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U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 33.

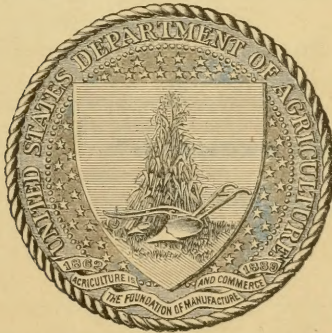
PEACH GROWING FOR MARKET.

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ERWIN F. SMITH,

DIVISION OF VEGETABLE PHYSIOLOGY AND PATHOLOGY.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF VEGETABLE PHYSIOLOGY AND PATHOLOGY,
Washington, D. C., August 1, 1895.

SIR: I have the honor to transmit herewith for publication as a Farmers' Bulletin an article on Peach Growing for Market, by Dr. Erwin F. Smith. Dr. Smith has devoted special attention to the diseases of the peach, and the material which forms the basis of this bulletin has been collected by him in the course of his investigations.

Respectfully,

B. T. GALLOWAY,
Chief of Division.

Hon. J. STERLING MORTON,
Secretary.

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IN EXCHANGE
P. W. Putnam

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PEACH GROWING FOR MARKET.

This bulletin is intended for the man who contemplates peach culture rather than for the one who is successfully raising this crop. The latter needs no advice, but is rather in a condition to give it, and if he who thinks of planting an orchard can find a successful grower by all means let him seek that man's counsel.

WHERE PEACHES CAN BE GROWN.

In what part of the United States can peaches be grown, is one of the first questions likely to be asked by a foreigner or a person unacquainted with the subject. This question admits of two answers. If peaches are desired simply for family use the answer is that they can be grown in nearly every State in the Union and in almost any part of any State, care of course being taken to select the right kind of site, to plant varieties adapted to the climate, and to give suitable winter protection in the extreme North and in high mountain regions. Even in the inhospitable climates along our northern border peaches may be grown out of doors with considerable success if the trees are dug under, tipped over, and covered with straw each autumn, and not uncovered and righted up until danger from late spring frosts has passed. Some of the finest peaches the writer has ever seen were grown in this way at the Kansas State Experiment Station following a winter and spring which destroyed every blossom on unprotected trees for miles around. The growing of peaches in large orchards for commercial purposes is quite another matter, and what follows will relate especially to such orchards.

CLIMATE BEST SUITED TO THE PEACH.

Climate is one of the first considerations in the selection of a place for the planting of commercial peach orchards, and the wide variety we have in the United States affords every opportunity for selecting a suitable location. The old notion that the peach is a tropical tree and must have a warm climate is not well founded. It is a tree of middle latitudes and does not like extreme cold nor extreme heat. The climate of China, which is probably its native home, is in many respects like parts of our own country.

Commercial orchards should not be planted in regions much subject to severe winters or to late spring frosts. It is well also to avoid

regions where the winters are very mild, such as the extreme southern parts of the United States, owing to the fact that the blossoms are apt to be forced out in late winter or early spring and afterwards injured by frosts. It is best to select a climate which is not given to violent extremes of any sort and which has a considerable rainfall, fairly well distributed throughout the year. Thirty-six to fifty inches of rainfall annually is about the proper amount. If the quantity of water precipitated is much below this the deficiency should be made up by irrigation.

SOILS ADAPTED TO PEACH CULTURE.

There are many kinds of soil in which orchards can be grown successfully. At present there are commercial orchards in New England on stony and gravelly soils of poor character; in Maryland, Delaware, and New Jersey, on fertile loams and on very light pine sands; in Pennsylvania, on mountain soils derived from limestones and sandstones; in South Carolina and Georgia, on light pine sands and on stiff red clay lands derived from the local decomposition of granites; in Michigan, on rather heavy clay hills, and also very successfully on loams and light pine sands, even on beach sand so light as to be blown about by the winds; in northwestern New York, on quite a variety of clays, gravels, and sands, forming the old lake bottom of Lake Ontario; in Florida, on flat pine sands; in Kansas, on deep black prairie soils. On all of these soils there are now growing very successful and profitable peach orchards.

In general it may be said that the peach prefers light, warm, well-drained, sandy or loamy land with a clay subsoil, although some very successful orchards have been grown upon rather heavy clays and many on deep sands. Muck soils, heavy clays retentive of moisture, and in general all wet lands and flat, frosty lands are especially to be avoided.

PLANTING WITHIN EASY REACH OF LARGE MARKETS.

In the planting of commercial orchards proximity to large markets and ease of shipment should never be forgotten. An excellent location may be worthless owing to lack of facilities for transportation. There are thousands of acres of land in the United States suitable for peach growing which it would be folly to plant at present owing to lack of shipping facilities. Competing railway and steamboat lines are a great advantage in securing low freights. One of the great drawbacks to successful peach growing in the South until recently, and one which still exists in many parts, has been due to the fact that the growers are not able to secure favorable freight rates.

THE SELECTION OF A SITE.

In selecting a site for the orchard several things should be borne in mind. Some fields on a farm may be much better adapted to the peach than others. In general the higher lands are to be selected rather than the lower, and in northern regions a water front is preferable to an

inland location; in inland regions a hillside with a northern exposure is generally better than one with a southern exposure, this being due to the fact that the northern exposure will somewhat retard the opening of the blossoms, and in this way orchards will escape late spring frosts, while if set in more sunny situations they might be induced to open blossoms a week or two earlier and then be caught by late frosts. In the Michigan peach orchards bordering on Lake Michigan it has been found that the cold air from the lake retards the opening of the blossom a week or ten days, the inland orchards being in full blossom before those on the lake front have opened. The advantage of this in case of late frosts is obvious.

EXTENT OF PEACH LANDS IN THE UNITED STATES.

The fear has sometimes been expressed that the ravages of yellows and other diseases would finally put an end to peach growing in the United States, but there is certainly no immediate danger. In North Carolina, South Carolina, Tennessee, Georgia, Missouri, Arkansas, Texas, and California there are many admirable locations for peach growing as yet unoccupied. California alone could grow enough peaches to supply the whole United States.

PLANTING THE ORCHARD.

Having decided on climate, soil, site, and location with reference to market, the next thing is the preparation of the land for planting. This should be plowed and cultivated as carefully as for a crop of wheat, corn, or cotton. The land should then be cross-marked and holes dug for the trees at the intersections. In general it is best to plant trees not closer together than 20 by 20 feet, especially if the soil is in good condition. In some places, however, where the soil is poor and where the orchards are not expected to last more than a dozen years, the trees may be planted closer—for example, 10 feet one way by 20 feet the other. At the time of planting a map of the orchard showing the location of each variety should be made for future use. The neglect of this frequently causes much inconvenience. The preparation of the soil, the digging of the holes for the trees, and all necessary work in connection with the planting should be done in advance, so that when the trees are received there need be no delay and consequent drying of the roots before planting. If it is absolutely necessary to utilize flat land retaining moisture, furrows should be turned toward the center of 20-foot lands for several years in succession and the trees finally planted on the middle portion of these artificial ridges.

SELECTION OF SUITABLE TREES.

The selection of the trees themselves is a matter of great importance. It is not necessary that they should be very large, but the trunks should be smooth and well grown and the roots abundant and as

little injured as possible. To secure these desirable qualities it is well in ordering trees to have a written agreement touching the points in question, so that inferior trees may be rejected. The roots should not be close pruned except for the removal of mangled or splintered portions, and the holes in which they are set should be of such dimensions that it will not be necessary to twist and cramp them in planting. Care should be taken that they are not set shallow—that is, on top of the earth—nor buried much deeper than they stood in the original nursery. They should not be set into hard earth, nor should the holes be filled with stones and rubbish, but with mellow earth well tramped down. Experience in the United States has shown pretty clearly that peach trees in open orchards do best on peach roots, but if the situation is low and the soil rather heavy plum roots¹ may be substituted, in which latter case the trees should then be closer together, say 15 by 15 or 15 by 12 feet. In the United States peaches are not grown to any extent on espaliers or in houses.

Judgment differs as to whether it is best to set June-budded or August-budded trees. Generally it will be found convenient to buy the trees of some reliable nurseryman, and such are usually propagated from buds set in August, but if the planter prefers to grow his own trees and time is a matter of consequence the seedlings should be budded in June so as to obtain a grafted top the same year.

In the selection of trees special attention should be paid to secure those which are free from fungi and injurious insects. The greatest care should be taken that the trees are not infested by borers, scale insects, or root aphides. Unfortunately trees of this character are sometimes sent out, and orchards planted from them are sure to give trouble. In general it is best to avoid trees grown in regions much subject to peach yellows and peach rosette. In buying trees the planter will do well to deal only with nurserymen who have by honest dealing gained a well-merited reputation. It is better to pay two prices for trees of an assured character than to take as a gift trees from doubtful sources.

VARIETIES TO BE PLANTED.

The selection of varieties is a matter of considerable importance, and no general rule applicable to the whole United States can be laid down. Many choice peaches do well only in restricted localities. Some are liable to be winterkilled or to be caught in bloom by late frosts; some are uncertain bearers; some mildew and others rot badly; some are too tender for long shipment by rail; some ripen at the same time as better sorts, which are to be preferred; some, like the Elberta, have many good qualities but fall short of the finest flavor. A variety for commercial purposes must combine as many good points as possible. The tree must be hardy and productive; the fruit must be of good size,

¹In selecting plum stocks care should be used to secure a variety which makes a good and lasting union. The Marianna should not be used for a stock.

fine color, and superior flavor, and must be firm enough to stand shipment. The grower who contemplates setting an orchard for profit will do well to stick closely to the old and well-tried sorts. If he is planting for home use or pleasure, then he may select a wider range of varieties, including all the choicer sorts, irrespective of other considerations. The man who is in the business to make money can well afford to let his neighbor try all the new sorts. The remarks which follow on the selection of varieties apply especially to the eastern United States, and with the limitations already expressed.

For market orchards the following have been found the most generally profitable varieties: Alexander, Amsden, Troth, Rivers, Louise, Hale, St. John, Mountain Rose, Crawford Early, Foster, Old Mixon, Stump, Elberta, Crawford Late, Reeves, Wager, Fox Seedling, and Beers Smock. These varieties ripen in about the order named. Owing to special conditions which prevail in the extreme North and at the far South some of these varieties would not be successful. For instance, in Michigan it has been found that Crawford Early is very likely to be winterkilled or caught in blossom by late spring frosts, and a number of other hardier varieties—for example, Barnard and Snows Orange—have been substituted for it. The same is true in Connecticut, where many of the old varieties are liable to be caught by late spring frosts and where the Crosby has proved exceptionally hardy. On the other hand, in Florida many of our choice sorts are nearly worthless owing to the earliness with which they bloom. There and in Texas the so-called Chinese sorts—Peen-to, Honey, and crosses—have proved more successful. In middle and upper Georgia the Elberta has proved one of the best peaches. Husted's No. 80 is also an excellent peach for that locality, ripening a few days after the Alexander. In general for that region early varieties are to be recommended rather than late sorts, which, however fine, would come into competition with Delaware and New Jersey peaches on a falling market. In the mountains of Maryland certain late varieties not suitable for the lowlands of Delaware and New Jersey have proved exceedingly remunerative, reaching good size and fine color, and coming in late, when the markets are comparatively empty and prices are high. Among these might be mentioned Salway and Bilyeu.

CULTIVATION OF THE ORCHARD.

The orchard subsequent to planting should be cultivated as carefully as a field of corn. The practice of successful growers varies a good deal in this particular. Some cultivate the orchard from the start without crops; others plant corn or tomatoes between the trees for the first two or three years—that is, until the orchard comes into bearing. There is no objection to this, provided the soil is strong and well fertilized; on the contrary, there appear to be some advantages. There is a choice, however, in crops that should be grown, and on no account

should potatoes or wheat be cultivated in orchards. As soon as the

trees come into bearing no crop of any sort should be grown between them, but each year the orchard should receive a shallow spring plowing and frequent cultivations until July. Most of the growers in the middle Eastern States prefer not to cultivate the soil later than this, but in some regions it is the practice to cultivate almost the year round, and even in Delaware very successful growers have followed this practice, keeping the soil stirred from early spring until late autumn. As a rule deep plowing should be avoided. The peach tree is almost as sensitive to clean cultivation as cotton or tobacco, and no man can expect to be very successful in the cultivation of the peach who allows his trees to stand in sod or fails to give



FIG. 1.—Peach tree in a Maryland orchard, showing customary way of pruning. Stake about 3 feet high.

them clean tillage during at least a part of the season.

PRUNING.

Opinions differ as to the proper method of pruning. When the trees are planted they should be cut back to within 1 or 2 feet of the ground, the entire branched top being removed. The remaining buds will push vigorously, and three or four of these should be selected to form the new top, care being taken that they come out from different sides of the stem and not too close together, but at a distance of several inches up and down the trunk. When the branches from these buds have grown to be several inches in diameter they should support a spreading or vase-shaped top (figs. 1, 2, 3). The proper starting of the new top is a matter of some importance, for if all of the branches have been allowed to grow out from nearly the same point on the trunk, when the tree has matured the giving way of a single limb under weight of fruit or stress of wind is very apt to involve all the rest and split the trunk from top to bottom. Such mishaps can be readily avoided by starting



FIG. 2.—Peach tree in a Delaware orchard, showing customary way of pruning. Stake about 3 feet high.

the main branches at different heights.

For orchards on most of the peach lands of the Eastern States comparatively little pruning appears to be necessary. Some growers practice "shortening in" annually over the whole top, but in general this is not desirable. However, if the tree has made an exceedingly vigorous growth it can be practiced to good advantage, and is generally best done in early spring. The aim in pruning should be to get a tree free from dead wood and full nearly to the main trunk of small branches capable of bearing fruit. Care should be taken in pruning to avoid cutting away bearing branches from the base of the limbs, for by this method long, straggling branches, having fruit-bearing limbs at the top only, are often produced. Some growers prune the trees so that the main trunk shall be 4 or 5 feet high, but in general this is



FIG. 3.—Peach tree in the same orchard as fig. 2.



FIG. 4.—Peach yellows the fourth year.

not to be recommended. It is much better to make them branch low in vase form. The only advantage of the other method is greater ease in cultivating close to the tree, and it has on the whole disadvantages which more than counterbalance, one of which is the greater exposure of the trunk to hot suns and another the increased danger of injuring the bark of the trunk by plows and cultivators.

FERTILIZERS.

Some words are necessary on the use and misuse of fertilizers. Unless the trees are on strong land it will be necessary

as soon as they come into bearing, and yearly thereafter, to give them

each spring or autumn some special fertilizer. There can be no objection to the use of well-composted barnyard manure. Where this is not procurable dependence must be put on clover and commercial fertilizers, taking care always that the latter are obtained from reliable sources. In general the dependence should be on potash salts and phosphates rather than on nitrogenous fertilizers. The peach can be injured readily by excess of nitrogen. Its effect upon the trees is to produce an excessive growth of wood and foliage at the expense of

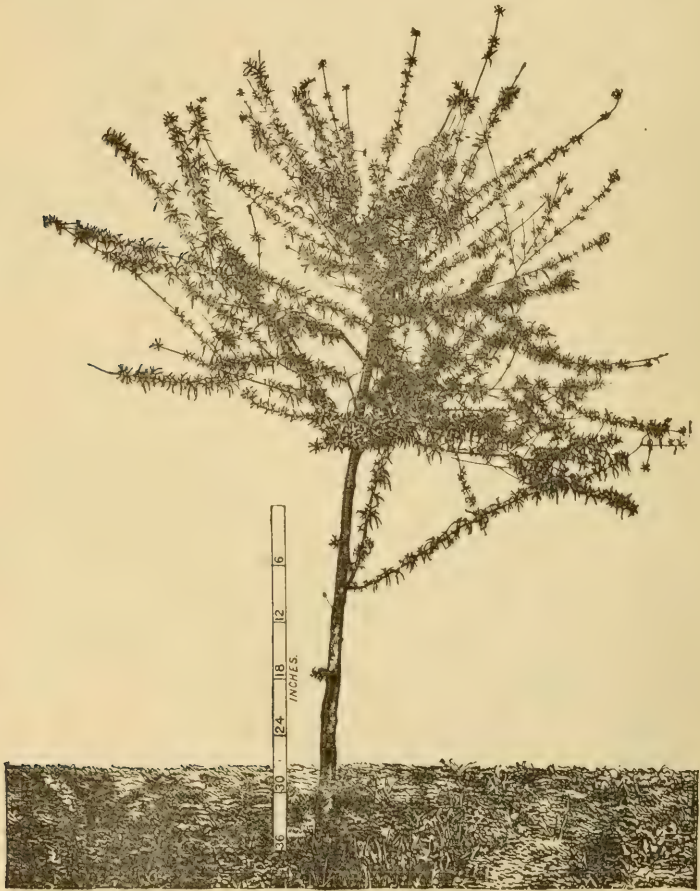


FIG. 5.—Peach rosette. A budded tree attacked in spring and photographed in June.

the fruit. Fifty to a hundred pounds per acre of nitrate of soda or its equivalent in dried blood or sulphate of ammonia is usually as much nitrogenous fertilizer as any orchard requires and many orchards do not need it at all. Muriate of potash, kainit, or sulphate of potash may be used in large quantities without injury. Four to five hundred pounds per acre will do no harm, provided it is not put too close to the trunks of the trees.

The same remarks apply to dissolved rock phosphates and to bone superphosphates and various bone mixtures. They have been applied in large quantities, even as high as a thousand pounds per acre, without injury; generally lesser quantities will suffice. Potash salts and phosphates should be put on and plowed down in the autumn and nitrogenous fertilizers always in the spring. Usually the effects of the latter disappear the same season. Where the grower has opportunity to procure unleached hardwood ashes these also may be used, and can be applied in large quantities without injury. A good home made fertilizer can be prepared by composting broken or coarsely ground bones with unleached hardwood ashes until the bones become soft. The grower who has not tried the effects of regularly fertilizing bearing orchards will be surprised at the difference in quantity and quality of the fruit which will result from careful fertilization. Judicious fertilization will bring large returns in the way of fine crops and

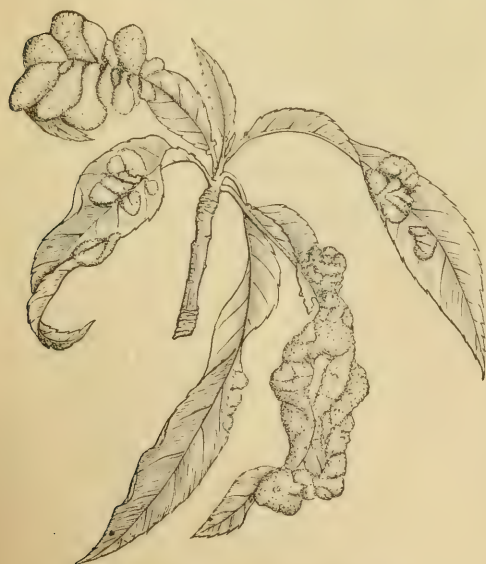


FIG. 7.—Peach curl (*Taphrina deformans*).



FIG. 6.—Peach mildew (*Sphaerotheca pannosa*?) on stem and fruit.

good prices. Even the most barren looking yellow sands without clay subsoils can be made to produce enormous crops of luscious fruit year after year by proper attention to cultivation and fertilization. Where it is impossible to procure fertilizers the grower must depend on prolonged cultivation of the soil and the occasional growth in the orchard of green crops for plowing un-

der, e g., cowpeas, crimson clover, etc. Much can be done in the way of furnishing an orchard food by repeated stirrings of the soil.

FUNGOUS DISEASES AND INSECT PESTS.

The peach tree is subject to various diseases, and no one should venture upon peach growing in a commercial way without having a reasonably good understanding of what the difficulties are in this direction. Peach yellows (fig. 4) and peach rosette (fig. 5) are two of the most destructive diseases. No remedy is yet known for either, but experience seems to show clearly that yellows may be held in check by the destruction of affected trees as soon as they appear, provided all the growers of a community unite in practicing it. In planting an orchard the grower will of course, if possible, select a region free or nearly free from such diseases. These diseases attack all varieties. Mildew (fig. 6), on the contrary, is a fungous disease which appears to be restricted principally to certain sorts—the serrate-leaved varieties. It is seriously troublesome only on the Pacific Coast. In the Eastern States the only remedy yet known is to pull out the affected

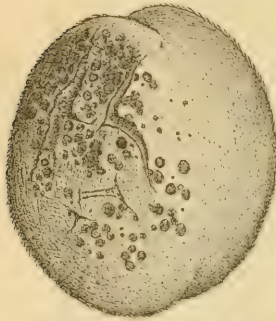


FIG. 8.—Black spot of the peach
(*Cladosporium carpophilum*).

varieties and plant others. Peach curl (fig. 7) is a disease distorting the foliage and causing it to fall in spring. It is widespread and very serious some years; other years it is but little prevalent. This disease also has been most troublesome in California. It is due to a fungus which may be held in check by spraying, as appears clearly from recent experiments made in California by Newton B. Pierce, of this division. The peach cercospora has also given some trouble in California. A fungous trouble known as black spot (fig. 8) often leads to cracking of the fruit and subsequent rot, especially in rainy periods. This is most prevalent on late varieties. Rot is one of the most serious troubles that visit the grower. The disease is due to a fungus, and in wet, hot weather it spreads with great rapidity from fruit to fruit, and even attacks the peaches in baskets on the way to market and while on the fruit stands. It is a disease that winters over in the rotted fruits of the previous year which either remain hanging on the tree or have fallen to the ground, and is to be combated by carefully removing and burning all affected fruit. If this is not done systematically the crop may be destroyed even before it is out of blossom. Spraying with copper fungicides has been recommended for this disease, but as yet the evidence in their favor is not entirely conclusive. Sulphur dust blown into the trees during the prevalence of the rot has also been recommended and appears to have some value. A safe, efficient powder or spray for the prevention of this disease would be invaluable.

Crown galls or root galls are irregular tumors on the trunk and roots. These are often of large size and occur most frequently at the

junction of the root and stem. This disease occurs in many parts of the United States, in nurseries as well as in orchards, and is seriously prevalent in parts of New Jersey, Texas, and California. No remedy is known, and even the cause is yet to be determined. Many growers think the disease is communicable, and in planting orchards it is safe to reject all trees showing any signs of it.

The root knot, which should be carefully distinguished from the preceding, is a disease caused by a small "eel worm" or nematode. The knots (fig. 9) due to this cause are generally much smaller than the preceding, and on microscopic examination of fresh knots it is usually not difficult to find cavities containing the eel worm in various stages of development. This nematode attacks the roots of a great variety of plants and is quite troublesome to the peach in parts of Georgia, Florida, and other Gulf States. The only symptom which the writer has seen above ground was scanty growth.



FIG. 9.—Root knots due to nematodes.

No good remedy is known. Of course trees affected with root-knot should never be planted.

Borers (fig. 10) are exceedingly troublesome in some regions, especially on sandy soils. A great number of washes and various labor-saving devices have been recommended, but the best method for dealing with them is the old one of carefully uncovering the trunk of the tree at the earth surface and digging them out with a sharp knife. In sandy lands they should be attended to twice a year—spring and fall. It is back-aching work, but can scarcely be trusted to an inexperienced hand, who will often do more injury to the trees than an army of

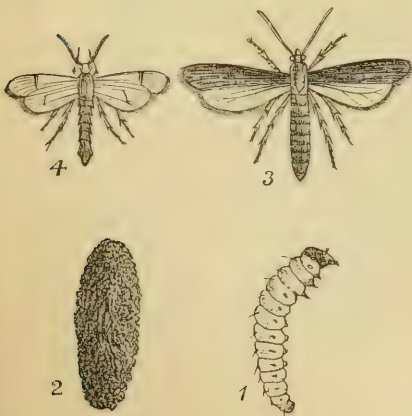


FIG. 10.—The peach tree borer (*Sannina exitosa*).
(1 and 2, original; 3 and 4, after Riley.)

borers. Of labor-saving devices one of the best, especially for young trees, is the covering of the base of the trunk in early spring with straw or cheap Chinese matting, the lower end of which should be buried an

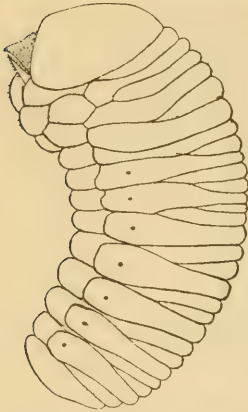


FIG. 11.—Larva of the pin borer (*Scolytus rugulosus*), enlarged 22 diam. (Forbes.)



FIG. 12.—Pupa of the pin borer. Side view, 20 diam. (Forbes.)



FIG. 13.—Pin borer beetle, 20 diam. (Forbes.)



FIG. 14.—Branch of peach, showing perforations of the pin borer, natural size. (Forbes.)

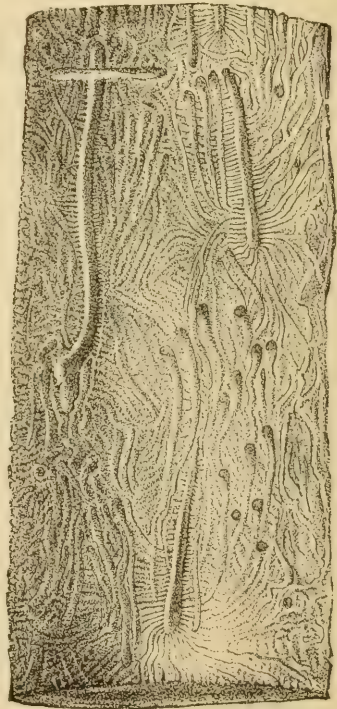


FIG. 15.—Denuded branch showing breeding chambers, larvæ channels, and pupa chambers of the pin borer, natural size. (Forbes.)

inch or two in the soil. This compels the insect to oviposit on the upper part of the trunk and on the branches, where the larvæ are easily found and where they do less general and permanent injury.

The pin borer, a scolytid beetle of European origin (figs. 11, 12, 13, 14, 15), has in recent years become rather troublesome in the eastern part of the United States. No good remedy is known, but some trouble can be avoided by annually removing all dead wood from the orchard and taking care that it is not piled anywhere in the vicinity. This should be done in the fall or winter. The insects prefer sickly trees, but while the larvæ are generally confined to such trees, the mature beetle often migrates to healthy trees and feeds upon them, to their great injury, the gummy trunks appearing as if peppered with fine shot. The most serious depredations the writer has seen on healthy trees were where piles of dead wood from old peach orchards were placed near healthy trees. Two cases in particular—one in Maryland and the other in western New York—were very striking, the injuries beginning in trees near large piles of dead wood and becoming less and less in trees more remote from these piles until all traces of injury disappeared.

Brown or black root aphides (figs. 16, 17, 18) are very common in the sandy lands of New Jersey and Delaware, and also occur in other parts of the Eastern States. The insect sometimes appears on parts above

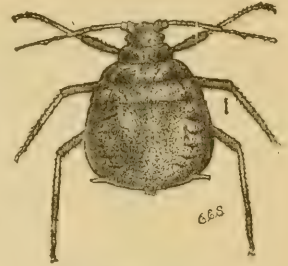


FIG. 16.—Black peach aphid (*Aphis persicæ-niger*), the common, wingless, viviparous form. (Slingerland.)



FIG. 17.—Black peach aphid (*Aphis persicæ-niger*), viviparous, winged form. (J. B. Smith.)

ground, but the chief injury is done while it is out of sight. As before stated, care should be taken that this insect is not introduced into the orchard on the roots of the trees when they are planted, and if there is any reason for thinking that the roots are infested the trees should

either be discarded or else dipped into some insecticide before planting. The underground depredations of this insect stunt the tree so that it dies or makes very little growth for several years.



FIG. 18.—Black peach aphid—joints of antenna: a, of young lico; b, first long joint of winged form; c, second; d, third; e, whip joint; f, top view; and g, side view of a single sense pore. (J. B. Smith.)

Stunted trees may, however, be started into a more vigorous growth by heavy applications of tobacco dust dug into the earth, and they may sometimes be brought out and induced to make a good growth by the application of strong stable manure.

The cureulio (fig. 19) is always present, and no safe remedy is known. It can be depended on to take a considerable part of the crop each year, and in years when the yield is scanty it is sometimes content with nothing short of the whole crop. This is especially apt to be the case when spring frosts have unduly thinned the crop or have restricted it to particular orchards. Arsenical sprays will hold the cureulio in check, but are scarcely to be recommended for the peach, since they are very apt to cause its leaves and fruit to fall and may even kill small branches. If used at all the greatest care should be exercised. In some cases it might pay to capture and destroy the beetles by jarring them onto a framework covered with sheets.

Scale insects have thus far done but little injury to peach trees in the Eastern States; but the enemy is present, and one species in particular, recently introduced from the West Indies (a white scale entirely covering trunk and limbs and quickly killing the tree), is already as far north as Washington, D. C., and is likely to be very troublesome when more generally distributed.

Growers should be on the lookout for this pest (fig. 20) and burn infested trees at sight.

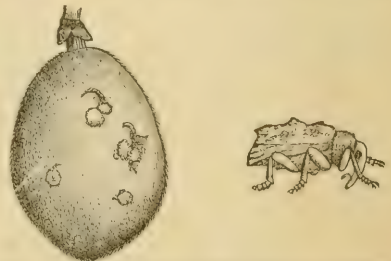


FIG. 19.—The cureulio (*Conotrachelus nemophar*) 1, Natural size (original); 2, much enlarged (after Howard).

SPRAYING, WASHES, ETC.

A word about sprays and tree washes in connection with peach-tree diseases is not out of place. Many have been recommended without proper inquiry as to their merits, and the results of their use have been in some cases so disastrous as to prejudice the whole community against any kind of fungicidal or insecticidal treatment. Twice the writer has known of fine orchards being ruined by the application to the trunks of washes containing tar, soap, and arsenites. In one case the grower was obliged to remove a whole orchard 7 years old, the trees being either killed by the application or injured beyond recovery.

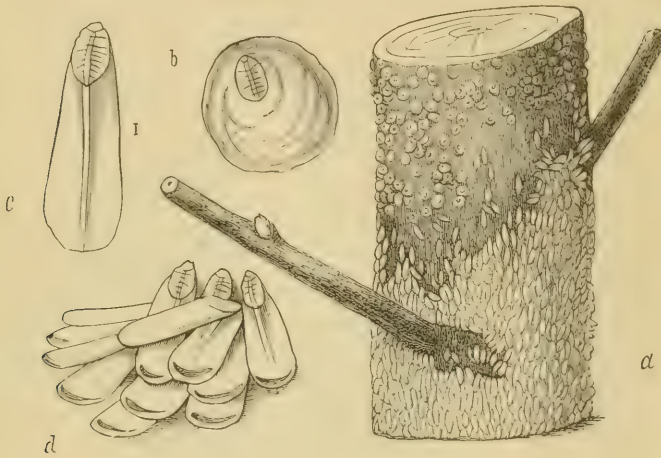


FIG. 20.—The whitewash scale (*Diaspis lanatus*). *a*, section of peach trunk with male and female scales *in situ*, natural size; *b*, scale of adult female; *c*, do. male; *d*, do. in natural position, enlarged (Howard.)

Spraying the foliage for insect and fungous diseases must also be followed with unusual caution. The leaves of the peach tree are very sensitive to acids and to arsenical poisons. However, peach trees may be sprayed with Bordeaux mixture without danger, provided proper care be taken in its preparation. The lime must be freshly slaked and must be in excess.

PICKING AND MARKETING THE FRUIT.

The first crop of fruit is always a matter of special interest, and the inexperienced grower is likely to allow the trees to overbear if not specially cautioned. After the June drop has passed, if the trees are heavily laden a very considerable number of the peaches should be pulled off. It takes much less labor to pick them at this time than when they are ripe, and the remaining fruit will be enough larger and better in flavor and color to more than compensate for this thinning.

Thinning is not very generally practiced by peach growers in the United States, but if judiciously done no work in the orchard will give better returns. Some of the qualities especially desirable in a crop of peaches are size, flavor, and color. These desirable points can not be expected when the tree is allowed to overbear, in which event the fruit is likely to be small and green and inferior in color, and will bring a correspondingly poor price when put upon the market. The extra labor involved in handling a large crop of inferior fruit is also a matter not to be forgotten. Some years thinning will not be necessary, but in years when the trees are burdened with fruit it should not be omitted.

Picking and packing are matters which require the personal attention of the grower. These can not be trusted to hired labor without strict oversight. The peach should be picked and packed as carefully as an orange; should never be poured from basket to basket; should never be bruised in handling; should be carefully assorted by grades; and should be put up for market with an eye to attractiveness, so that the best prices may be obtained. It is not strictly proper, however, to put red netting over green fruit. There is just the right time to pick for market, and this is something to be learned by experience—a day too early and the peaches are green, a day too late and they are overripe and will be soft and bruised and unsalable before they reach the consumer. No fruit requires greater expedition and better judgment in picking and marketing, and in these particulars the peach is strikingly in contrast with the orange, which never worries the grower, but may be picked and marketed any time from November to April, barring accidents from unexpected frosts.

In general peach growers in the Eastern States are very careless—almost indifferent—as to the manner of shipping fruit to market, and the result is that such fruit, while often of a very superior quality, rarely brings as good prices as inferior fruit put up with special pains to make it attractive. The baskets in general use in the Eastern States are too large for retail trade. Growers of peaches on a large scale in New Jersey, Delaware, and Maryland seem to think that they can not handle their vast quantities of fruit in small baskets. Growers in Michigan and California¹ have learned better and send their fruit out in much more attractive form, the result being that they get better prices. Florida fruit also comes to market in good shape, and the Florida crate is one of the best. The choicest grades of peaches should never be sent to market in large baskets, but each fruit should be wrapped separately and sent with as much care as eggs if the best prices are desired. For the canning house and the wholesale trade the Delaware

¹The California crate brings the fruit safely in car load lots as far as Chicago, but from this point eastward, in the hands of express companies, sometimes as much as 20 per cent of the peaches are bruised so as to be unsalable owing to the thin sides of the crate. These packages should be made of thicker material or else should have a partition through the middle.

basket is undoubtedly one of the most convenient forms for shipment. Inferior fruit should be kept at home and dried or fed to the pigs. The unprofitable handling of a large part of such fruit might be avoided by thinning, as already suggested.

On some accounts it is highly desirable that the fruit should be transported by water if the distance is not great and the journey can be made rapidly, otherwise it must go in cars and the extra jar must be compensated for by rapid delivery and sale. Of course when peaches are shipped long distances in warm weather particular pains must be taken to see that the cars are properly iced and that there are no delays in transit, and when they come from the Pacific Coast they must neces-

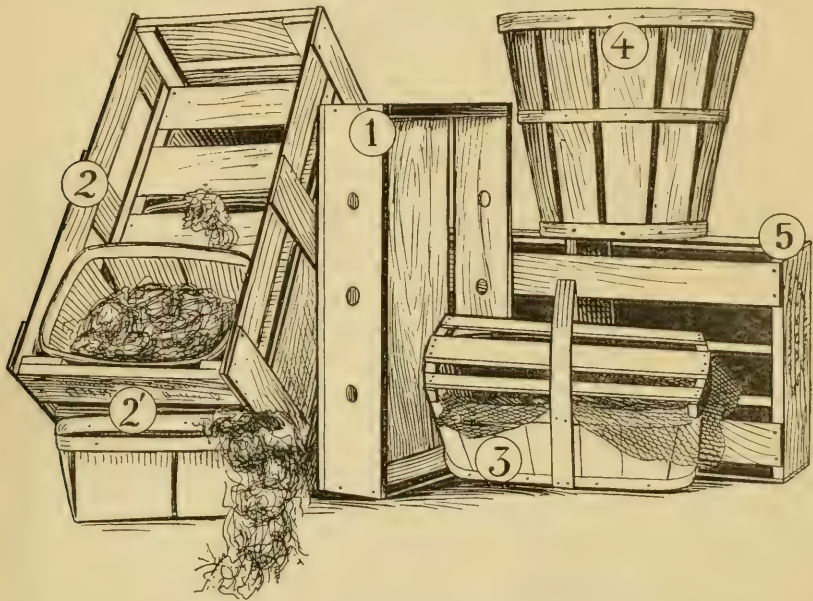


FIG. 21.—Peach crates. 1, California; 2, Florida; 2', single basket from same; 3, Michigan; 4, Delaware; 5, North Carolina.

sarily be picked green. Eastern growers have an advantage over those on the Pacific Coast in the much finer quality of fruit grown and in being near to market, so that their peaches may be allowed to ripen on the tree, something very necessary to the full perfection of this fruit; but these great advantages are largely lost by carelessness in packing and shipping, and consequently the California peach growers are generally able to command a better price in New York markets than Eastern growers. Mention has already been made of the desirability of planting orchards where competition in transportation exists. This affords to growers of the choicest fruit a reasonable guaranty that the whole of their profit will not be swallowed up by exorbitant freight rates.

GLUTS IN THE MARKET.

In years of great abundance another serious cause of loss is due to what are known as "slumps" in the market. Most Eastern-grown peaches find their way to a few large markets, where prices necessarily break down when a large quantity of fruit is suddenly thrown upon them. At times when a glut exists even the best fruit will scarcely pay for the baskets in which it is shipped, much less for transportation, picking, packing, etc., and this may happen several times during the season. This ruinous state of affairs is not attributable to overproduction, but to maldistribution. The crying need in the Eastern States is for a system of distribution which will prevent gluts in the market. It is well known that at the very time when these "slumps" occur in New York and other large centers hundreds of smaller towns in the interior can not procure peaches at any price.

The writer has frequently paid 5 cents apiece for quite ordinary peaches in interior towns in New York and Pennsylvania and farther west when the finest peaches could scarcely be given away in New York and Philadelphia. This suggests that much loss could be avoided by a well-organized system of distribution. Just how this shall finally be brought about is a difficult problem to solve, but it is certainly one of the things which peach growers must study to accomplish. It is worth the earnest consideration of pomological associations, boards of agriculture, and all who are interested in growing peaches.

It would seem that there might be some arrangement with the local dealers in many of the smaller towns in the Eastern United States and with large dealers in the cities whereby telegraphic advice could be sent every day during the season to some centrally located place in each peach region and thence communicated to all the growers. In this way it would be known where the market was full and where empty, and shipment could be arranged accordingly. Cooperation is the keynote of success. Indeed, without hearty cooperation and compact organization little or nothing can be accomplished, and yet to secure and maintain such organization presents the chief difficulty. Home consumption is another way to avoid gluts in the market; also the judicious use of canning and drying houses.

HINDRANCES TO PROFITABLE PEACH CULTURE.

One of the chief difficulties in the way of successful peach growing is undoubtedly the ignorance of the grower. The man who will not grow choice varieties, prefers seedlings, will not properly thin his fruit, will not properly grade it, will not keep the culls at home, will send to the market when he pleases and where he pleases, and who will not combat insect and fungous pests, can not make peach culture profitable, and the only thing for him to do is to go out of the business.

Many of the serious troubles which beset growers can be measurably overcome by intelligent foresight. The thing which is least within the range of control is the weather; yet, while growers can not entirely avoid the mischief of spring frosts or the results of hot and rainy weather, even these may be guarded against. The judicious selection of advantageous orchard sites, and, in special cases, smudges and sprayings with water will tend to avert the former, while prompt removal of rotting fruit, extra prompt marketing, and particular care in packing for shipment will do much to remedy the effects of the latter.

In conclusion it may be said that the labor involved in peach growing is great and the discouragements not a few. The proportion of failures to successes is at least as ten to one, and very few indeed are the men who become "peach kings." The man who is not full of energy and does not enjoy seeing the sun rise every day in the year had better venture his money in some other business.

NOTE.—Since the first edition of this Bulletin fruit growing in the Eastern United States has been seriously threatened, owing to the introduction and spread of the San José scale (*Aspidiotus perniciosus*). This scale now occurs in hundreds of orchards in the Eastern United States, and has been reported from quite a good many nurseries. This very general dissemination has been traced principally to two large nursery firms in New Jersey. These firms imported infested trees from California in 1886 or 1887 and sent out scale-infested stock for a number of years. The scale has been reported from the following States: Massachusetts, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, Georgia, Florida, Alabama, Louisiana, Missouri, Ohio, Indiana, Illinois, Arizona, New Mexico, California, Oregon, Washington, Nevada, and Idaho.

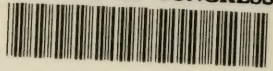
The San José scale is not restricted to the peach, but attacks a great variety of trees and shrubs, including all our common fruit trees, and is generally conceded to be by far the worst scale in the United States, if not in the world. It has seriously injured many orchards in California and has already destroyed quite a number on the Atlantic Coast. Great care should be exercised in purchasing stock, and no tree from an infested locality should be planted without rigid inspection. Infested trees should be grubbed up and burned as soon as discovered, even if it requires the taking out of whole orchards. Peach trees are now so cheap and easily grown that it is scarcely worth while to take any risks with uncertain washes and sprays. For further information consult Bulletin No. 3, N. S., Division of Entomology, United States Department of Agriculture: *The San José Scale*. By L. O. Howard and C. L. Marlatt.



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