



Crop Harvesting

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ECHO 2016

Best harvesting practices start from timing!



The nutritional value,
freshness and flavour of
*fresh produce (fruit and
vegetables marketed
fresh)*



depend on the stage of maturity and the
time of day at which they are harvested.

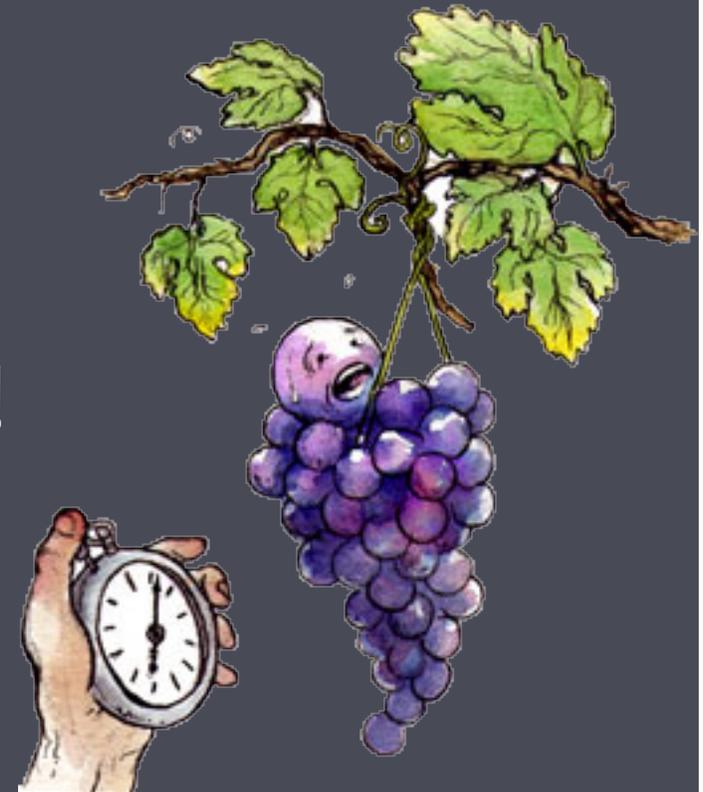


If a product is harvested at a too early stage of maturity, it may not mature at all,



On the other hand, if the same product is harvested when it exceeded the stage of maturity, it may lose some features.

The timing has to be right!



The quality of a product and the shelf-life thereof dependents on the way it is harvested and handled there after.





A key factor in this process is to make use of the correct tools, equipment and harvesting technique.





Using the correct tools and techniques will ensure fruit is not harmed and therefore the shelf-life is optimised.



Special harvest techniques and tools may be used for specific markets, because such markets may have specific quality requirements.



In the citrus industry for example, local markets will require the fruits to be snap picked (This is when the fruit is picked by hand.)



The fruit destined for export however, is picked from the tree by using small cutters because snap picking often causes the peel to tear, thus leaving areas where fruit may become infected.



Export fruit normally undergoes a post harvest treatment where the fruit is dipped in a chemical solution.



Damaged (torn) fruit will allow the solution to seep into the fruit resulting in the fruit being rejected due to the contents of high concentrations of the chemical in the fruit, exceeding export tolerances.



This is not a problem for the local fruit market as the duration from harvest until it reaches the market, is very short.



There are different harvesting tools,
depending on the crop and market.



Different harvesting tools, depending on the crop and market.

Pruning shears



The most common tools used for harvesting fruit are steel pruning shears.



Different harvesting tools, depending on the crop and market.

Pruning shears



These shears enables a worker to cut the fruit's stem as close as possible to the button (or calyx) without injuring the fruit's shoulder.



Different harvesting tools, depending on the crop and market.

Pruning shears

used on fruit, such as peppers while some vegetables (tomatoes) can easily be picked by a simple twist of the hand,



In some crops specialised shears and snips are used for harvesting. Pruning shears fit comfortably into the palm of the hand and have a rounded point and curved blade to avoid damaging the fruit.



A spring keeps the blade in an open position and ensures fast recovery for efficient picking.



Picking containers

Different kinds of containers are used to collect picked fruit, but the most common is a picking bag.





Picking bags are generally made from canvas or polyvinyl. They have a single strap that is tossed over the picker's shoulder. As the picker picks the fruit, it is placed inside the bag until it is full.



It is then taken to a central collection point in the orchard where the bags are emptied into bulk bins or picking trailers.



In preparation for harvesting, all picking bags and containers must be checked for holes and/or tears. The containers must be cleaned before harvesting is initiated.



When bags that are not woven (material or polyvinyl) like empty plastic fertiliser bags are used, especially in cases where the strands of the bags may contaminate the produce like cotton fibre. As these bags are not porous and the picked cotton still contains moisture, picked produce should not be left in these bags overnight as they may rot.



Fruits and vegetables, which damage easily, are picked into picking crates and taken to the cool-chambers or packing sheds as soon as possible. These crates are usually made from durable plastic and are well ventilated. They are also designed to be stacked.



Clean, dry and sterilised crates should be used to prevent disease contamination. Crates, which are damaged in such a way that bruising or puncturing of the crops could occur should be discarded.



Harvesting Knives



Knives are used when harvesting leafy crops such as cabbage, Swiss chard leaves and lettuce. A good quality knife with a strong blade should be supplied to the harvesters.



Harvesting Knives



The blade should be sharp enough to facilitate easy cutting. A blunt knife will not only reduce the harvest speed, but can cause unnecessary damage to the produce. Knives should be regularly cleaned and disinfected whilst harvesting to prevent the spreading of post harvest decay organisms.



Ladders

Ladders are used during harvesting of tree crops, depending on the height of trees. Ladders are placed alongside trees, or rested against the canopy in the case of larger trees.



Ladders

Ladders vary from home-made, single-sided, two-legged (ladders made from locally grown wood) to factory-manufactured, two- or three-legged ladders generally made from aluminium or wood.



In preparation for harvesting, ladders must be checked for sharp edges, splinters, loose components and dirt to ensure fruit is not damaged when the ladders are placed alongside the trees or against the canopy. The ladders should also be checked for defects that may impinge on the safety of the harvesters



Mechanical harvesters



Mechanical harvesters

Field crops such as grains, vegetables produced for industrial purposes, potatoes, onions, oil crops, protein crops and cotton are harvested mechanically.



Mechanical harvesters

The different types of harvesters are specially designed for a specific crop or group of crops.

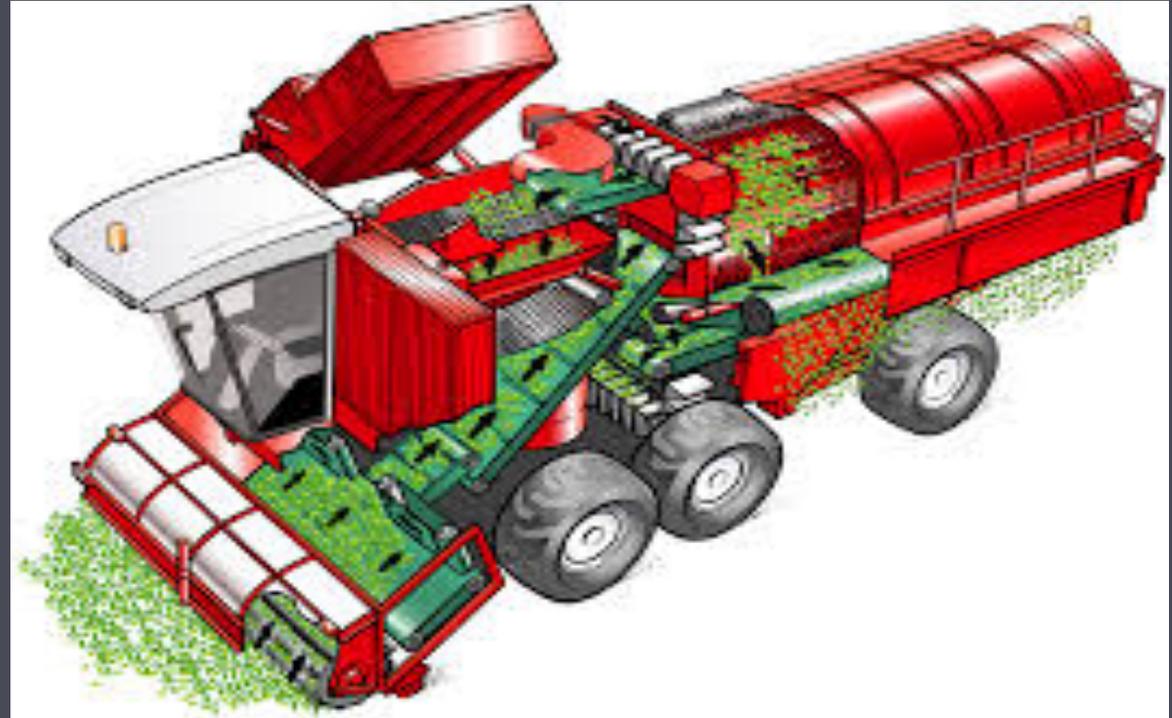




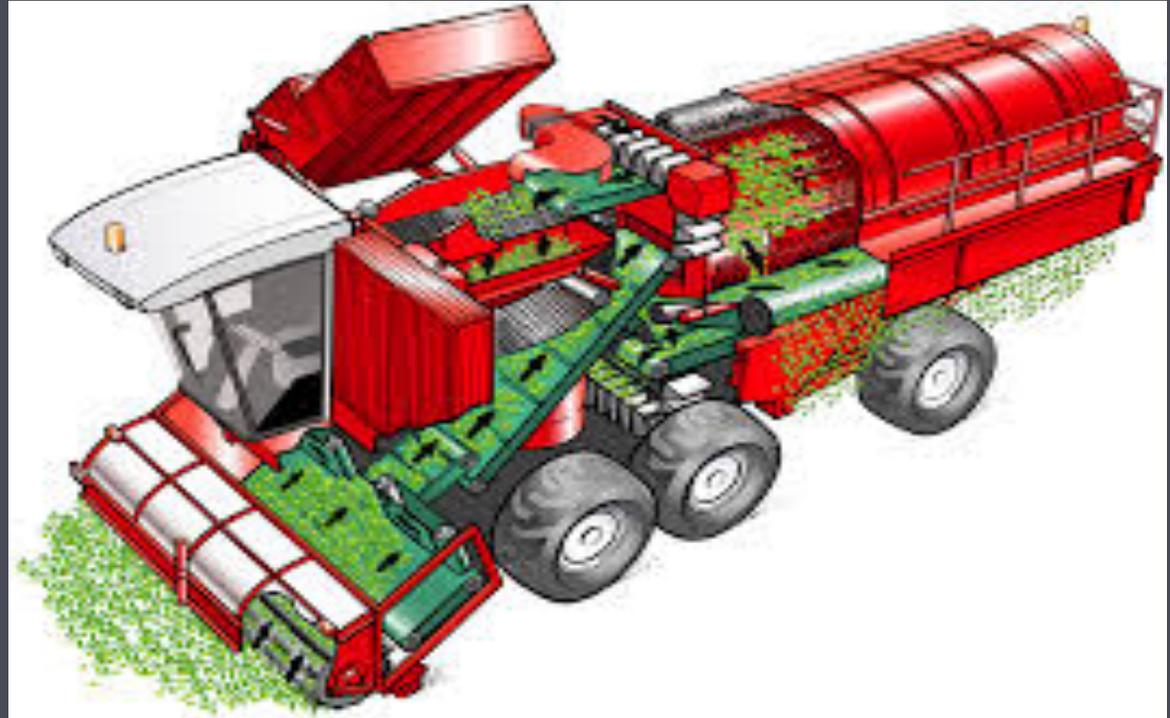
Wheat, maize, sunflower and soybean can be harvested with combine harvesters. These types of harvesters harvest the whole plant. This usually involves fast moving rollers and or blades.



The harvester then separates the kernels from the ears or cobs in a process known as threshing. It is a complex mechanical action that results in clean seed being dropped into a storage compartment.



The remaining plant residue is released (stalks, straw, pods, leaves, etc.) back onto the field.



Onions, potatoes and groundnuts grow below the soil surface. Commercially these crops are harvested by lifting\pulling the bulbs, tubers or pods from the soil at first.





Once this process has been completed the crop is picked up by hand, sorted and packed.



Lifting is done using specialised implements containing a blade which is attached to the back of a tractor. The “blade” is then inserted into the soil at one end of a row and dragged, just below the soil surface, to the other end (at a depth of $\pm 15 - 20$ cm).



The next step can be manual or mechanical. In both cases it involves the loosening of the plants from the soil and removing the tubers etc. from the plant. Potato tubers can be placed in bulk trailers or bulk bins on trailers and transported to the pack houses.



In the case of onions, the bulbs are left on the field for at least a week to cure (to dry out) before the dry leaves are cut (with sharp knives) from the bulbs and the bulbs placed into onion bags ready for the market.



Peanut plants are also left on the field for a week or two in heaps or in windrows to cure. Then only will the plants be threshed and the pods placed in woven material bags or bulk trailers and transported to where the peanuts will be processed.

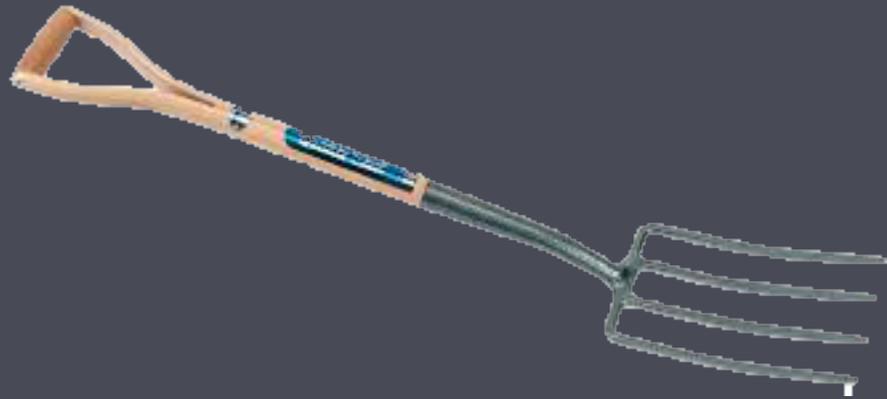


There are also implements designed for extracting cassava from the ground which are adapted from Garden forks



There are also implements designed for extracting cassava from the ground which are adapted from Garden forks

Garden fork



In the case where mechanical harvesters cannot be used, a fork can be used for lifting produce. The fork is inserted into the soil at an angle, close to the crop plant and then the plant and soil are lifted. Take care not to puncture a tuber, bulb etc.



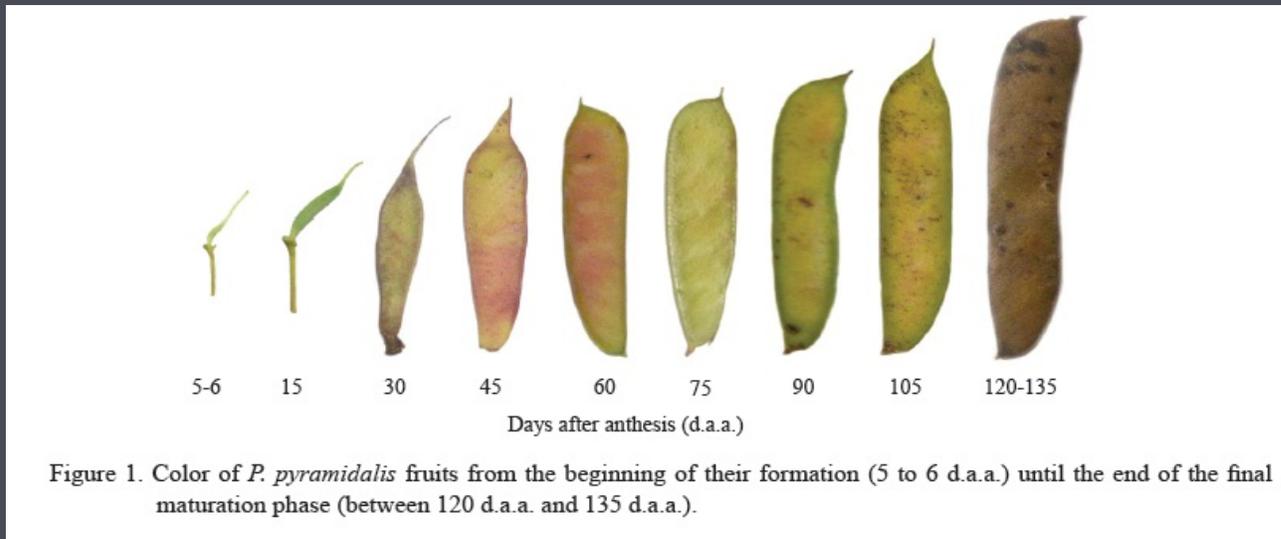
Bulk Bins and Picking Trailers



Fruit are transported from orchards in bulk picking trailers with a capacity of 2tonnes to 3tonnes or in wooden or plastic bulk bins with a capacity of 350kg. In small operations, crates with a capacity of 15 kg to 20 kg capacity are used.



Maturity indexes



Before a crop can be harvested, it must be determined whether the crop has reached maturity. Therefore maturity indexing is done on a crop.



Maturity indexes

Maturity indexing is the process of monitoring the **physiological development** of produce as it ripens. The basic parameters that are assessed and monitored during maturity indexing are parameters such as **internal quality parameters, fruit colour, water content etc.**



Figure 1. Color of *P. pyramidalis* fruits from the beginning of their formation (5 to 6 d.a.a.) until the end of the final maturation phase (between 120 d.a.a. and 135 d.a.a.).

Various industries have their own specific guidelines and procedures for determining maturity. These are available from growers' associations, retailers and exporters and should be available on farm for use by harvest personnel.



Sampling for maturity

Sampling is done from a few individual fruits selected from trees in an orchard or from a number of plants within a field.

Cell
division



Cell
expansion



Maturation



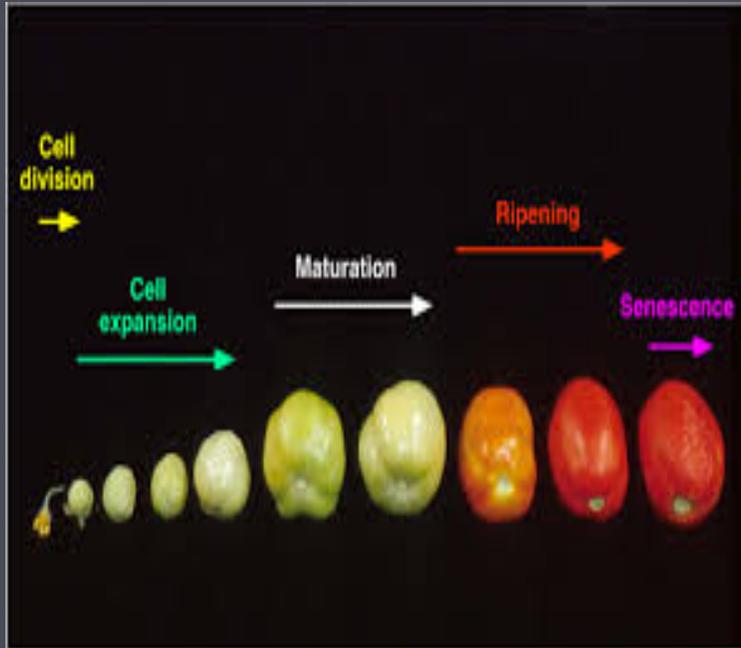
Ripening



Senescence



Sampling for maturity



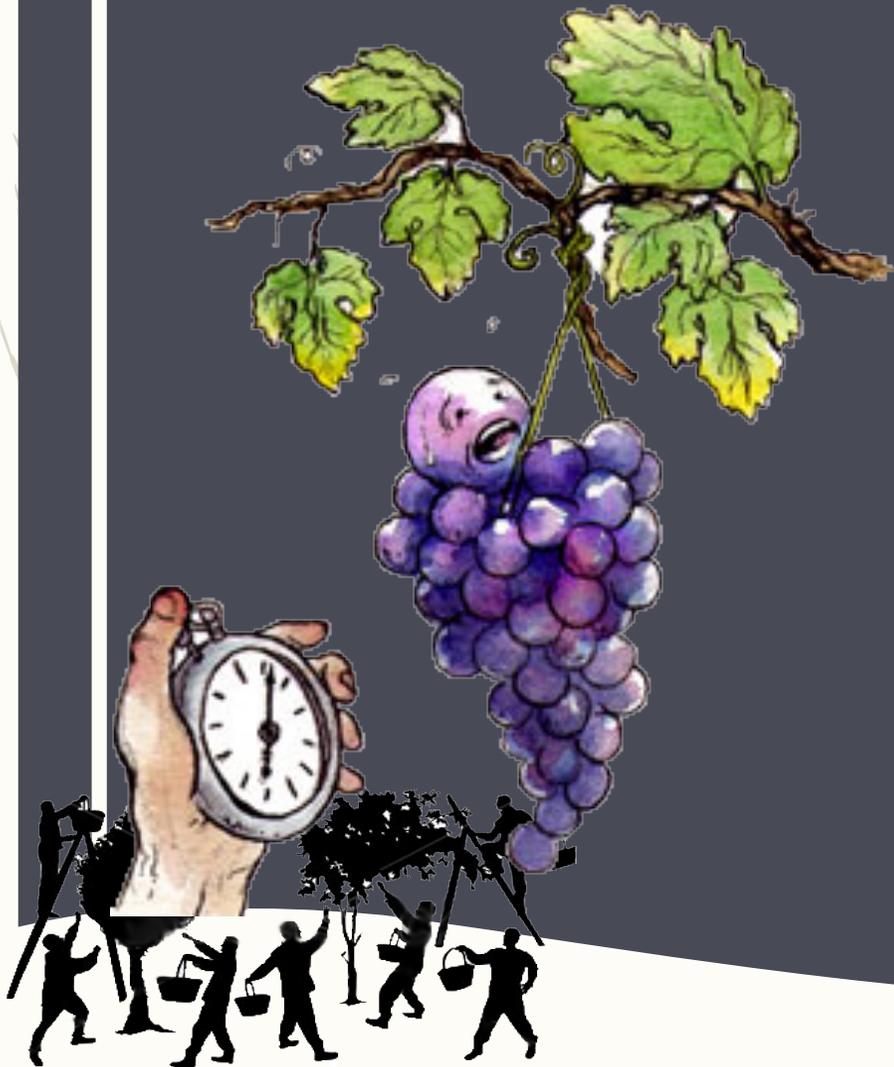
In some cases a visual assessment of maturity is done without having to sample the produce. The idea is that the condition of the sampled fruit is then representative of the field or orchards as a whole.



The sampling protocols are designed to ensure that the samples are in fact statistically representative of the field. Even where fruit is not taken, the representativeness should still be adhered to.



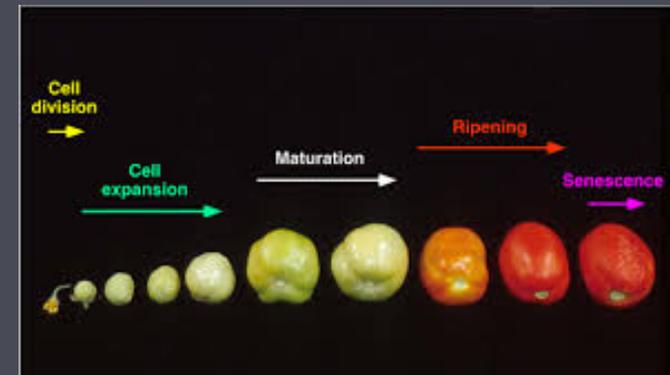
Harvest readiness does not necessarily mean that the fruit is mature or ripe. Different crops are harvested at different stages of development. Baby vegetables, for example, are harvested at a very young stage, mostly before the crop has reached maturity.



The size requirement for vegetables such as carrots, and lettuce for the crop may determine when it must be harvested.



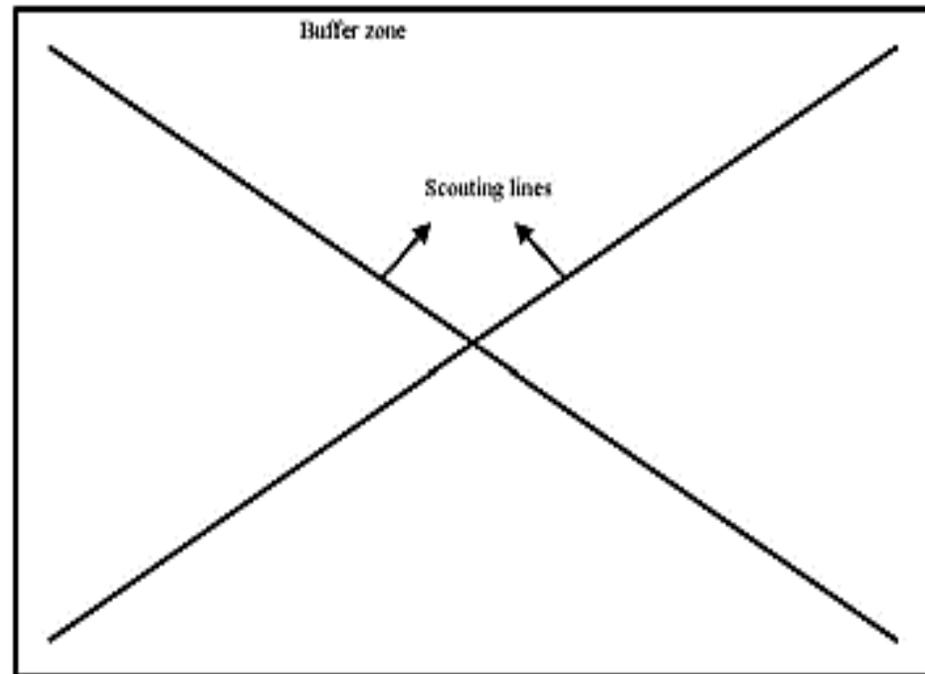
The sampling process for maturity indexing is similar to sampling for nutrient analyses, pest and disease management. The general procedures followed are crop or even site specific, but the initial selection of produce and sampled plants is done to represent the field as a whole.



Sampling the basics

The two most used sampling approaches are the step-wise and transect sampling method. Both techniques require the sampler to walk through a field or orchard and taking samples at pre determined, set intervals.

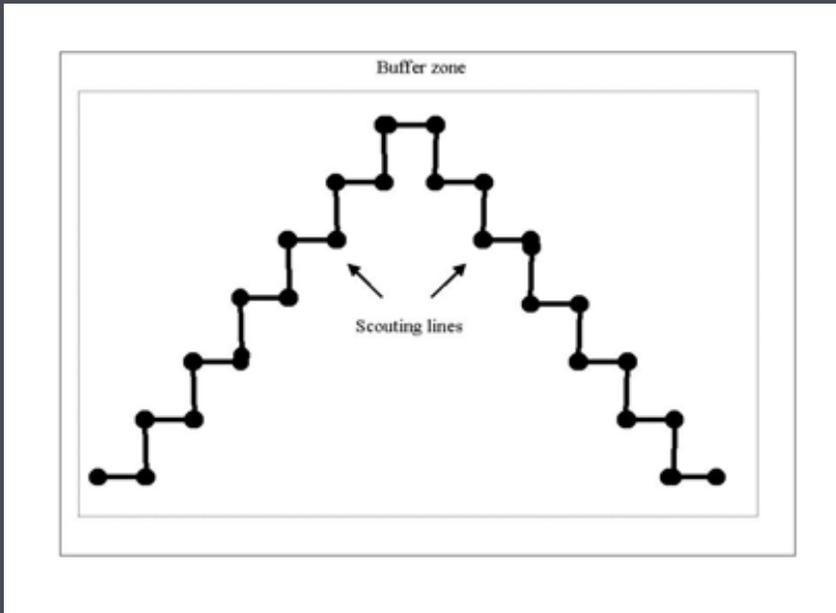




Transect sampling method involves sampling along a line across a field/orchard. The line can be diagonally across the field or parallel to the side of the field. A minimum of five sampling points per hectare should be selected. The number of samples will be determined by the crop \ plant density.



The stepwise sampling method implies that the sampler starts in the middle of one side of the field from where he moves forward and to his right, taking samples at pre determined distances. Once he has crossed the whole field, the sampler moves to the point of origin and repeats the exercise, but now moving forward and to his left. A maximum distance of 5 m should be used as minimum distance.



Vegetables should be harvested during the cool part of the morning and should be stored as soon as possible. If the produce is destined for the market, ensure that the storage conditions are correct for the produce.

If they are destined for processing, they should be cooled and stored under refrigeration to preserve flavour and quality.



Beans – green

- Start harvesting before seeds develop in the pod – when the green pods are about the diameter of a pencil.



Beans – green

To determine harvest readiness:

bend them in the middle;
if they snap easily, it can
be harvested.



Broccoli



- Harvest the dark green compact clusters or heads when they are about 15 cm in diameter. The buds must be tight and should be harvested before any yellow flowers develop.



Broccoli

As the heads are harvested, smaller side shoots will develop, providing an almost continuous harvest.



Cabbage



- . Harvest cabbage when the heads feel hard and solid.
- . If harvested too late, the heads will crack and split.



Cabbage



- Cut the heads from the stem, just below the point of attachment to the stem
- Ensure that you use a clean, sharp suitable knife.



Cabbage



- Always clean the knife by using a dip mixture of suitable sanitised water.

One can harvest the sprouts that develop as an after-crop.



Cucumbers

- Harvest when the fruits are deep green and before a yellow colour develops.
- The cucumber fruit should be 5 – 8 cm long for sweet pickles; 13 – 16 cm for dill pickles and 16 – 20 cm for slicing pickles.



Cucumbers

- Harvest 4 to 5 times per week to encourage continuous production.



Matured cucumbers left on the vine will stop the production of the entire plant.



Lettuce



- For non-heading types, harvest the older, outer leaves from leaf lettuce when they are 1- - 12 cm long.

For heading types; harvest when the heads are moderately firm but well before seed stalks form.



Onions



- Harvest when the lobes start to hang down and begins to turn yellow.
- Loosen and pull the bulbs from the soil and place them to dry out in the open sun for a few days



Onions



- The bulbs are sufficiently dry when the skin is toughened.
- Remove the dried soil by brushing the bulbs lightly.

Cut off the stem, leaving 4 to 5 cm and store in a net bag in a cool, dry place.



Tree crops

- . Do not shake the tree branches as this can cause bruising to fallen fruits.
- . Use ladders where possible.



Tree crops



When harvesting fruit for processing factories, a harvesting stick can be used where fruit are out of reach. Fruit must be allowed to drop onto a soft surface, such as a net.



Tree crops



- Mangoes and avocados destined for export; a piece of the stalk should be left on the fruit.
- Do not thrash fruit during harvest.

Tree crops



- When harvesting heavy banana bunches; use two people to handle a bunch.
- Harvest in the early morning or late afternoon.
- Do the first grading according to market requirements during harvest.

- Ensure that the plant-sap (latex) from mango, banana and pawpaw does not come in contact with human eyes and the fruit's skin. If this happens wash the fruit in clean water.



- . Place the fruit on a well-aerated surface or in containers that are not made of rough surfaces.
- . Handle the fruit as little as possible.
- . Pack the fruits into the final transport box or container as soon as possible.

Export fruit may have to be cooled





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