Harvesting Systems

Introduction

- Harvesting is the act of removing a crop from where it was growing and moving it to a more secure location for processing, consumption or storage.
- Maturity of the crop determines the time of harvest.
- Weather, availability of harvest equipment, pickers, packing and storage facilities, and transport are important considerations.

Introduction

- Economic and marketing issues are also important in deciding the time harvest.
- The goals of harvesting are to gather a commodity from the field at the proper level of maturity, with a minimum of damage and loss, as rapidly as possible, and at a minimum cost.

Harvesting process

- Harvesting can be separated into three steps.

1. Plant part of interest must be identified.
2. It should be detached from the rest of the plant.
3. Detached plant parts must be collected in suitable containers for transport from the field.

Harvesting process

- The harvesting of all major agronomic crops has been mechanized.
- Most horticultural crops are hand harvested for the fresh market. Little mechanical harvesting.

Harvesting process

- Some fruits attached to the plant by an abscission zone which permits the ripe fruit to be easily separated from the tree.
- Other fruits such as banana, citrus, peppers and vegetables such as cabbage, lettuce, carrot do not develop and abscission zone and must be cut from the plant.

Harvesting process

- Pickers, ladders, picking bags and baskets, stem clippers and wheelbarrows are used by harvesters to make harvesting easier, faster and safer.

Harvesting process

- Harvesters are trained to select only the commodities having correct maturity, size, and shape.
- Many vegetables are harvested directly into the retail containers without further sizing or grading.
- Other horticultural crops are harvested into field bins that are taken to packing sheds where the commodities are cleaned, sorted, graded, inspected, packed, cooled and stored before being transported to regional market.

Preparation of Fruits and Vegetables for Fresh Market

Components of harvesting

- Bags, metal or plastic buckets, bins and field lugs are used as harvesting field containers.

Components of harvesting

- Careful field supervision is critical in protecting fruits from injury by dropping fruits into buckets or bags, overfilling containers, striking containers against ladder, and lack of care in transferring fruits into field bins or lugs.

Transport from the field

- Bruises occur in fresh commodities during field transport.
- Impact bruises occur when bins or lugs are dropped or bounced.
- Compression bruises occur due to the stacking of overfilled field containers.
- Abrasion or vibration bruises occur when commodities move against rough surfaces or each other.

Transport from the field

- Following measures can be used to reduce damage during transport;

✓Avoid extended forklift movement of bins in the field as well as in the loading site.

✓Supervise truck loading to avoid rough handling and dropping of bins and lugs.

✓Pave farm roads to eliminate ruts, potholes and bumps.

Transport from the field

- ✓Restrict transport speed to avoid free movement of fruits and vegetables.
- ✓Use suspension systems on all transport equipment.
- ✓Install plastic liners inside bin sides (plastic bubble linear material).

Temperature protection

- Fresh commodities can be protected from high temperatures in the field by providing shading.
- Avoid harvesting at midday or harvest at night during periods of high field temperatures.

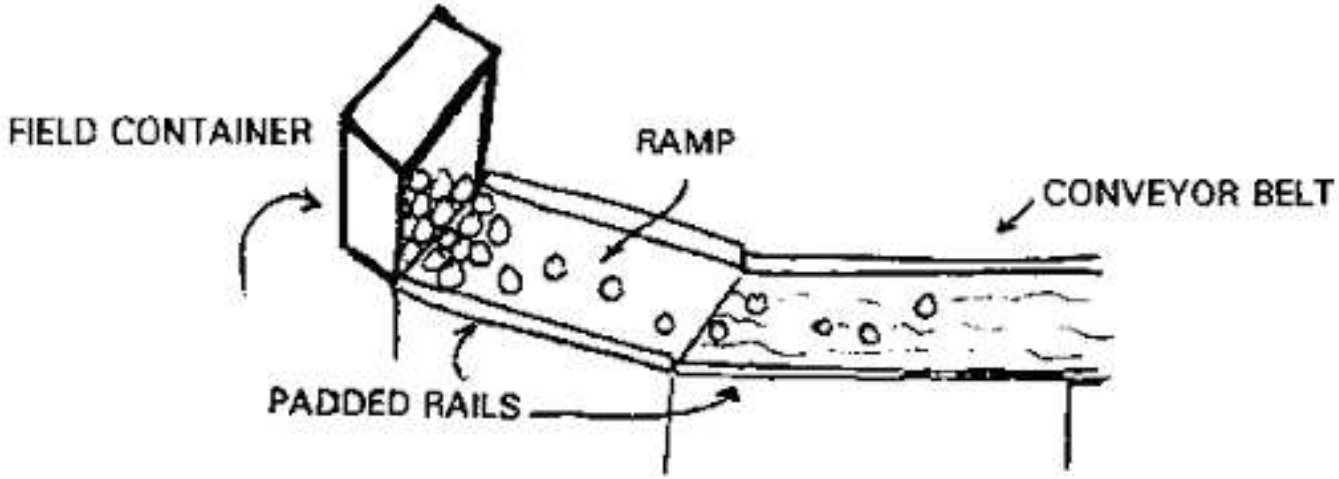
Temperature protection

- Speedy handling during transport is the only possible way to protect fresh fruits and vegetables from getting heated.
- light color tarpaulins are used to cover loads during transport.
- Wetting fabric tarpaulins can further reduce warming.
- Top icing can be used with frost and water tolerant commodities during transport.

Temperature protection

Preparation for packing – delivery to the packer

- Most fruits are dumped directly on to the grading and packing belt.



Preparation for packing – delivery to the packer

- Fruits in the field bins are dumped either by dry dumps or wet dumps.
- In dry dumps, the bin is slowly inverted allowing the fruits to be dumped on delivery belts.

Preparation for packing – delivery to the packer

- Water dumps are of several types.

✓Dumping fruits directly into water from the field bin.

✓Submerging bins in water and allowing fruits to float freely on water.

Preparation for packing – delivery to the packer

- Sanitation is important in water dumps.
- Dump water quickly accumulates high concentrations of fungal spores.
- Dump tanks should be designed in a way to allow rapid draining, filling and cleaning.
- Chlorine at a concentration of 50-200 ppm is added to water as a sanitary agent.

Preparation for packing – cleaning

- To remove soil, natural waxes and other foreign material.
- Detergent washes are sometimes used with soft brushes and sponges followed by clear washing.

Preparation for packing – cleaning

Preparation for packing – sorting

- Sorting is the separation of fruits and vegetables from the lot according to maturity, shape, colour, and other physical parameters (presence of diseases, injuries, insect attacks etc.).

Preparation for packing – sorting

- Requires careful supervision.
- Usually done by hand.
- Periodically rotating worker positions on the sorting line reduces monotony and fatigue.
- Workers must have a complete view of the entire surface of the product for efficient sorting.
- Worker comfort influences sorting efficiencies.

Preparation for packing – sorting

- Adequate lighting is also essential.
- The delivery system, the sorting belt, and the distribution belt must be designed in a way to minimize/ avoid product injury.
- Periodic cleaning of the system is required.
- The product flow to stay within the worker performance.

Preparation for packing – grading

- Grading is the sorting of fruits and vegetables into different grades according to the size, shape, colour and volume to fetch a high price in the market.
- Depends on cultivar, size, appearance, colour and quality.

Preparation for packing – grading

- Objectives of grading are to;

✓Get a higher price.

✓Have different marking values.

✓Facilitate marketing.

✓Adjust with world market.

✓Facilitate packing.

✓Facilitate transporting.

✓Increase shelf life.

Preparation for packing – curing

- Some products such as garlic, dry onions, sweet potato and potato are cured after harvesting and before storage or marketing.
- Curing helps heal harvest injuries, reduces water loss, and prevent entry of disease causing organisms during storage.

Preparation for packing – curing

Preparation for packing – special treatments

Pre-sizing

- Pre-sizers are usually located immediately after the dump.
- Design to eliminate/ remove products below a minimum size.

Preparation for packing – special treatments

Waxing

- Some fruits and fruit type vegetables are waxed using food grade waxes.
- These waxes reduce water loss, replace natural waxes removed during washing, cure minor injuries on surface, act as a carrier for fungicides, provide modified atmosphere and increase shelf life and increase cosmetic appearance.

Preparation for packing – special treatments

Waxing

Preparation for packing – special treatments

Disease control

- Heat treatment (hot water treatment) before or at the start of packing especially in papaya.

Preparation for packing – special treatments

Disease control

- Fungicide application (NaOCl, imazalil, or thiabendazole - TBZ) immediately after washing.