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Thesis.

Pruning of Frost Bitton Peach Trees.

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Class of '99.

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A number of times the peach trees of Michigan have been badly injured by the frost, and many methods of pruning have been tried. Mr. Hanford, of Indiana, said that in the cold winter of 1856 he had an orchard of thrifty young trees absolutely killed to the snow line, and of course a total loss as far as appearances indicated or experience could suggest. Knowing, however, that the trees had been vigorous, and that their roots must possess considerable power of reproduction, he proceeded to cut off the entire top of every tree that had been killed, and left nothing but unsightly stumps throughout the orchard. The spring came on; advanced somewhat: he watched his stumps with anxiety; found that numerous buds started out from these stubs, put forth their shoots and made a remarkable growth, and in two years he had as good and healthy an orchard as that which had been cut off by frost. Since that time he had frequently the occasion to treat other trees in similar manner, some times cutting off injured branches only, and had almost uniformly had good results. But it is necessary to cut off the injured branches of frozen tops as early as possible after the snow is gone, and always before the sap has begun to ascend the tree.

Mr. T. Lyon said his experience had taught him during the cold winter of 1873, to take vigorous measures with trees that have been seriously injured by cold. The discoloration of the bark was only the indication of injury to the tree, and if the sap 93808

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vessels are too much ruptured the tree will die. The only remedy, and one which will be efficient if there is any vitality left in the tree, is a thorough pruning early in the spring.

Suggestions as to the treatment of trees frozen by the cold snap of 1899, were given by many of the leaders in horticulture. Prof. W. J. Green of the Wooster, Ohio, Experiment Station, issued early in March, a press bulletin. He said, in the beginning, that a frozen branch is of no use to the tree, and the best thing that can be done is to remove all parts that are seriously effected. The questions which naturally arise are "When should pruning be done and how much of the top shall be removed?" It is well to wait until it is possible to determine about how much injury has been done, as shown by the discolored wood and shriveled barn. Usually one warm spell is a sufficient length of time to wait, but it is possible to defer the work too long, as the frozen wood seems to have a deleterious effect upon the sound parts, if not removed before growth commences. During March, and in some cases even as late as April, the pruning should be done.

The peach ought to be pruned more severely than merely to remove injured wood, except where they are killed to the snow line, and in such a case it is doubtful if they can be saved at all. Peach trees that are from three to five years old and have never been pruned to any extent need special attention. In case the injury to such trees does not extend beyond the twigs and

small branches, the best thing that can be done is to cut off all the branches to within one to three feet of the body of the tree. A tree five years old, which has been allowed to grow at will, may have long, slender branches, six to ten feet in length, with most of the fruit-bearing wood near the extremities. Such a tree needs topping, even if a crop has been sacrificed in order to get it into proper shape. To cut out half the top from such a tree will improve succeeding crops and prolong the life of the tree. This puts the pruning upon a different basis. It is to be done not merely to remove dead wood, but to get the trees into shape for future usefulness. With this object in view the trees are to be so pruned that they can carry the next crop of fruit without breaking down. Of course it will be necessary to cut off limbs of considerable size, in many cases, and it will not be possible to avoid naked stubs. This can be remedied the next season, however, at which time surplus branches may be removed also. Incidentally, it should be stated that some cutting back is necessary each season, in order to keep the trees in proper form. This method of pruning trees has so many advantages, that the loss of this season's crop will really prove to be a blessing to those who take advantage of the present opportunity to get trees into proper shape. In case of young trees which have been planted only one or two years, it may be found that the injury extends to the trunk and possibly to near the ground. If there is life above the bud the best thing to do

is to cut the entire top away as far as there appears to be injury, and start a new top. If cut off early in the season, however, the stump is apt to become dry, as shown by cracking. To prevent this the end should be covered with wax, or some material that will prevent the escape of moisture.

From Michigan we get the following as to the treatment of frozen trees. The trees in the different parts of the state were subjected to temperatures ranging from fifteen to forty degrees below zero and, in many places, were severely injured if not killed outright. The zero weather during the recent freeze lasted so long that many of the old trees suffered as much as others recently planted. In some cases, large cracks have formed in the bark upon large trees of all kinds, and in others, openings extend clear through the trees. More commonly, however, the bark and wood are unbroken, but one or both are discolored. When discoloration is confined to the wood, and especially if it is not very dark, the trees will live a number of years and may practically recover from the effects of the freeze if properly handled, but usually their period of life will be much shortened. Where the inner bark has been much discolored, and certainly if it has become loosened from the tree, there will be little hope of saving it if a considerable area is involved. In some sections of state, the ground was covered with snow to the depth of from six to sixteen inches, and the injury may not extend much below the snow line.

In such cases of trees not over four years old, where the bark above the snow has become browned and loose from the trees, and where there is a space of six or eight inches of uninjured wood above the bud, the top can often be cut back and a sprout trained from the stub. When young trees have the tics of the branches destroyed, or if they merely show serious injury, while the trunk is in good condition, it is advisable to head the trees back severely. Bearing peach trees, that have been allowed to grow with little or no heading in, may be cut back so as to leave four or five arms, well distributed about the trunk, with a length of from one to three feet. When trees of this size are unpruned, the sap will have to pass for a long distance through the injured in order to reach the leaves and, as there will be a large number of buds from which shoots will develop, the reduced quantity of sap that will find its way to the growing points will result in a feeble growth and probably in the death of the trees. When the trees are headed back, the distance that the sap will have to pass will be much lessened and, as only a few buds will remain, each will receive a much larger proportion of the sap and a much stronger growth will be secured than where trees are unpruned. A considerable number of shoots will start from these stubs, but before they have reached a length of ten or twelve inches, a part of them should be removed that those remaining will not be crowded and suffer from a lack of light and air. Treated in this way, the

shoots will make a firm growth and will much less likely to be injured by the cold of the following winter, than when all are allowed to grow, and in their own crowded condition, develop weak and watery shoots.

When the bark has cracked and loosened from the wood over a small area, there is still a chance of saving the tree if the loose bark is cut away and the wound is covered with grafting wax, or if grafting clay is bound upon it. The trees that have been most injured will soon begin to shrivel and may be removed at any time, but there is always a possibility that trees may prove less injured than they at first indicate, and too much haste in the removal of the trees might result in serious loss. When small trees are to be cut back to stubs near the ground, it is best to delay it until severe freezing weather is over, but if cutting back is put off too long the roots may be weakened. If it is sufficient to prune back the tops of the trees, this can best be done during the month of April, as at that time it will be possible to see how much the wood has been killed back, and there will be less danger from the drying out of the ends of the stubs than would be the case were they headed back earlier.

The extreme cold of the winter just passed has been very disastrous to nearly all kinds of fruit and has done much damage to the tree themselves, yet in a way it has been a benefit for it gave opportunities of trying several important experiments in re-

gard to prunning frost bitten peach trees.

Very early the trees gave evidence of having been badly frozen and it was determined if possible to answer the question about the different degrees of heading back; and also about the different times of doing the work during the spring.

The experiment was somewhat limited on account of having only a limited number of trees; and also because the final notes had to be taken before the trees could make sufficient growth.

For the purpose of making the experiment, the orchard was divided into three blocks of nine trees each with three trees in each row. See table. April 14th 1899, the first three trees of block one, row one, were pruned and headed back to one half of the previous years growth. The same date, the first three trees of block two, row one, were pruned and headed back nearly all of the previous years growth and also at the same time, the first three trees efblack three, row one, were pruned and headed olear back to stubs, leaving only a few young sheets.

May 3,1899, the second pruning was made. This was just as the buds began to open. This time the second three trees of block one, row two, were pruned and headed back, the same as row one, also the second row of blocks two and three, were pruned and headed back the same as row one of blocks two and three.

May 16th, 1899, the third and final pruning was made. The growth now being from one to three inches long. This time the

last three trees of block one, row three, were pruned and headed back the same as row one and two, also the third rows of blocks two and three were pruned and headed back, the same as rows one and two of blocks two and three.

Duplicates of this experiment were also made, and in all about seventy five trees were pruned.

Photographs were taken of the three methods of heading back, before the growth started, and also of the same trees, the same day the final notes were taken. The photographs correspond to the block in their order one, two, and three.

The final notes were taken May 29, 1899. The results were not very satisfactory, from the fact that the trees were so badly frozen, and the season so late that what trees did live had not made much growth.

The indications were, that the different degrees of heading back, did not make any material difference. The trees that were headed back to stubs, were making as good a growth, in proportion to their tops, as those trees which had only one half of the previous years growth removed. In some instances the growth on the stubbed trees, down closer to ground and upon larger limbs was much more vigorous.

As to the time to prune could not as yet see any difference, only in the fact, that the trees pruned after the growth had made a good start, and all of the dead wood could be removed. In the

trees pruned earlier, all the dead limbs could not be removed, for they could not be told from the live ones. Thus the trees pruned later in the season would save a repruning in order to have all the dead limbs removed and trees left in proper condition.

The indications are at this time, that the trees were too severely frosted to survive the summer. Some of the trees that appeared all right early in spring never leaved out, while many only made the growth sustained by the first flow of sap, and then withered and died. The one, two, and three year old trees seemed to stand the winter, but even they are in a condition which bespeaks little for the future thrift of the orchard.

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# TABLE.

Block I

Block II

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Row I	Row II	Row III	Row I	Row II	Row III
Apr. 14 One half previous years growth.	Ma <b>y 2</b>	Ma <b>y 16</b>	Apr. 14 Nearly years	May 2 all the growth.	May 16 previous
ŧ	#	<del>4</del>	#	+	#
#	#	#	#	<del></del>	#
4	- <del>4</del>	#	- <del>]]</del>	<del>#</del>	<del>#</del>

## Table continued.

## Block III

Row I	Row II	Row III		
Apr. 14 Headed	Ma <b>y 2</b> back to	May 16 stubs.		
#	-ife			
- <u>11</u> 	:# <b>-</b>	<del>#</del>		
4	-# <b> </b> =	_! <b> </b> =		



AN UNPRUNED TREE



BLOCK ONE BEFORE GROWTH STARTS



BLOCK ONE AFTER GROWTH STARTS





BLOCK TWO AFTER GROWTH STARTS



#### BLOCK THREE BEFORE GROWTH STARTS



BLOCK THREE AFTER GROWTH STARTS



A TREE PRUNED AFTER GROWTH STARTS

