet Rochester ranks as one of the most resistant to cold of the yellow sorts. The fruit is medium to large size, lemon yellow changing to orange yellow, blushed and mottled with dark red. The flesh is yellow stained with red near the pit, very juicy, tender, highly flavored, very good in quality, and the stone is free. Fruit is harvested in late July and early August. It is worthy of limited planting.

**Hiley.**—The tree is medium in size, moderately vigorous, upright, spreading, medium hardy, and productive. Although in keen competition with other white-fleshed varieties, it is as good or better than most of these varieties of its season. Furthermore, it is the earliest commercial freestone. The fruit is large in size when well grown, the skin is thin, tough, greenish yellow with a dull red blush on one side and usually mottled. The general effect of color is attractive. The stone is free to semi-free and the variety is harvested about August 5. It is generally considered profitable for the home and local markets, but it comes into competition with southern grown Elbertas.

**Champion.**—The tree is excellent in form and shape, vigorous, hardy, productive, distinguished by luxuriant green foliage, bears early, and is suited to fertile soils. The fruit matures in early mid-season or about August 10 to 15. It is attractive, excellent quality, and medium in size. The flesh is tender, white, juicy, and has a pleasant flavor. Its color is pale green to creamy white with splashes of carmine mingled with a blush of dark red, and the stone is free to semi-free. Because of high quality of fruit, good growth, tree vigor, hardiness, and regular abundant production, Champion is usually considered one of the best early to midseason sorts for home uses and local markets.

**Belle (Belle of Georgia).**—The trees are large, spreading, vigorous, hardy and very productive. It is a southern variety and reaches its best development toward the South. Of all the commercial varieties, this is one of the hardest in the fruit bud. Consequently, it is one of the surest croppers. The fruit is medium

size, matures about August 15 to 18, and is roundish oval in shape. The skin is thin, tender, greenish white to creamy white blushed and mottled with light and dark red. The flesh is white tinged with red at the pit, juicy, tender, sweet and mild. It has a semi-free to free stone. The quality is good and the variety ranks high for home uses and the local markets.

**Elberta.**—Elberta is still the most popular peach on the markets. Its wide and favorable reputation on local and distant markets gives it a distinct and marked sales advantage. Elberta is also outstanding on account of its handling and shipping qualities. These advantages, coupled with the tendency of the trees to bear regular and abundant crops, make the Elberta a leading commercial variety. The trees are not as hardy in bud or wood as some other less desirable sorts, and the fruit cannot be rated high in quality. The fruit is medium to large size and roundish oblong in shape. The skin is thick, tough, deep yellow partly overspread with red and mottling. The flesh is yellow, juicy, stringy, firm, tender and good. The stone is large and usually entirely free from the flesh. It ripens about August 20. With no other variety to replace it for shipping quality or as favorably known on the distant commercial markets, Elberta may continue to be a favorite for a long time, particularly for distant shipments.

**J. H. Hale.**—The tree is moderately vigorous, but not quite as large as Elberta. In most sections it is considered self-sterile. The fruit buds are not very resistant to low temperatures, being even more tender than Elberta. It ripens about August 20 with Elberta, and, therefore, competes with this variety. The fruit runs larger in size than Elberta and is generally considered more attractive. It is better in quality and may sell for somewhat higher prices on markets where it is known. Fruit growers may consider this variety in plantings for home and market uses.

**Salwey.**—Salwey trees are large, vigorous, hardy, and productive. For a yellow peach the buds are considered hardy and usually enough survive the winter to insure a crop. Salwey is yellow fleshed, freestone, attractive in appearance, and of good quality. It is one of the best varieties for canning, preserving and drying. The fruit ripens about September 25. It is an excellent variety for lengthening the season of the local market. For commercial markets, however, it is not attractive enough to compete successfully with Elberta from other producing sections.

**Heath Cling.**—Heath Cling was probably grown in the colonies before revolutionary days. It is also the oldest named Ameri-

can peach now in cultivation. Few varieties produce hardier, healthier trees. The fruit keeps longest, often being in good condition from October to December. It is sweet and rich in flavor. The flesh adheres tightly to the stone, but it ranks excellent for cooking, preserving, and pickling. Heath Cling is not as productive as some other varieties, but it has other qualities which recommend it strongly for planting in the home orchard and to a limited extent at least for local markets. The fruit ripens in late September.

**Krummel.**—The tree is large, hardy, vigorous, and fairly productive. It is usually considered as hardy in fruit bud as Salwey. Krummel is a valuable sort where a late peach is desired. The fruit is large, globose, one-sided, light lemon yellow blushed with carmine. The flesh is yellow, free from stone, red at the pit, very fine in texture, juicy, and the quality is good though a little acid. Krummel is usually considered a profitable variety for the home orchard and for local markets where a late variety is desired. The fruit ripens in late September or early October.

#### Other Varieties Worthy of Trial for Home and Market

Variety	Color of Flesh	Free or Clingstone	Ripening Season
Alton .....	White	Semi-cling	Early
Babcock .....	White	Free	Early
Candoka .....	Yellow	Free	Mid-season
Crawford Early .....	Yellow	Free	Early
Crawford Late .....	Yellow	Free	Mid-season
Cumberland .....	White	Semi-free	Early
Early Elberta .....	Yellow	Free	Early
Early Rose .....	White	Cling	Early
Eclipse .....	Yellow	Free	Early
Frank .....	Yellow	Cling	Late
Golden Jubilee .....	Yellow	Free	Early
Halberta Giant .....	Yellow	Free	Mid-season
Halehaven .....	Yellow	Free	Early
June Elberta (Mikado) .....	Yellow	Semi-free	Early
July Elberta .....	Yellow	Free	Early
Mamie Ross .....	White	Semi-cling	Early
Marigold .....	Yellow	Semi-cling	Mid-season
Markberta .....	Yellow	Free	Mid-season
Oriole .....	Yellow	Free	Early
Salberta .....	Yellow	Free	Mid-season
South Haven .....	Yellow	Free	Early
Wilma .....	Yellow	Free	Late

#### SUMMARY OF PEACH VARIETIES FOR PLANTING IN MISSOURI

The varieties which follow are suggested for distant shipments, including car lot and truck movements, and for roadside market sales. They may also be equally well suited for home culture and home uses.

### Commercial Varieties

**Early.**—Red Bird (Red Bird Cling), and Champion.

**Mid-season.**—Belle (Belle of Georgia), and Elberta.

**Late.**—Salwey, Frank (clingstone), and Krummel.

### For Roadside Market

**Early.**—June Elberta (Mikado), Mayflower, Greensboro, Red Bird (Red Bird Cling), Early Elberta, Early Crawford, Hiley, and Champion.

**Mid-season.**—Belle (Belle of Georgia), Elberta, J. H. Hale, Mamie Ross, South Haven, and Halberta Giant.

**Late.**—Salwey, Wilma, Frank, Heath Cling, and Krummel.

### For Home Orchard

(Minimum Requirement)

**Early.**—Red Bird (Red Bird Cling).

**Mid-season.**—Belle (Belle of Georgia) or Elberta.

**Late.**—Salwey or Frank.

Most home orchardists, however, prefer a larger number of varieties. For home uses, therefore, the producer can well afford to grow the kinds desired even though they are not profitable on the markets.

## PLANTING

The best nursery stock obtainable is usually the cheapest in the long run. It is false economy to plant inferior or low grade trees. The best trees are more likely to be true to name. Well matured healthy stock withstands transplanting better, is more resistant to dangerous insects and fungous diseases, comes into bearing earlier, and develops into a more profitable orchard than small, stunted, and less desirable trees.

Before planting the trees, the land should be prepared thoroughly by plowing and disking. Better results may often be obtained by doing this a year in advance by growing a green manure crop and plowing it under.

Equally as good or better results may be secured in the southern districts of the state through late fall and early winter planting. For Central and North Missouri, however, on account of danger of winter injury to the roots, it is generally advisable to plant in the spring as early as soil and weather conditions will permit.

One year old, thrifty trees are preferred and they are set from 20 to 24 feet apart each way. Broken or injured parts of roots should be removed before planting. Dig the planting hole large enough to allow the roots to be spread without cramping and the trees to stand about an inch deeper than they stood in the nursery. As the soil is filled in around the roots, firm it with the feet to prevent air spaces and subsequent root drying before the soil settles. After setting the trees, they should be pruned fairly severely as suggested on pages 12 and 13.

### CARE OF YOUNG AND MATURE ORCHARDS

The young trees should be given, during the spring and early summer, frequent and thorough cultivation by plowing and hoeing. It is usually advisable to continue cultivating after the trees come into bearing. If for any reason it is impractical to cultivate the entire space between the trees, hoeing or plowing a strip 5 or 6 feet wide about the trees will generally be of value. The best results; however, are usually obtained by cultivating the whole area between the rows up until about the middle of July, when the cultivating should be discontinued to allow the trees to mature properly for winter.

Peach trees thrive best in a soil well supplied with organic matter. Cover crops fill this need adequately. Such crops as cowpeas and soybeans may be sown as soon as cultivation ceases. Hairy vetch and rye may be preferred, and seeded about the middle of August. Wheat, rye, barley and winter oats are also sometimes sown during late August and early September. The cover crop is plowed under in early spring and cultivation continued.

To get the largest amount of growth to plow under, it may be well to fertilize the cover crop. Where this is necessary, a light dressing of a complete commercial fertilizer fairly high in nitrogen may be found of greatest value.

As the trees come into bearing it will usually be necessary to supplement the cover crop culture for building and maintaining the soil organic matter and nitrogen with applications of nitrogen fertilizers like nitrate of soda, sulphate of ammonia and cyanamid. Both spring and fall applications have been profitable. Spring fertilizing at time of blooming or shortly before is generally practiced. The amount used then is largely dependent upon the prospects for a crop. Regardless of the amount of bloom, if the trees need more growth, they should be fertilized. Mature trees generally receive from 2 to 3 pounds spread broadcast on the ground under the branches and beyond.

Manure may be particularly valuable in bearing orchards on very poor soil or where there is too much shade for the growth of a good cover crop. Moreover, it is important that manure, which is slowly available, be applied in the winter or very early in the spring. Applications made late in the spring or in summer may induce a late tree growth. This would delay maturity, lessen the color of the fruit, and increase the likelihood of winter injury.

In every planting, whether to fertilize and how much to use are questions that must be considered. The best answer will usually be found in a study of the growth and yield records of the trees. If an annual growth of less than 16 to 24 inches is being made, a nitrate fertilizer should prove worth while.

Trees in moderately good condition may not require fertilizer treatment unless they bear a crop. Furthermore, the increased set of fruit produced by an early application of nitrogen merely increases the work and cost of crop thinning. By waiting until danger of frost is past, the proper amount of fertilizer to be used can be ascertained by the prospects of a crop and should late frosts kill all the blossoms, the fertilizer may be withheld until it is needed. When peach trees are making a poor growth, an application of nitrogen should generally be made whether a crop is produced or not, and it may be made anytime in the spring.

Applications of phosphate, potash and lime have not in general influenced beneficially the growth and yield of peaches. It is true, however, that in the peach-growing sections of the South and especially in North Carolina and Georgia, a complete fertilizer may be beneficial.

The amount of fertilizer to use on peach trees will depend on the fertility of the soil and the condition and size of the trees. On the average a moderate application of manure for large bearing trees would be about  $\frac{1}{5}$  ton per tree. The same trees would receive in commercial nitrogen about 3 pounds of sodium nitrate,  $2\frac{1}{4}$  pounds of ammonium sulphate, or 2 pounds of cyanamid. Young trees 2 or 3 years old will not usually require more than  $\frac{1}{2}$  pound of sodium nitrate,  $\frac{1}{3}$  pound of ammonium sulphate, or 3 to 4 ounces of cyanamid to a tree. In special cases, the exact amount to be used must be determined by the grower on the basis of judgment and experience.

Chemical fertilizers for fruit trees are usually broadcast by hand or drilled in between the rows of trees. Care should be taken to keep the fertilizer away from the tree trunks as there is danger

of burning the bark. The distribution may extend a greater distance from the trunk than the branches, as an abundance of feeding roots may be found beyond the branches.

## PRUNING

A knowledge of the fruiting habits of the peach is fundamental to profitable and intelligent pruning practices. This is more true with this fruit than with other deciduous fruit trees because the peach bears only upon wood or growth of the past season. Therefore, the pruner must know and be able to locate the 1-year-old or fruiting branches. These are found, of course, as terminal growth or as shoot growth from the larger branches and main trunk.

The fruit produced each year, therefore, may be farther and farther from the main stem or trunk. Thus in a few years without pruning, the tree branches are likely to become greatly extended and may break in storms or when heavily loaded with fruit. To keep the fruiting wood within bounds, prevent the breakage of branches, and renew the fruiting wood yearly, the trees must be properly pruned annually. Such pruning tends to produce trees of long life and with fruiting wood close to the ground and near the main stem or trunk.

### Pruning Young Trees

Successful orchardists generally prune peach trees soon after planting, taking into account the grade and character of the tree growth. It is usually unwise to prune strictly according to a definite standard of severity and height, regardless of all other factors. Trees are generally headed back to a height of 16 to 24 inches, the greater height being used for large vigorous trees and the smaller for less vigorous ones which may be headed back close to the ground. The open head system is most often preferred, though the modified leader should prove satisfactory.

With a good grade of one-year-old peach trees, it is usually advisable to remove near the main trunk all but three to five of the strongest and best placed scaffold branches. These main branches should be spaced alternately up and down and around the tree trunk and, if possible, from 3 to 8 inches apart. After they are selected, they should be headed back to stubs about 2 or 3 inches long. If the peach trees used for planting are small, all the branches should be removed and the trees headed back to a height of 18 or 20 inches from the ground.

Very little if any pruning is done during the first summer. In the succeeding dormant season, three or four lateral shoots should be left for framework branches. These should be spaced at approximately equal intervals around and up and down the trunk, and should consist of branches having about the same vigor. Since limbs with wide angles are strongest at the crotch, these should be given preference—other factors being equal—in building the framework of the tree.

In the following dormant season, the second after planting, vigorous misplaced limbs should be removed to induce growth in the proper direction and limit the number of secondary framework branches. Each scaffold branch may now be pruned to leave one or two strong limbs for the permanent secondary framework. If these arise as much as 18 inches or more from the trunk all the better. The less vigorous interior shoots are thinned but all are not removed. Some should remain because they add to the total growth and the first fruit is borne upon them.

For the next pruning season, the third after planting, the same general procedure as in the second dormant period can be followed, removing misplaced vigorous shoots and thinning the interior ones where necessary. If secondary framework branches were not selected, due to poor growth in the first season, such a choice can be made at this time.

In the third year where growth has been very rapid, it may be necessary to start heading back lightly the strongest framework limbs to good growing laterals, developing in a horizontal direction. This is true because peach trees which make a vigorous growth may in three years approach a stage demanding treatment more like that given mature trees.

In this formative period of three to four years, the object is to develop a strong balanced framework. The general appearance of the trees should be spreading and bowl-shaped in order that high-colored fruit can be produced. More danger arises from too much pruning than too little. Trees making a poor growth are pruned heaviest while those producing strong shoots and laterals are pruned least.

Young trees do not require general cutting back of branches to obtain open heads. Only those branches that are more thrifty and that grow in the wrong directions or interfere with other limbs should be tipped. During the first two or three years, trees trained to four or five scaffold branches may need only thinning of shoots

in the center. An abundance of renewal wood for fruiting purposes can be secured by removing upright branches and by thinning shoots without cutting back the main limbs to upright stubs.

The chief problem in pruning a young orchard is to extend the framework and bearing surface of the trees so heavy loads of fruit may be carried without breaking the branches. The center of trees should be kept fairly open, allowing a few shoots to grow inward and upward. It is important that young trees be headed low and that the fruiting wood be kept near the ground and not too far from the main trunk in order to prevent breakage and to facilitate picking, spraying, and pruning operations.

### Pruning Bearing Trees

In some sections of the state there is considerable danger of injury to the fruit buds and branches by winter cold. Late spring freezes and frosts may also injure the fruit buds at or near blooming time. Where such conditions exist, pruning may be profitably delayed until the blooming period if the work can be done then. The amount of pruning, both heading and thinning, but more particularly the severity of the heading, may then be regulated by the abundance of the bloom and the indications of a crop. In case a heavy crop is expected, the tree may be headed back more severely, and perhaps one-fourth to one-third of the previous year's growth removed with a large number of fruit buds on the shoots. This procedure lightens the subsequent work of crop thinning.

The smaller the prospective crop, the less severe the heading should be to insure a full crop. In view of the danger from late frost, it is practically impossible to predict how large a crop will survive the winter. It may, therefore, be advisable in sections where there is danger of killing frosts up until near blooming time, to postpone pruning until the trees are in bloom as the work can then be regulated to much better advantage, cutting being fairly heavy for an abundant bloom and light for small bloom.

In large commercial orchards it may be impractical to leave all the pruning until the trees blossom. Growers who are unable, for practical reasons, to avail themselves of the advantages of delayed spring pruning should know that the hardier buds usually occur near the center and toward the base of the previous year's growth. With a moderate heading back of the fruiting whips by a removal of  $\frac{1}{4}$  to  $\frac{1}{3}$  of the length growth, the prospects of a crop are not likely to be decreased to any great extent, even when a considerable percentage of the fruit buds have been winter-killed.

This does not apply to thinning, however, for even a small amount of thinning done during the winter may make serious inroads on the crop in a season following excessive winter injury. It is therefore wise to confine the winter pruning for the most part to heading and leave the thinning until late May or early June. The work of thinning the trees can then be partly combined with thinning the crop. In summer pruning, it is possible to correct the tendency of trees to grow away from the direction of prevailing winds. This is accomplished by cutting back the longest branches on the leeward sides of the trees to good primary laterals. The trees should be kept symmetrical, and their centers made fairly open.

### Pruning After Winter Injury

If the entire crop is destroyed by winter cold or spring frosts, the orchardist may take advantage of the situation and head the trees fairly severely, cutting back into as much as 2-year-old wood. This may be needed as the peach tree bears fruit on 1-year-old wood which tends to grow farther out on the ends of the branches



Fig. 2.—Old peach trees cut back to two- and three-year-old wood after their fruit buds were killed by late spring frosts. The cutting should have been less severe and confined to one- and two-year-old wood.



Fig. 3.—The trees shown in Figure 2 after two years' growth. In both years, due to heavy pruning, the new growth was a little too vigorous for good fruit production.

each year. The exact amount of pruning may be greater or less, depending on the shape and condition of the tree and the amount of injury to the wood, if any. If a similar treatment was required the previous year, the heading need not be quite so severe now, though much of the past season's growth may be removed.

Where crops have been borne for a number of years, the destruction of all fruit buds by low winter temperatures or spring frosts affords an opportunity to lower the top and correct the shape of the tree. Under such circumstances it may be advisable to cut back into 2-year-old wood. When trees are so pruned, the new growth is usually very rank and should be thinned out early in the summer to aid the formation of fruit buds for the following year. It should be thoroughly understood, however, that cutting back into wood three or more years old lessens the likelihood of fruit bud formation and reduces the crop prospects for the following year, even though weather conditions may be favorable. Such heavy pruning is rarely necessary except where the wood has been injured seriously or killed by cold.

More moderate cutting back helps maintain regular fruiting. Heavy pruning must be avoided in the off-year of vigorous young trees. Moreover, heavy general heading back of all main branches on young growthy trees may cause an abundance of unfruitful shoot growth. This in turn shades the fruit buds in the interior of the tree and may delay early production and reduce yields.

### Reducing Pruning and Years of Bearing

Some Missouri peach growers, particularly in the Central and Northern sections of the state, practice little or no pruning after that given the trees at planting time. Emphasis is placed on such practices as cultivation, fertilization, use of cover crops and dormant spraying to prevent peach leaf curl.

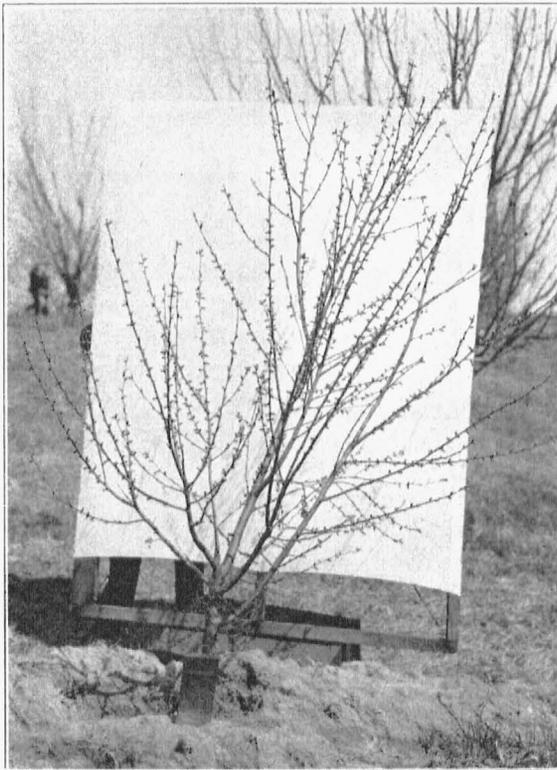


Fig. 4.—Before pruning a three-year-old peach tree.

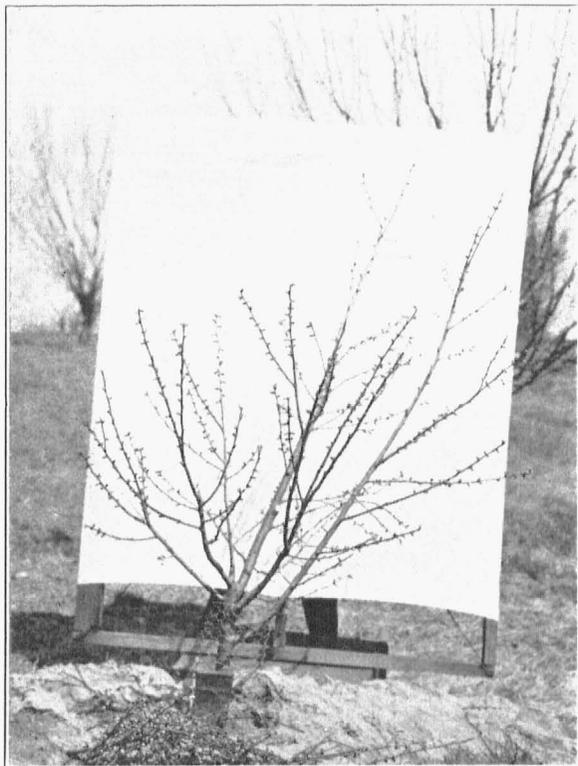


Fig. 5.—After pruning tree in Figure 4. Cutting and thinning was a little too severe for early profitable production.

Through such methods the trees are often brought into profitable bearing in from 3 to 4 years if they are not damaged by winter cold and spring frosts. Very little cutting or pruning is practiced during the following 3 or 4 years. In fact, pruning is reduced to the minimum and is chiefly of a corrective nature. Furthermore, the trees are removed when they reach an age of 6 to 8 years.

In the meantime another peach orchard has been planted and the trees are brought into bearing at about the time the bearing orchard is removed. Through such methods the trees do not develop sufficient growth for severe branch breakage as a result of practically no pruning. An abundance of fruiting wood near the ground is also produced.

Growing peaches under this system is suggested for trial plantings only. It does have merit, however, in that the pruning practices are based upon tree needs, and the need for pruning is not great at this age. Moreover, when tree vigor and production

begin to decline, the orchard is removed and attention is given to younger and more productive trees.

There will be instances when growers will desire to fruit the trees for longer periods than 6 to 8 years, and this may be accomplished. Peach trees so treated, however, will generally be found more difficult to maintain with an abundant supply of fruiting wood than trees which have been pruned and trained according to the more or less standard method. This will be true because fairly heavy cutting into at least 2-year-old wood will be required to induce new growth nearer the main stem or trunk and to prevent the breakage of branches from heavy loads of fruit carried near the ends of long limbs.

### THINNING

When heavy crops are produced, proper thinning in June should be practiced. Under Missouri conditions winter injury may be so great and the fruit so scattered that thinning is unnecessary. But when trees are heavily loaded, thinning the fruits until they are 4

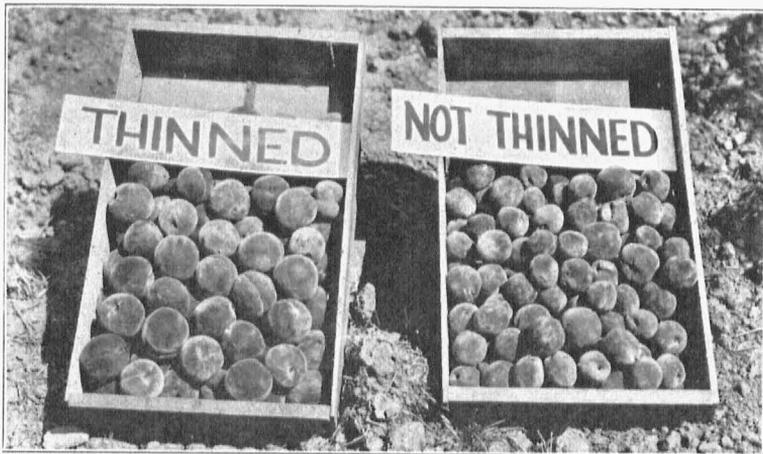


Fig. 6.—Comparison of peach yields from thinned and unthinned trees.

to 6 inches apart leads to greater uniformity, and usually enables the grower to market the product more readily and at higher prices. It also favors hardiness under certain conditions.

Thinning is done by hand when the peaches are about the size of the end of the thumb or after the regular late May or early June drop. The cost of the practice will vary in different localities but should average about 15 cents per tree. A profit is generally

shown from hand thinning by the difference in quality, uniformity in size and the price received for high grade fruit.

### INSECTS

(See also Spraying Program, page 27)

**San Jose Scale.**—San Jose scale is generally ranked as one of the most dangerous and serious pests of the peach. Several factors combine to make it the most difficult scale insect to control. For example, it is so inconspicuous or difficult to identify on the trees that it is often overlooked and the trees may be killed before the owner or producer is aware of what is wrong.

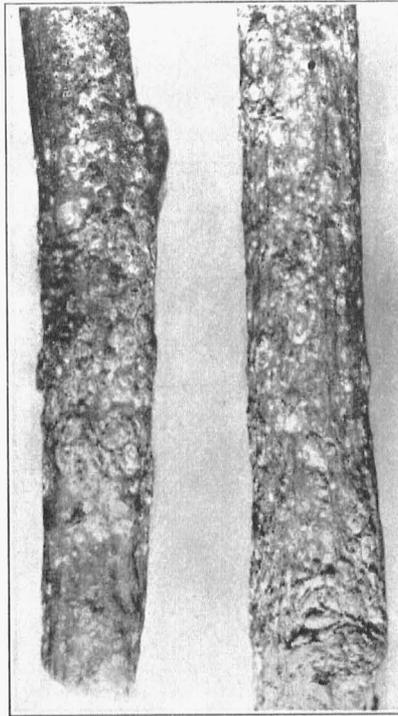


Fig. 7.—Young peach twigs showing a serious infestation of San Jose scale.

While the attack varies with the different varieties of the same fruit, yet practically all of our fruit crops may at times be seriously injured. The rapid multiplication and inconspicuous spread of this pest soon enable it to infest fruit plants badly. Unless sprays are applied thoroughly they may be of little or no value. It is also of

equal importance that the right dilution of the spray be made; otherwise ineffective results will follow. Dormant sprays are required because such caustic application, if made when the trees are in leaf and fruit, might do great injury.

**Plum Curculio.**—This is perhaps the most serious pest of the stone fruits; in fact, it is even more serious upon these than it is upon the apple, pear, and quince. It is chiefly responsible for the worms in peaches, cherries, and plums, and its feeding punctures may prove a means of entrance for the brown rot fungus. Since this fungus causes the fruit to rot very quickly, unsprayed or improperly sprayed fruit may rot upon the trees or in transit to market as a result of its attack. For this reason, it is important that special attention be directed toward the control of the curculio.

**Peach Tree Borer.**—In many peach growing regions, the peach tree borer is ranked as the most serious pest. At or near the surface of the soil, the worms gnaw away the tender inner portions of the bark. The insect's presence is indicated by a considerable flow of wax. If several borers are present in the sapwood at the base of the tree trunk, the tree may be completely girdled and killed. Nectarine, apricot, cherry, and plum trees are infested by the same borer. The adult is a moth having gray wings like a wasp. Eggs are laid in May, June and July on the bark of the tree trunks near the ground. The young grubs hatch from the eggs, tunnel into the sapwood, and remain there until the following spring when they resume activity. The adult moths emerge from the trees from May until August. Only one generation is produced in a year.

Paradichlorobenzene has during recent years given excellent control when placed in a ring about the base of the trees and covered with soil from about September 25 to October 15. For average four to five-year-old trees from one-half to three-fourths of an ounce of the white crystals is satisfactory and from one to two ounces are used for older and larger trees. Two ounces, if properly used, should be effective for large old trees.

The treatment, if applied to trees less than four years old, may prove injurious. This will be particularly true unless the proper dosage is applied and precautions are taken to prevent too much gas accumulation. Dosages of one-fourth ounce are suggested for orchard trees one to two years old and one-half ounce for trees three to four years of age. The mounds and crystals around such young trees should be hoed away from the base of the trees after a period of 10 to 14 days following treatment. Moreover, the grower should keep in mind the fact that there is much more likelihood of injury

to trees less than four years old and that the trees can be wormed by hand with little or no danger of material injury.

In applying P D B, the grass, rocks and litter should be removed from the tree base. The crystals are then placed on the ground in a closed ring around the trunk and covered with two to three inches of friable, mellow earth. This is then firmly pressed

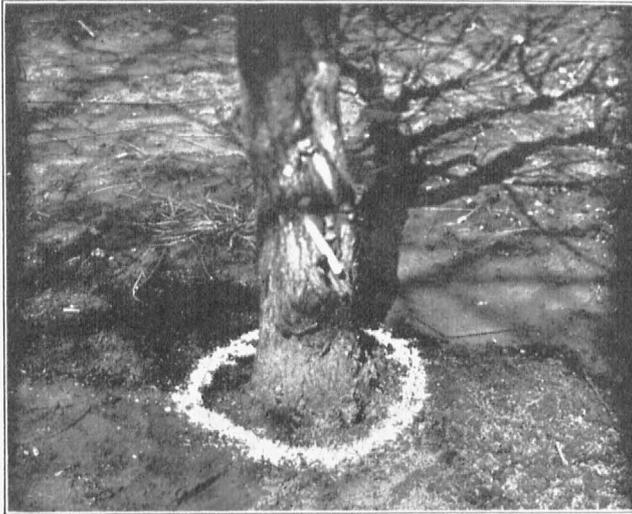


Fig. 8.—Peach tree being treated with Paradichlorobenzene (P D B) for borer control. (From Mo. Agr. Exp. Sta. Bul. 373).

down with the foot or back of a hoe or shovel. With trees under four years of age, it should be remembered that the mounds and crystals should be removed in 10 to 14 days after treatment while in the case of older trees mound and crystal removal following treatment is not required.

Investigations have shown recently that the P D B chemical may be dissolved in crude cottonseed oil and emulsified with potash fish oil soap, diluted and used effectively as a spray on young trees particularly. Excellent results have also been obtained with the crystals by mixing them in a miscible oil, diluting and using definite proportions on young trees. This work, however, is still in the experimental stage but very definite directions for making and using should soon be available. For additional information, see Missouri Agricultural Experiment Station Bulletin 373, Pages 10 and 11.

P D B costs from 18 to 35 cents a pound. The total cost of application, including labor, varies from 3 to 5 cents a tree. Chem-

ical concerns handling spray materials are often able to supply growers with the product. Local drug stores may also handle it. This treatment should not be extended to fruit trees other than the peach, as it is likely to cause serious injury. Where P D B is not used in the control of the pest, fairly good results may be obtained by digging out the borers in the early spring and fall seasons. This is done by means of a sharp knife and a moderately stiff wire. The wounds in the trunks of the trees should be made up and down as nearly as possible to prevent girdling. Through the use of a wire in probing the holes, it is usually possible to remove or destroy the borers without doing serious injury to the tree trunks. If the trunks up to a height of from two to three feet are kept covered with some repellent wash like whitewash or lime-sulphur solution 1-7, to which lead arsenate 4-50 is added, the injury from borers may be lessened greatly. It is important that the trunks be kept covered from May until September.

### DISEASES

(See also Spraying Program, page 27)

**Peach Scab.**—Peach scab is known also as freckles and black spot. The infected area of scab is black and a considerable portion of the surface may be injured, in which case the fruit often cracks

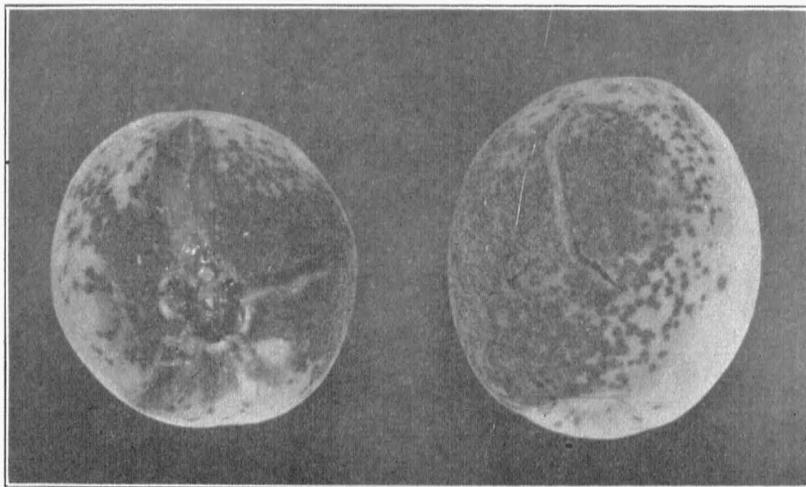


Fig. 9.—Injury of "freckles" or peach scab to peach fruit.

and becomes misshapen. This disease may be controlled readily by the application of any of the standard peach fungicidal sprays.

**Brown Rot.**—Brown rot is generally most destructive to stone fruits in warm climates and it has caused enormous losses, especially of peaches during seasons favorable to the fungus. Its attack on the fruit begins shortly before the ripening period when it may bring about the complete destruction of the crop before the producer

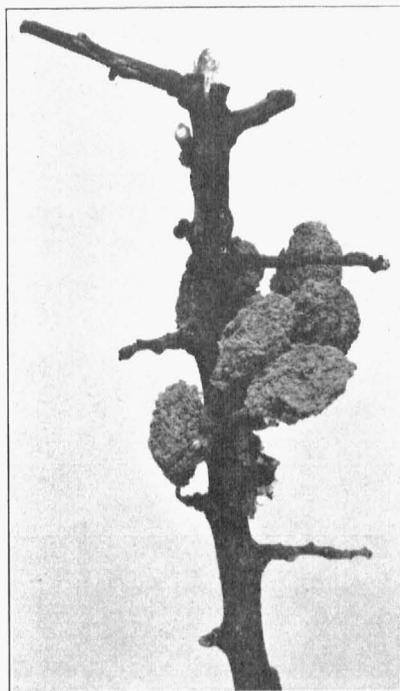


Fig. 10.—Peach mummies produced by brown rot still adhering to the peach twig. These should be removed and plowed under deeply or burned.

can harvest and market it. Brown rot also develops on the limbs and twigs, causing a leaf and twig blight. The latter is followed by the formation of cankers. The blossoms may be injured too, as in the case of blight on pears and apples, but the chief loss is confined to the rotting of the fruit.

In the control of brown rot, orchard sanitation should be emphasized. All dried fruit or mummies which are left hanging on the trees after harvest and during the winter should be removed and burned or plowed under. A dormant spray consisting of lime sulphur may also help. Following the dormant spray, however, spring

and summer applications of standard peach sprays should be made. Special attention should be given to the control of curculio, since the majority of brown rot infections may follow attacks by this pest.

**Peach Leaf Curl.**—In unsprayed or poorly sprayed orchards, peach leaf curl may be one of the most destructive diseases. Losses are due mainly to defoliation of trees. In severe cases the trees may be so completely stripped of leaves that the fruit will not ripen

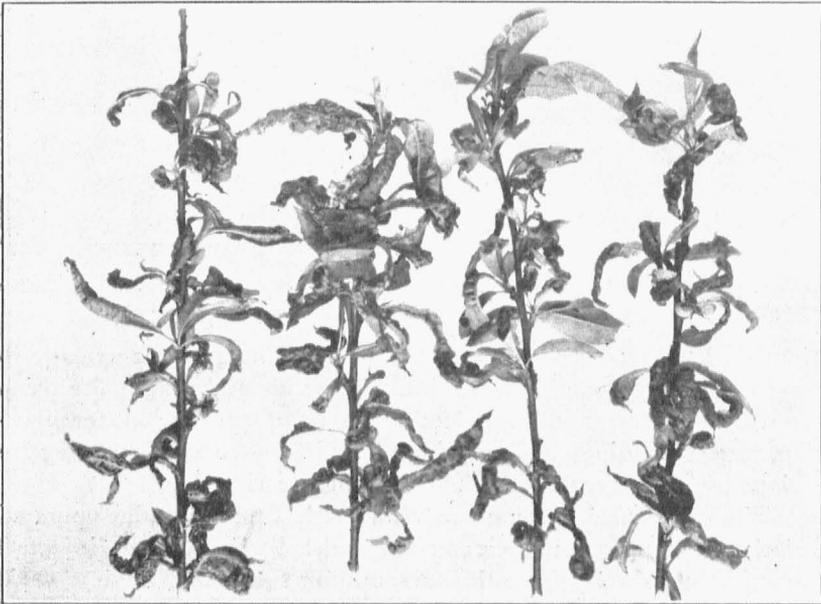


Fig. 11.—Peach foliage showing injury by the fungous disease known as peach leaf curl.

properly and new shoots may start into growth; new shoots and leaves may also develop during the late spring and early summer. This is a great drain on the trees and as a result they are greatly weakened. Thus injured during two or three seasons, they may become much less fruitful and less resistant to the attacks of borers, San Jose scale, and other pests.

The fungus attacks the twigs, leaves and blossoms of the current season's growth. The infected leaves become puffed and folded and the edges may curl inward, causing the surface of the leaf to become wrinkled. A purplish tint, very characteristic of the malady, may also develop. The foliage finally turns yellow or brown and falls off. The fungus rarely extends into the previous year's growth.

Sprays applied after growth starts in the spring do not control peach leaf curl. It is therefore essential that they be applied sometime during the dormant season and before growth starts.

**Bacterial Shothole.**—This disease is also known as black spot and, as the name indicates, is caused by bacteria. It occurs on the peach, apricot, cherry, nectarine and plum, though the peach and plum usually suffer most. It is known in all the peach, cherry, and

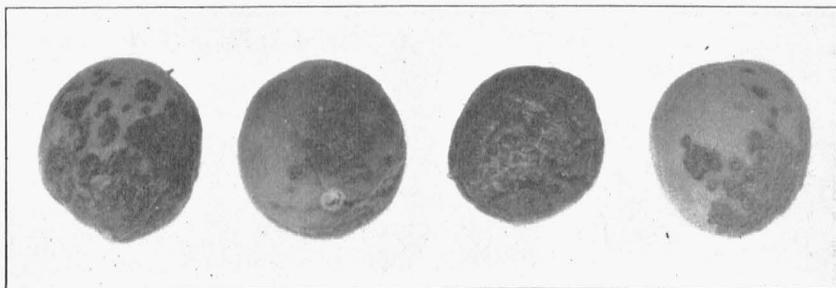


Fig. 12.—Bacterial shothole infection on apricot. The peach fruit is infected in a similar manner.

plum growing regions of the United States. The greatest damage is most frequently done in warm, humid regions and where the trees are weak and suffer from neglect or a lack of cultivation, fertilization, proper pruning, and spraying. The injury to the fruit may be serious and as a result much may fall before ripening.

The leaves also become badly infected. Small circular spots of a dark color appear on their surface and a little later the infected area may break away from the surrounding tissue and leave a small hole, thus giving the shothole appearance. The twigs too are injured, dark-colored spots developing on the youngest growth, and when the disease is serious, the entire twig tip may be blackened and finally killed.

The application of zinc sulphate, 4-4-50, as a spray has been found of value in preventing and checking the spread of this disease. It has been especially helpful when applied as soon as the first indications of the malady occurred and when sprays were continued at intervals of 7 to 10 days. When small numbers of infected fruit occur, they should be picked and destroyed. But if heavy infections occur, this will be useless.

Vigorous, productive trees appear to be more resistant to the disease than weak and devitalized ones. Thus any treatments such as cultivation, fertilization, pruning, and spraying which tend to build up or increase tree vigor generally aid in control.

## SPRAYING PROGRAM

Spraying is the most important orchard practice. Even though the grower may use the best known cultural practices, pruning methods and fertilization systems, if he fails to spray thoroughly and at the right time, he may not succeed. The cost is so small when compared with the returns it will bring that the orchardist can well afford to give the practice his most earnest consideration.

Thoroughness of application is one of the most important essentials in spraying. The right materials must be applied at the right time and in the right way. If the spray does not entirely cover the parts of the plant needing protection, it is not likely to be effective.

**Dormant Spray.**—This is used for the control of San Jose scale, other scale insects and peach leaf curl. Applications should be made in the fall after the leaves have dropped or preferably early in the spring before the buds swell.

For each 100 gallons of spray use for the control of both San Jose scale and peach leaf curl, 12½ gallons of commercial liquid lime sulphur. If an oil Bordeaux spray is desired, for each 100 gallons of spray use from three to four gallons of boiled or cold mix lubricating oil emulsion plus Bordeaux 6-6-100. Furthermore, a commercial miscible oil including a fungicide may be used according to recommendations of the manufacturer.

In orchards where scale is not present, use Bordeaux 6-6-100 or lime-sulphur solution at the rate of 7 gallons in 100 gallons of spray.

**First Summer Spray.**—This spray is made chiefly for the control of the plum curculio. It is applied about 7 to 10 days after the blooming period when the shucks are about half off the young fruit.

Use in each 100 gallons of spray three pounds of powdered lead arsenate with 2 pounds of zinc sulphate and 3 pounds of lime. If curculio is not serious, however, two pounds of lead arsenate is suggested. *The zinc sulphate and lime are added to reduce arsenical injury to leaves, twigs and fruits.*

In orchards where the fruit has been damaged badly by brown rot, add 6 pounds of flotation sulphur or one of the commercial wettable sulphurs at the dilution recommended by the manufacturer. If curculio and brown rot are serious, this spray should be repeated within about 3 to 4 days.

**Mixing 100 Gallons Zinc Sulphate, Lime and Lead Arsenate.—**

The formula for this mixture follows :

2 pounds of zinc sulphate  
3 pounds of hydrated lime  
3 pounds of lead arsenate  
100 gallons of water.

The spray tank is partly filled with water and 2 pounds of zinc sulphate is added. While the tank filling continues, add through the strainer 3 pounds of hydrated lime which has previously been made into a thin paste in a separate container. Then add the 3 pounds of lead arsenate that has also been made into a thin paste. Finish the filling of the tank, allow the agitator to work for a few minutes and the spraying operations may begin.

**Second Summer Spray.**—Within 10 days after the first summer spray, another spray will be needed usually for the control of plum curculio, scab and brown rot. Use the same materials in the same proportions as for the first summer spray. If there is danger of scab or brown rot infection on susceptible varieties, add to the spray mixture 6 pounds of flotation sulphur or use one of the commercial wettable sulphurs at the recommended dilution.

**Third Summer Spray.**—For this spray use the same material in the same proportions as for the second summer spray and apply 2 to 3 weeks later. For early peaches this application will usually be sufficient.

**Fourth Summer Spray.**—Mid-season and late varieties may require this application if curculio is abundant or if rainy weather prevails causing rapid development of brown rot. It is usually made 2 to 3 weeks after the third spray. For curculio alone use 2 pounds lead arsenate and 2 pounds of zinc sulphate and 3 pounds of hydrated lime. If brown rot is threatening, add 6 pounds of flotation sulphur for each 100 gallons of spray or use one of the commercial wettable sulphurs as recommended by the manufacturer.

**Fifth Summer Spray.**—Apply about 3 to 4 weeks before harvest to prevent brown rot infection. Use flotation sulphur or wettable sulphur, 6 pounds to 100 gallons of spray. Omit the lime, zinc and lead arsenate.

**Sixth Summer Spray.**—For further protection against brown rot, a spray may be needed a week or ten days before harvest. Use the same materials in the same proportions as for the fifth summer spray.

**Additional Summer Sprays.**—Where San Jose scale and peach leaf curl are absent, the second and third sprays; that is, the first and second summer sprays, will generally be adequate for early peaches. For the best protection of the fruit on varieties like Elberta, Heath Cling, Krummel, and other late varieties, two or three additional sprays applied at intervals of about 12 to 14 days may be required. This will be particularly true during wet seasons when brown rot may be prevalent. It is important, however, that the spraying work be discontinued about three or four weeks before picking time if brown rot is not threatening. This is to prevent marring the appearance of the fruit and having it discriminated against upon the markets. With brown rot serious, however, sprays may be required up until within a few days of harvest.

**Caution.**—Lime-sulphur solution and dry lime sulphur used in spraying apples should not be used in spraying peaches on account of danger of burning fruit and foliage. Even when used very diluted they may cause much injury. Lead arsenate should be added for curculio control but using more than the amount suggested may cause serious injury to twigs, foliage and fruit. Zinc sulphate and lime reduce the arsenical injury and they should be added when lead arsenate is to be used.

**Amount of Spray to Use.**—The following table indicates the approximate volume of spray solution that should be used for trees of average size at the ages indicated.

Age of Tree	Gallons of Spray
1-3 yrs. ....	¼ to ½ gal.
3-5 yrs. ....	1 to 2 gal.
5-6 yrs. ....	2 to 2½ gal.
6-8 yrs. ....	2½ to 4 gal.
More than 8 yrs. ....	3½ to 5 gal.

## HARVESTING AND MARKETING

The successful marketing of peaches is determined to a considerable extent by the care used in harvesting, handling, grading and packing. The time of picking or stage of fruit maturity will depend a great deal upon the method of selling. For the best size, color and quality the fruits should be left on the trees as long as possible.

If the fruit is sold largely through local roadside markets, it may be held on the trees until it begins to soften. For long distance

shipments by train or truck, it should be picked when hard ripe. This stage develops when the flesh loses its hard character and becomes springy to the touch. One familiar with varieties can usually tell when the fruit is ready to pick merely by looking at it. The ground color of both white-fleshed and yellow-fleshed peaches changes from green to greenish white or greenish yellow when ripe.

Careful grading is of paramount importance for the best prices and if the fruit is run over a grader or sizing machine, it must be at the hard ripe stage or much injury will be done. Most grading is done by hand on sorting tables in a shed or packing house. To build up a profitable trade, a uniformly high quality pack is very necessary.

Since peaches soften and go down rapidly at moderate temperatures, they should be put in a cool cellar or cold storage as soon as possible after picking. This precaution is particularly important if the fruit is to be sent to distant markets.

Successful marketing is largely dependent upon high quality and an attractive uniform pack. Yellow-fleshed varieties usually sell better than white-fleshed kinds. Good size for the variety is also desirable. Several sorts which will furnish a continuous supply of fruit throughout the season may help materially in securing the business of truckers, shippers and roadside markets.