Causes of postharvest losses

The causes of postharvest losses can be divided into different categories:

1. Metabolic

All fresh horticultural crops are live organs. The natural process of respiration involves the breakdown of food reserves and the aging of these organs.

2. Mechanical

Owing to their tender texture and high moisture content, fresh fruits and vegetables are very susceptible to mechanical injury. Poor handling, unsuitable containers, improper packaging and transportation can easily cause bruising, cutting, breaking, impact wounding and other forms of injury.

3. Developmental

These include sprouting, rooting, seed germination, which lead to deterioration in quality and nutritional value.

4. Parasitic diseases

High post-harvest losses are caused by the invasion of fungi, bacteria, insects and other organisms. Micro-organisms attack fresh produce easily and spread quickly, because the produce does not have much of a natural defense mechanism and has plenty of nutrients and moisture to support microbial growth.

5. Physiological deterioration

Fruits and vegetable cells are still alive after harvest and continue their physiological activity. Physiological disorders may occur due to mineral deficiency, low or high temperature injury or undesirable atmospheric conditions, such as high humidity, physiological deterioration can also occur spontaneously by enzymatic action leading to over-ripeness and senescence, a simple aging phenomenon.

6. Lack of market demand

Poor planning pr inaccurate production and market information may lead to over

production of certain fruits or vegetables which can't be sold in time. This situation occurs most frequently in areas where transportation and storage facilities are inadequate. Produce may lie rotting in production areas, if farmers are unable to transport it to people who need it in distant locations.

7. Consumption

These losses can be due to inadequate preservation methods at home, methods of cooking and preparation such as peeling, consumption styles etc.

Increase production can be achieved by:

1-**Increase the horizontal**

The expansion of agricultural area by adding new space through the reclamation or improvement of land.

2-**Increase Vertical**

By raising yields per Acre result of the use of high production, the application of appropriate technological methods.

Technologies for minimizing the losses

Some technologies for extension of shelf life of fruits and vegetables are:

1. Waxing

It is used as protective coating for fruits and vegetables and help in reduction in loss in moisture and rate of respiration and ultimately results in prolonged storage life.

2. Evaporative cool storage

It is the best short-term storage of fruits and vegetables at farm level. It helps the farmers to get better returns for their produce. In this structure, horticultural crops reduce shriveling and extend their storage life.

3. Pre-packaging

This technology controls the rate of transpiration and respiration and hence keeps the

commodity in fresh condition both at ambient and low temperature.

4. Cold storage

These structures are extensively used to store fruits and vegetables for a long period

and employ the principle of maintaining a low temperature, which reduces the rate of respiration and thus delays ripening.

5. Modified atmosphere packaging (MAP)

These packaging modify the atmosphere composition inside the package by respiration.

6. Controlled Atmosphere (CA) storage

It is based, on the principle of maintaining an artificial atmosphere in storage room, which has higher concentration of CO2 and lower concentration of 02 than normal atmosphere.

7. Irradiation

It is the newer technologies that can be gainfully employed during storage to reduce

post-harvest losses and extend storage life of fruits and vegetable. When fruits and vegetables expose to ionizing radiation (such as gamma-rays) at optimum dosage delays ripening minimizes insect infestation, retards microbial spoilages, control sprouting, and rotting of onion, garlic and potato during storage. It is also used as a disinfection treatment and controls fruit fly on citrus and papaya fruit fly.

8. Edible coatings

These are continuous matrices prepared from edible materials such as proteins,

polysaccharides and lipids. They can be used as film wraps and when consumed. They not only minimize the post harvest losses but also need for energy intensive operations and controlled atmosphere storage. They can control migration of gases, moisture, oil, fat, and solutes, as well as retain volatile flavouring compounds. An edible coating improves structural integrity and mechanical handling and carry product so that they help to maintain quality and inhibit microbial growth causing deterioration of the product.

Pre-harvest factors affecting quality

1. **Cultivar and rootstock genotype:** Cultivar and rootstock genotype have an important role in determining the taste quality, nutrient composition, and postharvest life of fresh commodities. The incidence of and severity of decay, insect damage, and physiological disorders can be reduced by choosing the correct genotype for given environmental conditions.
2. **Mineral nutrition:** Nutritional status is an important factor in quality at harvest and postharvest life of various fruits and vegetables. High nitrogen levels can stimulate vigorous vegetative growth but at the same time cause a reduction in ascorbic acid content, lower sugar content, increase tissue softening, lower acidity, and altered levels of essential amino-acids. In green leafy vegetables such as spinach, lettuce, celery and cabbage, high nitrogen application under low light conditions can result in the accumulation of nitrates in plant tissues to unhealthy levels.
3. **Irrigation and drainage:** A deficiency or excess of water may influence postharvest quality. Extreme water stress reduces yield and quality, mild water stress reduces crop yield but may improve some quality attributes, and no water stress increases yield but may reduce postharvest quality.
4. **Cultivation practices:**

   Weed control, pesticides and herbicides, growth regulating chemicals.

5. **Crop rotations:** Is the practice of growing a series of dissimilar/different types of crops in the same area in sequenced seasons. It also helps in reducing soil erosion and increases soil fertility and crop yield. Growing of different crops in succession on piece of land to avoid exhausting the soil and to control weeds, pests, and diseases.

Characteristics of horticultural crop:

1- Living tissue after harvest

2- Respiration

3- Transpiration (water loss)

4- Ethylene Production

5- Pathological damage, their susceptibility to fungal diseases

<u>Changes include:</u>

- Sprouting (onions, tubers, root crops)
- Rooting (onions, root crops)
- Elongation & Curvature (asparagus, gladiolus)
- Seed Germination (lemon, tomato, pepper)

Shelf life

Shelf life is generally defined as **the time** it as takes for a product to become unacceptable for consumption or unsalable. Quantities of shelf life depends on measurement of sensory, instrumental, or microbial deterioration, and the rate is affected by the type of product, processing method, Packing and storage condition. Fruits and horticultural crops are divided according to their **ability to the store** to the following sections:

1 - Perishable crops:

Leafy greens such as lettuce, spinach and cabbage, crops such as artichokes and figs and apricots. These crops are perishable and not more than one- two

weeks a period stored.

2 - Moderate crop damage:

These include vegetable fruit crops such as tomatoes, melons, beans and fruits such as grapes, peaches and pears and citrus. And these crops can be stored for a period of 3 weeks to several months.

3 - Slow crop damage:

They include vegetable crops such as potato tubers and root like sweet potato and turnips and radishes and carrots - bulbs such as onions and garlic - the fruits of dry legumes such as beans and peas, Walnut. These crops and stored for longer than several months to about the year. This division is the most important ways to divide the interest in horticultural crops Postharvest.