

over the surface of the wound. This will kill any kind of germ.

PRECAUTIONS FOR FUTURE.

To ward off cankers for the future, it is necessary: (1) To prevent as far as possible injury to trees by such means as tearing off the bark by whiffletrees or other implements, or by boots in climbing. If wounds are made in this way, they should be disinfected and painted at once; otherwise they let in the germs of the disease. Cankers usually start from wounds of some kind, though sometimes these may be very small. Sunscald injuries also allow canker germs to enter, hence young trees should be protected against sunscald by some of the well-known devices.

2. Water-sprouts should be kept off the trunks and main branches, because, as said above, the blight disease often runs down one of these, and starts the canker below. A few minutes usually suffices to remove all the water-sprouts from an ordinary tree.

3. The trees must be carefully sprayed with Bordeaux mixture, and special pains taken to see that the TRUNKS AND MAIN BRANCHES ARE THOROUGHLY COVERED with the Bordeaux. The first spraying should be done just before the leaf buds burst; the second a few days before the blossoms open, and the third within a week after most of the blossoms have fallen. Half a pound of Paris green should be added to each barrel of Bordeaux, and the whole kept well agitated while spraying. The spraying will then not only do a great deal to keep off cankers, but will also kill most of the codling moths (which cause the wormy apples), the cigar-case bearers, pistol-case bearers, canker worms, bud moths, and many other insects; and, in addition, will keep the apples free from scab, so that orchardists should thus get a return for the time and money spent, in the form of healthier trees and more and better fruit. Care should be taken in every case to see that the spraying is thoroughly done at the times mentioned. Orchards that are kept properly pruned and sprayed have been found to be very much less affected with canker than those that are neglected.

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TOMATOES IN SASKATCHEWAN.

Brenda E. Neville, of Saskatchewan, describes in "The Farmer's Advocate and Home Journal" a bit of interesting tomato-growing experience in that Western Province. As a rule, she says, it is necessary to start the plants very early. If it can be done, it is not too early to sow the seed in February, quite early in the month. The earliest tomatoes she had grown in Saskatchewan were started in boxes in the house in February. They were potted singly when four or five inches high. By the second week in May, they had small flower-buds on them. They were then set into a deep hotbed, removing the pots, and setting the plants a couple of inches deeper in the soil than they had been. By watering well and shading from the sun for several days, the plants were not injured. She did not set the plants out in the open till the third week in June. There was quite a heavy frost on the night of June 12th. The branches were kept nipped back, allowing only three clusters of flowers on each one. She thinks it would be better to allow only two, or perhaps but one. No doubt, the fruit would be larger, and would ripen earlier.

This year she planted tomatoes in the above manner. There was no severe frost in August, and they had quite a lot of fine, large, ripe tomatoes. But she also had ripe tomatoes on plants the seed of which was sown in the open garden on the fifteenth of May. The plants were thinned to about four inches apart in the row, and were only hoed enough to keep the weeds down. The weather was rather dry and hot, so that may have hastened the ripening. The fruit that ripened was small, but of very good shape and quality. This year she did not prune them, but just let them grow as they pleased.

FRUIT COOLED BEFORE SHIPPING.

Much of the success attending the efforts of fruit-growers in the Western States depends on expert packing. The more progressive shippers, however, have learned that, in shipping peaches, apricots, etc., instead of loading the fruit into the cars as soon as brought in by the growers, it should be held for twelve to twenty-four hours in cold-storage. The fruit is placed in a cold-storage plant as soon as delivered by the growers, and left there overnight, and sometimes longer. It is then loaded into regular refrigerator cars and shipped.

The stay of the fruit in the cold-storage room lowers the temperature very greatly, and as it is loaded into the car without any further exposure, the temperature of the car is not reduced much by the addition of the fruit. In some cases the fruit is placed in the car in which it is to be shipped, and exhaust fans draw off the warm air, which is replaced by cold air from a storage chamber. In this way the cooling is accomplished in twelve to twenty hours.

RESULTS OF ORCHARD SURVEY IN NEW YORK STATE.

Address by Prof. Chas. S. Wilson, Cornell University, Ithaca, N. Y.

The subject I am presenting is a new line of work which has been started in the United States, and which has proved one of the most valuable works ever done in orcharding.

I feel that this work is connected to the interests of the fruit-growers of Canada. In the first place, it has been done in the counties of New York State, bordering on Lake Ontario—counties which are neighbors of your Canadian Dominion. In the second place, the work was suggested and begun by one who formerly was a member of this Association, and who is known and loved by many of you—Professor Craig.

In the summer of 1902, at a meeting of the New York State Fruit-growers' Association, held at Olcott Beach, Professor Craig suggested that it would be an important part of the work of a fruit-growers' association to take up a definite study of the orchards in the leading fruit-growing sections.

The executive committee was keen for the project, but had no funds at that time to carry it out. In the winter of the same year, Professor Roberts, who was then Director of the Cornell Experiment Station, gave the necessary authorization and funds, and the work was begun.

HOW THE WORK IS DONE.

The word survey may be somewhat misleading. It does not mean, as the word might convey, from the civil engineer's standpoint, the accurate measurement and the number of acres in the orchards, their location, etc. It means more than that. It means a detailed record and history of the operations and products of that orchard for a period of five or ten years. The work is done by a surveyor—so-called—a graduate student of the College of Agriculture who has taken special work in horticulture. This surveyor visits personally every orchard in the county or State, and takes record of the different factors entering into its production. For example, in the case of the soil-management factor, the surveyor will secure information from the owner as to how that orchard has been managed for the past ten years. Has it been tilled for ten years? Has it been in sod? or is it tilled part of the time and in sod part of the time? If it has been tilled, how often each summer is the work done? If it has been in sod, has it been pastured with hogs, or with cattle, or with sheep, or not pastured? So, in the case of the spray, data are secured relative to the mixtures which are used, the number of applications, the machinery, the effects of the spray, etc. Detailed records are made of each one of the different factors which are represented on the blanks; and then, most important of all, a record is taken of the yields and prices per bushel. The practical value of the work depends upon a comparison of the yields and income. It is important, therefore, that data relative to these be secured. These data are taken for five years back.

After the surveyor has visited all of the orchards in the county, the work having been done in the summer, when the orchards could be best inspected—that is, during August and September—the records are brought to the office and tabulated. The tabulation is done in this way: For example, let us take the tillage factor; we divide the different methods of tillage somewhat as follows:

Tilled ten years or more.
Tilled five years or more.
Tilled three years, at least.
Sod three years, at least.
Sod five years or more.
Sod ten years or more.

Then we take the records of all the orchards which have been tilled ten years or more, putting the number of such orchards in one column, and the number of acres included in these orchards in another column. We add the yields of all the orchards, and divide by the number of orchards. This gives us the average yield of an orchard under that method of treatment. The same for the income; this gives us the average income per acre. We do this for all the different treatments under this one factor, which gives us our tabulation on the basis of average yields and income in such a manner that we can compare side by side the real results the fruit-growers are securing under the different treatments. We do this for all the different factors, and make out our tabulation in the same way.

APPROXIMATE ACCURACY OF AVERAGE ESTIMATES.

The question of the accuracy of these results is of great importance. One might think that, inasmuch as some of the records given by the fruit-growers are estimates, these estimates would make the result of the survey inaccurate, but this is not true. Of course, some of the records

of the yields and prices are estimates, but usually the grower knows definitely for three years back, and can estimate closely for the other two years. Often, when we have several estimates, the net average gives us accurate figures. The orchard survey is built up on the law of averages, and the law of averages, when a great number of orchards are considered, is accurate. Let me give you an example to show you how accurate these averages are. One of the men at the College was presenting the surveys at a meeting, and he wished to impress upon the minds of the members the accuracy of these averages. In order to do this, he brought into the meeting a number of slips of paper, on which were struck off a single line of the same length, less than an inch in diameter. He distributed these slips of paper, and asked the members to guess on the length of that line. There were 30 guesses made, varying from a minimum of one-quarter of an inch to a maximum of one inch, with all intermediate lengths. These guesses were averaged, and the average of the 30 guesses gave him .723. He had measured the line before coming into the meeting, and the nearest measurement he could make was .72 inch. Thus, the average of those 30 guesses gave a very accurate measurement of that line. Now, in our orchard-survey work, we are dealing, not with 30 surveys, but with hundreds of surveys, many of which are definite, only a few of which are estimates; hence, our results must be accurate.

And now for the results we have secured. There are four factors concerned in the care of an orchard—tillage, pruning, fertilizing, spraying—which are important to the good management of that orchard, and none of which should be neglected. I shall give you only the results which we have secured from the orchard-survey work on tillage and spraying. Do not conclude from what I shall say that these are the only two factors. The others are equally important. Below are given the results of tillage:

ALL ORCHARDS.

Five-year Average per Acre.	Niagara.		Orleans.	
	Bus.	Income	Bus.	Income
Tilled 10 years or more.....	280	\$120	327	\$182
Tilled 5 years or more.....	254	100	274	188
Tilled at least 3 years.....	239	97	225	118
Sod at least 3 years.....	209	67	222	107
Sod 5 years or more.....	197	76	204	108
Sod 10 years or more.....	194	75	176	87

ORCHARDS WELL CARED FOR ONLY.

Five-year Av. per Acre.	Orleans.	
	Bushels.	Income.
Tilled 10 years or more.....	337	\$189
Tilled 5 years or more.....	296	148
Tilled at least 3 years.....	234	121
Sod at least 3 years.....	242	118
Sod 5 years or more.....	258	134
Sod ten years or more.....	232	117

BEST RESULTS FROM TILLAGE.

Let us see what these figures teach us. If we look at the figures for Orleans Co., we see that in the case of all orchards, those that were tilled ten years or more gave 86 per cent. larger yields than those in sod ten years or more; and those tilled five years or more gave 34 per cent. larger yields than those in sod five years or more. In the case of orchards well cared for only, those tilled ten years or more gave 45 per cent. larger yields than those in sod ten years or more; and those tilled five years or more gave 15 per cent. larger yields than those in sod five years or more.

APPLES FROM CULTIVATED ORCHARDS SOLD HIGHER.

Another interesting thing is shown by this table. We often hear the question discussed, Are apples grown on sod better than those grown on cultivated land? The answer is generally given in favor of the sod apples, because of their higher color and early maturity. As a matter of fact, buyers have been paying more for those grown on cultivated land than for those grown on sod. If we look at the figures of Niagara Co., we find that for those grown on land tilled ten years or more, the average price per bushel is \$.43. Those grown on sod ten years or more, the average price is \$.38. In Orleans Co., the average price of the tilled apples is \$.56 per bushel, and the sod apples \$.50 per bushel; or, in other words, buyers actually have been paying \$.15 to \$.18 per bushel more for those grown on tilled land than for those grown on sod. Whatever the opinion of the fruit-grower and the buyer, the facts shown by these figures cannot be denied.

But all orchards are not tilled, and it would not be good for all orchards to be tilled. As a matter of fact, only about 5 per cent. of the orchards of these counties are tilled year after year, where 20 per cent. are in sod year after year. But while some orchards in sod are given this treatment, there are others not pastured at all, or pastured with cattle, or sheep, or hogs. The results of our surveys, comparing these different methods of treatment, are interesting. We