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## Fruit Tree Pruning in South Dakota

S. A. McCrory

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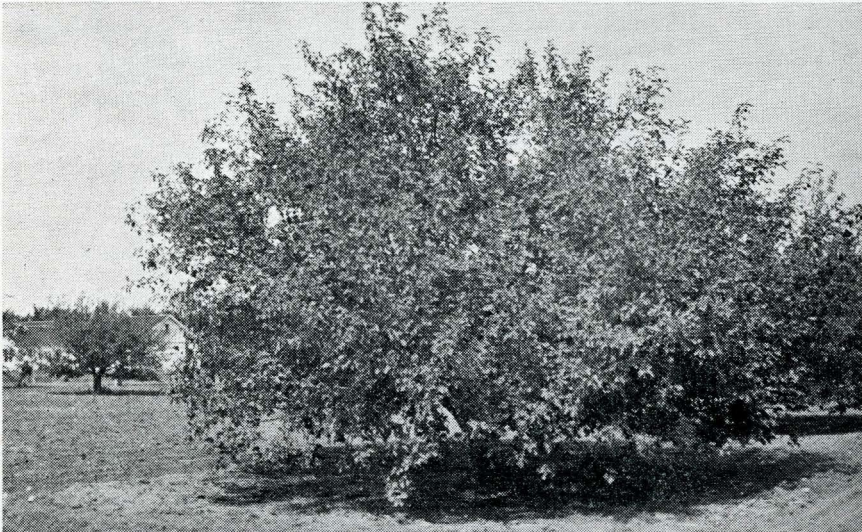
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# Fruit Tree Pruning In South Dakota

Extension Service  
South Dakota State College  
Brookings

Result  
Of Good  
Pruning



Result  
Of Poor  
Pruning



## This Circular at a Glance

Shape or Form of Fruit Tree .....	3
Pruning Fruit Trees .....	3
Object of Pruning .....	3
Open-Headed Type .....	4
Central-Leader Type .....	4
Modified-Leader Type .....	5
Time of Year to Prune .....	5
Method of Removing Branches .....	6
Pruning Tools .....	8
Maintaining Balance Between Top and Roots .....	8
Pruning Apple and Pear Trees .....	9
Pruning Young Trees .....	9
Old Apple and Pear Trees May Require Heavy Pruning .....	11
Removal of Unproductive Branches .....	11
Cut Back to Lateral Branches.....	12
Pruning Plum Trees .....	12
Pruning Apricot Trees .....	14
Pruning Peach Trees .....	16
Pruning at Transplanting Time.....	15
Pruning Bearing Trees .....	15
Treating Pruning Wounds.....	15
Additional Suggestions .....	16

### Illustrations

Fig. 1. A low headed apple tree is not subject to much injury from wind and sun.....	4
Fig. 2. An exposed tree showing sunscald and fungous growth which comes as a secondary attack.....	5
Fig. 3. Illustration of how the direction of growth may be influenced by cutting to a side-bud.....	6
Fig. 4. Good pruning tools. Long handled shears, hand shear, heavy knife, swivel pruning saw, curved saw, and heavy saw.....	7
Fig. 5. One-year-old apple tree at planting time. By heading near the ground a low-growing tree is started .....	9
Fig. 6. A case of too severe pruning.....	10
Fig. 7. A well shaped four-year-old plum tree .....	13

# Fruit Tree Pruning in South Dakota

By S. A. McCrory

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## Pruning Fruit Trees

Pruning generally constitutes a major problem for the fruit-grower. Unlike many other orchard practices, the results of experimental methods of pruning are less conclusive. Since a number of years may be required to observe the full results of pruning, the problem becomes all the more uncertain and difficult.

With definite information lacking, it is only natural that different pruning systems are found in the same locality, and that they range from the most severe to no pruning at all.

The best place to study fruit tree pruning and training systems is in the most productive orchards. All the varietal characteristics of the tree must be carefully considered among the factors determining the amount and kind of pruning a tree should receive. A properly pruned tree cannot be expected to give the best results if other good cultural practices are neglected. Cultivation and the use of fertilizer should also be a part of the program.

## Object of Pruning

There are two main objects of pruning a fruit tree: First, to alter the shape or form the framework; and the second, to influence production and character of the fruit. Less important reasons for pruning are: to increase the vigor of old trees; to prevent the formation of weak crotches; to remove dead or injured wood; to remove crossing branches; and to establish a balance between top and root at planting time. The total yield of a pruned tree is not always greater than that of an unpruned tree; however, the quantity of first-grade fruit from a well-pruned tree will usually exceed that of a tree receiving no pruning. Sunshine has a marked influence on the color of fruit. A tree with branches so dense that the proper light cannot reach the center of the tree will produce poor quality fruit.

## Shape or Form of Fruit Tree

By training and pruning, a tree may be made to grow into different shapes of which three forms are generally recognized. They are: The open head or bush shape, the central leader, and the modified leader. Since growth habits differ with varieties it is well for the grower to become familiar with such habits and modify his pruning practices accordingly. In sections where climatic conditions are most favorable, the system of pruning used will largely depend upon the opinion and liking of the grower. If conditions for growth are less favorable, any pruning or training one can give a tree to help overcome the adverse conditions can be justified.

**Open-Head Type.** With the open head type of pruning, the main leader is suppressed by severe pruning when the tree is small. Conditions in South Dakota are such as to give the open-head or bush type of tree decided advantages over trees pruned to a different form. If the trunk of a tree is exposed to the sun's rays during late winter or early spring, the temperature on the exposed side will be materially increased. This drying influence plus

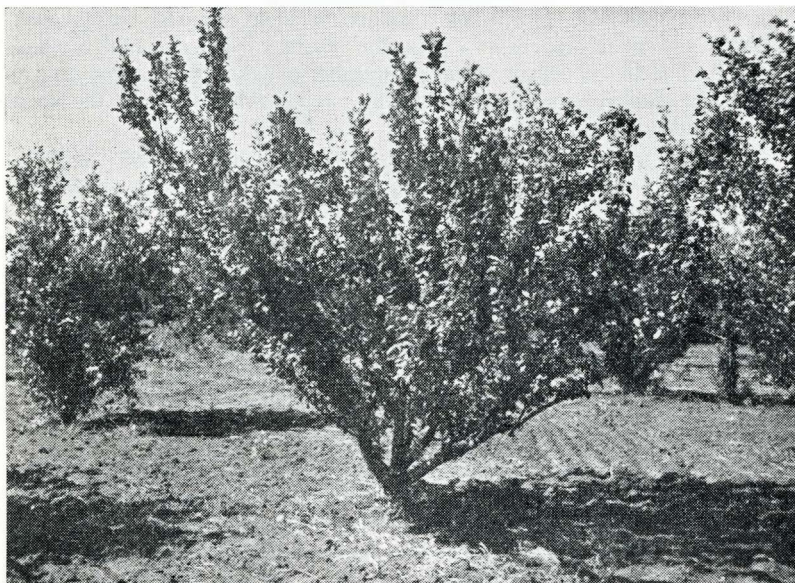


Fig. 1. A low headed apple tree is not subject to much injury from sun and wind.

the sudden change to a much lower night temperature often results in the drying and death of the bark. The injury is known as "sunscauld." The lower the head the greater the shading of the trunk and as a result less sunscald injury and less damage from borers and fungous diseases which follow. Low-headed trees are not subjected to as much injury from strong winds and will stand straight. With a low-standing tree the pruning, spraying and harvesting processes are made easier. Some disadvantages are to be found with this type of tree. The lateral branches may be too close together, but partial correction may be had through careful selection during the early growth period.

**Central Leader Type.** This form is the shape the tree would generally develop when no pruning is done. The central and top-most branch is allowed to gain ascendancy. More branches may be produced with better spacing up and down the trunk. While this is a strong tree, and one which gives a natural appearance, it does not lend itself well to conditions of South Da-

kota. A high-headed tree is subject to sunscald and may also be injured by the wind. As trees grown in South Dakota are subject to injury from both wind and sun, a central leader type tree should not be developed.

**Modified Leader Type.** The modified leader is one in which the central stem is allowed to grow but is suppressed from time to time by cutting it back. This tends to produce a tree less in height than the central leader type



Fig. 2. An exposed tree showing sunscald and fungous growth which comes as a secondary attack.

and with stronger crotches than the open headed type of tree. Such a tree should have as great a bearing surface as the central leader type and a better distribution of branches than the open head type of tree. However, pruning to this shape should be limited to the sections having modified climatic conditions.

### **Time of Year to Prune**

In general the principal work of pruning may be done sometime after the leaves drop in the fall and before the buds start growth in the spring. Wounds made just as growth starts in the spring heal a little quicker than those made at earlier periods. Some injury to fresh wounds may result from low temperatures. If such injury does occur the bark around the pruning wound may dry out, particularly in the late fall, and the healing will require

much more time. Pruning is not advisable when the wood is frozen as this increases the mechanical injury to the growing tissue. As time is an important factor in the spring, because of other duties, much pruning is done in the fall.

Certain types of summer pruning may occasionally be desirable. The "pinching" out of undesirable shoots just after growth starts in newly planted trees may be advantageous in forming the framework in young trees. In older trees the rubbing off of water sprouts and suckers during early spring will no doubt benefit the remaining tree by conserving moisture and soil nutrients. Summer pruning, with some of the stone fruits, may be practiced to reduce the yield.

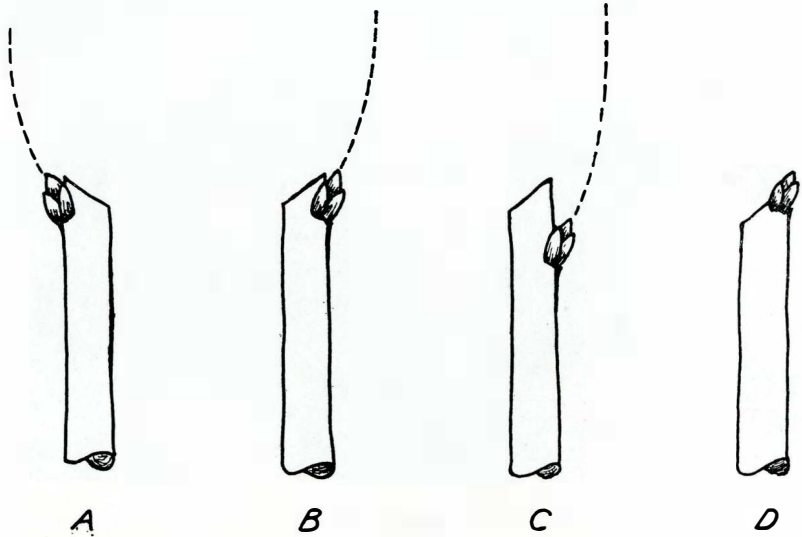


Fig. 3. A and B illustrate how the direction of growth may be influenced by cutting to a side bud. The dotted line indicates the direction the branch will grow. In C the cut was made too far from the bud, while in D the cut was too near the bud.

### Method of Removing Branches

The direction a branch grows is of importance in properly shaping young trees. A small branch should be removed at an angle just above a vegetative bud. If it is desirable to cause the branch to grow to the outside, the bud nearest the cut should be on the outside of the branch pruned. By cutting to a bud on the inside a more compact tree is formed. Care should be taken to remove the branch the correct distance from the bud. If cut at too great a distance that portion above the bud will die and the bud is likely not to survive. The branch may dry out below the cut and die back to the next bud.

This leaves a dead stub and makes healing difficult. If cut too close there is a danger of the bud drying out.

In the removal of either large or small branches it is a good rule to make close, clean, smooth cuts. If the branch is not removed close to the point of its origin a stub is formed which does not heal rapidly. Larger limbs may never heal. With larger limbs there is usually a bulge or enlargement at their

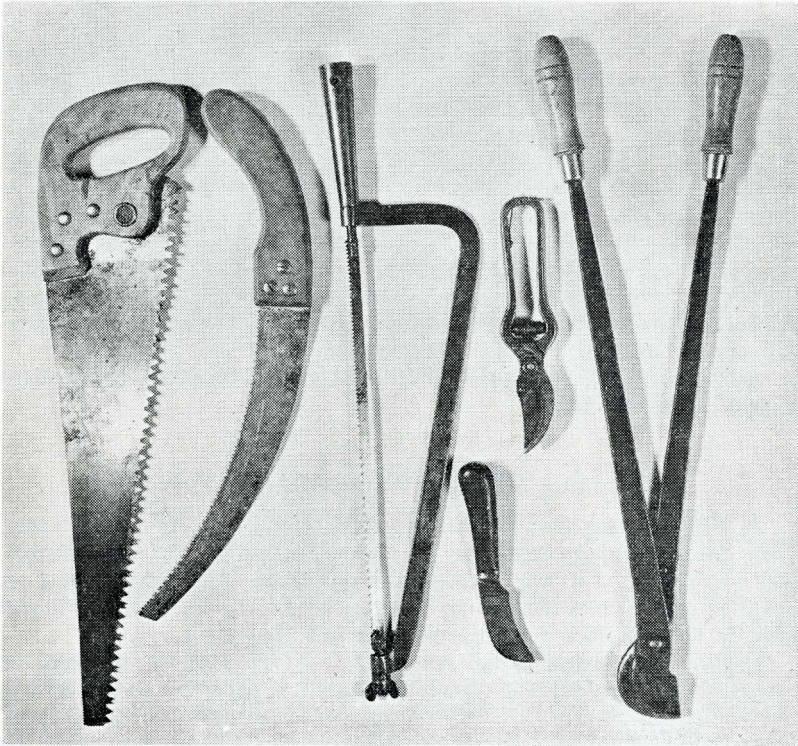


Fig. 4. Good pruning tools. Long handled shears, hand shear, heavy knife, swivel pruning saw, curved saw, and heavy saw.

base. If removing such a limb it would be easier and is often the practice to make the cut just beyond the bulge. A limb removed in this manner would leave a stub and make healing difficult if not impossible. The cut should be made as close as possible. This leaves a wound which will heal more rapidly and offers less opportunity for decay to start.

All effort should be made to prevent the larger limbs from splitting or tearing the back when removed. Splitting may be prevented by sawing a cut



on the lower side of a large limb before sawing it from above. In case the limb is very heavy this operation may first be made a foot or more away from the trunk and a second cut made to remove the stub.

### **Pruning Tools**

If a tree receives constant attention the removal of large branches, is unnecessary. For most pruning, a pruning knife, with a long hooked blade, serves the purpose. For most fruit trees pruning shears and a knife are all the tools necessary for small trees. Shears have a disadvantage in that the user may become careless and the cut will be made too far from the side branch. Some mechanical injury to growing tissue is also done with hand shears. Another type shear is one attached to a pole with a lever arrangement for operating the jaws. This may speed up work in higher branches since it eliminates the use of a ladder. A swivel blade or meat type saw has the advantage of being adjustable so as to saw at difficult angles. For larger limbs a saw containing six to seven teeth per inch is satisfactory. A two-edged saw is not to be recommended since the top of the saw is likely to cause injury to the bark of the tree. An axe should never be used in pruning work because it is difficult to make a clean smooth cut with such a tool.

Additional tools may be useful but the above described are enough to do a good job of pruning.

### **Maintaining a Balance Between Top and Roots**

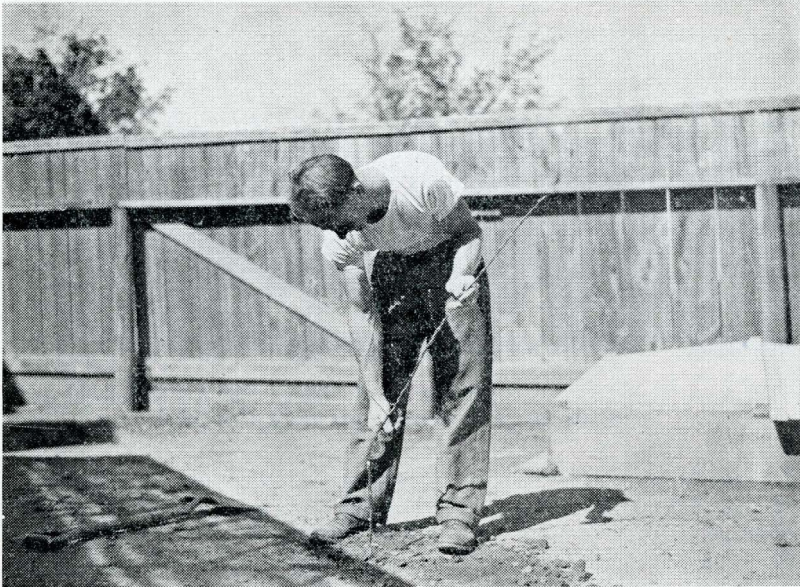
A plant growing normally has a perfect balance between top and root. They mutually supply each other. A tree will attempt to establish this balance if too much of its top is removed. If severe pruning is done there is an equal amount of root left to supply a greatly reduced top. The result will likely be an increase of vegetative wood or water-sprouts.

When a tree begins to fail (provided it is not attacked by insects or fungi) a heavy pruning may prevent its loss. It is generally best to remove the weaker parts, unless such branches are needed to retain shape and form. Under such conditions a severe pruning of healthy tissue may cause the weaker parts to be rejuvenated.

It is an old and well known fact that plants making a slow and weak growth should be pruned severely while those making a vigorous growth should be pruned moderately. Moderate pruning is best for trees making a normal growth. Heavy pruning will result in much wood growth, while light pruning will maintain the habitual conditions. However, there are exceptions to this rule. One branch may appropriate the food normally supplied for another. A weak growing branch in one part of a tree may be stimulated into growing by the pruning of a stronger growing branch at another point. It may sometimes be necessary, in maintaining the shape of the tree, to force a weak branch by pruning a stronger one.

### **Pruning Apple and Pear Trees**

Apple and pear trees have practically the same habits of growth and would therefore receive the same methods of pruning. Most varieties bear almost entirely on short, crooked growths known as "fruit spurs." These fruit spurs are produced laterally on branches at least two years old. Normally these spurs do not produce two years in succession. A part of the spurs bear one year and the rest the following season. Fruit spurs may continue



**Fig. 5.** One-year-old apple tree at planting time. By heading near the ground a low growing tree is started.

to bear for a period as long as 12 to 15 years. If they are removed from a branch a number of years will be required to grow new wood from which fruit spurs may develop in time. They can never be produced again at the point from which they are removed. Therefore, their protection is essential.

**Pruning Young Trees.** When a tree is moved from the nursery to its permanent location many roots are broken off. This destroys the balance nature has established between the top and root system. To establish this balance again a proportional part of the top should be removed. This is an ideal time to start the framework of the tree.

Immediately after planting, apple or pear trees should be cut back severely. In order to form an open-headed or bush-like tree it is advisable to

cut the top back, leaving only a stub 8 to 12 inches tall. This treatment may seem severe, especially to one not familiar with the process of heading trees low. During the summer branches will appear from dormant buds of the stub. Those not favorably located should be pinched off to give an even distribution.

The most common practice is to let the branches grow the first year following transplanting. Pruning to form the framework is then started in the following spring. Lateral branches will grow spirally on the stub. From three to five of these laterals should be selected as the framework of the



Fig. 6. A case of too severe pruning in which apple trees were cut back. Had pruning been done annually severe pruning could have been avoided.

tree and the rest of them should be removed. A sharp knife is the best tool for this as it permits a clean cut to be made close to the trunk. In selecting the branches care should be exercised to see that one is not located directly above another and it is best if they are distributed up and down the trunk as much as possible. One or more of these branches should be on the south or southwest side of the tree as they will later be a protection against the sun. As a final step the laterals selected should be shortened by cutting them back to approximately one-third their original length.

The second spring following that of transplanting branches will be growing from the laterals of the past season. Three or four of these should be left on each lateral but should be cut back to about one-half their length. This is only an estimate and will be determined by the extent of growth. The branch remaining after pruning should be about one foot long.

This should form the framework of the tree, and pruning in later years should consist of thinning branches and cutting back particularly strong growing limbs in order to develop a better balance. A well balanced tree may be formed from regular light thinning and the suppression of strong leaders. Severe pruning is not advisable unless it is to correct some ill-shaped or neglected tree. Thinning should be done with a view of opening the center of the tree and to permit sunlight to reach protected parts.

**Old Apple and Pear Trees May Require Heavy Pruning.** Old bearing trees may respond better to moderately heavy pruning than to light pruning. The tops of such trees usually become filled with old and weak spurs. The annual renewal of either spur or terminal growth may be small, and the leaves are frequently small and yellowish in appearance. The grower frequently gets the impression that there is too much top growth for the root system and attempts to correct the condition by a "de-horning" process. Such a system of pruning will not accomplish the desired results.

Rather, the pruning should consist primarily of making numerous small cuts equally distributed over the entire tree so that all parts will be invigorated. The removal of large limbs on any part of the tree should be avoided unless they are diseased or dead. The removal of a large limb will have little beneficial effect on the remaining spur growth. However, the removal of an equal amount of wood by making several small cuts will have a marked effect on spur growth. Small cuts properly distributed result in a maximum fruit-bearing area. The removal of large limbs leaves "holes" or non-bearing areas over the tree. The lower branches should be well thinned out and in some cases an occasional heading back of the long and weak limbs is advisable, provided they are cut to a good lateral. This will tend to shorten them and stimulate growth. Lower branches should be kept growing and fruiting as well as the upper parts of the tree. Very often the lower branches are in a weakened condition due to excessive shading. As a result too many trees have to be "pruned up." To prevent the dying of lower branches the top should be cut back and thinned out so as to permit light and air to reach the lower wood.

As a result of severe pruning more water and soil nutrients will be available for the remaining buds. Old fruit spurs which have not borne for years will again produce fruit and new ones will develop. It is well to keep in mind, however, that heavy pruning is taking from the tree the growth it has been years in building, and that such pruning would not be necessary if regular annual pruning is practiced.

### **Removal of Unproductive Branches**

A system known as "thinwood" pruning is receiving much consideration in some commercial apple-growing sections. This method of pruning is largely limited to the lower, inner part of the bearing apple tree. The branches removed consist of slender, weak wood. Such branches usually make a downward growth and produce but a small amount of low quality fruit. The term "thinwood" is applied because the branch seldom reaches a diameter of one-fourth inch in three or four years of growth. Few leaves are produced on the branch and terminal growth is slow.

The first step in removing this unproductive wood consists in the removal of comparatively large limbs which give rise to a number of small branches, all of which are of the "thinwood" type. While some of these branches may grow more or less upright, most of them will be found grow-

ing downward. A saw is a convenient tool for removing these limbs from the trunk or larger limbs. As they are low growing limbs most of the work may be done without the aid of a ladder.

After the larger limbs are removed there will remain a number of small "thinwood" branches. These may be removed with shears or a sharp knife. The tallest growing branches will probably not be too high for the worker to reach from the ground.

A tree pruned to the "thin wood" method would appear to have most of the branches removed from the trunk or main limbs at the center and lower part of the tree while the top and outside growth would carry the productive wood. By using such a method of pruning one would not expect to reduce the yield materially, as it is a well known fact that the bulk of the fruit is found in the top and outside branches.

**Cut Back to Lateral Branches.** Many growers have cut back the top only to have the tree make a heavy growth of "suckers" or watersprouts. This is not likely to happen if the cut is made in the proper place. If a large branch is removed near small spurs, much whip growth may be the result. However, if the cut is made near a relatively large lateral branch the whip growth may be avoided. Old dead branches should be removed regardless of size or location.

If growth is to be stimulated in an old tree something other than pruning is necessary. Cultivation of the ground during the growing season and application of commercial fertilizer possessing some nitrogen will do much to promote new growth. Of these three practices pruning is credited by some authorities<sup>1</sup> as having a more direct use in rejuvenation of old spurs on older fruit trees than cultivation or the use of commercial fertilizer.

### **Pruning Plum Trees**

There is quite a varietal difference in the fruiting habits of plums. The Japanese group, with which some of the fruit of South Dakota are hybrids, needs more severe pruning than native plums. New wood is the more desirable fruiting wood and enough pruning should be done to force strong new growth. Fruit is formed on the sides of spurs as well as on the one-year-old wood. Fruit spurs of the plum do not live as long as do those of the apple and must therefore be renewed more often. This calls for a little heavier pruning than is given apple trees. Plum trees should not be pruned as severely as the peach tree because of the difference in their fruiting habits.

Like the apple, plum trees grown in South Dakota should be trained to the open-head or bush type. Being a small tree, the plum if properly trained, will take a bush-like form.

Most one-year-old plants supplied by nurseries will have few, if any branches on the main stem. As soon as the tree is transplanted the top should be removed at a distance of six to eight inches above the ground

1. Roberts, R. H., Wis. Agric. Exp. Sta. Bul. No. 317, 1920, pp 31.

level. If lateral branches are present below the point at which the tree is cut back, they should be pruned back severely or removed if not properly distributed. A knife is a convenient tool for this purpose. New branches not properly located may be pinched off as soon as they start to grow. If one has enough time to spend with his trees a well formed tree may be started the first year.



Fig. 7. A well shaped four-year-old plum tree.

If the branches are permitted to grow without pruning the first summer, some thinning will be necessary the following spring. Five branches should be left to form the framework of the tree. Proper distribution on the stem is essential. One should select branches to give as much space as possible between them. A branch should never be permitted to grow directly above or below another branch. After the thinning out is completed the five remaining branches should be cut back to approximately one-third their length to induce further branching. In most cases this should leave a branch 8 to 12 inches long.

At the end of the second year, two years after transplanting, the lateral branches produced during the second season should be cut back about half way to cause more branching or the formation of sub-laterals. This should give a well formed tree, and in most cases, little further pruning will be necessary to establish the framework.

Young plum trees will need little pruning other than that necessary to shape the tree and to keep fast growing branches within bounds. Too severe pruning should be avoided as an older plum tree may never recover from severe pruning. It would be better to under prune than to over prune a plum

tree. After bearing age is reached the object of pruning should be to maintain the tree's shape, shortening of laterals to prevent their breaking, and to encourage the production of fruiting wood.

If a tree is a heavy bearer it may produce but little new wood. After three or four years of heavy bearing the spurs become weak and the yield is reduced. Branches become crowded, the foliage is thin and the fruit is of inferior quality. To correct this condition a thorough thinning of the small, thickly spurred branches should be made. The tops of main limbs and the ends of laterals should be thinned and shortened. This pruning will admit more light and invigorate the old spurs as well as stimulate new growth.

### **Pruning Apricot Trees**

Apricots have not been generally grown in sections where the temperature during the winter is as low as that found in South Dakota. However, hardy varieties may be successfully grown in this state.

The fruit bearing habits of the apricot in general are quite similar to that of Japanese plums. Fruit is borne on short fruit spurs as well as on the one-year-old shoots. The fruit spurs are short lived and the pruning practice should be such as to induce growth of new fruiting wood.

The pruning of the apricot for the first three years should be much the same as that described for plums. The branches of the apricot are inclined to become too long and "willowy" unless they are headed back to desirable laterals. As the tree grows older it is inclined to become dense and the central part of the tree becomes less productive. A thinning out process is necessary to keep the center of the tree open and fruitful. Care should be used not to remove too much wood any one season. This may best be done by taking out a little of the top each year over a three or four-year period until a full new top is made.

As is true with all stone fruits, apricots are likely to produce exceptionally large crops under favorable conditions. If the lateral branches are permitted to become long there may be many broken branches as a result of a heavy load of fruit. Short laterals with the fruit carried as close to the tree as possible are therefore advisable. Shortening the laterals will also lessen the possibility of injury from wind and ice storms. The cutting back will probably be necessary after the tree is six to eight years old. By cutting the limb back to a small side branch which grows at an angle to the main lateral, the direction of growth can be changed and the weight can be brought closer to the center of the tree.

### **Pruning Peach Trees**

The peach tree bears fruit only on wood or growth of the past season. Therefore, the grower must locate the one-year-old wood and leave a well distributed amount of it when pruning. This fruiting wood may be found as terminal growth, on lateral branches, or on the main trunk. As most fruit wood comes from terminal growth the fruit will be produced farther and

farther from the main stem as the tree grows. If branches become greatly extended there is much danger of their breaking when the tree is heavily loaded with fruit. Thus, in order to keep the tree within bounds and at the same time renew the fruit wood annually, pruning should be done each year.

**Pruning At Transplanting Time.** The peach should be trained to a form similar to that described for the plum and apricot. The peach naturally lends itself well to the open center type tree. After transplanting the "whip" should be removed at a height of 10 to 14 inches above the ground. If small branches are to be found below this height they should be cut back to one bud or remove entirely.

**Pruning Bearing Trees.** Older trees will respond better to moderately heavy pruning than will young trees. When the fruit crop is destroyed as a result of low temperature during the winter, the branches may be cut back into two-year-old wood. This will stimulate a strong growth of fruit wood for the next year. It will also reduce the height of the tree and the fruiting wood will be brought closer to the main stem of the tree. Such heading back is necessary every few years if breaking of the branches is to be prevented. Cuts should always be made to a side branch, being careful not to destroy the shape of the tree.

Summer pruning is practiced in many peach growing sections. As soon as the danger of frost is past the trees are pruned moderately before the fruit sets. The branches are thinned out to admit sunlight and the most vigorous shoots are headed back. If the bloom is very heavy the pruning is more severe. If the bloom is light very little thinning out or heading back is done. The summer pruning helps to regulate the wood growth as well as thinning the fruit to the proper quantity and results in more regular bearing.

### **Treating Pruning Wounds**

A dressing for pruning wounds does not hasten the healing process except as it prevents decay. It serves as a preservative and a preventative by checking the weathering of the wound and by preventing the growth of bacteria and fungi.

There are a number of materials in general use for treating pruning wounds. Lead paint, pine tar, grafting wax, shellac, and tallow are used in many orchards. A difference of opinion exists among authorities on what is the best material to use.

Durability is of importance. Paint and tar seem to be among the most durable materials available. If the dressing material is inclined to crack and peel off its effectiveness is soon lost. Wax and shellac crack and peel off badly. Tar is sometimes credited as being injurious to fruit tree tissue.

In pruning young trees it is seldom necessary to sterilize the small wounds made by the removal of a branch. Disease is more frequently found in old trees than in young, and since the wounds are larger and require



longer to heal, a disinfectant may be necessary. Several disinfectants may be used for this purpose. Copper sulphate (blue stone) dissolved in water (1 lb. Copper Sulphate to 5 gal. of water) is perhaps the most economical. Mercuric cyanide (1 part to 500 parts water) or corrosive sublimate of the same concentration are very effective. Either of these materials may be applied to the wound by means of a mop made from several thickness of a soft cloth tied to a stick. The freshly made wound should be thoroughly moistened with the disinfectant. After it has dried it should be painted with ordinary paint which is composed of white lead and raw linseed oil. Boiled linseed oil should never be used. If the wound is large, (2 or more inches in diameter) the painting should be repeated at least once each year until the wound has healed.

### **Additional Suggestions**

1. The object of pruning a young tree is to train and shape it.
2. A young tree may be dwarfed if pruned too severely.
3. The framework of the tree should be formed in the first two or three years of its growth.
4. When two-year-old trees are heavily pruned at the time of transplanting, but little is gained in size over one-year-old trees.
5. Go over the tree every year during the dormant season so that corrections can be made while the branches are small.
6. A tree leaning with the prevailing wind should receive heavier pruning on the leaning side and lighter pruning on the opposite side.
7. Remove all branches that rub or cross.
8. When two branches grow at an equal rate from a common point a weak crotch will be formed. This may be corrected by pruning one of the branches more severely than the other.
9. Prune moderately, never severely, on a normal well-cared for tree.
10. To prevent watersprout growth avoid heavy pruning at any one point.
11. Keep the head evenly thinned out, giving special attention to the upper part of the tree.
12. Avoid removing fruit spurs unless they are past bearing.
13. Maintain a regular supply of new bearing wood.
14. Do not injure the bark or leave a stub when removing a branch.
15. Buy good quality pruning tools and use them for nothing but pruning.