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The Peach Varieties and Methods of Orchard Management

Kenneth D. Rockwell

1912

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THE PEACH

VARIETIES AND METHODS OF ORCHARD MANAGEMENT

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FOR B.S. in Agr.

KENNETH D. ROCKWELL

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THE PEACH.

VARIETIES AND METHODS OF ORCHARD MANAGEMENT.

In the following discussion the logical beginning would seem to lie in a brief description of the several groups under which peaches are classified and a mention of the more important varieties as they fall under these various headings. In a special report of "The American Pomological Society" for 1904-05 R.H.Price has described these five groups as follows-

I. "Peen-To;- Tree rather large, vigorous, branches willow-like, come out at an angle of about forty degrees; flowers large, appear frequently in January in the states bordering on the Gulf, bloom at a low temperature and very irregularly; winter buds small, oblong, rather sharp pointed, grow close to the limb; leaves narrow, long and inclined to hang on all winter; fruit much flattened; skin white mottled with carmen; flesh white; flesh sweet but has a peculiar almond taste; seed nearly round, much compressed at the ends, corrugations small, somewhat round. This race takes its name from the variety Peen-To which is its ancestor-was imported from Australia by P.J.Blakmans of Georgia in 1869, but its origin has been traced to China. This variety and some seedlings from it fruit well in the northern part of the citrus belt. Seedlings of Peen-To fruit better farther north than the parent variety. Angel

and Waldo are seedlings of Peen-To.

2. South China;-"The parent of this race is the variety Honey.The tree is a medium sized grower,branches come out at an angle of about fifty degrees and curve upward,less willow-like than the Peen-To;winter buds very prominent round to oval,two or three buds often occur at the same place,occasionally projected axillary buds occur;buds occur on the limb all along to the tip leaving no vacant spaces as we see in the"Persian"race.The dark red buds stand out fromtthe limb at an angle of about fifty degrees; leaves are small,slightly trough shaped,in the fall the color becomes slightly brownish red,foreshowing the color of the fruit in the young trees;hang on late in the fall;blossoms veryblarge and profuse,very resistant to cold.A sure bearer in the Gulf States,requires short seasons of rest.Fruit rather small,slightly oval and a little flattened;suture very deep at the base but only extends one third the way down,apex long and recurved,has peculiar honey sweet flavor;seed is oval with apex slightly recurved,corrugations slight,prominent flange on one side. Honey,which is the parent of the race is supposed originated in Southern China,hence the name of the race. Was imported from China by Charles Downing in 1850,and fruited for the first time in America under the care of Henry Lyon of South Carolina.Was introduced for the first time in America by P.J.Bercksmans in 1858.Valuable Americaan

seedlings from Honey are Pallos,Climax,Coleman and Early China.

3. Spanish;-"The parent of this race is unknown but the type is supposed to have been brought over by the early Spanish Settlers.

Tree is about the largest we have.The "Indian" type of this race has much"Persian"blood and these trees are not so large.Limbs large,long and spreading,inclined to droop down except on the"Indian Type";buds larger than those of South China and nearly always occur singly on the new wood; oval and project out from the wood at an angle of fifty degrees;short naked places occur on the bearing wood, color of the buds is dull greyish;leaves small,flat,hang on late in fall,stay green during severe droughts,turn slightly yellow in the fall,foreshadowing the color of the fruit in a young tree;blooms often large and profuse.The fruit ripens very late,nearly always downy,color tinged with more or lessyellow,nearly always acid and of low quality. The"Indian"type is usually streaked with red,sometimes blood red under the skin.Seed is oval,nearly flat,apex prominent,corrugations very large and wide;at the base they run more longitudinally than in any other race,flange oftenoccurs on one side.

A heavy bearer and sure cropper in its proper zone.The "Persian"blood in the"Indian"type carries it well up into the Central States.The seedlings one usually sees bearing such loads of small peaches along the fence and road sides

most frequently belong to this race.The following are some varieties belonging to this race- Cobbler,Columbia,Druid, Galveston,Guadalupe,La Reine,Lulu,Onderdonk,Sanders, Texas and Victoria.

4. North China;-"The parent of this race is Chinese Cling which is supposed to have originated in North China.

Tree is a medium sized grower,blooms nearly always, large buds,slightly larger than those of"Spanish"and more pointed,many latent buds occur near the tips of the limbs,in the Gulf States especially,stand out at an angle of about forty-five degrees;branches are short thick and stubby.Leaves are very large and flat,near fall in the southern states especially the foliage turns a peculiar pea green and by this character alone one can easily recognize Chinese Cling and its seedlings in an orchard at once.Fruit the largest,dead white with small red blush on one side, ripens first on the outside,sometimes the skin may be easily stripped off by hand.The seed is round and irregular somewhat more prominent on one side.It is by far the most important race known to the peach world.Such noted varieties as Elberta,Maimie Ross and Carmen belong here.These go into the great markets of the north by the solid train load. Chinese Cling was imported by Charles Downing and Henry Lyon in 1850 was the first to fruit it.A second importation was made in 1860 by William A.Spottswood of the United States Navy.From this later importation originated such varieties as Lee,Stonewall,and Spottswood.Some

others belonging to the race are Albert,Bernice,Becquett Free,Family Smock,and Thurber.

5. Persian;-"The parent of this race is unknown but it is supposed to have come from the high altitudes of Persia.Tree medium sized to large,limbs short and thick with long naked places,wood highly colored in fall and winter foreshowing a highly colored fruit;bloom varies in size;foliage sheds early,needs long period of rest; fruit most highly colored and of best quality;stone more flattened at the base than any other,corrugations prominent at the apex but seldomextend to the base as in the Spanish.Well known varieties belonging to this race are;- Alexander,Amsden,Amelia,Crawford,Downing, Golden Drop,Hale Early,St.John etc.

The bulk of northern orchards has come from this race. However since such dreaded diseases as yellows and rosette have destroyed large orchards of the extreme northern states the tendancy of such growers now seems to be to go farther south where North China varieties are adapted"

SOIL;The peach will grow on nearly any soil but in the commercial growing of the fruit a light,warm,sandy soil is essential.While the trees will grow taller and live longer on the heavier loams,the high color and rich flavor of the fruit will be lacking and can only be secured on the lighter soils.

In connection with a light soil good drainage is essential in peach culture.Drainage might be called the limiting factor for peaches will grow on the poorest lands providing they be well drained but will not grow on the best if they be wet."Wet feet"are fatal in the growing of peaches.The ideal soil would be a light sandy loam with a clay subsoil.Care should be taken to avoid hardpan. If these conditions can be obtained better results will follow even if the land is poor in plant food than if the orchard be planted on very rich land of a heavier nature.

PREPARATION OF THE SOIL;"Well cleared and well cultivated land is preferred by peach growers.Cultivate the field in some crop suitable to the locality for two or three years before planting the peaches.This takes the excessive nitrogen and general rawness out of the soil. Old worn out land should be sown to clover or cow-peas or some cover crop and plowed under before planting.If the land is extra rich crop with an exhaustive crop. Generally it would be poor as land best suited for peaches is generally poor and the green manure and cover crops would be advisable.Where feasable it is better to grow potatoes or some truck crop especially if the latter requires manuring and fertilizing and thus bring the land into a garden condition.Most soils require deepening in order to grow peaches and other fruits successfully.

Where poor land is being made fertile by plowing under covercrops this can be obtained by plowing an inch deeper a year for two or three years. Subsoiling is of great benefit in preparing land for peaches. Tillage should be as deep as possible before the trees are planted for afterward there will be no opportunity for deep plowing. All wet spots should be underdrained."*

Land that has never been in peaches is very much better than land where an orchard has grown and been pulled out. This is so true that many growers advise against planting on such land at all. This sentiment is due to certain parasites, such as root aphis, rot-root fungi, nematodes, etc, which, however insignificant upon the roots of the mature trees, would mean certain death to the new planting. If, however, after the land has been cleared of the old orchard, crops be grown for two or three years, these pests will die and the new trees can be planted in safety. At the same time if the land is low in fertility it can be improved and a double result be obtained.

SITE;-In connection with the soil the location must be taken into consideration. The peach blooms very early and the flowers are liable to be killed by late spring frosts. The site, therefore, should be one that is practically free from these frosts, or one where the

*
Year Book, for 1902, by M.B. Waite.

blossoming would be checked.Late spring frosts are less likely to occur near large bodies of water.The water equalizes the temperature and retards the bloom.Inregions where these conditions are not to be obtained,a northern slope or some other backward site should be chosen.

PLANTING THE ORCHARD;-The distance apart at which peaches are planted varies with the soil,climate,and with the ideas of the individual planter.The standard distance is 20 by 20 feet.Some growers in the north advocate 18 by 18 and in the east Mr.J.H.Hale approves of planting as close as 13 by 13 feet.Where the greatest yield per acre is desired in the first few crops,distances under 16 feet are satisfactory but after the first few yields the trees become crowded and the ultimate results are not as good as where the trees are planted 20 by 20.The shorter distances are advocated by growers who believe the life of the orchard to be ffom twelve to fifteen years and therefore plan to make it pay while young.In many cases this is true and orchards succumb to insect pests and diseases but in regions where these troubles are not predominant the larger distances are to be preferred.Some planters favor the rectangular system and this method has many advantages over the square system.

The rectangular system consists in the planting of the trees at a distance of 18 by 20 or 16 by 18 or

according to any such system that the individual has. By means of this system the advantages arising from both the close and standard square methods by planting the trees at say 12 by 16 and then after they begin to crowd by taking out the 12 foot row leaving the orchard planted 16 by 24.This is the filler system applied to peaches.The trees begin to crowd at about four or five years,however,and ordinarily it would not pay to go to the increased trouble and expense involved in this system. The rectangular system of planting is rather convenient, however,for it gives a better opportunity for cultivating, spraying,and hauling between the rows.The square system seems to be more popular and under ordinary circumstances would probably be the more satisfactory.Having decided upon the system of planting and the distances at which the trees are to be planted the actual work of setting the trees follows in order.

SETTING THE TREES;-In the setting out of orchards there are a great many methods in use.In fact nearly every grower has either systems of his own or modifications of other methods which amount to the same thing.There are,however,certain methods which are more or less standard.Probably the most common of these is the furrow system.

The Furrow System consists in the measuring off of the land to be planted and the placing of a stake at the

end of each row around the orchard.Then,by lining in with the stakes,the field is checked off,with a one horse plow,into squares or rectangles,according to the planting system that is used.The trees are then planted at the intersections of the furrows.With a skillful man at the plow,and providdd the field is fairly level,the planting can be very accurately done.It is very evident,however, that if the land is undulating the system will not work out very successfully.

The other methods of locating the trees can go unmentioned,except one which is most suitable under all conditions and in all cases the most accurate.This is commonly called the stake method and has been very ably described by Mr.C.D.Jarvis of the Storrs Experiment Station at Storrs Conn.The following is quoted direct.

"The determination of the correct position of the trees is often one of the most difficult tasks in connection with the starting of young orchards.The problem is a more serious one when large areas are considered and when the location selected is on irregular and uneven land.For convenience in cultivation and also for the sake of appearance,the trees should be set in such a way that they will be in line in all directions.With this in mind it is usually advisable to indicate the position of each tree by a stake,and to lay out the whole field before

setting the trees

In square or rectangular fields the stakes for a row of trees on all sides of the orchard may be set by measuring the distance into spaces of the required length; for example if the trees are to be set 20 feet apart each way on the square method, the stakes are placed every 20 feet on all sides of the field. The position of the intervening trees may be readilly determined by sighting between the stakes on the opposite sides. On small acres the land may be marked off with a line connecting the opposite stakes, in both directions. The point of intersection of these lines indicates the position of the trees. On larger areas the position of the trees is usually determined by sighting across the field or by the use of a modified corn marker. Sometimes a plow is used to open up a furrow in both directions.

Before attempting to lay out a field that is irregular in outline it must be squared off in such a way that the rows running across the field will be at right angles to the rows running in the other direction. A base line running along a straight side of the field is first chosen. If there is no straight side, a straight line running along the longer side of the field may be established. At right angles to this straight line and near each end may be projected two other lines. On small areas this may be done with two straight edges and a carpenter's square

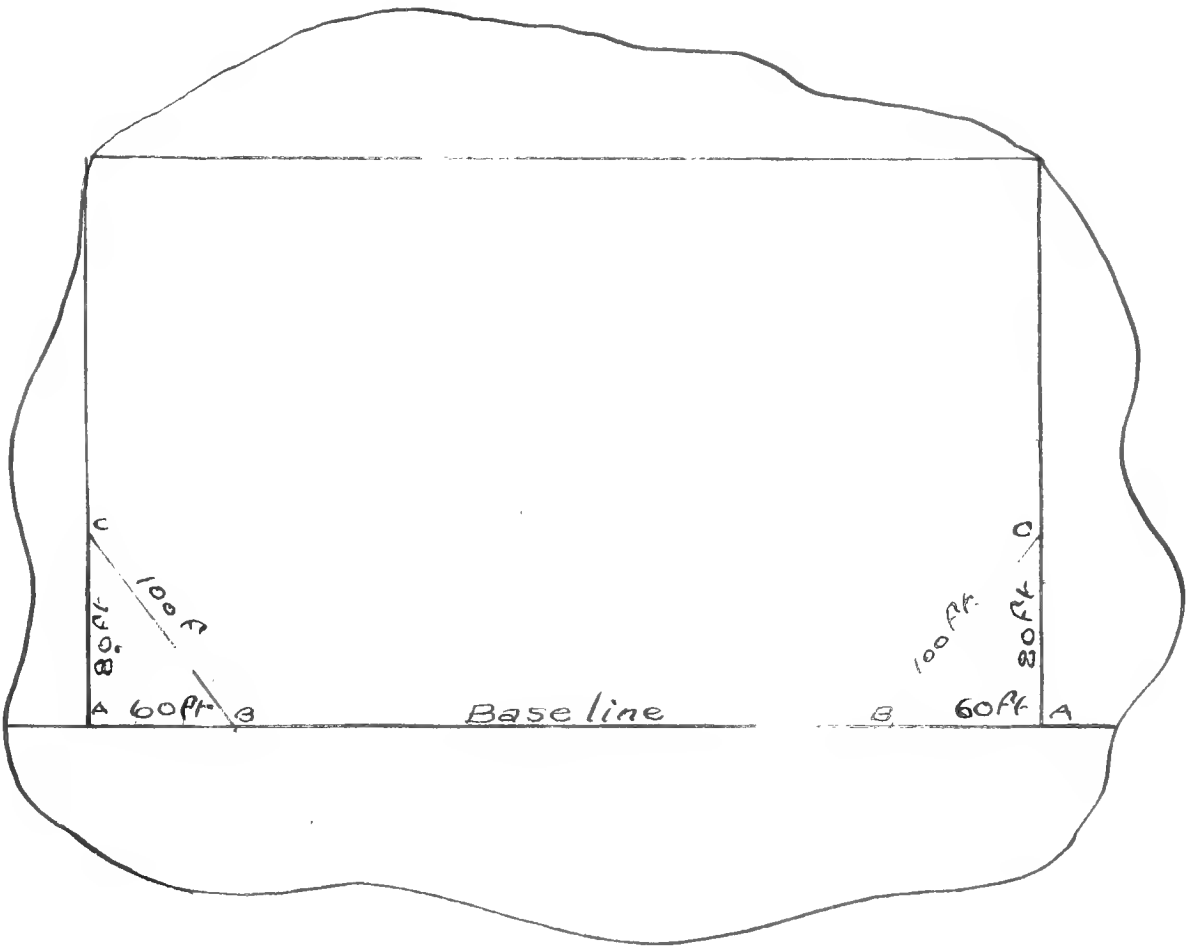

Diagram to Show Method of an Irregular Field for the Stake Method of Planting

but on large areas this method is not sufficiently accurate. The best and most reliable method is that described in the accompanying diagram. At the desired point (A) on the base line a stake is set and exactly 60 feet from this on the same line another stake (B) is set. By stretching a string 80 feet long from the first stake (A) and another string 100 feet long from the second stake (B) and by bringing the two ends together at (C) the position of the third stake may be determined. Then the desired line is drawn from A through C to the other side of the field. The same operation is repeated near the other end of the field. The distance between the rows, one way, may be marked off on the projected lines and the distance between the rows, the other way, may be indicated on the base line and also on the line parallel to it on the other side of the field. The rows in both directions can be extended to the marginof the field.

On hilly land it is often very difficult to get the trees lined up properly. In such cases telephone wire is sometimes employed to stretch across the field. To indicate the position of the trees a smaller wire may be wound around and soldered to the larger one at the required distances. The telephone wire is stretched tightly and a stake set at every point indicated by the soldered wire. In the hollow places where the wire is high above the ground, a plumb-bob may be necessary to find the exact

Position where the stake should be set.Twine,on account of its stretching character,is unsuited to this purpose. The main point in measuring off uneven land,is in keeping the measuring line level".

PRUNING:-There is a reciprocal relation between the absorbing capacity of the roots and the food producing power of the leaves of a growing tree.A strongly developed root system makes a healthy top possible but the vigorous root system could not have been attained without the food which is first prepared by healthy foliage.

In taking a tree from the nursery row a large proportion of the original root system is left in the ground.In this way the balance between the top and the roots is broken and the branches must be correspondingly reduced while the new roots are developing.Both root pruning and top pruning are generally considered by growers to be helpful to young trees.The rate,however, at which the cutting back isddone is much disputed, some growers advocating extreme pruning and others very little.Experiments have shown that in different regions different methods produce the best results.

Some few years ago H.M.Stringfellow of Texas devised a system of root pruning which has since become known as the Strinfellow or stub-root system.It cuts off practically all the roots,leaving only stubs an inch or two long,and it cuts back the top to a mere stump twelve to eighteen inches long.In his book entitled "The New

Horticulture",says,"cut back just below the collar and just under the first good side roots".We should,"not leave any length of the main or tap root with side roots cut back ".

Soon after Stringfellow offered this extreme method of pruning young trees the Deleware Experiment Station ran a series of tests in the endeavor to determine the relation between the rate of pruning and the general development of the young trees.At both Newark and Seaford three groups of Early Crawford trees were set out,eighteen in a group.The roots of one third were pruned to a length of eight to ten inches,another third to a length of three inches,and the last third were pruned according to the ideas of Stringfellow.At Newark the soil is a heavy well drained clay loam with a stiff subsoil eight to ten inches below the surface.At Seaford the land is a warm well drained sandy loam with a stiff subsoil two feet below the surface.

At Newark on the clay soil the results were as follows-Eight inch roots;Seventeen lived all being in first class condition.The new roots were diagonally downward and there were no tap roots.The roots arose largely near the ends of the old roots,a few from the body of the tree.These came into leaf the earliest of the three groups.
Three inch roots;eighteen lived,all in first class condition They were larger than the long rooted series.The new roots were diagonally downward,no tap roots.The roots arose

largely from near the ends of the old roots ,although more were from the body of the tree than in the first case. These trees came into leaf a few days later than the longer rooted.

Stub pruned;Of the eighteen but ten lived,five were second class,one was third class and four were worthless.The new roots were not more downward than the others and there were some distinctly lateral systems.As a lot these trees were distinctly inferior.

At Seaford on the sandy loam the results were slightly different.

Eight inch roots;Eighteen lived and all were first class. The new roots grew strongly downward,there wereno tap roots and the newcroots arose largely from near the ends of the old roots.The roots were more downward here than at Newark.

Three inch roots;Eighteen lived,seventeen of which were in first class condition.There were no differences to be noticed in this group from the group with the longer roots.

Stub pruned; In this case seventeen lived,only two of which were first class fifteen being worthless.The roots were smaller as were also the tops.The tops were well formed.The new roots were not more downward than the others. Except with the two the roots were fewer and smaller than where the trees were pruned differently.The roots in all three tests were more downward than at Newark.

In 1896 at the Cornell Station a similar experiment was carried in which five groups of twenty Horton Rivers peach trees were pruned in the following manner.
A.Roots normal,six inches long.Of these sixteem lived.All the roots had a strong downward tendancy.The average weight of the trees in December 1897 was seventeen pounds.
B.Roots cut to four and one-half inches long;Of these eighteen lived.These were the strongest and most thrifty of any of the groups.The roots all struck downward.
C.Roots cutbto three inches long.Fifteen lived.Ten had downward growing roots and five had very flat or horizontal systems.
D.Roots cut to two inches.Of these nine lived,five having downward growing roots and five having the horizontal.roots.
E.Roots cut to one inch long.Twelve lived,six had downward roots and six had flat roots.The average weight was one pound and fourteen ounces.

From these two series of experiments it seems to be very clear that the medium method of pruning,and not the long or the short systems is the one to follow.
In New York we have seen that the trees whose roots were pruned to four and one-half inches gave the best results, while in Deleware the most satisfactory length was found to be three inches.There are of course exceptions to every rule and many exceptions to every rule that is laid down for the fruit grower,but it may be safely said

I think that the roots should be cut to a length of from three to five inches.When the growing season starts suddenly as is the ease in the northern states,the root system is called upon more strongly than in the southern districts where the season is slower.It follows then that more length of root should be left in the north than in the south.

"The peach usually bears on the shoots of the previous year;therefore heading in thins the fruit.Heading-in also induces a growth of new shoots,and thereby increases the fruit bearing wood.Heading-in is also advantageous in removing winter-injured twigs.Notwithstanding these advantages,heading-in of the peach is a question of local application and of training the top to some given form. It is more generally practiced on heavy lands,on which the trees grow exuberantly,than on sandy lands.In the commercial peach regions,trees are rarely headed-in at least not after they begin to bear.If heading-in is not practiced,the chief attention to be given to the tree after the general framework of the top is formed,is to trim out the weak and dead interior wood by means of hand shears.This fine wood dies or becomes weak after bearing and should be removed."*

"Young peach trees allowed to grow at will at the first season after setting should have their three or four leading branches make a growth of from two and a half to four feet each.Fall and winter pruning has not been satisfactory with us,and therefore all pruning is

delayed untilllate winter or early spring.In the early days it was my custom,in trimming trees one year planted,to cut branches back to within twelve or fifteen inches of the mainsstem;but as this tends to form rather a toom close head for the foundation year,I now prefer to leave the first season's growth two and one-half to three feet long,and to reserve the severe shortening-in for the second third and fourth years.Besides the main branches to be cut away the first year,it will be necessary to cut off some lateral branches entirely and to shorten others somewhat.With liberal culture and manuring,each of the three or four main branches will,in the second year,throw out from their tips two or three leaders,each of which should make a growth of three to four feet.Early in theespring following prunigg should begin,with the object of building a broad,low,open headed tree.This is accompolished best by first thinning out all crowding inside branches and leaders,and shortening-in all otherd ffom one-half to three-fourths of the new years growth,the closest cutting being in the central top.The third years work should be on the same general plan;and it will often be found,unless the second years work was exceedingly well done,that some of the third years work ought to have been done then.The object of the first three years pruning is to establish a well-formed tree best suited to forcing the greatest amount of fruit to the highest perfection at the least

possible cost!

"After the right sort of a tree has been established and trees have reached a bearing age,pruning for a year or two may be continued,partially on the line of a correct tree form,but more particularly as relating to fruit production.And so right here we abandon late winter and early spring pruning,and do most of the work after the fruit-buds begin to swell,so that we can judge on inspection which are alive and which are dead.In years when very few buds have survived the frosts of winter,pruning should be done with the object of retaining a great majority of the living buds,regardless of tree form,which can be somewhat righted the next year.Of course,in years when a good number of buds are found alive,pruning can be continued for form,but as the tree grows older,less and less pruning will be required.The methods here described have in their early years given handsome,even headed,well rounded trees which have been exceedingly profitable,although in later years they have become less shapely.As it is results, fruit results and dollar results ,that count in commercial peach culture,we judge the method to be a decided success, at least for sections where winter-killing of fruit-buds is the greatest drawback to success,and we shall follow it closely till some better plan presents itself.There should be no off-year with peaches,except when fruit or blossom buds are entirely killed by frosts.Right culture

proper feeding and pruning should each year stimulate enough new growth to furnish far more buds than are required for abundant crops".*

"The methods of pruning peach trees are the occasion of much discussion among pomologists.The differences of opinion turn chiefly about three practices,-short trunks with rapidly ascendingnbranches,high trunks with more horizontal branches,and shortening-in or heading back tha annual growth.Each of these three methods of handling or training peach trees had ardent advocates and pronounced opponentd.It is probable that each system has distinct merits for particular cases.I believe that the nature and fertility of the spil are the dominating factors in these opposing methods.A system of pruning which fits thehslow growth and hard wood of sandy soils may not be adapted to the rapid growth and heavier tops of trees on strong soils."**Perhaps the system that would be most g generally in accordance with the various methods would be somewhat as follows;-

Buy one year old trees.Plant in the spring.Trim the roots to about four inches.Start head at six inches to two feet according to conditions.Prune all of the side branches to stubs one or two inches long.Choose from the adventitious buds the four or five buds which are to form the frame work of the tree.The second spring all branches one-third to one-half of their length.The third

*J.H.Hale.
**L.H.Bailey

fourth and fifth years the head should be kept well opened. It is very important in peach culture to keep an open head,and if the pruning is carefully done in the first few years,the later work will greatly simplified.

CULTIVATION:-The only practical method of caring for an orchard is clean cultivation.With peaches especially this is very important and the practice should be strictly fOllowed.Some growers advocate a hoed-crop for the first two years,between the rows,but it is doubtful as to whether even this is advisable.After the second year however, the orchard should be kept claan.In the spring the ground should be broken with a light plow,deep plowing not being necessary and after that an ordinary cultivator may be used. Several cultivations are advised during the season.In July or August a cover crop is planted.The exact time of plantimg will depend on the region and general conditions prevailing.Cover crops serve three purposes in the orchard. They protect the soil.enrich it,and hasten the seasonal maturity of the tree.Many growers do not approve of using manure in the peach orchard,but instead use commercial fertilizesr to obtain the necessary Potassium and Phosphoric acid and secure the nitrogen throught the legumes planted as cover crops. They maintain That the nitrogen in the manure causes an excessive growth of woody tissue at the expense of the fruit.Still others doenot believe in leguminous cover crops for they state thet the roots of the cover crops bear a peculiar relation to the roots of the peaches and that

here also there is too much nirtogen obtained for the best rsesults in the yield.After interyiewing several practical men who depend upon their peach crop for their daily bread however it would seem that there is little or no foundation for these beliefs.In all cases manure was used where it was possible to obtain it.Moreover it was very liberally applied.One fruit grower near Rochester told me during an interview that all there was to peach growing was "manure and hard work".Leguminous cover crops were also strongly advocated,each grower of course having his own particula one.By means of this begging for imformation a mixture was brought to my attention which seems to meet all requirements. This was a combination of rye and vetch.They were planted together in the late summer.The rye makes a good growth that fall providing a good mat for the orchard.The vetch will get a good start but used alone would hardly be sufficient to cover the ground.The following spring the vetch makes aggod growth and when plowed under the combination furnishes the soil with a large amount of humus and also considerable nitrogen. Red clover makes aggod cover in a young orchard where the trees are not draining the soil of its moisture as is the case in an older orchard.Of course the region,soil and climatic conditions will govern and determine the cover crops that will be used.The two mentioned above are especially adapted to the state of New York.The main thing to be considered is to secure allarge amount of humus and as much nirtogen as possibel

FERTILIZERS:-In the study of fertilizers for peaches, the first thing to be considered is the natural fertility of the soil. In some of the northern and western states the soil is sufficiently rich in plant foods to meet the demands of heavy crops of fruit.Generally,however,the soils that are best adapted to peach growing are more or less lacking in the elements essential to fertility."Green manures and cover crops should be utilized to their fullest possible extent in the orchard There are some soils so well supplied with humus that the annual use of green manures is not necessary,or in some cases desirable,as the amount of humus and nitrogen might be unduly increased and an excessive or belated growth of twigs and buds result.However,in most peach orchards,especially in the sandy and poorer soils,this condition is not to be feared,and annual cover crops should be plowed under.On a moderately rich soil perhaps all or nearly all of the nitrigen necessary can be supplied with leguminous cover crops,but even here it is not always safe to depend entirely on cover crops.Perhaps a dry year may come with a heavy crop of fruit,and while an unusual draft is made by the trees on the nitrogen in the soil very littleeis returned to it,therefore the bitrogen should be replaced artificially. Indirect fertilization,therefore ffom nurse crops and cover crops combined with the natural fertility of the soil cannot be depended on for maximun crops over most sections of the country. Direct fertilization may be necessary.In the young orchard where th the soil is very fertile it may not benecessary to fertilize the young trees until they come into bearing."*

The elements that go to form fruit are potassium and phosphoric acid.An experiment was made at the Geneva Station, Bulletin 265,in order to determine just how much of the various plant foods were used and where they were used.It was found that 19.3 % of all thnitrogen used went to the fruit while 76.7% went to the leaves and wood.In the case of potassium 50% was found in the fruit and 50% in the leavesaand wood. Of the phosphoric acid,47% was in the fruit and the remaining 53% distributed throughout the tree.This shows conclusively that the fruit is largely dependant onnthe last two elements.

To determine the amount of nitrogen,potassium,and phosphoric acid etc.that brought the best results in the orchard,the Connecticut Experiment Station began a test in 1896.Six plots were chosen,each covering one-third of an acre.On each of these plots 48 trees werecplanted.Fertilizer was applied as follows.
Plot A;65 pounds of muriate of potash;160 pounds acid phosphate.
Plot B;Sameaas above with 170 pounds of cotton seed meal.
Plot C;65 pounds of muriate of potash;160 pounds acid phosphate.
Plot D;130 " " " " " ;160 " " " " .
Plot E:260 " " " " " ;160 " " " " .
Plot F;260 pounds of high grade sulphate of potash and 160 pounds of acid phosphate.

167 Pounds of slaked oyster shell lime were annually applied to the northern half of each plot.

Until 1901 crimson clover was sown each year in August on D,E,and F and plowed under im May.

Plot A has an abundance of potassium and phosphoric acid but no nitrogen.Plot B has each year 500 pounds of cotton seed meal

per acre,which means 35 pounds of nitrogen.The other plots received the nitrigen from the cover crops.

Plots C,D,and E should show the effects of a heavycdressing with muriate of potash and F should show the effects of a heavy dressing of high grade sulphate.

Each year a certain number of trees died and were replaced by new ones in the spring.No case of yellows was found in the orchard till 1900.

The following tables show the results of the experiment;-

Number of Dead Trees

Plot	1896	'97	'98	'99	'00	'01	'02	'03	Total
A	2	12	2	1	10	4	5	6	42
B	3	6	1	1	2	3	5	0	21
C	2	3	1	1	7	3	3	5	25
D	0	1	2	0	8	3	4	2	20
E	0	1	0	0	0	0	5	1	7
F	0	0	0	0	0	2	3	0	5
Total	7	23	6	3	27	15	25	14	

Plot A lost more trees than the rest,5/6 of the trees in 8 years.Plots E and F lost the fewest trees.

In 1898 there was a fime set of fruit buds but most of the very young ffuit fell later in consequence at and just after setting time of cold storms

The following tables show the yields from the different plots

1899

	A	B	C	D	E	F
No. of baskets	65	117	81	110	155.6	140.5
No.of trees in bearing except Early Rivers	20	31	23	27	36	30
Average nO. baskets per bearing tree.	3.2	3.8	3.5	4.1	4.1	4.7

1900

	A	B	C	D	E	F
No.baskets	140.25	212.5	151.5	190.75	279	243.35
No.of trees bearing except Early Rivers	26	35	29	33	44	40
Average no. baskets per bearing tree	5.6	6.3	5.2	5.8	6.3	6.1

1901

	A	B	C	D	E	F
No.baskets	66.5	99	73.75	112.75	168	172.5
No.trees bearing except Early Rivers	20	30	26	31	40	37
Average no.baskets per bearing tree.	3.3	3.3	2.8	3.6	4.2	4.2

1902

	A	B	C	D	E	F
No.baskets	48.5	117.5	64	69.5	125	80.5
No.trees bearing except Early Rivers	31	33	31	31	33	35
Average no. baskets per bearing tree.	1.6	3.6	2.1	2.2	3.8	2.3

1903

	A	B	C	D	E	F
No. baskets	74	63	43	41	55	41
No. trees beraing except Early Rivers	33	32	30	30	34	36
Average no. of baskets per bearing tree	2.2	2.0	1.4	1.4	1.6	1.1

Plots F and F were each given 250 pounds of nitrate of soda in the dpring of 1903

It will be noticed that plots D,E,and F to which the heavy applications of potassium and phosphoric acid were given yielded most heavily up till 1903 when the nitrogen was added. Plots D,E,and F lost the fewest trees.Another point worthy of mention is that no Yellows developed on the limed portions.

The question of fertilizer for the peach may be summed up in a very few words; Be sure to use enough potassium and ph phosphoric acid and little enough nirtogen.No definite law can be laid down as conditions of soil etc differ greatly.As shown in the preceeding experiment therevis no danger of applying too much potassium or phosphoric acid for a practical man would hardly use more thar 780 pounds of muriate of potash or 480 pounds of phosphcrica acid per acre.Study conditions from year to year and act accordingly.

INSECT PESTS OF THE PEACH

San Jose Scale;It is believed that this scale pest came originally from China.It was first reported in this country at San Jose,California,hence its name.It was first found in the east in 1887 and has ever since been the terror of the fruit-grower.

These insects pass the winter in an immature state under the scales .They mature early in the spring and the young are born in June.In the coirse of the season there are three or four generations.The young are born alive and the breeding goes on until late in the autumn.A single female scale can produce in a single season several hundred young.Breeding continues until late fall when the cold weather kills all but the small half-formed scales which persist and thus complete the life cycle.

The scale is to be found on the infested tree the year around,sometimes in great masses on the branches.It is nearly circular and about the size of a pin-head.Sometimes it becomes so abundant that it appears on the fruit causing small red spots on the surface.

The best time in which to fight this pest is when the scale is in an immature state,namely in the winter.Spraying is done while the tree is dormant either late in the fall or early in the spring.When the tree is badly infested two applications are made,one in the fall and the other in the spring.

Lime-sulphur,1 to 8 for a 32 or33 degree concentrate is the best remedy.This should control the scale very effectively.

The Peach Borer;The borer is a common and important enemy of the peach.It has been known east of the Rockies since the earliest settlements.

The presence of the peach borer may be detected by the gummy matter which exudes from the drowns of trees in which they are working.The larvae feed on the soft inner bark of the crown of the foot and the base of the trunk.So active are thes larvae that they will often completely girdle a trunk. When badly infested the foliage will turn a sickly yellow and if not treated the tree will die in a short time.With the exception of San Jose Scale probably more trees are lost through this medium than from any other cause,that is any insect cause.

The adults of this borer are clear winged moths resembling wasps,the females being a deep steel blue with a broad orange band across the abdomen.The fore-wings are opaque,being covered with bluish scales,the hind wings transparent except for the dark margin.The males are smaller with clear wings and three or four narrow stripes of yellow across the abdomen.

In New York State the moths appear from the middle of July to the last of August,there being but one generation a year. The female lays her eggs usually on the base of the trunk often laying as many as 800 eggs.These reddish-brown eggs hatch in about ten days,the young larvze entering the bark through small cracks from whence they work into the soft under bark. Here they feed until fall and they are forced to hibernate.

In the spring the feeding is resumed,the larvae entering the lower layers of the bark.This causes the masses of gum to exude which give a clue to the presence of the borers.The full grown larva is about one inch in length,light yellow with a brown head and thoracic legs and four pairs of prolegs on the abdomen.The body is thinly covered with small brown hairs.

The full grown larvae spin cacoons at or near the surface of the ground,pupate and emerge as moths in about a week.

Control; A good means of preventing injury by these borers is to mound the soil around the trunk as high as possible just before the moths appear in the spring.This forces them to lay their eggs high up on the trunk where the small borers may be easily found.This in itself seem to prevent the establishment of the pest.Early in the fall the earth should be levelled down and a search made for the larvae.Ordinary building paperif wrapped around the trunk and extending into the ground and also tied at the top just below the crotch will prevent the deposition of the eggs.These wrappers should be placed around the trunks before the moths appear and removed early in the fall.

These two methods of control will greatly reduce the number of infested trees and the remaining borers should be wormed out late in the fall and early in the spring by means of a knife and a piece of wire.If the orchard is closely watched and the borers wormed out as fast as they appear,little trouble need be experienced on their account.

The Peach Twig Borer;The peach twig borer is largely a pest

of the west.Some small damage however has been done in Deleware,Virginia,and Maryland and it will perhaps be well to mention thepest.

The larvae of this borer work in the tender shoots in the early spring.Later they enter the fruit especially the later varieties.The adult moth is dark grey with fore-wings expanding about one-half inch and marked with darker spots.The full grown larvae is about one-half inch long of a dull reddish brown color.

The Peach Tree Bark Beetle;The presence of this beetle is indicated by numerous small worm holes which give the tree the appearance of having received a charge of bird shot.More or less gum exudes from these small holes.This beetle attacks weak and deseased trees although young trees are often attacked and badlay damaged.The injury is largely due to the presence of dead or dying trees which allow the beetles to increase and allowing their spread to the healthy trees.

When the beetles are present in large numbers their injury to the trees is quickly brought to the attention of the grower by the large amount of sap exuding from the small holes in the trunk and branches.The larvae and beetles both cause injury to the tree.The beetles in the fall fly to the trees and form their hibernation cells. These are injurious to the tree for in the following spring there will be a loss of sap from each.In the spring the beetles leave these cells and burrow into the bark only to emerge again in a short time in order to form egg burrows in the sickly trees.Sap flows from these burrows in large amounts forming large gummy masses.After a few

years the once healthy trees become sickly due to the repeated attacks of the beetle and the latter then form their egg burrors there,the larvae soon completing the work.There are two broods a year,the summer brood appearing in the last half of August and the other hibernating over the winter.

Control;Destroy all dead and deseased wood,burn all prunings and trimmings.Trees which are affected should be l liberally fertilized so that they may make a quick growth in the spring and better withstand the injury.If the tree is washed with a solution containing one pint of crude carbolic to ten gallons of a thick soap the beetles will be prevented from o oviposition.White-washing has also been advised a small amount of portland cement being added to make the mixture more adhesive.

The Black Peach Aphis;The black aphis attacks the roots, tender shoots and foliage of the tree.When the aphis is on the roots the presence of the pest is often not noticed until much damage has been done.Young trees are especially affected, the foliage taking on a sickly yellow tinge.However the young shoots are affected when the roots are.The aphides cluster on the tender shoots,at the crotch,and low down on the limbs, forming a disagreeable black mass over the young leaves which curl up due to the injury caused.This injury is often so great as to either kill or severely check the growth of young stock.

The wingless aphides live and multiply on the roots throughout the year,all being females and giving birth to live young.In the spring there is apartial migration to the

young foliage.They often appear on the twigs before the buds open. Multiplication is rapid and a great deal of damage is done to the tender shoots.Certain of the aphides develop wings and migrate to other trees.In the summer most of the aphides are found on the roots where they seem to prefer the young and more tender parts.This pest seems to be more numerous where the soil is sandy.

Control;Where the aphis believed to be present the roots of all young trees should be examined before planting and if found should be dipped in strong tobacco water.This tobacco in the form of dust may be used on the roots of orchard trees by removing the surface soil and applying the dust which will reach the roots by the process of leaching.If noticed on the branches the control is easy for they cluster on the trees until the latter become crowded before migrating.Small twigs may be removed and the pest controlled.A fifteen percent solution of kerosene emulsion,or a one to four solution of whale oil soap may be used as a spray.This must be forcibly applied in order to penetrate into the curled leaves and honey dew.Also the spraying should be done early before the leaves are badly curled.

Green Peach Aphis;The green aphis is of European origin butshas been known as a peach pest in this country for years. This aphis causes the leaves to curl up and also injures the buds very badly.

The winter is passed in the egg state on the branches of the peach,although the wingless females persist on the summer food plants where they are able to find sufficient

protection.The eggs are small,oval and shiny.Theseeeggs hatch early in the spring,so early in fact that the stem mothers are fully mature before the earliest blossoms open.About the time the buds open the stem mothers are a deep pink colorand at this time they begin to give birth to living young,which are a pale yellowish green.Very few of this brood have wings.The third generation is very largely winged and here migration starts. By the middle of June these lice have almost wholly left the tree and gone to the succulent vegetables etc.where they live through the summer.In the fall winged females return to the peach where wingless females are developed which produce the winter eggs.

Trees which are affected by this pest should be sprayed about one week before the buds open with a five percent solution of kerosene emulsion.Whale oil soap or miscible oils may also be used.If the trees are sprayed with lime sulphur the aphides should be largely controlled.

DISEASES OF THE PEACH

BROWN ROT;- Brown Rot is the most serious fungous disease that the growers of peaches have to contend with,in this part of the country."The soft brown rot of the peach is caused by a fungous which attacks the fruit and causes it to rot at about the time when it is beginning to ripen.The peaches rot very rapidly at this time and the disease causes them to dry up and hang on the tree during the winter."*

All of these dried or mummied peaches should be gathered during the winter and burned in order to prevent the disease from being carried over until next season.The tree should be aprayed with a solution of lime and sulphur during the winter when the disease is present.Self boiled lime sulphur may be used as a summer spray when the fungous appears.

Peach Mildew;-The powdery mildew of the peadh,causes the l leaves to be curled up together and to appear to be covered with a whitish powder.The tips of the growing stems are often swollen and distorted.The disease sometimes occurs on nursery stock in which case the trees should be gathered and burned.Here also the disease can be dontrolled by means of the self boiled lime sulphur.

Peach Yellows;-"This serious disease of the peach has as yet not been studied enough to isolate any definite cause for it.Many theories have been advenced as to the cause of the trouble but none of them have borne out by investigation.The disease attacks the tree at various stages in its development and causes it to die rapidly.The fruit on a tree affected by Yellows ripens prematurely and is usually

smaller than normal,and is characterized by red streaks running from the outside to the center of the fruit.Very often we find that the fruit on a diseased tree will hang on the tree throughout the entire winter.

It is characteristic for this disease to produce great clusters of slender, wiry twigs on the main trunk and on the branches.The color of the foliage is also usually quite characteristic.

A similar and just as little understood disease is known as the Peach Rosette.The principle difference seems to be that there is less tendancy to the production of the slender wiry twigs and the fruit lacks the characteristic streaks of red color.

Whenever either of these two diseases occur in the orchard the trees affected should be cut down at once and burned. There is practically no other remedy eorth considering.

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