APPLE ORCHARD MANAGEMENT IN IDAHO.

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"APPLE ORCHARD MANAGEMENT IN IDAHO."

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LOCATION.

Before the question of what to plant arises in the mind of a person about to set out a commercial apple orchard in Idaho, there should arise the all-important question of: Where shall I locate my orchard?

There are many sections of Idaho that will produce very fine apples but the transportation accommodations are so poor and undeveloped that a commercial orchard in such localities would be unprofitable. It is evident then that the proper location for a commercial orchard is where there will be ready transportation facilities. The finished product of an Idaho apple orchard will not endure rough handling; thence, it is desirable that the orchard be located in a vicinity where long rough hauls in wagons are not necessary to reach the shipping place.

The climatic conditions of the location in view, of course, should be considered and varieties should be selected that would grow and mature in the number of growing months of the particular vicinity in which the orchard is located. It is rarely advisable to plant an orchard for commercial purposes at an altitude greater than 4500 feet, and experience has taught that the greater percentage of the profitable commercial orchards of Idaho are in sections where the elevations are less than 3000 feet.

Where new soil cannot be obtained for orchard planting, only rich land should be used. Where one is at liberty and can choose it is always best to locate the orchard on a piece of land that slopes to the north or northeast and if possible somewhat elevated above the immediate surrounding country. Such a location

would be freer from frost, as cold air is heavier than warm air and, therefore, slides down the hill sides into the valleys. The soil on the northern and northeastern slopes is usually deeper and richer than that of other slopes. This condition is due to some extent to the prevailing Westerly winds.

Too much care and deliberation cannot be taken in locating an apple orchard for it represents a large amount of capital invested which if placed in the right place means success, and if placed in the wrong place it means a total loss of capital invested.

SOIL.

The Idaho soils that are taken for orchard sites are as a rule sufficiently rich in plant-food, so that there is no immediate need of applying commercial fertilizers. It is, however, a recognized fact that some of our Idaho soils are deficient in their humus content. This fault can be corrected if a leguminous crop be grown on the land the season before the trees are set out. This growth should be turned under and allowed to decay.

There are three types of soils: loamy, clay, and sandy soils. A loamy soil is rich in plant food and needs only to be thoroughly broken up by sub-soiling to produce a strong and vigorous wood growth. Clay soils are more difficult to prepare and require deep plowing, sub-soiling, and continual attention during the summer months to prevent them from becoming compact and baking. Trees grown on clay soils are not such vigorous growers and for this reason are not as susceptible to winter-killing as those grown on very loamy or what may be termed free soil. Sandy soils are generally lacking in the necessary plant food. They also have the objection of losing all the fertilizer as may be added to them by the leadhing effect of the rainfall; hence, it is very important that should a sandy soil beused for orchard purposes, sufficient leguminous crops should be grown on the land to prevent as much as possible the leaching process, and also enable the soil to hold moisture.

It has been found that the best type of soil for apple growing is a loamy clay with a free soil underlying it. This soil is rich enough in plant food to allow the trees to make

a good growth and still not such a vigorous growth as to encourage blight or winter-killinb. Such a soil also affords good drainaye, which is extremely desirable for the production of a good healthy apple tree.

The prospective fruit grower should not make the mistake in the future that so many have made in the past, the mistake of planting the trees before he has prepared the land. The better and wiser plan would be for him to anticipate the planting of trees at least one year and better still to or three years, and devote this time to getting the land in condition by getting rid of the sage-brush or stumps, and by putting in a cover crop such as clover or alfalfa, for in the arid sections of southern Idaho the need of orvanic matter in the soil is obvious to the casual observer.

In no case should an orchard be planted in a section where irrigation is practiced before ditches for carrying the water have been completed. It is conceded that the furrow system of irrigation is the best and most efficient method of carrying the water to the trees. A clean cultivated orchard should never be flooded, except in cases where the drainage is exceptionally good and the excess moisture is readily carried off. When a cover crop is sowed in an orchard, flloding is often practiced and good results have been obtained. Water should not be allowed to stand in an appde orchard, for an excess amount of water is inducive of blight - that bacterial disease which has caused the destruction of so many apple trees during the past few years.

Lands that are to be planted to apples should be prepared in the fall so as to expose the soil to the ameliorating effects

of the winter and allow it to catch and hold the rainfall of that season.

When the surface soil is underlaid with hard-pan or by a stiff stratum of clay, sub-soiling should be practiced before the trees are set out. This sub-soiling may be accomplished with a sub-soiling plow or by the use of dynamite where hard-pan is very pronounced. The stirring of the surface to form a mulch is all that will be needed in the spring if the autumn preparation of the land is thoroughly done.

NURSERY STOCK.

Every orchardist is anxious to obtain the best stock possible but to secure the best stock is a question of vital importance as the future of the orchard has its beginning and bearing on the selection of the young trees. There are several ways of obtaining the stock and each should be darefully considered in order to determine the best one.

Some prospective orchardists think they can get the best results by propagating their own trees. Propagatinn is a business by itself and requires the same amount of time and study that any other branch of fruit growing. Growers overlook this point because so many people have been swindled by nurseries or the products of some company have been misrepresented by the salesman ar representative of that company. They feel they cannot get trees true to name where they are sure of this if they propagate their own trees. Many men have nursed and cared for trees from seedlings to bearing age and the greatest fruit they have received for their labors was disappointment. So mahy cases like this have led many to believe that it is impossible to get varieties true to name from nursery men. But all doubt will be set aside if the planter makes sure before buying that he is going to get trees true to name even if the cost for such a gurantee is extra he might better do it than to depend upon his own propagation. There are today many very reliable nursery companies who can make a guarantee and they can produce this stock much cheaper than the individual himself can. Of course, the selection of a nursery is important and one should become acquainted with several of the most reliable ones before making a purchase.

If one is so lucky as t be in the same vicnity as a nursery, that is the best plan to select your stock. This nurseryman's trees are grown under the same climatic conditions and the soil is likely to be the same as that in your own orchard. The trees are acclimated and will suffer no violent changes upon being transplanted. This is an important point because you can go right to the nursery and if you see thrifty, vigourous, and strong growing trees you may rest assured that they will do the same in your own orchard. Other advantages are that you can select your own trees instead of having your order filled by some disinterested party and you can carry on your business in a more friendly way By knowing the proprietor than is possible thru letters or correspondence in general. The trees will not have to be boxed or bailed, not the chance for their being frosted, long hauls are done away with and there is not the chance of the trees drying out.

From these arvuments one that located near a nursery might be somewhat discouraged or wonder how to obtain stock from the distant nurseries even if they are reliable. To this I would say, order from a nursery north of your own location as trees from that locality will be hardier than those grown in the warmer sedtions south of you. By its natural instincts a tree or plant will adapt itself better and quicker where it is removed from its own home to less sever conditions than it will upon being removed from a warmer climate to a colder one. Then, too, see that the nurseryman sends you trees carefully packed so that no injury has resulted from freezing or drying out, while in transportation. In correspondence with several of theimportant nurseries we found that their methods of shipping, packing, etc. were very

similar and some of the facts that are and tend to make the buyer impressed are thefollowing:

1. Entomologists' certificates are attached to all orders and the nurseries receive regular inspection.

2. By excellent systems of packing, the stock can be shipped even to foreign countries. The stock is put in boxes or bales; packed in straw and moss or fiber and each package lined with heavy paper to guard against freezing or drying out. Where a nursery will make these statements one may be sure that he is making a safe investment and these are the companies he better patronize.

Most nurserymen offer two grades of trees as first class and second class; some perhaps using other terms but which are synonomous. Of course, the first class means the best and is most generally the ones to buy. It means clean, straight, and well grown trees. Do not be influenced by the difference in price of the two grades because if you cannot do your own selecting, the second class from a distant nursery is little better than nothing. One will be repaid many times over by getting the first grade tree when that tree makes returns to the grower. Where one can do their own selecting they can take some of the second grade trees if they use good judgment. Perhaps a tree is under size because it was crowded while growing, but under favorable conditions would undoubtedly grow the same as the others. Most varieties will, however, grow straight trees and the crooked ones should be overlooked even where personal selection is made. A motto that every buyer of nursery stock should keep in mind is "Do not economize for the sake of buying cheap trees."

Having decided upon the nursery from which you wish to obtain your trees, two important questions immediately arise and they are: Shall I plant one or two-year old trees? Shall they be whole or piece roots? Each should be considered carefully.

Some nurserymen offer whole roots while others offer piece roots, each basing their arguments on well established facts, but in our opinion for Idaho conditions the whole root is the better one of the two. Downing in "Fruits and Fruit Trees of America" says: "Large quantities of trees are propagated by using pieces of roots. This tends to debilitate and reduce vitality. It is, therefore, apparent that but one healthy permenant tree can ever be grown from a single seedling stock."

P.J. Berkmans, when president of the American Pomological Society many years ago, after exhaustive study of the subject, said: "Standard trees should be propagated only upon healthy and vigorous stocks. The system of grafting upon pieces of roots is wrong, to say the least of it, but as it is cheaper and quicker it is resorted to by some nurserymen. No lasting results can possibly be expected from trees propagated upon this plan. The system is worthless and is only calculated to disappoint the planter. The history of all piece root worked trees planted in orchards since 1860 has been the same - 8 to 10 years of life - a few small crops of fruit and then death."

The late Nicholas F. Murray, while president of the Missouri State Horticultural Society in 1884, read a paper before that body on this subject. He said: "The mad rush and greed to multiply trees to satisfy the demand for cheap nursery stock has caused us to depart from one of the great and grand laws

of nature that never should have been violated, when in place of making one root for each graft from each seedling we commenced cutting them into stocks. This practice may suit the nursery man who feels that he must grow cheaper trees and the public have no right to complain so long as people are unwilling to pay more than 10¢ or 15¢ for their trees; but such stock will never make the large, healthy, lasting trees that once flourished in our country and were started before this perniciousstyle was introduced." The most profitable orchards - those that live longest and therefore produce the most profit - are those planted with whole root trees.

The question of one or two-year old trees is readily answered without any doubt for Idaho conditions. Plant "One-year old trees always". Not only will the one-year old trees overtake the older trees in growth, but they have all the buds in tact and this allows the orchardist starting his scaffold limbs where he chooses. For western conditions in general all trees are headed low and where trees are left in the nursery until the second year they are invariably headed high which are suitable for eastern conditions but not for Idaho or the northwest. High headed trees in Idaho will sunscald, economy is lost in pruning, harvesting, spraying, thinning, and injury from strong winds is made more likely. With the one-year old trees you can prune and set them to meet the existing local conditions. The nursery man selling you two-year old trees cannot do this. His trees have at least four feet trunks and numerous side branches. These the nurserymen cut off according to his ideas and perhaps not yours. It makes the tree look neater but it is not so serviceable. The only advantage in planting the two-year old trees is

that it comes into bearing earlier, but will it be as productive in lager years as the yearling tree? Experience has told many decidedly no.

PLANTING.

It is said by many that Idaho stands foremost among the states of the Union when rated according to the future of its apple production. Many people are coming into this state annually with the idea in mind of making a permenant home and the first impulse is to plant fruit trees for the future. These people that are coming in are of a mixed class and very few of them know the principles of fruit growing and immediately they want to know how to plant, what to plant, and when to plant. The authors shall dendeavor to bring out such points and necessary information on this subject that any person may be benefited and helped by it.

Points which are of vast importance in planting are the following:

1. Size of the orchard
2. The individualhimself
3. Selection of varieties
4. Different systems of planting

Each of these should be treated separately because of their importance.

I. Size of the orchard: This depends to a great extent upon the experience and ability of the planter and for what purpose he is going to grow the fruit. If he is inexperienced and desires to put out an commercial orchard, he should confine his attention to a few acres. If he does not have enough capital to see his way clear with just his orchard alone, he can add a few acres and devote part of his time to general farming. Then in later years when he has become more experienced in fruit growing, he has his extra land and can enlarge his orchardaccordingly. Many people think that because some of their friends can make larger profits from a bid orchard, that they themselves

could do likewise, but they are wrong owing to the peculiar conditions governing fruit growing. In Idaho we are so located that our fruit markets are at a great distance and to get the best results and the most profits, each grower should have a large enough orchard that he can ship his produce in car load lots. A ten-acre orchard is plenty large enough to do this and when the shipping facilities are so adjusted many smaller tracts than ten acres will be put in and prove just as profitable proportionally as the larger orchards.

2. The individual himself. In the management of an orchard the best results are known to be obtained by personal attention. But in devoting his own time to the orchard, the planter must understand and know some of the requirements that must be satisfied if he is to gain success as a fruit grower. If possible he should have a college training or at least a general knowledge of chemistry, botany, and entomology. Chemistry will aid him in his soil analyses, spraying mixtures, and sprays, and the application of fertilizers. In the study of botany he gets the growth of plants, their structure, diseases, and how they live and grow. A good knowledge of entomology will enable him to identify all insect pests that may infect his orchard; then with his chemistry he knows immediately how to eradicate them.

Business ability and business methods go hand in hand with scientific training and it is as important to be as well versed in business as it is in scientific training. He must study the market conditions, be able to sell as well as produce, and sett at the right time. Co-operation of business and producing will bring anyone good results.

3. Selection of Varieties. To the new planter the selection of

varieties is best made by his neighbor. Conditions we know are not alike in all sections and because one variety does will in one locality it will not necessarily do as well in another locality. Choose those varieties that you know ill do best in your section. At this age fruit lands in any of the northwest states is too expensive to experiment on. Then, too, plant the same varieties as your neighbor does and in time you will make a name for your locality. Examples of this are the Wageners of Latah County, the Jonathans of the Boise Valley, the Spizenbergs of Wenatchee and the Yellow Newtons of Hood River, Oregon. They have made themselves famous in the fruit world for producing just one or two varieties of apples. New planters coming in then, have the experience of thos before them demonstrated and they naturally plant the same varieties. That is what must be done and what is being done in this state.

4. Different Systems of Planting. There are several systems of planting in practice today, the most important ones being the square, hexagonal, quincunx, and triangular. The trinngular system is very similar to the hexagonal and is the least used of the four.

The system most common in Idaho is the SQUARE system as shown in Plate XV. According to this system the trees are planted in rectangles or squares. By this system one can cultivate both ways and this is a great advantage when the trees become larger. Trees planted by this system give a very good appearance and practically all orchards in this state are laid out according to this plan.

The main disadvantage of this system is that it does not give equal distribution of the trees over the ground. Then, too, some people, upon thinning out trees, make some very serious mis-

takes when this system has been used. One common mistake is to plant trees a certain distance apart and then take out every other one at thinning time, tinking the space between the permanent trees will be doubled. For instance, trees planted 20 feetapart will not be doubled to 40 feet but the distance will only be 28 feet and will be left in squares running diagonally across the field. One should have this point in mind when planting by the square system if they later intend to remover some of thetrees.

How to plant trees by the square method: Establish the boundary lines of the orchard. Then set stakes along the boundary lines at opposite sides of the area to be planted, then use a marked wire or rope for the position of each tree. Beginning on the side boundary of the area, the first stake is set 25 feet from the end. Following this stake, other stakes are set successively at the distances the trees are to occupy these stakes to be in line along the side boundary and extending the entire length of the field. The opposite side of the area is staked in like manner, beginning at the same end and staking in the same direction. After this a telephone wire which is long enough to reach across the field is secured. In one end of the wire a loop is made large enough to slip over the stakes 25 feet from this loop the wire is rapped tightly with fine stove wire over which a piece of red flannel is tied. Then at distances the trees are to stand in the rows, other markings are made likewise along the telephone wire. By stretching the wire between opposite pairs of stakes, the spot where each trees is to stand may be located; Holes may be dug and trees set out at once or stakes may be driven at the various marks. (Idaho 64).

This method is very good for small tracts but where there

are any number of acres, it would be much cheaper to engage an engineer or transit man.

Plate XVI shows the HEXAGONAL system of planting. The trees are planted in a regular hexagon with one tree in the center, each one being equidistant from the other, thereby utilizing the ground to a better advantage than where squares are used, and each tree gets an equal amount of air and light. Cultivation is rendered more difficult, however, by the square system, especially when the trees begin to crowd a little. Fillers may be used but this is not practiced so much as in the quincux system. How to plant trees by the Hexagonal Method. Since an orchard laid out in hexagons has all of its trees equidistant, the first essential device for this work is a trimgle the length of each side of which is the desirid distance between the two rows of trees. Usually this triangle is constructed by the use of three pieces of flexible wire joined together at the three corners by rings one and one-half or two inches in diameter. Measured from the middle of each ring, each side should correspond exactly with the distance between the trees. A triangle constructed in this manner works very well on comparatively level ground but for sloping ground it is usually best to make the triangle of wood. Three well-seasoned one-by-two inch strips of pine, each two inches shorter than the distance the trees are to be planted, are nailed firmly and braced together forming an equilateral trinagle. Care should be taken to have the sides of the face of this trinagle on the same plane. At each corner of the trinngle a pine board six by six inches is nailed, an inch hole is bored in each board in such a manner that measured from the center of the holes each side corresponds exactly with the

distances the trees are to be planted.

In using the triangle it is necessary to stake out one row by line at one side of the field, after which the triangle serves to locate all other stakes. Three men must carry the trinagle, one at each ring. By placing two of the rings separately over two established stakes a third stake is established This process is repeated until the entire field has been staked. Where it is desired to use hexagons on sloping or hilly ground a plum-line and carpenters' level must be used in connection with the wooden triangle. Each time that the trinngle is moved it is leveled and the plumb-line hung at the corner where the ground is lowest. By this method the third stake may be exactly located in reference to the other stakes. (Idaho 64).

Plate XVII shows the QUINCUNX system of planting. This system is little used today in the northwest unless it is desired to have fillers put in the permanent orchard and this is its greatest advantage. It means planting in fives. Permanent plantings are made in squares or rectangles and then another tree is placed in the center of each square. When the trees become matured or begin to crowd this center tree or filler is removed. By this system 75% more trees can be planted than by the square method as the figure on Plant XV will show. The manner of staking out an orchard by the quincunx system is the same as for the square except that it is necessary to place an additional stake midway between each two stakes described in the preliminary staking for squares. The marked wire described for laying out the squares has an additional mark placed upon it, which measured from the loop previously described is half the distance that exists between the permanent trees.

In determining the distance the trees shall be apart, the

planter must be governed by the soil, location, type of fruit, variety, and elevation. For the most part, apples are now planted forty (40) feet apart. Growers of experience find that this is none too far when the trees reach the age of fifteen to eighteen years. Our strong soils of low elevation, greater distances are required than on the higher elevations and lighter soils. For Idaho in general fourty (40) feet is the best distance.

Then in planting the trees, the size of holes made depends largely upon the nature of the soil. In the Lewiston Valley the soil is of a volcanic ash origin, being loose and friable, therefore, digging of large holes in unnecessary; but where there are clay sokls care should be taken to dig large holes as the soil is compact and does not allow the small and young roots to penetrate it so easily. Some say if a soil has to be dynamited that it is not good fruit land but this is not always so. Some heavy clay soils properly drained will grow good trees but the holes should be dynamited to loosen the soil, thereby allowing the roots to grow more readily;

After receiving the treatment described under pruning the young trees should be set firmly in the ground and three or four inches lower than they grew in the nursery. In planting the trees, a planting board is generally used. It is a common board with a notch cut in the center and holes bored in the ends. After the orchard is staked and the holes dug, the board is placed so that the notch comes next to the stake and short stakes are driven through the holes in the end of the board. The board is then lifted and when the trees are planted the board is then replaced and the tree set so that it comes in the notch in the board. By this method the trees can be kept in exact align ment.

If located where there are heavy prevailing winds, lean the tree slightly at time of planting to the windward. Examples of this precaution not being observed can be found in several orchards in Latah County. Wind breaks can also be planted to a great advantage.

One final point on the question of planting is the arrangement of varieties. When commercial orchards are planted there are not more than four varieties chosen. By experience many growers have found that it brings evil results to plant each variety by itself - that is, in blocks. This plan should never be followed as will be clearly shown under pollination. Owing to the fact that the flowers of some varieties are self-sterile, it is considered important to intermix the varieties. Furthermore, though many varieties are able to fertilize themselves, frequently the size of the fruit is much increased if pollen from other varieties serves this purpose. The best plan is to plant a few rows of one variety together followed by a few rows of another variety. If the varieties are arranged in pairs it betternfacilitates labor in harvesting and affords the best opportunity for cross-pollination.

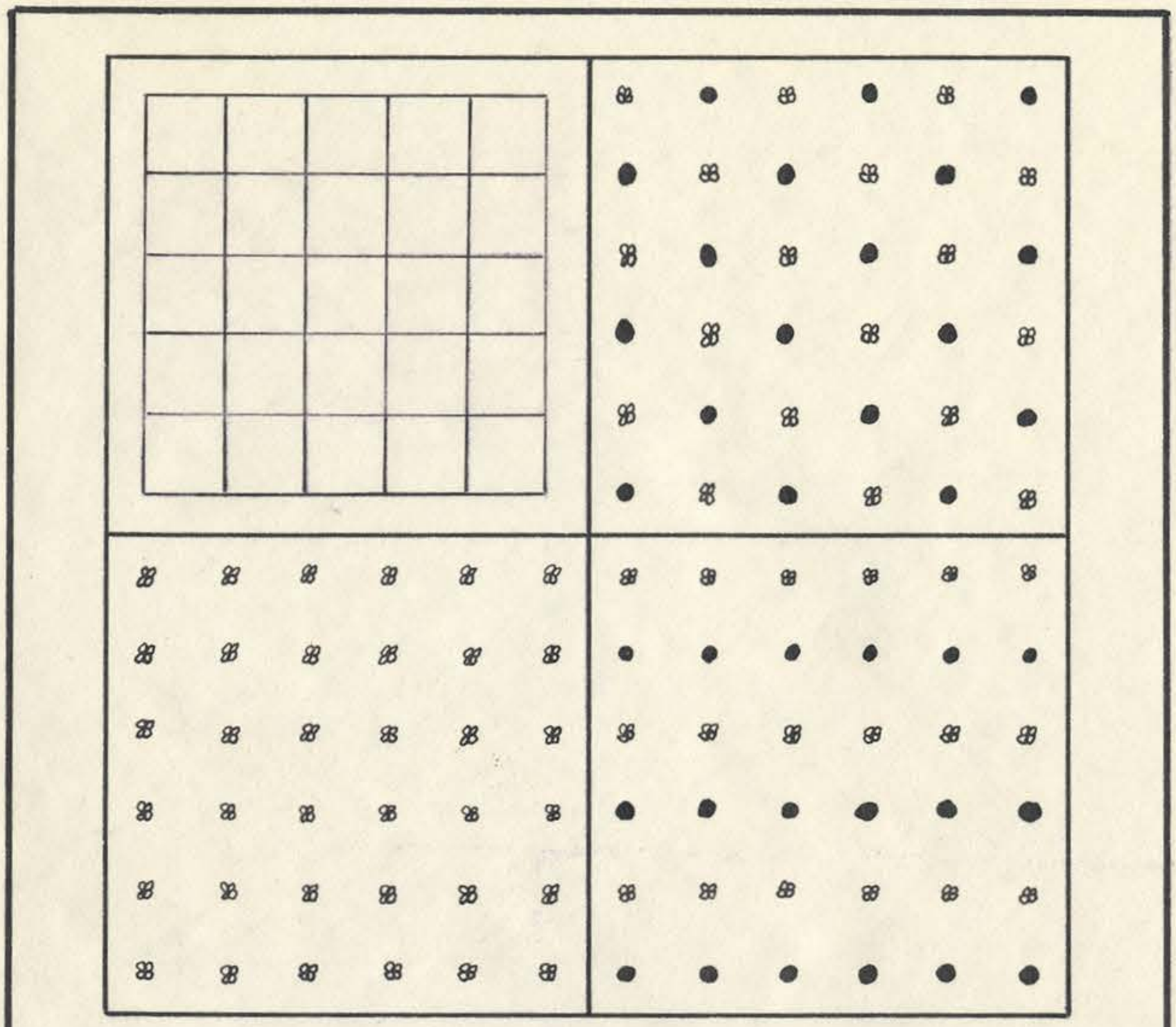


PLATE XV

THE SQUARE SYSTEM OF PLANTING.

NO.I FIELD LINED.

NO.II FIELD SET.

NO.III PROPER THINNING.

NO.IV IMPROPER THINNING.

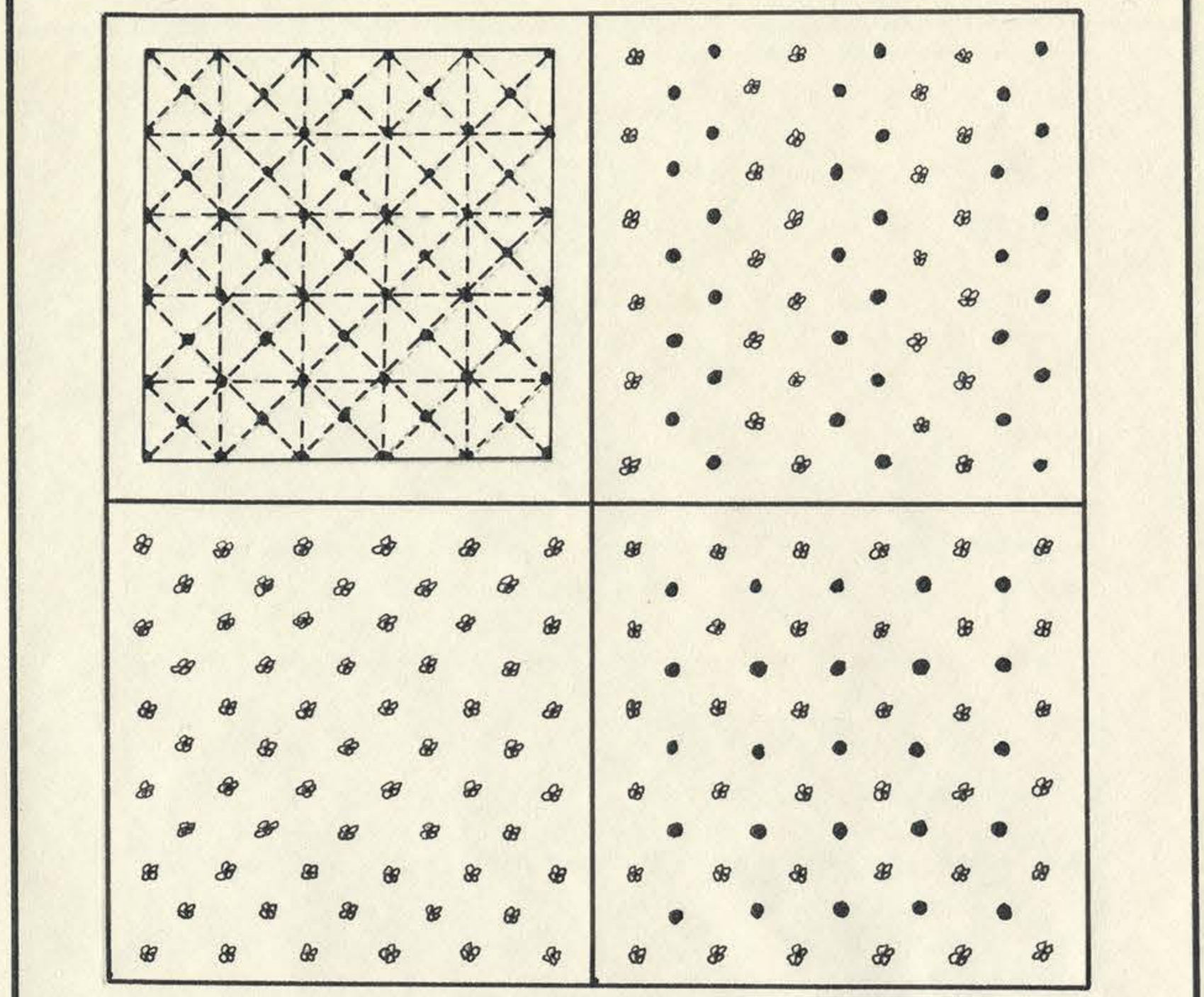


PLATE XVI

THE HEXAGONAL SYSTEM OF PLANTING

NO.I FIELD STAKED.

NO.II FIELD SET.

NO.III IMPROPER THINNING.

NO.IV PARTLY THINNED BUT PROPERLY DONE.

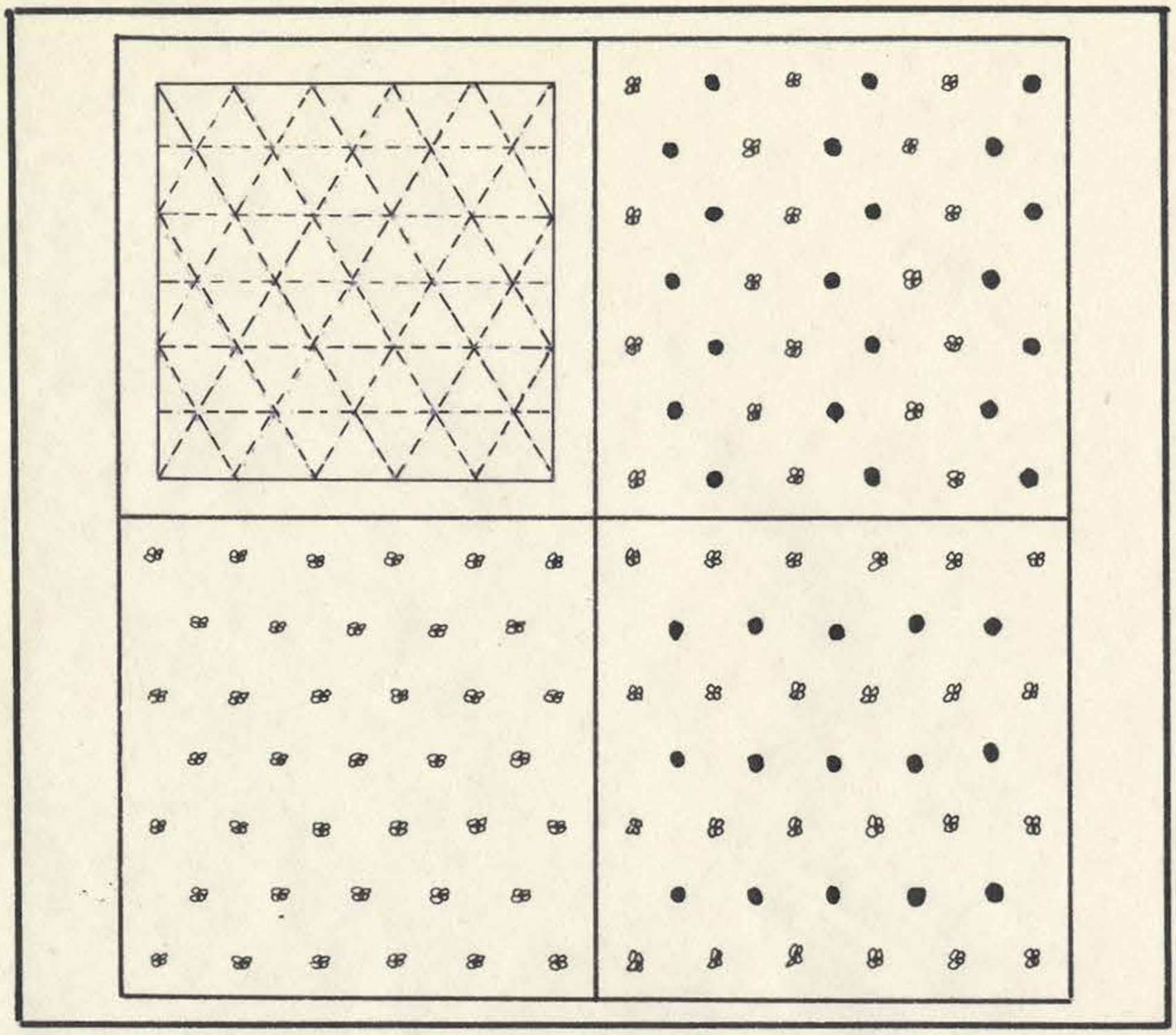


PLATE XVII

THE QUINCUNX SYSTEM OF PLANTING

NO.I FIELD LINED.

NO.II FIELD SET.

NO.III IMPROPER THINNING.

NO.IV PROPER THINNING

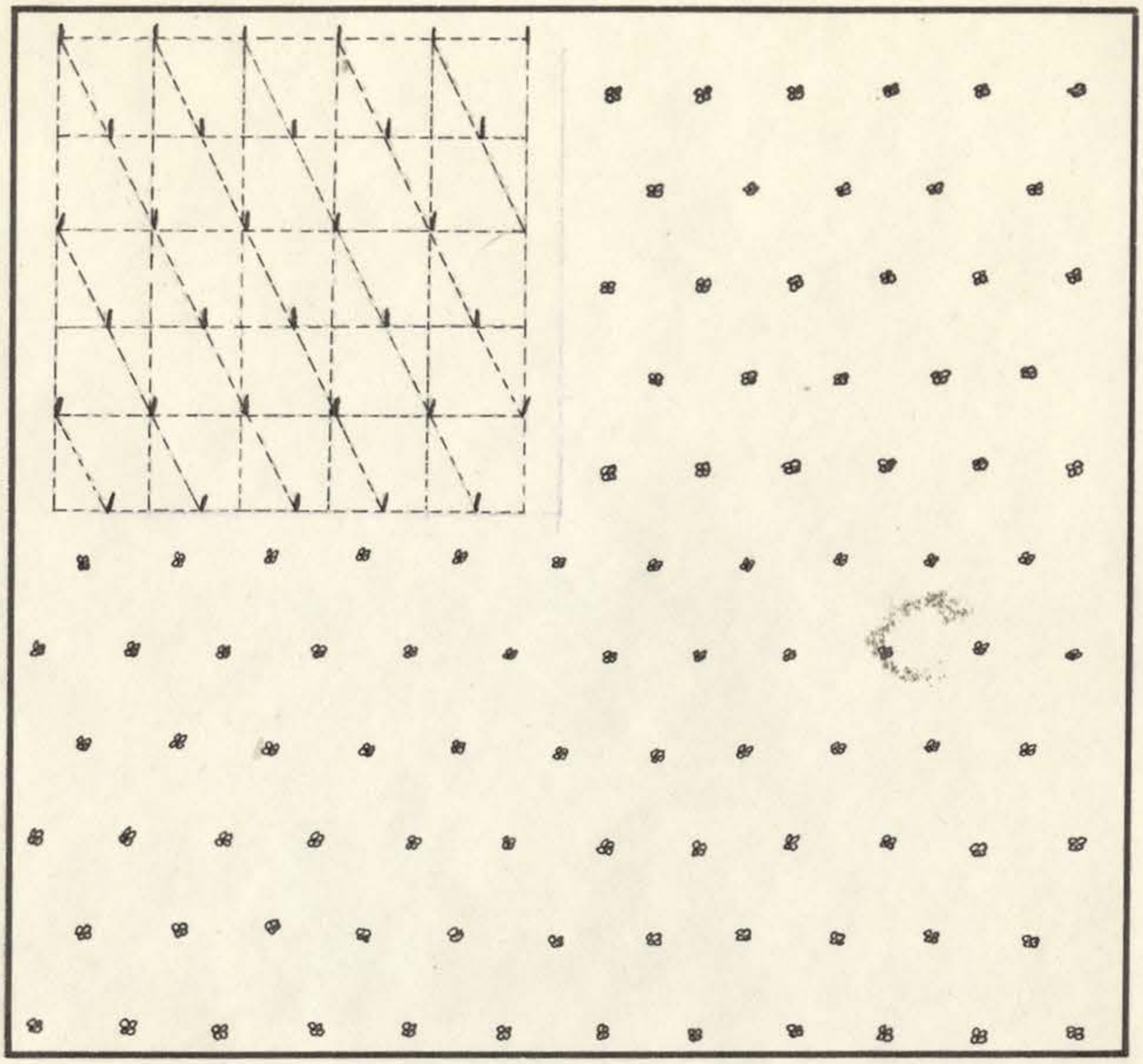


PLATE XVIII

THE TRIANGULAR OR ALTERNATE SYSTEM OF PLANTING SHOWING FIELD STAKED AND SET.

CULTIVATION.

After the tree has been planted, care should be given and the moisture in the soil should be carefully watched, so that there will be enough moisture in the soil at all times to make a maximum growth; although too much water is just as bad as not enough and good cultivation is just as essential as irrigation; in fact, some of the best orchards of Idaho are extensively cultivated and a minimum amount of water used. In some of the apple growing districts of Idaho the soil has become alkaline by the excessive use of water.

The ultimate outcome of the producing power of an apple orchard is governed entirely by the attention that it receives during the first few years of its life. Plowing of the orchard each spring about the time that the cold weather breaks, followed by a clod crusher or disc harrow is an excellent practice. A light dust mulch should be kept on the surface thruout the dry season by the use of a harrow or cultivator. This tends to conserve moisture and gives the trees a chance to make a vigorous growth. Extensive cultivation should not be given the trees lage in the summer as it is liable to cause a second growth in one season which is undesirable and harmful to the trees. Cultivation should be continued from year to year until the trees come to the bearing age and even then it is questionable whether it should be discontinued. If it should be sown. But before sowing a cover crop, determine what results you wish to obtain and sow a crop that will tend to give the desired results. For example if the trees need nitrogen sow a leguminous crop, if you need more potash in your soil sow crops such as turnips or rape, and if you have too much water in your soil sow

those plants that will reduce the water by evaporation. The use of a cover crop is an excellent method of restoring humus to the soil and a cover crop should be turned under at least once every two years.

Cultivation should be begun when the orchard is first set out and the land should never be allowed to so grow up with weeds and brush that a big turning plow is the only thing that can be used as a cultivator. The best cultivation is that which begins early in the string and keeps the land cleared up until mid summer or early fall. Some orchardists make a practice of sowing a cover crop at mid-summer and allowing it to grow the remainder of the growing season and turning the growth under at the spring plowing. This is an excellent practice and tends to keep the soil in good condition.

Regular cultivation is important for two reasons: First, it makes the plant food which is stored up in the soil more available; and second, it conserves moisture.

PRUNING.

Pruning is an art in apple growing the same as the construction of buildings is to the architect. Before he plans to build a house he always selects some certain style of structure and then tries to follow it to completion. It is just so with the successful orchardist, he should first determine the style of structure of a tree that he desires and then follow it to completion. On this point one often makes mistakes in that he will prune one way one year and the next year change the style entirely, thereby not obtaining good results or the best result possible. There are two general styles of forming a gree, the OPEN center head or vase form and the CENTER STALK head or pyramid form. If you desire one of these two styles, you should prune with that fixed idea and follow it until completed. As to the choice of style to be made, the decision depends upon the climatic conditions, the locality of the orchard, the variety of fruit and the individual planter himself. Many experts even disregard these points and hold by definite facts and arguments, that one style is superior to the other. But these men are certainly in the wrong in not considering the above named points because it is a certainity that all trees will not do the same in one locality as in another. For Idaho conditions in general, the open centered head or vase form is the style mostly used and the one recommended by the State Experiment Station.

An Open Headed Tree is shown in Plat I.

The building of an apple tree should begin when the tree is first set in the ground - in fact the roots should be pruned before setting. It is not generally realized that when a tree

is taken from the nursery row a large portion of the root system is left in the ground. The balance between the roots and the top is then destroyed and obviously the top should be removed. Practically all of the elements which nourish and build up the tree are taken from the soil in liquid form by the roots. This material is carried in the cell sap mostly thru the outer sap wood to the leaves. Here the crude food is changed by the influence of the sunlight and the chlorophyl or green substance of the leaves to a form that can be readily assimilated by the plant. This food is stored in the cells, especially in the fall, to be drawn upon at any tie that the roots fail to suply the required amount. In transplating, the nursery tree is deprived of one-half or more of its roots, and not only must it become established in the soil, but it must produce a large number of new roots before much new food can be manufactured and supplied. In the meantime the leaves begin to push out and the stored-up or reserved food and moisture may all be used before the root system is in a condition to supply more. Is not then the question readily answered why so many young trees die the first year they are set. This is especially true in the southern part of the State as the dry air and intense sunshine cause the trees to dry out rapidly. A precaution that should be noted here is to plant the trees as soon as possible after they have been heeled in, as they dry out quicker and more liable to sunscald than at any other time. The fact that all stock upon receipt from the nursery should be heeled in is well established and taken for granted that all planters have this point in mind. The trees should be heeled in deeply in damp soil, and when planting the work should be so arranged that the roots will be exposed to the air for the shortest possible

time. All bruised roots should be carefully removed, leaving smoothly cut ends which will readily heal, because if this is not done decay is apt to set in, which may seriously injure the tree. Long straggling roots shold be shortened and if the entire root system is in more or less of a tangled mass, it should be shortened and thinned.

After the tree is set and the dirt firmly pressed around it being careful not to make it higher than the surrounding surface of land, you shald then make your first pruning. If you have just one whip, which is preferable, you should make your first cut about 18 or 20 inches from the ground, as is shown in the drawing, Fig.I, Plate XIV., leaving the terminal bud toward the prevailing winds. Also if possible, the tree should be so set that a majority of the lateral buds are toward the prevailing winds, because in after years the tree willhave grown in an upright position instead of being slanted. This method is being practiced in north Idaho and especially at the State Experiment Station. If when setting the one year old trees, they being preferable to two year old stock, you find some side limbs below the cut, you should cut them back from 2 to 4 inches from the body of the tree.

During the first few weeks growth after the tree is set, it will put out small sprouts at nearly every bud on the whip. These should be kept pinched off or rubbed off, except the three or four stronger sprouts which should be evenly distributed around the stalk, depending upon conditions of locality just mentioned. The shoots being left, continue to grow during the summer and are pruned back the following spring as shown in Fig. 2, Plate XIV. This tree is now two years old. All inside limb growth is removed only those limbs which have started to

grow outward being left. In the third year the main upright limbs are given the advantage in being left somewhat longer than the others. They should never be headed back so severely as th rest. In making the cuts or pruning the three year old tree it may be regarded as a rule that when a limb is cut back, unless the cut is made just above a strong lateral, two or more branches will develop near the cut end and some of the buds lower down will develop into shoots. The usual practice is to allow two of these to grow on each of the previous years limbs to form an additional framework for the tree. The two selected should be some distance apart, one at the end and the other farther back, and so placed that the development of crotches will be impossible. They are now out back from one-half to two-thirds of their growth and the laterals are shortened to two buds, so that they may later develop fruit spurs and also shade the branches with their cluster of leaves. If too many have formed, some of them of course should be removed.

In he fourth year the framework of the tree should be well formed, so that it will require less atttention from this time on. Surplus branches and those that rub or are inclined to form crotches, should be removed. Extra vigorous growths should also be headed back. Thus it is with the succeeding years. The form having been obtahed subsequent pruning should be directed toward retaining he shape, cutting back excessive growths, thinning and renewing the bearing wood.

Figs. I & 2 of Plate XII are of three and four year old trees.

Figs. I & 2 of Plate XIII are of five and six year old trees.

After the tree has come into bearing, the question arises

how shall fruitfulness be produced? This is readily answered Summer Prune - but a point of vital importance must be considered. Does your tree make a rank wood growth each year? Some sections of Idaho vary considerably in this respect, The fruit sections of this State all have a more or less rich soil, but some having better soils than others, gorw plants and trees more rapidly and more luxuriantly and it is in these sections where summer pruning should be practiced. The saying is "Prune in winter to produce wood growth and prune in summer to produce fruit". Thus where the conditions are such that a tree tends to produce an excellent wood growth but does not bear well, summer pruning should be practiced. To differentiate and intelligently practice summer pruning, the pruner must have a knowledge of tree growth in his particular locality and be more or less familiar with the habits of the varieties. No definite time can be set to summer prune for the formation of fruit buds, but dependence must be placed upon the variety, the district, the method of culture and the season.

The same rules also hold for winter pruning. One should become well acquainted with the varieties, as a few grow slowly and will not bear heavy pruning. Some are erect growers and others are spreading. The upright varieties may be spread somewhat by pruning to the outside laterals, and the spreading kinds may be contracted by cutting to those which have an inward direction. And by cutting back the vigorous growths each season, those 2 feet or over inlength the limbs are made stocky, these in a great measure doing away with dropping branches. This can only be done by intelligent annual pruning.

In pruning some growers pride themselves on cutting their

trees very heavy annually, while others seem to be as equally proud in not pruning at all. It should be the aim of every grower to strike a happy medium. Prune the trees so that there is ample room to raise a good quality of fruit and at the same time have ample wood growth to bear a heavy load with as heavy props and other artificial supports as possible.

In conclusion I would say, quoting from Idaho Bulletin #47 By L.B. Judson - "Before touching saw or knife to a tree, you should have well in mind what you ought to accomplish by the work. Among the following are the chief objects sought in intelligent apple pruning:

1. To restore the balance between top and roots at the time of setting out.
2. To make the top open centered, regulate the number of limbs composing it, fix it at the proper height from the ground and do away with weak crotches.
3. In older trees, to remove crossing branches, thin them out to admit sunlight and facilitate spraying.
4. To induce the production of fruit rather than wood and vice versa; in other words, to correct shy bearing and over bearing.
5. To keep lower limbs out of the way of cultivation, and upper ones from growing out of easy reach for spraying and picking.
6. To change biennial to annual bearing; in other words, to break a tree of the "Off-Year" habit.
7. To correct too compact or too spreading growth of top."

IMPLEMENTS TO USE.

Besides knowing what to prune for and when another indispensible preliminary is to have the tools. It is thought by some that all that is necessary is the thumb and finger and a keen

eye; that is, that all undesirable limbs should be pinched off while gree and tender or the buds rubbed off and never allowed to grow at all. But what are we to do with broken and diseased limbs and the trees which have been neglected? Immediately we see the need of pruning tools and it is absured to attempt to handle the pruning with such equipment as thay mentioned above.

The saw and shears are the only pruning tools worthy or mention or consideration. The knife is useful for young trees or in trimming the roots when the trees are set out, but not safisfactory when used on the tops as often clean cuts can not be made, as pieces of bark are left; and, too, the force needed to cut a small limb, is liable to injure the remaining part or to cut where it was not intended.

There are everal types of saws in common use, some of them being represented in Plate II. of these No.I is by far the best. The blade is very thin, the rigidity being maintained in the frame. It makes a narrow kerf and never pinches because the blade is less than half an inch wide. This is known as the "Swivel Saw". Its greatest advantage is that the blade can be turned at any angle and is the handiest for working in difficult places. Having a small blade it does not make so much sawdust as No.4 does. It will work in tighter places than the "Compass Saw" no.5. The tension is regulated by twisting the handle. Twisting to the left loosens the blade so it can be removed when dull and another substituted as it is more economical to put in a new one than try to file such a thin, hard blade. A complete saw costs about a dollar and a half. Its disadvantages are that it cannot be used on limbs larger than 3 inches in diameter

and that the handle tires one if using the saw steadily.

Next to No.I, No.2 is the most satisfactory. Being narrow it does not pinch very much yet it is wide enough to give the blade strength and siffness. It does not cut so fast as No.I.

No.3 should have no place in a kit of pruning tools. The curve in the blade only adds to its awkwardness and in having a double edge, the other edge is always ripping into the bark.

No.4 has the disadvantage in being curved and then the teeth are sent backward making it a very awkward tool for anyone accustomed to handling an ordinary saw.

No.5 is known as the "Compass Saw". It saws very slowly but does not pinch and is handy in difficult places. One fault is that it kinks easily.

Plate III shows the different styles of shears that are used. It is a matter of opinion as to which are the best or what one is better than the other. Probably one that is very serviceable and not expensive is No.8. No.5 is the same kind only of a higher grade and more expensive. It has a rachet nut which insures against working loose. The best pair in the collection, but the most expensive pair is No.2, the "Rieser Shears". These are an imported make and very similar to No.3, a domestic and not so expensive make. The blades are removable and can be replaced by new ones. Such shears as Nos. 2, 3, 4, 5, 6, 8, and 9 will bruise the bark somewhat unless the cutting blade is turned toward the tree. To prevent this bruising the double cuttinb pruniny shears shown at No.1 have been devised, each blade being ground to a thin cutting edge. To prevent the blades cuttiny each other under the side pressure of the wood when passing thru a limb, the points are curved so that they over-

lap while there is still half an inch in the clear between the middle of the blades. The blades being curved do not allow a branch to be admitted unless opened to the full width, which makes them tiresome to handle.

No.7 is the "Levin" pruner. This is of no practical use as it makes such slow work. The small opening must fit around the limb and this takes extra time. Then, too, the handles must be spread so wide to draw the blade out of the way that it is very tiresome to the hand. The blade works in a slot and practical experience shows that the bark is always injured whichever way the shears are turned, and it is impossible to cut cleanly and closely to the trunk.

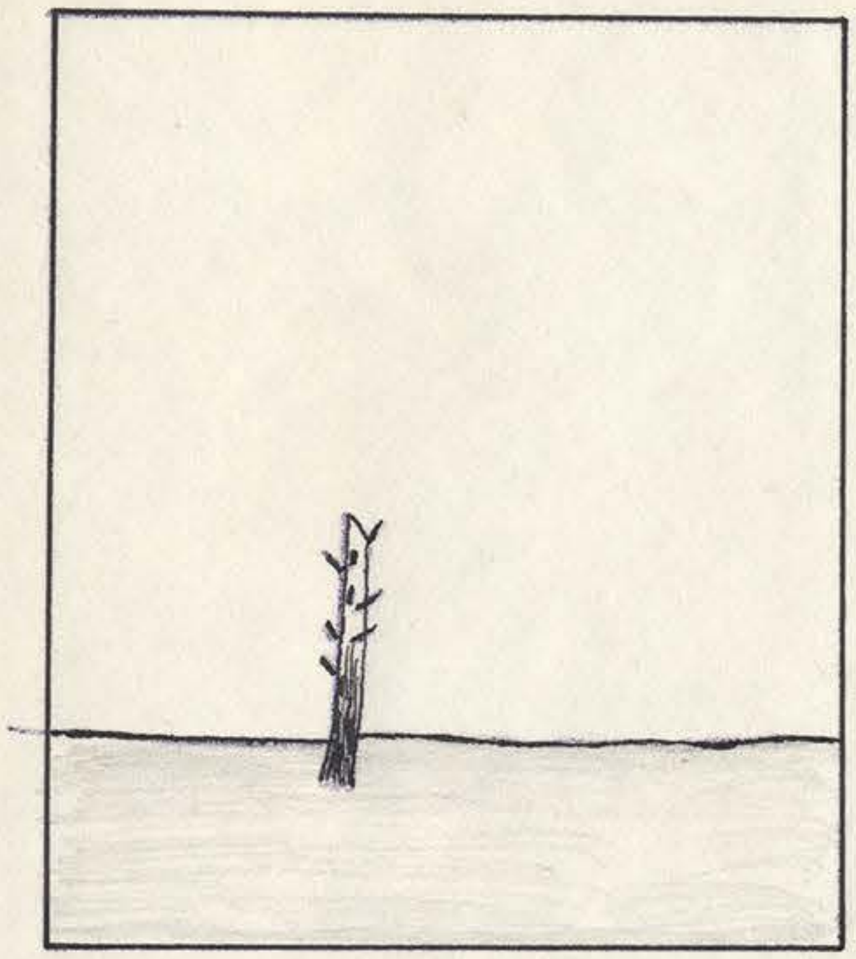
Plate IV shows the different styles of "Lopping" shear. These are long-handled, double-hand shears used in pruning large limbs. They are the logical development of hand shears to meet the need for a stronger and more powerful tool. They are used to an advantage on limbs up to an inch in diameter and are quicker than a saw and require less strength than the hand shear to cut any given thickness. They do not tire one so quickly but are less convenient in cutting small limbs than hand shears, but can be manipulated quite madily with alittle practice. No.I, "The Cronk" is objectionable because the straight blades tend to force the limb from between them. The blunt blade is not beveled, which makes it a "bruiser". The ferrules are heavier and less apt to come off than those on Nos. 2 and 4. The main fault with No.2 is that the ferrules come loose causing the handle to split where it is wired. Also it it a clumsy tool to secure a draw cout the nut working in a slot in the shank of the blade. No.3, the "New Yolo", is the most strongly made and best pair of any of

the styles. The wire winding ensures no trouble with loose ferrules. No.4 is too light and has very poor ferrules.

Plate V shows the pole shears. These are used to an advantage in larger trees where cutting out cross twigs and high branches occur. It is difficult to cut to a bud with them as they are not easily guided. They cost from 75¢ up. Plate VI shows a new style of Pole Pruners.

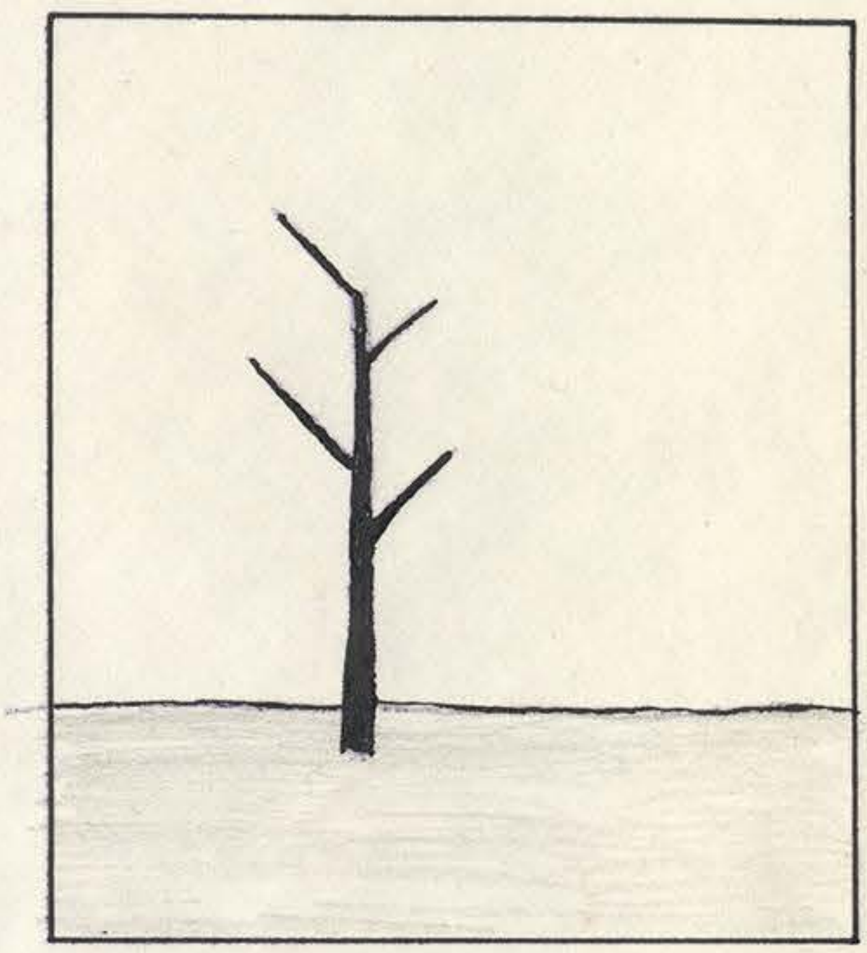
Last but not least, is the paint post. In making large cuts the cut surface on the tree should be painted to protect it from disease and weather conditions. Common lead paint may be used to an advantage on wounds over one inch in diameter, and should always be applied on large wounds. In making large cuts Plates VII and VIII show the proper and improper ways.

Fig. I



ONE YEAR OLD TREE

Fig. II



TWO YEAR OLD TREE

PLATE XI

TREES PROPERLY PRUNED.

FIG. I

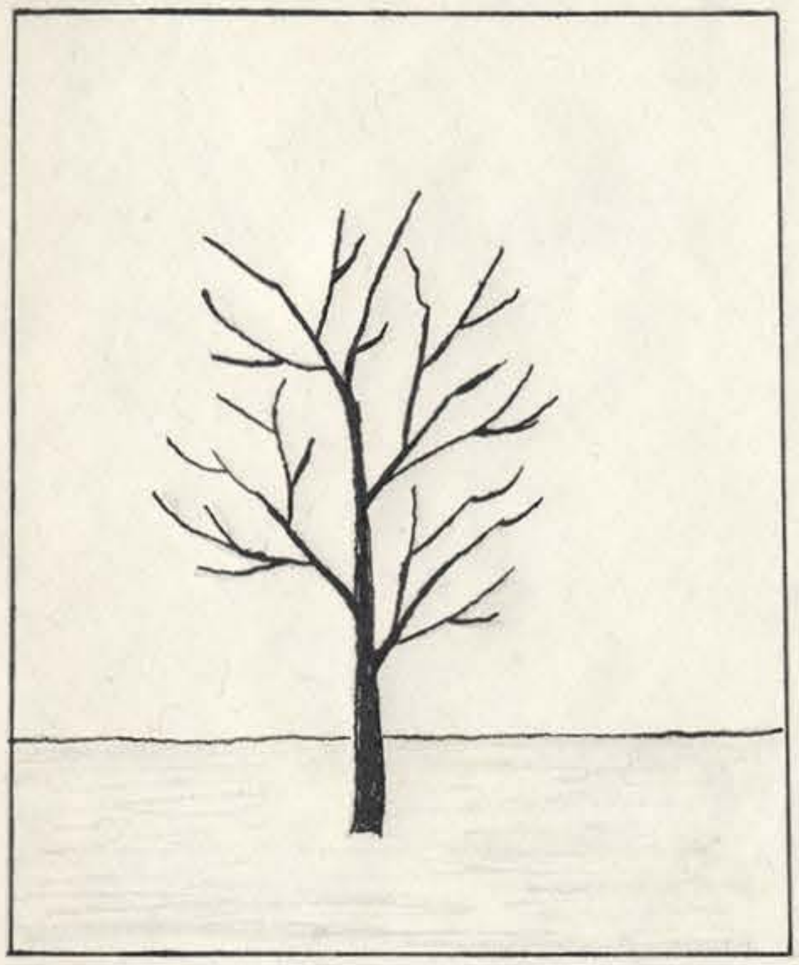
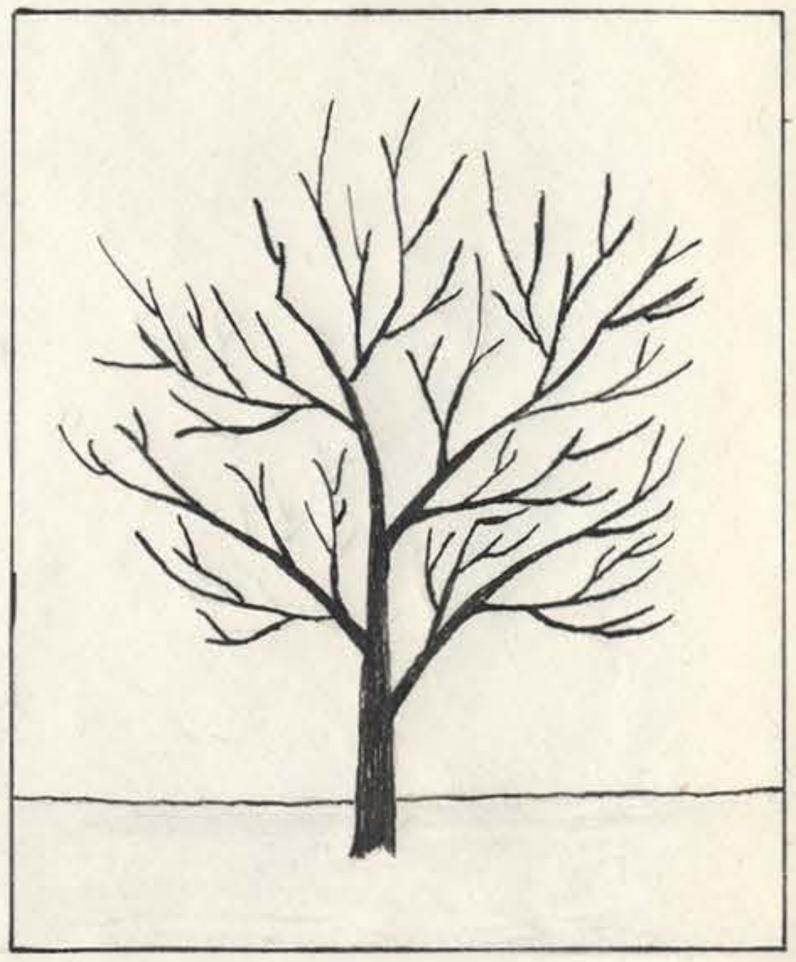


FIG. II



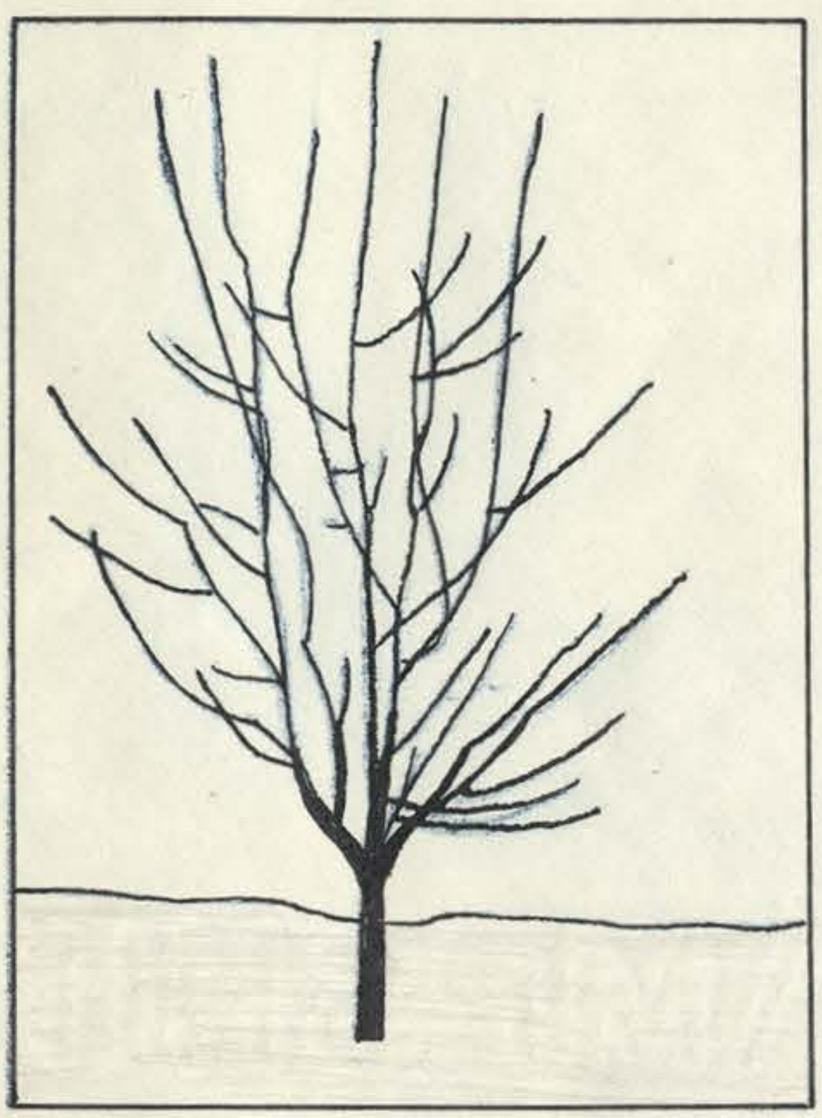
THREE YEAR OLD TREE

FOUR YEAR OLD TREE

PLATE XII

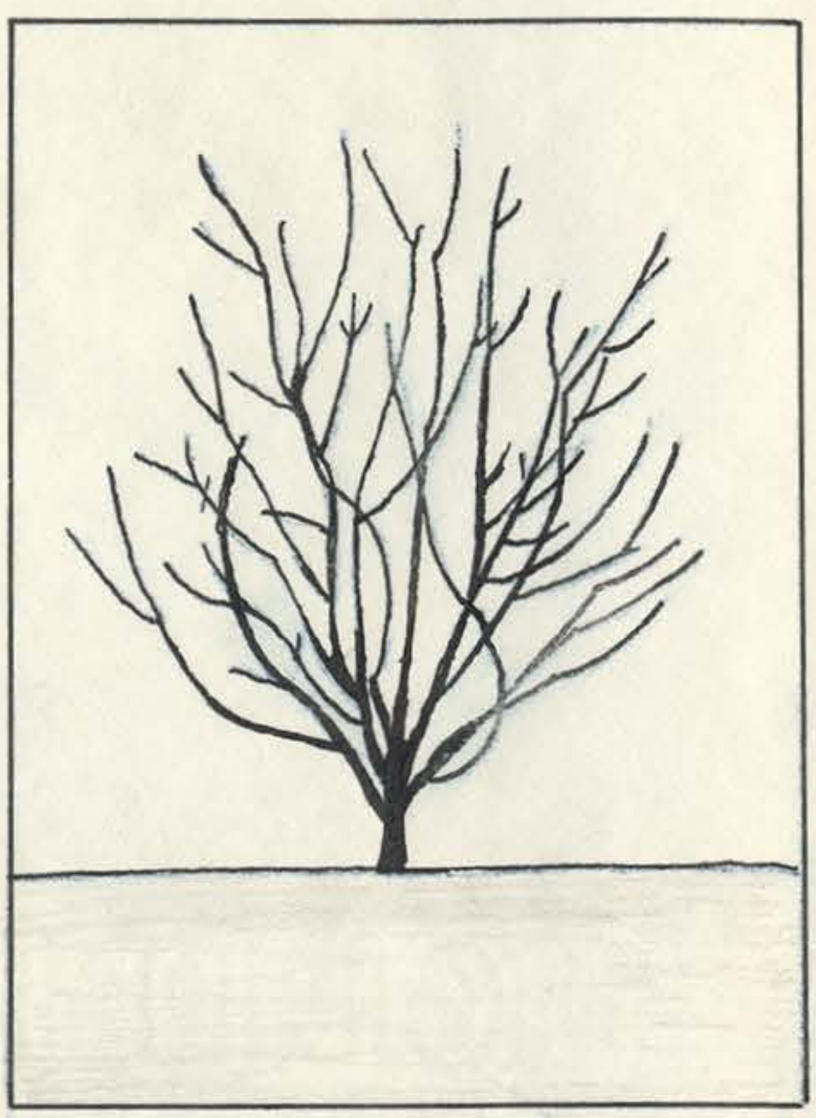
TREES PROPERLY PRUNED.

FIG. I



FIVE YEAR OLD TREE

FIG. II



SIX YEAR OLD TREE

PLATE XIII

TREES PROPERLY PRUNED.

PLATE II

SIX STYLES OF PRUNING SAWS.

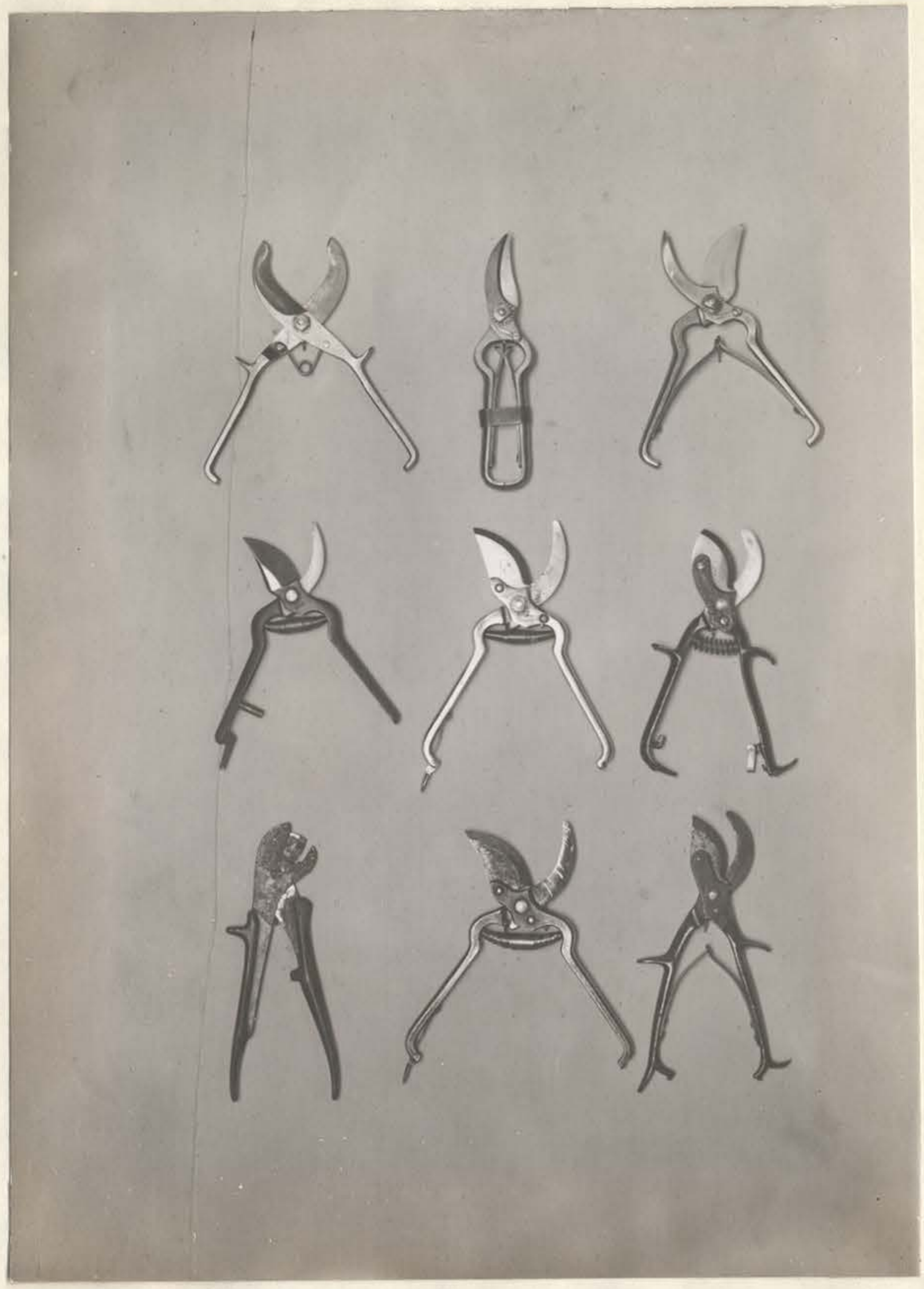


PLATE III

NINE STYLES OF HAND PRUNING SHEARS.

PLATE IV

FIVE STYLES OF LOPPING SHEARS.

PLATE V

LONG HANDLED TREE PRUNER.

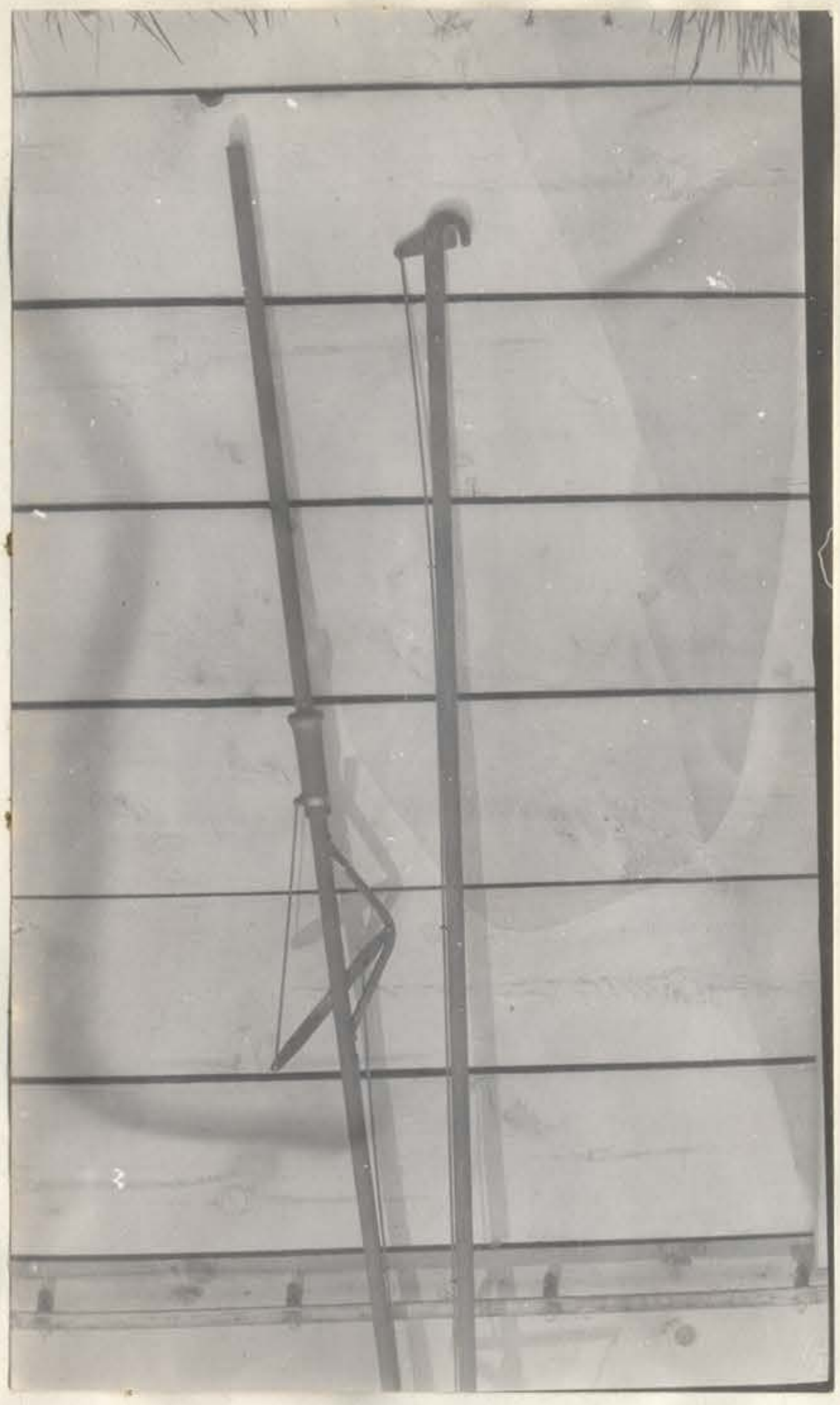


PLATE VI

LONG HANDLED TREE PRUNER.

PLATE VII

LARGE LIMB CUT FROM APPLE TREE, SHOWING CUT PROPERLY MADE.

PLATE VIII

LARGE LIMB CUT FROM APPLE TREE SHOWING CUT IMPROPERLY MADE.

PLATE IX

THREE-LEGGED TALL OR JAPANESE LADDER.

PLATE X

THREE-LEGGED STEP LADDER FOR FRUIT PICKING.

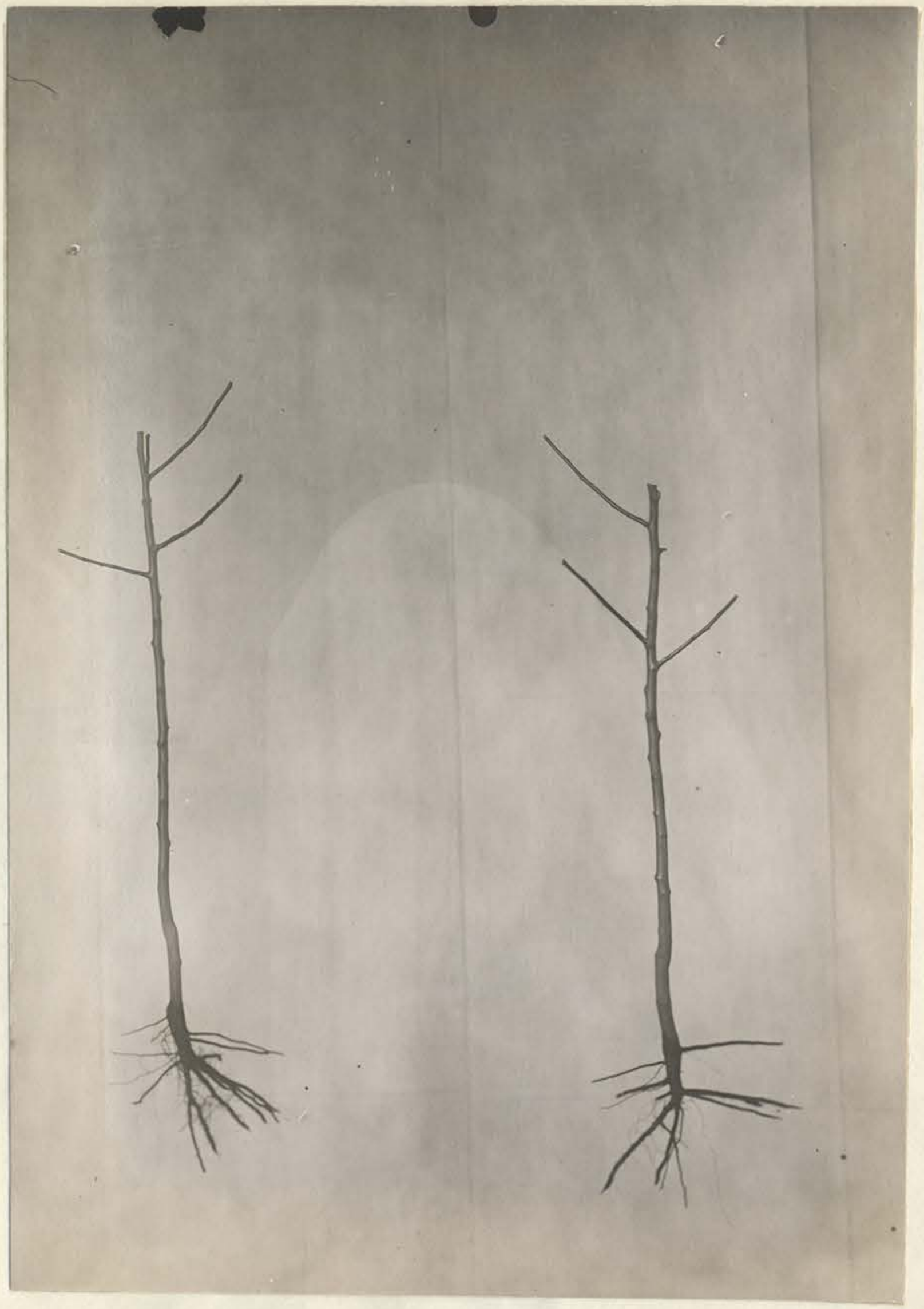


PLATE XI

TWO YEAR OLD TREE PROPERLY PRUNED.

SPRAYING.

Spraying is one of the most essential things if success is to be made of fruit growing. There are some growers who believe that sunshine and rain are enough to produce the best fruit, but this is not true, for while sunshine and rain are essential to the production of a good crop, still they are also favorable to the production of pests which destroy both fruit and trees. Not many years ago spraying was looked upon as an expense, but now it is considered by all up-to-date growers and by commercial orchardists as an investment, and it is recognized as a necessity for the profitable production of fruit.

It isimpossible to set an exact time at which one should begin to spray a young orchard, but many of the experienced orchardists of this state begin to spray when the trees are two or three years old, generaly as a preventive against disease and insect pests. A careful watch should be made at all times and every care should be taken to keep the young trees free from the fungus diseases and the insect pests that are ever at work to destroy the orchards of Idaho.

There are two groups of spray used in the apple orchards of this State for protection against pests and diseases. The first group that we will mention will be the insecticides or those sprays that are used for the control of insect pests in our apple orchards. There are two classes of insecticides. First, those that act as food poisons, which are for the control of insects that feed upon the leaves and fruit of the tree. These insects have biting and chewing mouth parts. The second class of insecticides are those that kill by contact. The insects

controlled by this class of spray have sucking mouth parts.

In our apple orchards of Idaho we have in the first class mentioned above the Codling moth, which is of great economic importance to the growers of this State. Since the apple worm chews and devours its food a stomach poison is the remedy to use. It has been found that from 2½ to 3 pounds of arsenate of Lead to 50 gallons of water is the best material for this purpose. The time to spray for this insect is just after the blossoms fall and an effort should be made to have spray under a high pressure in order that the calyx cups will be filled with the spray. If the first spraying is not thorough (and it is rarely so) it is best to cover the trees with a mist spray three weeks later to catch the worms when they take their first meal on the foliage at surfact of the fruit.

In young orchards the green aphis is of great importance. It is the most conspicuous and probably the most troublesome of the aphis family. The insect winters over in the egg stage and can be easily detected on the smaller branches of the tree. They begin to hatch as soon as warm weather comes in the spring and the insect soon inserts its proboxcis and begins sucking the sap out of the tree. This pest is best controlled while it is in the egg stage and while it is in the egg stage the trees are dormant, by the use of the lime-sulphur solution at the rate of 2 pounds of sulphur, 4 pounds of lime, and 6 gallons of water.

Contact insecticides are used against this class of insects and should be applied as soon after the eggs hatch as possible. Kerosene emulsion and tobacco decoction are both good remedies to use against such insect pests.

The San Jose scale is the dreaded fore of the fruit growers

of Idaho and particularly those of southern Idaho. It is a very minute insect but exceedingly prolific. The young and the old insects are killed by the cold weather in the fall, leaving only the half grown insects to pass over the winter and reproduce in the spring, giving birth to hundreds of young. For he first few hours these newly born insects crawl about, then settle and begin to sip their nourishment from the sap of the trees. They at once begin to secrete a waxy substance which turns gray with age. It takes from 30 to 40 days for these insects to reach maturity, the males acquiring wings, while the females are wingless and never leave their scale.

This insect pest can be and is kept under control in this State by the intelligent use of the lime-sulphur spray during the dormant season. In the last few years many brands of concentrated lime-sulphur solution have been put on the market in Idaho. These mixtures have become very popular and if used at the strength required by the Horticultural Laws of Idaho they are very efficient in the control of the San Jose scale.

The second group of sprays consists of the fungicides or those sprays that will control fungi.

Apple Scab is the destructive fungus enemy of the apple growers of Idaho. This disease is confined to northern Idaho owing to the greater amount of moisture and the more humid atmosphere of that section of the state. It affects fruit, leaves, and twigs. The twig injury is, however, of minor importance. The spots on both the fruit and leaves are of an olive color and usually have a velvety appearance. The fruit spots often continue development in cold storage and decay is very apt to start in such places. The fungus lives over winter in the leaf spots and is also believed to be carried over to some

extent in the twigs. A low temperature and damp weather favors the development of the fungus. Neglected, unpruned, and uncared for trees are more subject to the diseane.

Varieties of apples differ in their susceptibility to scab, but susceptible varieties possess counterbalancing desirable qualities which lead to their extensive use.

Apple Scab may be controlled by spraying with either Bordeaux mixture or lime-sulphur. The first application should be made just as the leaves are unfolding and again at intervals of two or three weeks for three sprayings. All prunings, twigs, and leaves should be plowed under or else carefully gathered up and burned.

There are a few valuable points that one must keep in mind in regard to sprayings. First, it is a waste of time if when the spray is applied it is not well done. Watch the work and be sure that the material is well mixed and that no limbs are overlooked. Second, spray every year and in this way keep the trees free from all insects, diseases, and pests. Third, keep the orchard well pruned and allow no unhealthy nursery stock to be brought in which would be liable to spread disease. Fourth, always be sure that the pressure is good when spraying for the codling moth. Fifth, always remember that there is a time in the progress of all fungi and in the life of all insect pests when they may be attacked to best advantage. To have success in spraying the work must be done at this time, regardless of other work. Seasons and climatic conditions have their influences and the proper time to spray must be determined each year. Sixth, to spray successfully one must be provided with the proper equipment. A barrel pump may be used in home orchards to good advantage, but in large commercial orchards a

power sprayer can be used to better advantabe, and more effective work can be done.

DISEASES OF APPLE NOT CONTROLLED BY SPRAYING.

Blight.

The blight is a contagious bacterial disease which attacks and rapidly kills the apple trees in this State, and in fact it is widely spread over the entire United States. It varies greatly in severity, often it only extends a few inches down the twig and sometimes it runs down the entire length of the limb to the trunk of the tree. Trees that are making a rapid growth of new, soft tissues are most severly injured by blight. Climatic conditions greatly influence the disease; warm, moist weather with frequent showers, favoring it; and dry, cool, and sunny weather hindering it.

The blight can be controlled only by cutting out the diseased parts of the tree and painting the wound in order to keep out germs that might be injurious to the tree. A minimum amount of water should be used in sections where blight is prevalent.

Crown Gall.

Crown Gall is the rough enlargement that sometiges occurs around the union of the stock and scion. In some cases the galls are found on the roots of the tree. Nursery stock affected withthis disease may live for many years and produce considerable fruit, but as a rule trees affected by the disease never read maturity. There is no remedy that can be recommended for the infected tree. Any nursery stock affected by this disease should not be accepted or planted.

SPRAYING CALENDAR FOR IDAHO APPLES.

Insect or Disease	Spray to use	First spraying	Notes
Codling Moth	Ardenate of Lead or White Arsenate.	While the last blossoms are falling. Spray with force directly into every flower. Use Bordeaux nozzle.	Repeat 10 days later in same way. Spray third time 3 weeks after worms appear under the bands, and again 3 weeks later.
San Jose Scale	Lime-sulphur wash.	In spring before the buds open	Be sure to cover every portion of the tree as the spray kills only by contact
Oyster Shell Bark Louse	Lime-sulphur wash.	When leaves are off the tree.	After the eggs under the scales hatch (May 15-June15th) spray with kerosene emulsion - 1 part to 10 parts of water, or whale oil soap 1 lb. to 5 gals. water for effective work.
Green Aphis	Lime-sulphur wash.	When leaves are off the tree.	When the insects appear, whale oil soap and Quassia chips or tobacco sheep dip are the most effective remedies.
Wooly Aphis		Remove the soil about two feet around the trunk of the tree and dissolve 1 lb. of lye in a bucket of water. Pour this on the exposed roots, covering im ediately with soil.	
Red Spider	Lime-sulphur wash.	When leaves are off the tree.	This will kill the winter eggs. If the mite appears in summer use kerosene emulsion.
Flat-headed Borer		Dig out the worms in the fall and spring with a knife. During growing season whitewash the base of tree.	

SPRAYING CALENDAR FOR IDAHO APPLES -Cont.

Insect or Disease	Spray to use	First Spraying	Notes
Apple Scab	Lime-sulphur solution made with 10 lbs. of lime and 50 gals. of water and 5 lbs. sulphur.	Just before the blossoms open.	Again while the last petals are falling. Spray once or twice later in season if necessary.

DILUTION TABLE FOR LIME-SULPHUR SOLUTIONS.

Reading om Beaume Hydrometer	Number of gallons of water to one gallon of lime and sulphur solution.	
	For San Jose Scale. Dormant spraying only.	For summer spraying.
36 degrees	9 gals. Water	45. gals. water
35	8¾	43½
34	8¼	41½
33	8	40
32	7½	37¾
31	7¼	36¼
30	6¾	34¼
29	6½	32¾
28	6	31
27	5¾	29½
26	5¼	27¾
25	5	26
24	4½	24¼
23	4¼	22¾
22	3¾	21¼
21	3½	19¾
20	3¼	18¼
19	3	17
18	2¾	16
17	2½	15
16	2¼	14
15	2	12¾

ORCHARD HEATING.

The importance of being prepred for orchard heating and protection against the late spring frosts was realized this year. Those who were prepared for coldweather lost practically none of their crops while those who were not prepared for the sudden freeze lost practically their entire crop.

There are two methods of orchard heating in general use in Idaho:

(1) The use of cord wood, brush, or old fence rails to keep up the temperature on very cold nights in some sections of the state is a common practice and it serve the purpose. Whatever the material to be used may be, it should be so placed that it might be distributed on short notice, after frost warnings are given out. Usually it is not necessary to fire more than one or twice durinv a season, but sufficient material should be kept on hand, to fire four or five times if necessary to do so.

In cases where the temperature cannot be kept up straw or manure should be placed on top of the wood fires to produce a dense smudge with the idea of protecting the orchard from the direct rays of the sun after it is known that there has been some freezing of the blossoms.

(2) The use of oil heaters has come into great favor with Idaho orchardists and excellent results are obtained. Not all grades of oil will burn in these heaters. Some grades are much more desirable than others. The light gravity oil is high priced and burns quickly; hence, it is too expensive. The heavy gravity oil does not burn clean and does not heat as well as lighter oils. The oil that has given the best results is one of about 19 or 20 degrees Beaume.

Torches should be used for lighting the fires as this is the quickest method, one man being able to start the fire on the one acre in about seven minutes. The time to start the heater varies, but to be on the safe side one should have the fires burning at 32°F. Usually this temperature is not reached until 3 or 4 o'clock in the morning.

TEMPERATURES INJURIOUS TO APPLES.

In Bud	In Blossom	In setting Fruit	At other times
27°F	29°F	30°F	25°F

POLLINATION.

Pollination is the process of impregnating flowers with pollen. This subject may perhaps be of little interst or importance to the orchardists as themajority of them pay little attention to the fertilization of the flowers. They know the trees will blossom and will get fruit, but <u>why</u> they do and under what conditions they would produce more, few people khow. This is why pollination and cross fertilization are important questions and should be carefully studied by every grower.

Flowers are classified in regard to pollination under two main headings:

(1) Self-fertilized flowers, those in which no foreign agency is needed to ensure proper fertilization of the ovule and where cross fertilization is often impossible.

(2) Cross fertilized flowers, those which demand pollen from another plant to ensure proper fetilization.
(Thesis of C.H.Heard)

Immediately one might say plant those varieties which are self-fertile and thus do away with all possibility of scant blossoming or setting of fruit, but this is impossible because some of the best varieties are not self-fertilizers but depend on foreign pollen to impregnate them and to make them fertile.

The blooming period of the different varieties should be known as this will aid every grower in the selection of his varieties. In every locality where fruit growing has become a speciality, the blooming periods of the different varieties are known and only those varieties that blossom at about the same time are planted. Things which govern the grower, however, are his predecessors, the site, location, and exposure of the orchard containing these varieties.

Some of the agencies that are useful in cross pollination are the wind, insects, and humming birds. Of these three the insects are of the most impwrtance in the corss fertilization of apple blossoms. One has little ideaas to the number of flowers a bee will cover in a short time. Those insects whih are known to fertilize flowers are some moths, butterflies, bees, and some flies. Each one is in search of nectar and they fly from flower to flower in their search, and upon alighting, their lege become dusted with pollen. This they carry on to the next blossom and thus the blossoms become fertilized.

Several colonies of bees should be kept in every orchard as they not only work on the flowers of the trees, but they will be an asset in their manufacture of honey. They require very little care and in turn pay big dividends.

After the selection ofvarieties has been made in planting, do not place over four rows of the same variety next to each other. A great many growers recommend the planting of onlu two rows. There are many beneficial reasons why this should be done, but theidea here is that with the varieties so mixed, cross fertilization is almost absolutely assured. If the wind plays an important part in the pollination of apple blossoms, one can readily see that it is an advantage to have the varieties alternate by some definite system.

THINNING.

Thinning is probably the most neglected work in the production of apples by commercial growers. Many depend on nature to thin the fruit and to a limited extent nature will do this for them. But nature will not do enough. The grower must thin the apples himself if he wishes to produce the first class product. Proper thinning makes the fruit larger, better colored, and reserves the vitality of the tree.

Young trees should be allowed to bear only a few apples each year as heavy bearing reduces the vitality of the tree and the result is a stunted abd deformed orchard.

Fruit on mature trees should be thinned to one apple on each fruitspur and in cases where the spurs are unusually numerous these should be thinned so that no fruit when mature will come in contact or rub abainst other fruit on the tree.

The cost of thinning varies according to the conditions of the orchard, the size of the threes and the price of labor. In this state the cost ranges from 12¢ to 80¢ per tree. Those who have made a practice of thinning have been successful and are convinced that the cost is small as compared with the benefits obtained.

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