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Preparation of fruit for marketing — part 2 — handling, grading and sizing

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THE orchardist’s careful attention to such operations as pruning, spraying and thinning in his effort to grow good quality fruit may be nullified to a large extent by carelessness at harvesting or during the subsequent period of handling before the fruit reaches the consumer. The grower cannot afford to become careless at any stage for every injury to the skin surface or underlying tissues of the fruit will ultimately show up as a bruise, puncture or other blemish. Many of these injuries may not be noticeable at the time of picking but will be only too obvious when the fruit is offered for sale.

There are several stages in the picking operation where damage can occur and the following are probably the most important faults.

1. Careless dropping of the fruit into the picking bag.
2. Bumping the picking bag against the ladder or against the knees when moving about.
3. Tipping the fruit, instead of carefully lowering it into the picking box.
4. Filling the fruit above the level of the box, causing damage when the boxes are stacked.

Picking is essentially seasonal work and usually needs to be completed in a limited time. Some of the above points may therefore be overlooked, particularly where inexperienced labour must be used.

**PICKING BOXES**

Although the initial cost of providing special picking boxes may seem high, the benefits will more than compensate for the outlay.

The picking box should be sufficiently wide to allow any type of picking bag to be lowered to the bottom of the box before releasing the fruit. It should be constructed of pine to minimise the weight; the boards should be thicker than the ordinary dump case to give greater stability, and all boards should be butted to leave no gaps.

The old time “kero” box which has been used extensively in the past, provides a very suitable pattern. Kero cases with normal care and attention have been used as long as 30 years, so that the apparent high initial cost can be spread over a considerable period. Should the standard apple box come into general use then separate picking boxes would be essential.

With proper picking boxes stacking is much more satisfactory because the sides are stronger and flush with the top of the box. They will also stand cross stacking better and in every way are a much more useful container. A well-filled “kero” case of apples will pack out a bushel case.

Dump cases have been used extensively since the war for picking apples but they are not ideal for this purpose. Considerable damage occurs to new cases both in handling and by exposure to the weather, while fruit handled in this way is more liable to injury because of the wide gaps between the boards, especially with sliced boards which are inclined to buckle. Should it be necessary to use dump cases for apples and pears then strawboards can be used to advantage for lining the bottom and sides.

Special picking boxes are also very useful for citrus fruits, although for this purpose a box of more open construction may be preferable to enable quicker drying of the fruit during the winter.
A cleated lug box similar in size to the "kero" case but opened on the side is a very satisfactory container for handling pears.

Stone fruits should be handled as little as possible. Picking bags cannot be used and it is usual to pick directly into cut down four-gallon tins fitted with handles.

**DELIVERY TO THE PACKING SHED**

Much of the fruit in this State is harvested during the hottest part of the year and therefore requires careful protection to prevent deterioration from undue exposure to the hot, dry atmosphere. Picked fruit, awaiting transport from the orchard, should be stacked in the shade of the tree and moved to the packing shed as soon as possible. Where practicable, fruit is best picked first thing in the morning while the atmosphere is still cool; but when it is removed from the trees in late afternoon it is preferable to leave it in the orchard overnight to benefit from the cool night air in preference to stacking it in a hot shed. Stone fruit requires much more careful handling than other fruits owing to the rapid rate of ripening. Pears and stone fruit which are not required for immediate sale should be placed in cool store as soon as possible after picking. This will assist in maintaining the condition of the fruit and in obtaining the maximum storage life.

Most fruit, in these days, is transported from the orchard to the central packing shed by road and, provided the trucks are well laden, apples and pears can be transported quite well over comparatively rough roads.

With few exceptions, fruit should be packed as soon as possible after receipt at the packing shed. Exceptions where a short shed storage period is an advantage, are late harvested Granny Smiths and winter-harvested citrus fruits. Granny Smiths picked late in May are very susceptible to bruising even under normal handling conditions, and should be held for a few days in the shed prior to packing to minimise this damage. Citrus fruits, particularly those harvested in the winter months, benefit from a few days' storage before packing.

**SORTING**

Every line of fruit passing through the packing shed will contain a proportion which does not conform to the grade being packed and must be removed before going to the packers. Even in small grower sheds where the sorting and packing
is done by the same persons, the fruit should be graded before going to the bins as this will simplify packing operations. The packers have to contend with the size of the fruit, the various packs, and variable-sized cases and should not be called upon to grade the fruit as well.

The person sorting the fruit must be responsible for the grade and should be in a position to check the results of the work by examining the fruit in the bins at intervals. This does not mean that the packer should not look for and remove obvious rejects, but the less attention that is required in this respect the more effectively will the packing be carried out.

Grades are standards of quality laid down by regulation to maintain uniformity in the marketing of the fruit both locally and overseas. Grading is therefore the sorting of the fruit into various quality groups or grades. Thus for apples and pears there are “fancy” and “good” grades and for citrus “standard” and “plain” grades. In this State it is usual to market fruit predominantly under one grade. For instance, apples and pears are packed chiefly as a “fancy” grade. Citrus fruits on the other hand are marketed mainly as “standard” grade.

Grading is a most important operation, as the efficiency with which the work is carried out will determine the uniformity of quality of the final pack. Too often, lines are rejected for export or de-graded, because insufficient attention has been paid to the sorting and the large proportion of good fruit is spoilt by the small proportion which should not have reached the packing bin.

The component parts of the fruit-grader comprise the hopper, elevator, sorting table, sizing rollers and bins. The fruit comes to the sorters from the hopper which is usually fitted with a device for feeding the fruit on to the elevator. Considerable damage can occur to fruit if the hopper is not kept free from twigs and other debris; if the hopper is overfilled, or if the picking-box, during the process of emptying, is allowed to rest on the fruit. The operation of tipping apples into the hopper is shown in Fig. 10.

Sorting facilities will vary with the amount of fruit to be handled. The average grower packing his own fruit will sort it as it passes up the elevator from the hopper, and place rejects in boxes nearby. In larger sheds sorting tables are used. This makes the job much less tiring, allows more than one sorter to operate and thus enables a larger volume of fruit to be handled. In front of the sorting table, conveniently-placed conveyor belts enable the sorters to dispose of rejects without loss of time. In the case of apples, two belts are ideal, one for good grade or local market fruit, the other for rejects. Similar conveyors should also run above the packing bins within easy reach of the packers. Apart from ease of handling on conveyor belts, less damage is done this way than by dropping the fruit into boxes. Spring-loaded case holders attached to the end of the conveyor also help to keep bruising to a minimum. A satisfactory set-up is shown in Fig. 11.

On some machines a common sorting table feeds two separate sizers placed back to back. In this State where the percentage of rejects is usually small this
Fig. 11.—Fruit from the hopper passes up the elevators to the sorting table. Good grade or local market fruit is placed on the lower belt in front of the sorters and “rejects” on the upper belt. Spring loaded boxes at the end of the conveyor reduce bruising.

arrangement is rarely warranted and individual sorting facilities are normally provided for each machine. Where small lines of fruit have to be dealt with or it is desired to pack two different varieties, this arrangement is a decided advantage. As in the previous set-up the machines stand back to back but each is a separate entity with an independent drive.

**SIZING**

From the sorting table the fruit moves by endless conveyor to the sizing component of the machine. The actual sizing is affected by the fruit being carried along an endless belt past a series of rollers set at varying heights to allow fruits of different sizes to pass into allotted bins. The rather loose use of the term grader has led to the incorrect use of the word grade when actually size is meant. The component which segregates the fruit into the various sizes is really a sizer and not a grader. Furthermore, sizes are actually size ranges, varying by 1/8 inch. For instance, a 2½ inch fruit is one which is 2½ inches or greater at its maximum diameter but is less than 2¾ inch. In other words the fruit will pass through a 2¾ inch sizing gauge but not through a 2½ inch ring.

**ADJUSTING THE SIZER**

It is most important to be able to set up a sizing machine and know how to adjust it so as to make one pack from each bin. Packing charts are based on correct sizing, and success in following these charts will depend on proper machine adjustment. The first column in any chart always gives the size of the fruit.

For setting up the orthodox machine fitted with a set of individual rollers, a set of vertical gauges increasing by 1/8 inch increments is used. Commencing at the hopper end of the machine each roller is adjusted in turn. This is done by slackening off the roller, placing the correct gauge between the belt and the roller at the hopper end and tightening it down until it just touches. The far end of the roller is then set in an identical manner and then raised approximately 1/16 of an inch. This operation is illustrated in Fig. 12.

This 1/16 inch variation along the length of each roller allows a slight variation in the size of fruits entering each bin which is necessary to produce the desired packs. This adjustment will, however, vary slightly according to varieties and more particularly with size. Small fruit is generally more regular in size than larger fruit and therefore it may be necessary to raise the roller more than 1/16 inch for small sizes and slightly less than 1/16 inch for larger sizes. Should the finished packed case come a little low, a few still larger fruits will be required. This is achieved by slightly raising the end of the roller away from the hopper. On no account should the setting of the hopper end of the roller be altered, all adjustments should be made at the opposite end.

An alternative adjustment, where the pack is coming too low would be to slightly raise the roller in the previous bin thus removing some of the smaller fruit which would otherwise go into the bin the case is being packed from.
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Should the pack be too high the reverse procedure would apply. In other words, the roller on the bin in question should be slightly lowered. The same variety of fruit from different parts of the orchard will often vary in shape but a slight alteration to the sizing rollers will rectify any adverse effect this may have and maintain a standard pack.

When making gross adjustments to the sizing machine, for instance when changing from small fruit such as mandarins to large fruit like grapefruit, it is necessary to move the whole beam which supports the sizing rollers. This is easily and quickly done. Most commercial machines have ¼ inch adjusting screws which are threaded with 16 threads to the inch. This simplifies the adjustment as eight complete turns of the adjusting nut will equal approximately a ¼ inch movement of the beam.

The beam should be distinctly off-set so that it runs across the belt along the length of the machine. This means that the fruit will be running towards the top edge of the belt at the feed end of the sizer but nearer the bottom edge of the belt at the far end. This has the effect of lessening the pressure of the fruit against the rollers, thus minimising mechanical damage.

Belt speed is important to uniform sizing. Often the speed of the belt is too high and this causes mixed sizing. Uneven belt speed which may occur with engine-driven machines will also produce a similar effect. Uneven running may be detected by placing the hand firmly upon the belt while the machine is in operation and walking along behind it.

With a positive driven machine, that is where the rollers cannot be left un-driven, the following speeds are an advantage. For round fruit such as oranges a normal speed for the belt and rollers is best. Long-type fruit such as lemons require a slow belt speed but a fast roller speed. Flat fruit, such as grapefruit, will size better with a fast belt and slow rollers. On machines fitted with friction roller drive, however, driving the rollers is optional. The free roller is better in most instances except for some long-type fruit where a driven roller can be used to an advantage.

BINS

There are two types of bins in general use. In the past, canvas spring type bins were used exclusively, but in more
recent years the rotary bin has become very popular. While the rotary bins are considerably more expensive and therefore are limited to larger sheds they have many advantages in handling the fruit and should be installed wherever the quantity of fruit warrants.

As the name suggests, the rotary bin when in operation gradually rotates and receives fruit as it comes off the sizer. The fruit in the bin is maintained at a uniform level, no pulling down is necessary while the packer has a better view of the fruit being handled. Furthermore, these bins have a considerably greater capacity than the ordinary canvas bins and bruising resulting from fruit running into them is practically eliminated. With extra care pears, other than Comice, have been successfully handled with this type of equipment.

(To be continued.)

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