T H E S I S

A P P L E G R O W I M G.

by

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upon graduation from the

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APPLE GROWING.

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1. Topics treated

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1. How shall the seedling be treated?

a. By budding;

Nature of

Advantages of

b. By grafting;

Nature of

Advantages of

c. Which, budding or grafting;

2. Which is the best, one or two year old trees?

a. Advantages of each;:

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3. How shall the tree be trained:

a. With a high head:

Advantages of

Disadvantages of

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Nature of

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4. Spraying as a means of protecting the fruit.

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APPLE GROWING.

One of the fruits that has been cultivated from time immemorial is the apple. How to grow thss most delicious fruit so that the best and largest yield might be obtained has been a subject of the greatest importance to the horticulturist. It is a subject of more interest today than every before. In this paper I will try to give a discussion of a few of the problems that confront the apple grower of today. Briefly stated they are: The treatment of the seedling, the planting of one or two year old apple trees, the training of the tree, and spraying for insects and fungus diseases.

In the first place it is well known that apple seedlings will not produce true to name. The fruit is often inferior. There is absolutely no certainty as to what may be expected from such seedling. Allow a BenDavis to produce fruit; you might get a superior apple, but the chances are more in favor of getting an inferior one. Thus we must have trees that will produce true to name. We must also bud or graft the desired variety onto these seedlings. The question is which of these two methods is best, if there is any difference.

Budding is a process by which a bud of a variety of apple as the Rome Beauty for instance, is inserted under the bark of a seedling of known hardiness. The object is to bring the combinations of growing parts of

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the bud and stock in contact with each other so that the bud will grow and made a shoot in place of that of the stock which is cut off, after a time. Thus, the seedling is so changed that it will yield fruit true to name. Of the numerous forms of budding, the most important ones are: Shield, Plate, Prong, and H-budding. Each has its place in budding. And so budding has some advantage over cion grafting. In the first place large trees can be budded with less injury, for cion grafting necessitates the making of larger wounds. This is something that the larger tree cannot stand. Again budding is the simpler operation. For instance take Shield or T budding, the cuts or slits are made in the bark of the tree or seedling at right angles to each other. A bud of the desired variety is inserted by prying up the bark and pushing it in place, and tieing. It is claimed that budded trees will live the longest. It is also said that budded trees have the best roots.

What is cion grafting? How does it differ from budding? Cion grafting is a process by which a cion from a desired variety is caused to grow upon a hardier stock. This is another means of securing trees true to name. The cion is a live growing twig that has a number of buds on it, while in budding a single bud is used. Cion grafting is practiced on all parts of the tree; the root, the stem, and the top. The principal forms of cion grafting are: whip, side, veneer, splice, saddle and cleft grafting. The best

and most common of these is whip grafting. This method is used mostly in root grafting; that is where a whole or a piece of a root is used as a stock. The work of grafting is done in the winter in-doors. Stocks of one or two year old seedlings are dug and put in storage in the fall and kept there until January or February. Shoots or twigs are also cut from the variety of apple wanted, labeled and placed in storage. When the time comes, both the scion and stocks are cut abliquely across so that the cut is about an inch and a half on each. A cleft or notch is made in each. They are then placed together and held by waxed cloth. The grafts as they are now called are now ready for storage until spring.

This method, has a number of advantages over budding. In the first place it is cheaper for it can be done in the winter while the budding must be done in the summer. There is not so much work to be done in the winter as in the summer. Then again, by budding only one tree can be obtained from each seedling, while by grafting proper, in piece root grafting, two or more trees may be obtained from one seedling. I could not see any difference between whole and piece root grafting in the College orchard. I believe S. W. Fletcher is about right in his book, "How to Make a Fruit Garden", which reads as follows: "There seems to be no material difference in the value of piece root grafted, whole root grafted, and budded trees, provided they are of the same size and vigor. The important point is the size

and vigor of the tree; not the methods of propagation. Budded trees are commonly preferred except in some parts of the middle weat where apples are usually root-grafted so as to secure trees of known hardiness."

Another point of interest in the growing of apples is the age at which the tree should be put into the orchard. The question is: Which is the best if there are any differences, ore or two year old trees? There seems to be a variety of opinion here also. Both have some advantages. If a one year old tree is set out there is not so great check to the growth as the tree is small. It is a well known fact that the younger plant will stand transplanting better than the older one. The wound made by digging and pruning are smaller and will heal over more readily. As to the two year old rree, it has been in the nursery an extra year and has had a chance to make a more vigorous growth. The one year old tree is merely a straight shoot while the two year old tree is large enough to prune so as to start to form a head.

As an experiment, the writer in the spring of 1906, the writer sent some Rome Beauty apple trees home, near Minneapolis, Kansas. Six year one old and six two year old trees were used. The trees were set out in one row, first a year old tree and then a two year old tree, alternating the two ages of trees. The trees had the same care and cultivation. The soil was the same for each tree. All the

trees lived through the summer except one two year old, which was nearly dead in the fall. The following summer was hot and dry and a rather poor summer for such an experiment. The trees stood still without growing too much of the time. Below is a table giving a comparison of length and number of branches they grew during the season:

One year old.			Two year old.		
Tree No.	Length of branches. inches	No. of branches. inches	Tree No.	Length of branches. inches	No. of branches. inches.
No. 1	2 1-2 : 9 1-2	6	2		
3	4 : 16	5	4	1 1-2 : 14	8
5	1-2 : 14	4	6	1 to 10	8
7	11 : 13 1-2	3	8	3-4 to 5	9
9	1-2 : 9	7	10	3 to 9	8
11	5 1-2: 15 1-2	5	12	1 1-2 : 10	9
Average.	4 to 11 1-2	5	Average	1.55 to 11.6	8.5

It will be noted that the two year old trees produced the larger number of branches of new growth. The one year old trees had the shortest branches and also the longest branches: 1-2 in. and 16 in. The average of the longest branches wss in favor of the two year olds. I can not see as there is much difference between the two ages, but I believe the two year old trees are a little the best for the orchard. The growth of the two year olds did not seem to be much checked by being a year older than the one year olds.

It might be well to note what others have to say on this subject. Mr. W. B. Eames of Delphos, Kansas, says; "I think two year old trees are best. Get No. 1 every time". Mr. Francis Globe, in the 35th Annnal report of the Kansas State Historical Society has the following remark to make: "I prefer two year old trees, strictly first class, and plenty of roots in good condition". Mr. B. T. Combs, of Parker, Kansas, in the 39th Annual Report of the same society says: "In the first place, it is necessary to have good healthy two year old trees from the nursery". I found only one writer that recommended the setting out of one year old trees and he was from Australia. Thus the two year old trees seem to be the best to set in the orchard.

Another subject of very great importance in apple growing is the training of the tree as to whether it should grow with a high or a low head. Advantages and disadvantages are to be found for each form of head. By a high head it is meant that the trunk of the tree has no branches within five or six feet of the ground, while with a low headed tree the branches are within three or four feet of the ground. There is a place for each in the orchard.

With high headed trees the orchard can be cultivated ceasily; the team can be driven closer to the tree, thus saving hand labor. There is not so much danger of barking the limbs, and there is better circulation of air through the tops of the trees.

This is of greatest importance in the east where the air is so moist and humid. This circulation of air through the tops prevents the collection of moisture on the limbs, which is so favorable to fungus growth. Also the fruit needs to be ventilated to give it the proper flavor.and coloration. In our climate where there are so many strong, hard winds such heading would not do. The wind has too much purchase on the tops. The limbs are also too easily broken off. This causes sun-scald and gives fungus diseases a chance to get a hold on the tree.

With the low headed tree, cultivation is not quite so easy, but the tree can be trained so that the main branches will go up more nearly straight and thus make it about as easy to cultivate as high headed trees. Where the head is low a great deal of labor and time is saved in pruning the tree and picking the fruit. The work is also easier, than at the top of a tall ladder. Spraying may be done easier also. Although in this it makes but little difference. The sun cannot get at the trunk as it is protected by the branches, and as the branches are lower, the wind cannot play havoc with them so readily. With all these things in its favor, it seems to me that the low headed tree is to be strived for, while in the east under other conditions, the higher headed tree seems to be best.

A very important means of training for this low head is by pinching or summer pruning. Farmers' Bulletin No. 181 gives the following definition for pinching: "Pinching

or stopping is a method of summer pruning, whereby robust shoots are checked at any desired height in their growth by removing their extreme points with a pinch between the thumb and finger, without the further removal of foliage. This operation retards for a time, the extension of such shoots, induces additional growth in other buds, and encourages the developement of lateral shoots as well as of other shoots where a more active extension is required.

Finally another subject of importance is that of spraying for insects and fungus diseases. There are three very essential factors that enter into the operation. First there is the time element. It must be done at a time when it is most effective. For example, take the codlin moth. The spraying must be done before the young apple begins to droop so that there will be poison in the blossom for the larva to eat when it hatches. Secondly, the application must be thorough. All parts must be reached with the spray so as to destroy all or nearly all of the insects or fungus diseases. Thirdly, the spraying must be done with intelligence. The conditions and reasons should be understood so that changes may be made to suit the varying conditions of the season.

It would be well to consider spraying as one of the worst enemies of the apple worm. It often happens that spraying can be done so as to kill a number of them at one time. The following is taken from Bulletin No. 145 of this College

on spraying:

"Spring Canker worm: Spray with arsenate of lead or Paris Green as soon as or soon after worms appear. If this is not enough subsequent spraying as for the codling meth should hold the insect in check.

Codling Moth: Spray with arsenate of lead or Paris green as soon as the petals have fallen from the flowers, repeating again in about ten days, also repeating agin in fifteen to twenty days, and still again about the middle of July."

Diseases.

"Scab, Bitter Rot, Leaf Spot, Rust, etc: Spray with a solution of copper sulphate or use Boredaux Mixture before the buds open. Spray with Bordeaux Mixture two or three times after blossoming, about ten to twenty days apart. "

The Bordeaux Mixture and arsenate of lead or Paris Green can be mixed so as to spray for all enemies at any time they be present.

It may be asked why spray at all. In the first place it must be done to save the fruit; if the season happens to be favorable for the increase and growth of insects and fungi the crop may be very small or inferior. Then it pays to spray. The increased yield and quality more than makes up for the cost of spraying. Also there is the satisfaction of securing superior fruit. It is true that the work is disagreeable, but this is not excuse.

In the above I have tried to give a discussion of some

of the problems of apple growing. In summing up: Set out either grafted or budded trees, but be sure they they are strong, vigorous, and hardy. The two year old trees seem to be a little the best. The low headed tree is the one for our conditions. Spray whenever needed and do thorough work.

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