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Cherries

By

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EVER since Henderson Lewelling brought the first nursery stock for the Oregon country across the plains by wagon in 1847, and planted Napoleon (Royal Ann) cherry trees in his nursery near the present town of Milwaukie, Oregon has been noted for its fine sweet cherries. As another proof of the natural adaptability of parts of this state to grow this fruit, it is only necessary to point to the fact that some of the best sweet cherries in existence originated here, such as the Bing, Lambert, and Black Republican.

Sour cherries and Duke cherries also grow excellently in many parts of the state.

REQUIREMENTS OF CLIMATE AND SOIL

The sweet cherry does well in the mild climate of Western Oregon, along the Columbia River Basin, and in parts of Eastern Oregon where winter temperatures do not run much below zero. Where temperatures run to zero or below cherries will survive only where the wood is well ripened and thoroughly dormant.

The greatest drawbacks to the sweet-cherry industry in Western Oregon are (1) the cracking of cherries after untimely rains and (2) the presence of brown-rot spores on the fruit, which makes it unsafe for shipment to eastern markets. As a consequence most of the sweet cherries of this region are processed in some manner—in cans or in brine for maraschino purposes. A few are dried.

In the producing districts east of the Cascades, brown-rot and cracking are not serious and a larger proportion of cherries are therefore shipped fresh than are processed.

The sour cherry is hardier to cold than the sweet cherry and may be grown in family orchards in some parts of the state where the sweet cherry might not succeed.

The Duke cherries are nearly as hardy as the sour cherries.

VARIETIES

The Napoleon, Bing, and Lambert are the leading commercial sweet cherries of the state. Other sweet cherries grow well but are used either as pollenizers for the principal varieties just mentioned or for home consumption.

The Napoleon is especially adapted to commercial canning and to the manufacture of maraschino cherries. Its light color makes bruises show up worse than on red or black cherries. Bing and Lambert, on the other hand, are not canned commercially to any extent, owing to the poor color of the canned product and to a severe pitting of tin cans. For home

canning in glass they have fine color and are delicious. Both Bing and Lambert are well adapted to shipping long distances when not affected with brown-rot. Districts east of the Cascade Mountains ship most of their black cherries because there is little danger from brown-rot in the relatively dry summer climate of that region. Cherries produced west of the mountains are for the most part either used locally or used for canning or for barreling for maraschino purposes.

Montmorency, the most popular sour cherry, is raised chiefly for canning and pie making.

POLLINATION

All sweet cherries in the climate of the Pacific Northwest are practically self-sterile and many of them will not even cross-pollenize each other. The three commercial varieties noted above are in the latter group.

To bring about satisfactory setting of fruit it is necessary to plant a sufficient number of trees of a variety known or proved as a pollenizer. Under Oregon conditions the minimum number of pollenizing trees should be one in nine or every third tree in every third row. In some sections where pollenizers which themselves bring in considerable profit are used, it is recommended to plant one row of the pollenizer in every four rows. This facilitates spraying and harvesting.

Old orchards not sufficiently supplied with pollenizers may have every third tree in every third row top-worked to the desired variety or a limb or two may be grafted in each tree. The first plan is usually better.

Of a number of varieties tested for pollenizing the *true* Black Republican has proved best, under most conditions, for the three varieties Napoleon, Bing, and Lambert. Unfortunately some seedlings of Black Republican, so closely resembling their parent as to deceive nurserymen and fruitgrowers, do not have the ability to cross-pollenize the commercial varieties. It is necessary, therefore, to be sure that the buds and grafts to be used in nurseries and for top-working come from Black Republican trees which have successfully pollenized trees around them.

Other varieties tested with fair to good success have been Centennial (which cracks badly in rainy weather), Black Tartarian, and Governor Wood.

There are several different strains or varieties of the Montmorency sour cherry. Most of these, under the climatic conditions of Western Oregon where most of them are produced, are fairly self-fertile. If a pollenizer is used, Early Richmond is the best variety found to date. When the pollenizer is planted in every fourth or fifth row the fruit is not so easily mixed with that of the Montmorency by careless pickers.

Cherries are pollinated by insects, mostly bees. During blooming it is desirable that at least one strong colony of bees to an acre be provided.

PLANTING

Stocks. There are two stocks commonly used in the propagation of sweet and sour cherries—the Mazzard and the Mahaleb. On some heavier and more moist land in California where these two stocks do not succeed, a variety called Stockton Morello is being used with success. It has a

dwarfing effect on the tree. So far this variety has not had an adequate trial in Oregon.

The Mazzard produces a thrifty growing tree which comes into bearing somewhat later and is longer lived and larger than the Mahaleb. The Mahaleb has a slightly dwarfing effect on the top of the tree and may be slightly hardier to cold winters.

Nursery trees. No money is made in buying poor nursery stock. Trees are usually divided into three grades according to their size—4 to 6 ft., 3 to 4 ft., and 2 to 3 ft. trees. The best trees, while they cost most, are cheapest in the end because few of them die in transplanting and they produce large, rapidly growing, productive trees in the shortest time if given good care. The medium-sized trees often make good trees, especially if they can be irrigated to force good growth from the start. One-year-old nursery trees are usually best for planting.

Every precaution should be taken to get varieties true to name. It is especially important that the right varieties and strains be obtained for pollenizers. In the final analysis, success in starting the orchard depends very largely upon the integrity of the nurseryman.

Time of planting. In Western Oregon cherry trees may be planted from the time they are well-matured in late fall to early spring, whenever the soil is in good physical shape for handling. East of the Cascades spring planting will usually be better because of danger that the young tree, if set before winter starts, will dry out and die.

When the trees arrive from the nursery they should be examined at once to note any damage in transit, poor packing, drying of roots and so on. At that time the roots of the trees should be examined for crown gall and root rot and then pruned. In pruning, broken or badly damaged roots should be cut back above the break or injury. Minor rootlets should be cut out to enable the soil to be better packed around the main roots when they are being planted.

The trees, as fast as root pruned, should be heeled in on a well-drained piece of land, preferably in the shade of some building. Heeling in consists in plowing a deep furrow, cleaning it out, and then placing the trees in the furrow either upright or on their sides. The furrow slice is then thrown back over the roots, being sifted in between the roots to keep them from drying out. If exposed to the sun, trees should never be leaned toward the north because of the danger of serious damage or death from sun scald on the trunks.

Planting distances and plans. The sweet-cherry tree on good soils approaches the apple tree in size and needs a space of 30 to 35 feet. The sour cherry needs from 25 to 30 feet, depending upon the stock it is worked on and the depth, richness, and moisture content of the soil.

Three systems of planting are commonly used—the square, the hexagonal or triangular, and the quincunx. The first mentioned is the easiest to lay out on the land and, as a consequence, is most popular. On rather steep slopes the hexagonal system permits easier grades for cultivation and checks erosion to some extent. It allows about 15 percent more trees to be planted to the acre than the square plan. The quincunx system is especially adapted to the setting of filler trees. The permanent trees occupy the corners of the square while the filler stands in the center of the

square. Later, when the fillers begin to crowd the permanent trees, the former should be removed and the orchard arrangement will then be changed to the square system.

Staking for planting. The methods most frequently used for laying out the square and hexagonal systems of planting are described in Oregon Experiment Station Bulletin 212, from which the following is quoted:

"*For the square system* take one side of the field from which a line can be laid off parallel to the fence or road, such as the base line AB (Figure 1). With a tape or other measure lay out 60 feet on this line AB. Then on the line AC approximately at right angles to base line AB, lay off 80 feet,

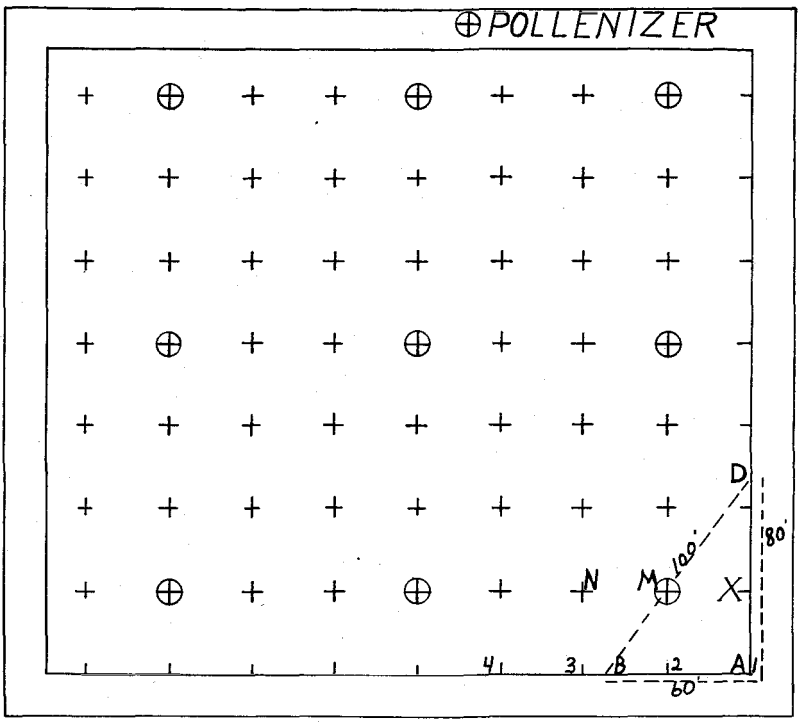

Figure 1. Square system of orchard planting.

striking an arc and using A as a pivot point. From point B with a line 100 feet long strike another arc. Where the arc of AD and BD intersect will be the point through which the line AC may be located permanently and at right angles to the base line AB.

"It is generally of advantage to lay off another base line at the opposite point of the field from A on the base line AB.

"As equipment in laying off by the square system, or by the hexagonal system, a set of wires should be provided of the same length as the distance apart that the trees will be set out. These are two wires with one end

joined together in a small ring and the free ends fastened to separate rings. After staking off the base line at the intervals desired for the tree, staking of the tract can commence. By placing one wire over stake 2 and another over stake X, and drawing them taut, a stake can then be placed at point M. Then move the wires over so that the ring can be placed over stake M and stake 3; a stake can then be placed at the center ring at point N. This process can be carried on indefinitely, backward and forward across the field until the field is completely staked out. The wires should be held in a horizontal plane and drawn up to the same degree of tautness. Occasional checking by sighting or by remeasuring the wires will be necessary to straighten out the rows, especially if the field is uneven.

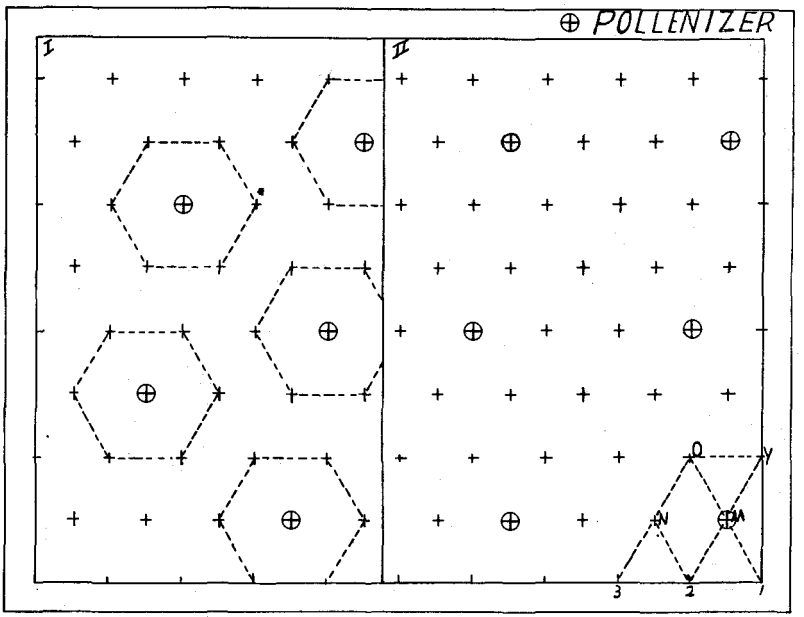

Figure 2. Hexagonal system of orchard planting. I. Pollenizers placed in center of each hexagon. II. Pollenizers placed every third tree in every third row.

"A long wire with soldered points on it indicating the points at which stakes are to be set is often used.

"Other methods of staking out can be used, such as the use of transit or by sighting from two sides of the field with a man to set the stakes at the points desired. On the whole it will probably be found that the use of wire is the quickest and simplest method that can be employed for land not too uneven.

"*For the triangular or hexagonal system* one base line only is needed, spaced at the regular intervals for the planting of the trees. Placing the rings over stakes 1 and 2 (Figure 2), the wires are drawn tight and a stake is set at M. Then move over until the rings are over stakes 2 and 3; the

stake is then placed at N and so on throughout the field. In using this method the rows will each time become shorter so that it will be necessary to fill out the side of the field. By placing one free ring over M in the second row and O in the third row, as illustrated, a stake can be placed at Y so that the third row will be lengthened out to the normal length."

The quincunx system may be laid out on the ground by using an adaptation of the method used for hexagonal planting, in which the wires are made of sufficient length to reach from two permanent trees to the filler tree in the center of the square. When a row of stakes representing filler trees has been set, this row acts as a base from which to stretch the wires to determine the location of the next row representing permanent trees and so on.

Another plan is first to stake out the orchard as for the square system, and then two or three men can set in stakes representing fillers very rapidly by aligning them diagonally with the rows already set.

After stakes have been set they must be "located" by the use of a planting board. The board should be made of 1" x 8" S4S material about 3½ to 4 feet long. It should have a deep notch cut in the middle of one side and two smaller notches, one in each end, so placed that a line drawn from one end notch to the other will pass about ½ inch outside the point of the notch on the side. When such a board has its side notch placed against a stake an imaginary line from the end notches will pass through the stake no matter which side up the board may be.

In locating the stakes, small, rough, wooden pegs cut 6 to 8 inches long are used. The locator places the planting board with its side notch tight against the stake. He should wear heavy leather gloves. He then takes two pegs from a sack slung from his shoulder and sticks them firmly in the ground, fitting tightly into the end notches and pointing slightly outward. After this operation the stake may be pulled at any time.

The hole for the tree should be dug directly between the locating pegs, taking especial care not to disturb them. It should be deep enough so that the young tree can be planted fully as deep as it grew in the nursery and broad enough to accommodate roots without serious bending. The top soil, which is richer, should be placed at one side to use in packing around the roots in planting. The bottom of the hole may be loosened by the shovel.

Setting trees. In setting young trees every precaution must be taken to keep tree roots from drying seriously. This is done by keeping the roots in barrels of water or by lightly covering with soil near where they are to be planted. In drying weather, trees should be planted within a short time after they have been distributed to the holes.

A planting crew is as a rule made up of two-men units, one man to locate the tree and tamp it properly, the other to shovel the earth. In setting, the tree is placed in the side notch of the planting board which has been placed over the locating pegs. It is leaned slightly toward the prevailing winds and placed fully as deep as it grew in the nursery. It is sighted in carefully to detect any error in location. This is very important because trees out of line are much more apt to be injured by cultivation. The next step is to pack the top soil, which has been placed at one side of

the hole, tightly around the roots, the hands usually being used in this operation. Then the remaining dirt is added, being tramped down until near the top of the hole and then left loose to prevent excessive drying out.

Great pains must be taken to locate pollenizer trees properly and to avoid mixing varieties when trees are distributed for planting. Carelessness in this respect may be dearly paid for for years afterward.

CULTIVATION

Plowing may or may not be necessary, depending primarily upon the type of soil planted. On lands naturally loose and friable a disk will break up the soil as well as a plow, or better, and is much faster in its work. When cover crops are to be worked into the soil a cover-crop disk will chop up the crop and mix it with the soil even better than a plow will do it, provided the soil is not too hard or too stony.

On heavy silt or clay loams, plowing alternated with disking every other year is good practice because it pulverizes the surface soil often enough to keep it from becoming too heavily packed. In Western Oregon where winter rains pack soils badly, plowing clay soils every year may be advisable. Cover crops plowed under aid greatly in keeping the soil more friable. Plowing may be necessary on ground so stony as to make disking difficult.

In Eastern Oregon fall plowing or disking turns up the soil so that frost of winter pulverizes it much better than spring plowing, but the ground must be worked fine enough to prevent cold air from penetrating deeply enough to kill tree roots. West of the Cascades cultivation in late fall is money thrown away because of heavy packing of soils by winter rains.

After plowing or disking, soils should be well pulverized by such tools as spring-tooth harrow, peg-tooth harrow, plank clod-masher, or corrugated roller, depending upon the type and condition of the soil.

Experimental evidence shows that *deep* cultivation is not so necessary in unirrigated soils as it was once believed to be. The main result of cultivation is to destroy weeds sufficiently to keep them from transpiring into the air large amounts of soil moisture. After a soil has been thoroughly worked and fined in the spring, tools that will cut off weeds well under the surface of the soil, such as a Kimball or Cyclone weeder, will be satisfactory for the rest of the season.

Cultivation of bearing cherries in most cases should be kept up throughout the summer until the coming of the early fall rains. This treatment not only increases the crop but also provides moisture for building up food reserves and the setting of strong fruit buds for the following year.

With young trees it is best to stop cultivation about the first of August in order to slow up growth and to allow the tree to ripen its wood before winter.

COVER CROPS

Cover crops are used to increase both the water-holding capacity of the soil and in some cases the fertility as well. Such plants as gray or

winter oats, winter barley, winter rye, and winter wheat (when cheap), are the cereals most often used. Common vetch in Western Oregon and hairy vetch in the colder climate east of the Cascades are among the most popular legumes grown for this purpose. Austrian field peas are also a good legume.

Usually cereals and legumes are mixed in sowing. Sown at the rate of 2 bushels to the acre of either oats or barley and vetch about half and half by weight, the resulting cover is dense enough, provided growing conditions are satisfactory. Sowing is done in early fall as soon as the rainfall will insure germination.

Investigations have shown that cover crops are most beneficial when left until about half grown before plowing under. The plants are large enough to make a goodly amount of humus and still young enough to decay quickly in the soil. In many seasons, however, it may be necessary to plow under the cover crop before it attains this size because it may pump so much moisture from the soil as to do more harm than good to the growth of the orchard.

In old orchards the shade is often so dark and the competition between roots so great that cover crops make a poor start and show small growth in spring. Under such conditions light applications of straw or low-grade alfalfa or clover hay may be substituted for cover crops in the fall as soon as rain is plentiful enough to reduce fire hazard. By spring the material will be rotted sufficiently to plow or disk into the soil.

In irrigated districts permanent cover crops (often called shade crops) of alfalfa are grown. Enough water must be available to supply both cover crop and trees. Often the alfalfa robs the orchard of moisture before the grower realizes what is taking place—much to the detriment of tree growth and next year's crop. The alfalfa is sometimes cut for hay if not covered heavily with arsenate spray, but a practice better for the soil is to cut or roll down the plants and allow them to rot on the soil.

IRRIGATION

In deep friable soils and subsoils cherry roots will range far for moisture. This characteristic coupled with the fact that the crop is harvested before summer is far advanced, has led to the planting of cherries where other tree fruits would not succeed for want of water. In most parts of Western Oregon soil moisture, if carefully conserved by cultivation, is sufficient to produce good growth and heavy tonnage of fruit. In the greater part of Eastern Oregon, however, cherry orchards need some irrigation to supplement rainfall.

The time when an orchard should be irrigated depends on such factors as rainfall, nature of the soil, kind of fruit grown, and other local conditions. In irrigating, the operator watches his trees to notice signs of wilting in foliage or fruit. The cherry seems to approach the wilting point with less damage to size of fruit and foliage than many other fruit trees. On the other hand, trees subjected year after year to serious deficiencies of moisture show loss of vitality and do not produce fruit to capacity.

Some irrigators become so proficient that they can tell by the looks of soil when it needs irrigation without waiting for signs of wilting. General-

ly it is better to use an augur to determine moisture conditions to a depth of five or six feet.

The furrow or "rill" system is most commonly used in irrigation. These furrows should be placed from 2 to 4 feet apart, depending on the nature of the soil. Sandy and gravelly soils, where water goes downward rapidly, need furrows the closer distance. Heavier silt and clay loam soils, where water penetrates slowly downward and to some distance laterally, should have the greater distance between furrows.

"Rills" should be about 8 inches deep in order that the water may penetrate to lower levels without wetting the surface soil to any great extent. The drier top prevents evaporation.

The length of the furrow will depend on the character of the soil and the steepness of the grade. On open sandy or gravelly soils 250 to 300 feet is as long as the "rill" should be. On compact soils the furrow may be opened for 500 feet or even longer.

Usually orchard land is brought to as even grades as possible before planting. On grades running from 1 to 10 percent, furrows may run directly down the hill without damage, provided the stream is made smaller as the slope increases. When grades exceed 10 percent the furrows should follow contours of the land.

In irrigated sections deposits of alkalies are often found on uplands and also in lowlands where irrigation has raised the water table and brought to the surface, or near to it, alkaline salts. While it may be possible to reclaim some of these lands by treating with sulfur, flooding, and draining, this process is too expensive to be profitable for fruit trees. Such land should be strictly avoided for planting. If land already in orchard is being threatened by irrigation water carrying harmful salts, however, deep drainage should be provided at once to prevent the rise of salts to the point where tree roots may be seriously injured.

FERTILIZERS

Of the various chemical elements used by the tree in growth and fruiting processes nitrogen, phosphorus, and potassium are most apt to be deficient in the order given. Under some conditions iron may be made unavailable to tree roots by the presence of alkalies, especially calcium carbonate. Such a condition, shown by little or no green color in the leaves, is called "chlorosis." In exceptional cases sulfur may be needed to render soils less alkaline. Calcium, when applied as lime to soils, may be used to correct acidity, but most fruit trees including cherries, are tolerant to a moderate amount of soil acidity. Under Oregon conditions, the grower seldom has to consider the application of any fertilizer containing other than the three elements nitrogen, phosphorus, and potassium.

Nitrogen in most of its compounds is the element most quickly available to the roots of trees. Unfortunately, however, it is most easily carried to lower levels of the soil too deep to be available to the roots. Consequently this element is the one most often found lacking in soils.

The presence in the soil of amounts of nitrogen sufficient for tree growth is indicated by thick, lustrous, dark-green leaves, by vigorous new shoot growth, and by satisfactory yields of fruit.

When trees show thin, light-colored foliage and poor growth they will usually respond profitably to applications of nitrogen fertilizers. Depleted vigor may, however, be caused by neglect in pruning, irrigation, cultivation, or spraying.

Apparently most soils of Oregon contain enough available phosphorus and potash to provide cherry trees with all they need for satisfactory growth and production. Under these conditions applications of fertilizers containing phosphorus and potash fail to give *direct* benefits.

Recent experiments with cover crops, however, indicate that phosphorus, at least, often stimulates cover-crop growth and in that way may be of considerable *indirect* benefit to the trees. Also, applications of lime to acid soils may increase the growth of legumes grown for cover crops.

Fertilizers are grouped under two general heads: organic and inorganic. The first group comprises those of animal or plant origin, such as manures of various kinds, bone-meal, dried blood, and alfalfa hay. The second group comprises those fertilizers of mineral origin such as nitrate of soda, sulfate of ammonia, superphosphate, muriate and sulfate of potash, ammophos, and other commercial fertilizers.

The analysis of some of the common fertilizers in terms of nitrogen, phosphoric acid, and potash is shown in Table I.

TABLE I. COMPOSITION OF FERTILIZERS

Product	Nitrogen (N)		Phosphoric acid (P_2O_5)	Potash (K_2O)
	Mineral or inorganic	Organic		
	%	%	%	%
Nitrate of soda	15-16.0	.....	.....	.....
Ammonium sulfate	20.0	.....	.....	.....
Calcium cyanamid	20-24.0	.....	.....	.....
Calcium nitrate	15.0	.....	.....	.....
Leuna saltpetre	26.0	.....	.....	.....
Urea	46.0	.....	.....	.....
Calurea	34.0	.....	.....	.....
Cal-nitro	20.5	.....	.....	.....
Ammophos A	11.0	.....	47	.....
Ammophos B	16.5	.....	20	.....
Diammophos	21.0	.....	53	.....
Potassium nitrate	13.0	.....	.....	44
Nitrophoska	15.0	.....	30	15
Ammo-phos-ko	10.0	.....	30	10
Superphosphate	.....	.....	16-45	.....
Potassium phosphate	.....	.....	32-53	30-50
Muriate of potash or potassium chloride	.....	.....	.....	48-50
Potassium sulfate	.....	.....	.....	48-50
Dried blood	.....	10.50	1.9	.....
Bone-meal	.....	4.00	23.25	.....
Horse manure	.....	.69	.25	.55
Cow manure	.....	.59	.15	.45
Sheep manure	.....	.93	.35	1.00
Poultry manure, fresh	.....	1.07	.40	.50
Alfalfa hay	.....	2.19	.51	1.68
Red clover hay	.....	2.07	.38	2.20

Time of application of fertilizers will depend primarily upon the kind used—whether it is quick or slow to become available as plant food. Quickly available fertilizers are usually applied three or four weeks before the blooming period while there is still enough rainfall to dissolve and carry

the fertilizer down to the roots. Application of nitrogen at this time strengthens tree growth and increases the set of young fruits. Under irrigation part of this fertilizer may be applied before blooming and part in early summer.

Slower-acting fertilizers such as manures had best be applied during the autumn in order to give time for decomposition and for the fertility to percolate to the roots. Manures, alfalfa, clover, and dried blood give off fertility for some time and effects may even be seen the second season after the application. The decayed vegetable matter of manures adds humus to the soil, thus increasing water-holding capacity, air circulation, and bacterial activity.

The amount of fertilizers given to fruit trees will depend upon the type of soil, the condition of the tree, and the kind of fertilizer used. Nitrogen fertilizers are applied directly above the root zone to avoid waste of materials. Superphosphate and potash may be broadcast, especially if used for a cover crop.

From ¼ to 1 pound of nitrogen to the tree may be applied, depending on size of tree, soil type, and other conditions. This is equivalent to from 2 to 7 pounds of nitrate of soda. Superphosphate or its equivalent may be used at the rate of 300 to 500 pounds per acre. Potash, if needed, may be put on at the rate of 100 to 200 pounds per acre.

Manures and other organic fertilizers, as their action is slower, need to carry as much or more of the fertilizing elements as do the inorganic group of fertilizers. Because they are slower in action and usually bulky, they must be applied in relatively large amounts to insure a sufficient supply of fertility to soil.

PRUNING

Bearing cherry trees, generally speaking, need less pruning than apples. There must be considerable thinning out of branches, however, to keep the remainder strong and to allow the development of large, vigorous leaves which will build up food supplies for fruit buds and fruits. Trees must be kept low enough, also, to enable them to be picked economically. More old sweet-cherry trees become unprofitable because they grow too high than because they are too old.

Much trouble and expense with bearing trees can be avoided by properly forming the head of the young tree. Both sweet and sour cherries should be trained to the modified leader form, giving, first of all, a strong framework and, in the second place, a well-opened top.

The modified leader type of head is formed after planting by cutting off the top of the young tree about a foot higher than the place where the lowest branch is to be produced (approximately 30 inches above ground). During the spring, young shoots will start strongest from near the top of the tree. The tips of these shoots should be cut off as soon as they are 4 to 6 inches long. This tipping checks the growth of the topmost twigs for a time, and the lower buds on the trunk are given a better chance to grow. In this way several branches are produced along the upper part of the trunk. Young twigs starting below the location of the lowest limb may be rubbed off during summer, but the rest of the limbs should be left because their leaves stimulate growth.

When pruning the following winter or early spring only one or two side limbs should be left and they should be spaced as far apart as possible. The top limb usually runs up straight and this should be kept as a leader for the coming year. Treat the new leader in the same way as the young tree was handled the first spring—first cutting it back to a foot or fifteen inches in length, later in the spring pinching off the ends of the young limbs near the top. A good distribution of branches should be found on the leader at the time of the next annual pruning. At that time select enough sturdy side branches coming from the leader to balance the branches left on the lower part of the tree the previous season. When properly done, there should be four or five good side branches left for main limbs. The top is then removed just above the uppermost side branch.

For the next two or three years vigorous growing trees will need their main limbs topped back to leave growths about two feet long. This practice will keep the young tree lower and more spreading in its growth. After the tree gets to bearing, the terminal growth will be shorter and little if any cutting back will be needed. Injury by gummosis is usually worse on young trees heavily pruned. It is best, therefore, to top back very little after the fourth year's growth.

In cases of very strong growth, summer pinching of the tips of branches at points where side branches are desired will cause side branches to form in midsummer short enough to need no topping in winter. Summer pinching to be effective should be done some time in June in order to give time enough for fairly strong side branches to be formed before autumn. Cultivation may need to be continued somewhat longer than usual to conserve moisture enough for good growth in late summer.

Thinning side branches should be practiced each year during the lifetime of the tree. Strong limbs growing toward the center of the tree should be removed to prevent too dense shade. One or two branches growing outward from each main limb should be left to spread the tree and to bear fruit. A number of small branches in the interior of the tree should be left for bearing also.

In cases where trees have not been properly headed when young, they usually grow tall without sufficient spread. Such a condition can be remedied to a great extent if the tree is cut back at the top rather severely while it is relatively young—say six to eight years old. This treatment will check top growth and cause greater spreading.

Whenever it may be necessary to cut off branches larger than 1½ inches in diameter they should be sawed smoothly close to the parent limb in order that they may heal over quickly and completely.

The wound should be covered with a bordeaux paint to shut out wood rot organisms, for cherries are easily attacked by wood rots. The paint is made by using powdered bordeaux mixed with enough raw linseed oil to form a thick paint. A thick bordeaux paste is often used but flakes off the wound rather quickly and must be renewed more often than the paint. For further particulars see Oregon Station Circular 73, *Cankers of Apple and Pear in Oregon and Their Control.*

INSECT PESTS AND DISEASES OF CHERRIES

Cherries are often seriously affected by insect pests and plant diseases. Among the most important of the insects may be mentioned San Jose scale, red spider-mite, cherry aphid, cherry and pear slug, bud-moth, cherry fruit-fly, and syneta beetle.

The chief diseases are cylindrosporium leaf-spot, brown-rot, and bacterial gummosis of the sweet cherry.

Space is not available in this bulletin for a discussion of these insects and diseases together with methods of control. The reader is referred to the following bulletins which may be obtained by writing to Oregon State College: *Orchard Protection Program for Oregon,* Ext. Bul. 431; *Sprays, Their Preparation and Use,* Sta. Bul. 259; *The Cherry Fruit-fly,* Sta. Cir. 35; and *Brown-rot and Related Diseases of Stone Fruits in Oregon,* Sta. Cir. 53.

HARVESTING AND MARKETING

The equipment for cherry harvest is simple. Tripod ladders are used for picking the lower portions of trees, but light ordinary ladders or ladders that can be extended are better for the tops of high trees. Picking sticks about four feet long with hooks at both ends, enable pickers to pull long branches within reach. Different kinds of picking receptacles are used, from the "cup" which hooks to the belt, to ordinary buckets.

The cannery lug, holding 40 to 50 pounds of fruit, is still in common use. This box is so deep that fruit is often bruised by the weight above it. A broader, more shallow box is needed for this work. Some canneries and processing plants are transporting cherries from the orchard in 1 pound hallocks in cannery crates. This is good practice especially for the sour cherries.

In picking, care should be taken not to pull off the stems, when fruit is to be shipped, or to bruise the fruit by careless handling, or by piling too deeply in picking buckets. Wagons used for transporting the fruit to the packing shed or to the hauling platform should be equipped with springs. Trucks should be loaded heavily enough so they will not bounce the fruit in the boxes.

Both sweet and sour cherries are often picked immature. There is a temptation to ship sweet cherries as early as possible to obtain highest prices, but as a rule the loss suffered by immature fruit in size and quality offsets the high prices received.

It has been found that sweet cherries increase in size from 30 to 35 percent and show a gain of 10 or 11 percent in sugars in the month's time between the earliest picking and the latest. Immature cherries are high in acid and lose weight easily in transit and in storage. When canned they make a product soft in texture, flat in taste, somewhat shriveled, and requiring large amounts of sugar. The color of the late pickings is much improved both for canning and for fresh shipment. Napoleon (Royal Ann) should show pale yellow to light golden "ground" color before picking, and the black cherries, such as Bing and Lambert, should have a purple color.

An accurate method of determining the maturity of cherries is by means of the Balling scale hydrometer. The juice is pressed out of the fruit and poured into a glass cylinder. The hydrometer is then lowered into the juice and the amount of submergence is noted on the scale. The best quality is indicated by readings from 18 to 21 percent for Napoleon and Lambert, and from 20 to 22 percent for Black Republican.

Quality in sweet cherries does not increase after leaving the tree. Fully ripened fruits hold up well in shipment.

Cracking of cherries is due to the excessive absorption of water through the skin of the fruit or from the roots of the tree. The fruit cracks most easily just before attaining full maturity. Some varieties crack more easily than others. Bing cracks more readily than Napoleon or Lambert.

Sour cherries, also, are improved in color, size, and quality by hanging on the tree until fully mature. As sour cherries do not crack, this is not a factor in harvesting operations.

For shipping fresh, cherries should be packed in well-lighted sheds or packing-houses.

Sorting can be most economically done by feeding the cherries on to a moving belt where blemished, undersized, and over-ripe fruit and leaves and trash can be easily seen and removed. The fruit should run fairly uniform in color.

Packed sweet cherries look more attractive when the box is faced and lined with lace paper. They usually sell for enough more to make such treatment profitable. Many cherries, however, are put up with no facing in what is known as a "jumble" pack.

In facing, the cherry box or lug has the top nailed on before the bottom is put in place. The box is placed bottom side up on an incline on the packing table and the cherries are placed in rows in the box, laying on their cheeks with their stems toward the packer. A second layer is placed in the spaces between the cherries of the first layer. The remainder of the space is then filled with cherries, care being taken to fill the corners and to allow no cherries to be crushed on the sides. The bottom is then nailed on and the box stamped and labeled.

Cherry packing boxes and lugs are of various sizes. The cherry box extensively used in The Dalles contains 15 pounds of fruit and is made with a divider in the center separating the box into two equal compartments. The inside dimensions of the box are 4″ x 8½″ x 17¼″ and it is made with 3/16″ thick tops and bottoms, ¼″ sides, and ⅝″ ends. The cherry boxes in use at Hood River are made in a similar manner, only they are slightly larger and hold 16 pounds of cherries.

Lug boxes do not have a dividing piece and hold about 15 pounds of fruit. A lug used in Western Oregon has the following inside dimensions: length 15″, width 11″, depth 4″. It is made with 3/16″ thick sides, ¼″ tops and bottoms, and ¾″ ends, all planed on four sides.

Most of the Napoleons and practically all of the sour varieties are canned. The Napoleon is now being used to quite an extent for maraschino purposes. Both canning and maraschino processes are too intricate for description in such a bulletin as this. Oregon Agricultural Experiment

Station Bulletin 275, *Bleaching and Dyeing Royal Ann Cherries for Maraschino or Fruit Salad Use,* will be found helpful to those interested.

Standards of quality for fresh, canned and sulfured (brined) cherries have been established by the Oregon State Department of Agriculture. Grading rules covering these standards may be obtained by writing that department at Salem, Oregon.

Sour cherries are for the most part canned, but in recent years many have been frozen for use in bakeries and lumber and construction camps. The cherry should be pitted and frozen promptly after picking. It is put up chiefly in 10-, 15-, and 30-pound tin cans. Sugar is used in densities running from 4 pounds of cherries to 1 pound of sugar to as rich as 2 pounds of cherries to 1 pound of sugar.

The pack is frozen at zero to 5° F. and stored at about 15° F. It keeps indefinitely.

PRESENT STATUS OF THE CHERRY INDUSTRY

The cherry industry of the United States is governed largely by climatic conditions. In the eastern part of this country where summer rains are frequent, the sweet cherry cracks so badly that it has not been commercially profitable except in a few small sections. The sour cherries of the clear juice type, like Montmorency, predominate there. Michigan, New York, and Wisconsin are the leading producing states of the East, while Colorado is the only western state with a heavy production of sour cherries. Relatively few sour cherries are grown on the Pacific Coast.

Most of the sweet cherries are grown in the Pacific Coast states with a few in Utah and Idaho. According to the United States census figures, the cherry tree population of the United States, California, Oregon, and Washington is as shown in Table II.

TABLE II. CHERRY FARMS, TREE POPULATION, AND PRODUCTION

	No. of farms producing cherries (all ages of trees)		Trees not bearing		Trees bearing		Production§	
	1930	1920	1930	1920	1930	1920	1929	1919
							Bushels	*Bushels*
United States	867,944	1,516,012	4,615,286	3,694,531	8,381,472	10,787,751	4,067,041	3,945,749
Pacific Coast	62,289	83,948	1,113,354	509,944	1,882,466	1,381,730	1,389,545	1,206,819
Washington*	29,270	37,608	304,864	72,976	461,484	329,187	554,920	249,226
Oregon†	21,712	26,023	371,956	89,396	446,106	395,073	290,735	303,893
California‡	11,307	20,317	436,534	347,572	974,876	657,470	543,890	653,700

*Percentage of sour cherries, trees and production not definitely known, though it is believed to be greater than that of Oregon.

†Of this number of trees 7.6% were bearing and 8.8% non-bearing in 1930. (Estimated by M. N. Nelson.)

‡California produces no commercial acreage of sour cherries.

§To obtain production in pounds multiply by 60.

Imports of cherries averaged slightly more than 8,000 tons a year for the period 1924-1930. Most of these came from Italy for maraschino purposes, though 5 to 8 percent came in the dried form. In 1930, however,

when the new protective tariff on brined cherries took effect, imports dropped to 4,160 tons. They aggregated about 2,916 tons for the first nine months of 1931.

Exports of cherries have always been light, averaging about 30,000 cases of canned goods a year or 1,350,000 pounds of fruit.

What the future holds for cherry growers of Oregon is hard to foretell. There was an increase of 36 percent in the number of bearing cherry trees on the Pacific Coast in the ten years between 1920 and 1930, and the rather astonishing increase of 118 percent of non-bearing trees. While bearing cherry trees in the United States showed a substantial decrease during that period, an increase of nearly 25 percent is noted in the non-bearing group. Michigan, New York, Pennsylvania, Wisconsin, and Colorado, the leading states growing sour cherries, increased their non-bearing acreage from 1,007,816 trees in 1920 to 2,106,719 in 1930.

It seems safe to say that the sour-cherry crop of the Pacific Coast should be marketed for the most part west of the Rocky Mountains. Whenever production becomes too heavy for the markets of this region, prices are bound to suffer severely.

Sweet canned cherries come into keen competition with such cheaper fruits as peaches and pineapples. The present indications are that a wider distribution and larger consumption of this canned product must be brought about or else the industry may be faced with a serious surplus.

The United States tariff act of 1930 has made it possible to relieve this situation to some extent by encouraging the manufacture of maraschino cherries. Growers will need to defend their industry from the attacks of importers and glacé manufacturers by fighting any attempt to reduce the import duties on brined cherries.

Black sweet cherries from Western Oregon are of excellent quality and sell well, provided they reach the market free from brown-rot. This disease is often responsible for considerable loss in shipping fresh cherries and has been the most important factor in holding down shipments to relatively small amounts.

In Eastern Oregon there is much less rainfall during the growing and shipping season than in the western part of the state. Cherries are shipped, as a consequence, with no danger of spoilage by brown-rot. Cherries of excellent quality and finish are produced in this region. The great concern of growers there should be to plant on deep, friable soils that will hold moisture well in order to produce fruit of good size.

Black cherries, at present, are sold in a small number of large eastern markets. At times when fruit from the competing Pacific Coast states and Idaho and Utah enters these markets, gluts are formed which result in prices too low to be profitable. It has been estimated that approximately 70 percent of the American people east of the Rocky Mountains never have the opportunity of purchasing these cherries. What seems to be needed is an improvement in the system of distribution which will spread this attractive fruit into smaller centers of population.

Prospective producers of cherries of all kinds should, as a rule, locate in districts where others are engaged in the same industry and where

handling and marketing facilities have been developed. They should choose locations where the climatic conditions are favorable and the soil is deep and well adapted to cherry growing. With competition as keen as it is in all branches of farming, the man on a "marginal" fruit farm or in an unprogressive locality will suffer a severe handicap.