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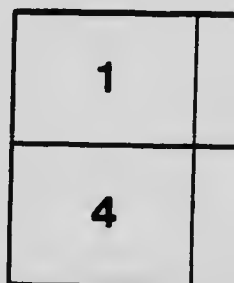
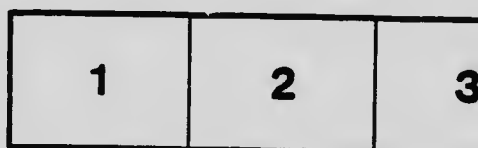
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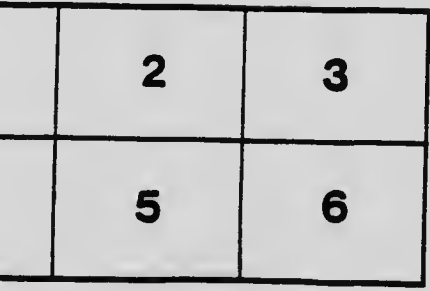
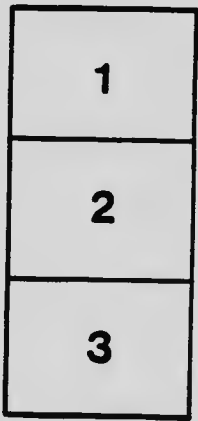
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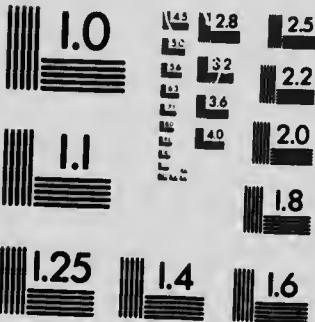
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PROVINCE OF BRITISH COLUMBIA.

DEPARTMENT OF AGRICULTURE (HORTICULTURAL BRANCH).

METHODS OF FRUIT PICKING AND HANDLING.

BY EDWIN SMITH, B.Sc. (IN CHARGE OF CAREFUL HANDLING INVESTIGATIONS, ETC.).

FROM the time that a grower plants a tree until the time that it has matured fruit he always has the assistance of nature. If he has intelligently selected the site for his orchard and used available knowledge in planting, cultivating, irrigating, pruning, spraying, and thinning, he will always be backed up and assisted by the unfailing laws of nature, which unceasingly tend toward reproduction. But as soon as the fruit has been produced and reaches maturity the laws of nature are reversed, and so we find that even before maturity the life processes of a fruit are started in a direction toward its decomposition, and do not end until the flesh of the fruit is entirely disintegrated and its seed or seeds are exposed and ready for germination. Consequently, we see that most people easily attain sufficient knowledge to assist nature to the end of having beautiful and delicious fruit bending every branch and twig of a carefully planned orchard; but when we count the number of fruit-growers who have made a study and know just what methods to use in handling the fruit of a vine or tree which has been brought into prolific and would-be profitable bearing through years of careful attention, we find the number is surprisingly small.

Even scientific horticulturists have neglected the study of means and methods which should be employed in handling fruit so that the beauty and usefulness which has been perfected in the orchard may be transported to the consumer at some distant market and increase his demand for more. As a result of these conditions many proficient fruit-growers are not proficient horticulturists, for, although they are instructed how to raise fruit, they have to resort to their own crude methods of handling when that end has been attained. Many men have successfully brought an orchard to a profitable bearing age and then have gone bankrupt for this very reason. So again, the writer says that with the assistance of nature it is comparatively an easy matter to produce a fruit, but the difficult problem comes when we consider that after production we have nature fighting us, and when we consider what we are to do with the fruit when we have it on our hands.

INJURY FROM HANDLING IN BRITISH COLUMBIA.

In the United States the Department of Agriculture was surprised to find that from 10 to 15 per cent. of apples receive mechanical injury in picking. During the season of 1912 the investigator inspected a large number of lots of apples as they were brought from the orchards into the various packing-houses of British Columbia, and found that an average of 26.3 per cent. of the apples were injured through handling, the counts varying from 8 to 80 per cent., according to the care exhibited by the orchardist, and according to the variety selected. This amount of injury is far too great, for the packer cannot be expected to assort all injured specimens, and if he did, how disastrous the results would be to some of the grower's returns!

Investigations were made in the wholesale houses of Vancouver, Calgary, and Edmonton, and from 1,838 specimens examined it was found that an average of 65.2 per cent. of No. 1 apples in British Columbia boxes were bruised or punctured. This was more than 10 per cent. higher than the mechanical injury found in the American "fancy" grade of the same variety. From 25 to 40 per cent. of the apples in the box are destined to be slightly bruised by pressing them into the box firmly enough and with enough bulge to the box to make a satisfactory pack. However, it was very noticeable, in making these investigations, that the injuries in the fruit from this Province did not stop with the first one or two layers, but continued throughout the box, showing very conclusively that the fruit was injured before it was brought to the packing-house.

In these investigations no decayed specimens were found in the imported fruit, while in a number of British Columbia boxes apples were found that were in a bad state of decay. A few bruises on fruit may seem an inconsiderate matter to the grower. His fruit looks extraordinarily well as he sees it in the orchard. But he does not see the fruit after it has passed through the series of transportation and handling hardships and appears upon the market with some of its specimens decayed and with bruises brought out dark and ugly, giving the article a decidedly inferior appearance when shown beside competitors' fruit.

CAREFUL HANDLING vs. PRECOOLING.

Continued complaints from the markets have made British Columbia growers feel that something is wrong with their methods of handling soft fruits. The Department of Agriculture has sought to remedy this by starting precooling investigations. The writer has spent the season of 1912 in that work. Facilities were not at hand to do precooling at once, so a series of investigations were undertaken to determine the need of it, if any.

One of the experiments dealt with the careful handling of Early Crawford peaches. Peaches were picked by the investigator, packed in the orchard, and placed in a refrigerator-car temperature—i.e., 42-47° Fahr. In handling the fruit there was no dumping, no rolling, nor any excessive handling; still the peaches were packed in a manner that could be employed commercially *without added expense*.

At the same time boxes of Early Crawford peaches were taken from the packing-house, these being handled in the old way. After six, twelve, and eighteen days, boxes of these peaches were taken out and the decayed specimens counted. Then after the fruit had been exposed to market conditions for two, four, and six days, the decayed specimens were again counted.

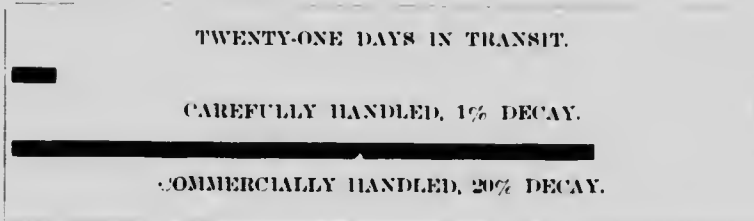
Results showed that the careful handling lengthened the life of the fruit and reduced the decay enormously, as may be seen in the tables below:—

Time in Transit.	Commercial Pack.	Careful Pack.
Average amount of decay after 6 days.....	1.0 per cent.	0.8 per cent.
" " " " 12 "	12.17 "	1.7 "
" " " " 18 "	24.5 "	0.5 "

After Six Days on the Market.	Careful Handling had reduced Decay.
Six days in transit	27.31 per cent.
Twelve days in transit	27.6 "
Eighteen days in transit	30.4 "

Among other soft fruits besides the peach, careful handling experiments were carried on with the Italian prune, with almost startling results. The diagram shown below illustrates a very significant lesson.

WHAT CAREFUL HANDLING DID FOR ITALIAN PRUNES.



A precooling plant will not remedy careless handling nor delay in shipment. The precooling experts rightly maintain this fact. Investigations show that the grower would be benefited by more careful handling and less delay in the industry. Precooling is a process that checks the life processes of the fruit before they have taken place, and does not stop decay once started in the injured fruit. None of the large peach districts in the North-west employ precooling plants, and still market their fruit in prime condition as far east as the Atlantic seaboard towns. Consequently, in improving the condition of our fruit on the market, we must look to methods employed with success in other places, some of which are given subsequently.

STANDARD METHODS OF HANDLING FRUITS.

TIME OF PICKING.

The proper time to pick a fruit is a problem that the fruit-grower's best judgment must decide. The best time to start picking most tree-fruits is in the month of June—i.e., just after the "June drop" or at thinning-time. Thinning is the "first picking" and one that should never be neglected. The next picking comes just before maturity of the fruit, which may be

determined by the colour of the fruit for the variety, by its firmness under pressure, by the manner in which it yields from the spur or branch to which it is attached, and in the case of the apple and pear by the colour of the seeds. The seeds should just be turning to a brownish colour, or started to turn black in the case of the pear.

With the apple and pear, the proper time may be told best by taking the fruit firmly in the full of the hand and giving it a lateral twist, with the stem taking leverage over the index finger. If fit for picking, the stem will let loose from the fruit-spur without breaking. Early apples are best when they have attained full colour and begin to yield to pressure. Those which have a tendency to become dry or mealy when ripened, like the Yellow Transparent, should be picked some days before fully ripe. Winter apples with seasons varying from that of the Jonathan to that of the Baldwin should be mature, but not ripe. The pear must be picked before ripening, in order to get the best quality in flavour and lusciousness. To exactly determine when to pick a variety of pears the grower must judge by the size the fruit has attained and by the ripening of a few premature specimens that are always present in a tree of fruit. The seeds also will have started to turn at this time.

Cherries should be allowed to remain upon the tree until they are well coloured, of good size for the variety, and have ripened sufficiently to be marketable.

Plums may be left until they have attained a fairly good colour for the variety. However, excessive losses with the Italian prune have been experienced by allowing them to get too ripe. A plum should be picked just before it begins to lose in firmness, and, for local consumption, gains in dessert quality if allowed to ripen further upon the tree.

With the peach, the time for picking, depends upon the distance of the market. Local markets will allow the peach to ripen further than where it is to be in transit for a number of days. Peaches are often allowed to colour and ripen too far before being picked for the Prairie markets, resulting in excessive overripeness and decay. However, the peach should have attained full size and started slightly to colour at the time of picking.

Small fruits, such as strawberries, raspberries, blackberries, currants, and gooseberries, must be picked while firm. Overdelay in picking these most perishable of fruits is disastrous.

We should never judge the picking-time by the premature falling of a few fruits. This is sometimes an indication that fruit is fit to pick, but it is not always a dependable one. Do not judge an orchard by a tree that is diseased or one that is suffering from lack of water. These will always mature their fruit before normal trees.

Above all things, keep close watch of the orchard as picking-time approaches. The neglect of doing this and the delay of one day in making a picking often causes the loss of a shipment of fruit. If in doubt as to when a fruit is ready for picking, the uninitiated should look for advice from an experienced fruitman. Shippers usually are fairly well informed as to the proper state of ripeness for picking.

NUMBER OF PICKINGS.

We cannot gather a crop of fruit as we do a crop of wheat or hay, by making a clean sweep at harvest-time and clearing all the territory covered at one picking. Instead, we must take the fruit from the tree as it ripens,

otherwise a part of the fruit would be picked too green, and at the same time a good share would be overripe. Thus with the peach we must go over the tree three or even four times and pick the fruit as it ripens. In moist, warm weather, when peaches ripen very rapidly, the trees should be gone over every two days, while in cool September days, when later peaches like the Elberta are ripening, the time between pickings may be increased by a day if they do not seem to ripen too fast.

Plums and prunes should have two and three pickings; apricots the same number; while early apples usually require going over the trees three times. Investigations have shown that lack of attention in picking raspberries and loganberries as fast as they ripen—"not keeping up with the pickings"—is the cause of immense losses from overripeness and decay as they reach the market. Berries should be picked over at periods not greater than two days.

EQUIPMENT.

In picking fruit four things are necessary: (1) A good ladder; (2) a suitable picking-basket; (3) convenient orchard-boxes; and (4) an orchard-wagon with *springs* and suited to turn about the rows.

All trees not over 20 feet in height may be picked from a step-ladder, which ensures the least possible amount of fruit being knocked off. A step-ladder with a single brace-standard should always be selected, as it is the lightest and best adapted to getting within the tree.

There are a great many styles of picking bags or baskets, but we should always choose one that opens at the bottom, allowing the fruit to come into the orchard-box without rolling or bruising. One of the best of these has galvanized sides and a canvas bottom, and is manufactured to order by a local firm. With cherries it is expedient to use metal pails. A picking-bag that requires dumping from the mouth should never be tolerated.

The lug-box or orchard-box should be strongly built with super-cleats to prevent injury from stacking. It should hold about 70 or 75 lb., and should be built to accommodate the rack of the orchard-wagon.

Do not employ an orchard-wagon that is not equipped with good elastic springs, nor one that requires high stacking.

METHODS.

The neglect of technique in taking fruit from the tree or vine is the cause of more injury and loss than any other phase of fruit-handling. Some orchardists prefer to shake the fruit from the trees, while others supplement a bag or pail, and render an equal number of bruises by dropping the fruit into the pail and then again by dumping into the orchard-box. The investigator has seen all classes of fruit-handling in British Columbia, and is impressed with the disregard that growers give to this end of their business.

Small fruits, such as raspberries, strawberries, loganberries, etc., are most responsive to careful handling of any that we have in the Province. In removing the berry from the vine, it must not be pinched, clutched, or crushed, but taken firmly between the forefingers and thumb, and with a quick lateral twist removed and placed directly in the picking box. If attention is paid in acquiring this skill upon the start, berries can be picked as rapidly as in a haphazard manner and with a reduction in injury that is surprising. Any bruise to the pulp of these fruits is immediately followed by the growth of a mould, while the pinching of a berry results in a discoloration, after it has been on the market a few days, which resembles a scald, and is always

followed by a premature softening, making an unattractive-looking package as well as an inferior fruit.

Cherries, being one of the softer fruits, respond in a remunerative way to careful handling. Cherries should be picked with the stems retained to the fruit. Picking-boxes should not be filled more than half full, as injury comes from pressure to the fruit in the bottom of the box. If packed from a table, injury is avoided by emptying the box from the side; and in placing the fruit in the shipping-crates, do not grab into the fruit, but raise it by carefully sliding the hand underneath.

In picking tree-fruits each picker should have a system of covering the tree. It is best to pick, first, fruit that may be reached from the ground, then place the orchard-ladder in the tree so that the fruit that hangs towards the centre of the tree may be reached. Remove all of the fruit systematically from the branches, starting from the base of the tree and working upwards. In this way a minimum of fruit is knocked from the tree by clunging the ladder or by climbing in and out of the tree, and a great deal of time is saved in a day's work.

When picking peaches extreme care must be taken in handling the fruit without pinching or unnecessary pressure. With a side-twist of the hand remove the peach from the branch without tearing the flesh. The fruit should not be dropped in the picking-basket, but deftly laid upon the other fruit. The picking-basket should be lowered into the picking-box until it rests upon the bottom of the box, then release the fastenings and allow the fruit to rest in the box without rolling or dumping. Peaches should be picked from the orchard-box without dumping into a packing-table. We recommend packing peaches in the orchard. For long shipments the peaches should be picked, carried directly to the orchard packing-benches, packed at once, and hauled to the refrigerator-car, in which they should be loaded within twelve hours from the time of picking. These are strenuous measures, and as yet have not been adopted in British Columbia to any extent, but they are the measures used in the large peach districts of the United States, which are successful in marketing their peaches in prime condition and realizing a margin of profit.

It is necessary to pick plums with stems attached. The same general principles of careful handling as used with the peach should be maintained with the plum. Prunes do not require to have the stems attached; in fact, less wrinkling about the base of the fruit is noticed when picked without the stems. Delay in picking also increases wrinkling as well as decay.

Pears and apples demand much the same treatment. Some growers, in referring to careful handling, speak delightedly about the extreme care that is used in handling the oranges and lemons in California, where they even go so far as to pick the fruit with gloves on; but these men are of the opinion that apples do not need the same care that oranges do. Yet the skin of the apple or pear does not compare with the thickness or toughness of the oranges; and just as extreme, if not more so, precautions should be taken in avoiding mechanical injury when handling the apple and pear as they do with citrus fruits.

We find four important points where these fruits are injured:—

- (1.) Pulling-out of stems when picking;
- (2.) Bruising of fruit by carelessly dropping it in the picking-basket against other fruit;
- (3.) Dumping and rolling from picking-basket to orchard-box;
- (4.) Dumping of fruit from orchard-box to packing-table.

The man in charge of the picking-gang is responsible for the first three crimes, while the fourth lies with the packing-house superintendent, and can best be eliminated by packing direct from the orchard-box. In fact, the foreman of the picking-gang assumes the burden of the responsibility in maintaining quality when fruit is marketed. In a Californian orchard mechanical injury was reduced from 20 to 5 per cent. by selecting the right kind of a foreman for the picking-gang.

Packing-house methods should be simplified. Here the fruit *has* should be handled but *once*, and that is when the packer takes the fruit from the orchard-box and packs it in the shipping-case. The packing benches should be so arranged as to permit the fruit to be trucked from the "weighing-in" scales to the packing benches, and from these to the loading car or stock-room without superfluous handling.

COST OF CAREFUL HANDLING.

The added expense of employing methods for careful handling is not appreciable. In fact, tests have shown that fruit may be picked carefully with as much speed as in the more careless manner, and in some instances with greater speed. However, to do this every picker must be trained and must do his work systematically and skillfully, making no useless motions, and using deftness instead of a profusion of movements. Much depends upon the picking foreman in instructing the workmen and insisting that no dumping nor rolling is employed.

SUMMARY.

At present an average of over 20 per cent. of British Columbia apples are injured through careless handling in orchards, and over 60 per cent. receive bruises or punctures before reaching the markets.

Bruises make an inferior-looking fruit and hasten decay. Skin-punctures are gateways for mould-spores and are quickly followed by decay.

Decay in soft fruits has been reduced from 41 to 2 per cent. (twelve days in transit temperature) by careful handling.

British Columbia peaches are invariably overripe and decay rapidly on the market. This condition is greatly the result of the thirty-six to eighty-four hours' delay between picking and the refrigerator-car. Successful peach-shipping districts allow but twelve hours between picking and the refrigerator-car.

The time of picking greatly influences transportation. Too ripe fruit will not stand long shipment.

Fruit should never be dropped, rolled, or dumped. Bruises and decay follow. Neither should fruit that has fallen from the tree be placed with the fruit that has been picked.

Fruit that is too small or has bluish should never be picked and placed with the fruit that is to be packed. Needless handling of culls causes added injury to good fruit and increases expense.

Methods of picking and handling should be based upon a carefully planned system with approved equipment, for no remedy can be employed to counteract unnecessary injury or excessive delay in handling.

There is no added cost for careful handling if work is methodically done.

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