Janta Vedic College, Baraut (BAGHPAT)

Dairy Science and Technology Department

M. Sc Ag (III) Semester (D.S.T.)

J-3012 Elementary Food Science (2022-23)

Topic- Post Harvest Management

Post harvest losses in fruits and vegetables are very high (20-40%). About 10-15% fresh Fruits and vegetables shrivel and decay resulting lowering their market value and consumer acceptability. Minimizing these losses can increase their supply without bringing additional land under Cultivation. Improper handling and storage cause physical damage due to tissue breakdown. Mechanical losses include bruising, cracking, cuts, microbial spoilage by fungi and bacteria, Whereas physiological losses include changes in respiration, transpiration, pigments, organic acids and flavour.

NATURE AND CAUSES OF POST-HARVEST LOSSES

Losses occur after harvesting is known as post harvest losses. It starts first from the Field, after harvest, in grading and packing areas, in storage, during

(a) Extend of post-harvest loss: It is evident that the estimation of post-harvest loss is essential to make available more food from the existing level of production. And (The Confederation of Indian Industry (CII), at least 50% of the production of fruits and Vegetab1es in the country is lost due to wastage and value destruction. Post-harvest handling accounts for 20-30% of the losses at different stages of storage, grading, Packing, transport and finally marketing as a fresh produce or in the processed form. According to Chadha (2009) India loses about 35-45% of the harvested fruits and vegetables during Handling, storage, transportation etc.

(b) Important sites of post-harvest losses: Important sites where post-harvest losses are noticed in India are —

- Farmer's field (15-20%)
- Packaging (15%)
- . Transportation (30-40%)
- Marketing (30-40%)

III. POST HARVEST HANDLING Being living organs, fruits and vegetables continue to respire even after harvesting when They have a limited source of food reserves. In addition to degradation of respiratory substrates, A number of changes in taste, colour, flavour, texture

and appearance take place in the Harvested commodities which make them unacceptable for consumption by the consumers if These are not handled properly. Post harvest technology starts immediately after the harvest of Fruits and vegetables. The whole process of processing the commodities is categorized as Handling of fresh produce. Post harvest Technology of fresh fruits and vegetables combines the Biological and environmental factors in the process of value addition of a commodity.

1. Precooling - is important for most of the fruits and Vegetables because they may deteriorate as much in 1 hr at 32°C. In addition to removal of field Heat from commodities, precooling also reduces bruise damage from vibration during transit. Cooling requirement for a crop vary with the air temperature during harvesting, stage of maturity and nature of crop. There are many methods of precooling viz, cold air (room cooling, forced air cooling), Cold water (hydro cooling), direct contact with ice (contact icing), evaporation of water from the Produce (evaporative cooling, vacuum cooling) and combination of vacuum and hydro cooling (hydro vac cooling). Some chemicals (nutrients/growth regulators/ fungicides) can also be mixed with the water used in hydro cooling to prolong the shelf life by improving nutrient status of crop and preventing the spread of post harvest diseases.

2. **Washing, Cleaning and Trimming** before fresh fruits and vegetables are marketed various amounts of cleaning are Necessary which typically involves the removal of soil dust, adhering debris, insects and spray Residues. Chlorine in fresh water is often used as disinfectant to wash the commodity. Some Fungicides like Diphenylamine (0.1 – 0.25%) or ethoxyquin (0.2 – 0.5%) may be used as post Harvest dip to control the disorders.Many Vegetable need trimming, cutting and removal of unsightly leaves or other vegetative parts. Sunlight Exposure to direct sunlight reduces the ripening period of Fruits. Sunlight increases fruit temperature above ambient temperature, Which increases respiration, and possibly the rate of water loss. The Solar radiation that falls upon foods held in direct sunlight increases the Temperature above the ambient temperature. The amount of increase in Temperature depends on the intensity of the radiation, the size and Shape of the food' and the duration of exposure to the direct rays of the Sun. The intensity of solar radiation depends upon latitude, altitude, Season of the year, time of day, and degree of cloud cover. Altitude. Within a given latitude the prevailing temperature is dependent upon the elevation when other factors are equal. There is on the average a drop in temperature of 6.5°C for each Km increase in Elevation above sea level. Storing food at high altitudes will therefore Tend to increase the storage life and decrease the losses in food provided it is kept out of the direct rays of the sun. Atmosphere. The normal atmosphere contains by volume, Approximately 78% nitrogen, 21% oxygen, 1% argon, 0.03% carbon Dioxide' various amounts of water vapor and traces of inert gases. Modifying the atmosphere can improve the shelf life and reduce Wastage of certain foods. One type of controlled atmosphere storage (CA) is refrigerated storage In which the level of oxygen is reduced to about 3% with the carbon Dioxide content being raised to 1 to 5%, depending on the commodity. This CA storage may double the storage life over that of regular cold Mechanical damage. Mechanical damage is a physical factor affecting ripening.

Fruit damage during handling generates ethylene. If ethylene Production is sufficient to start the climacteric respiratory response, fruit Immediately starts to ripen. Damage can also reduce ripening period by causing moisture loss. The Effect of damage can easily be measured by recording fruit weight loss Over time. Cuts and abrasions on the surface membrane cause the Most weight los Method of harvesting: Selection of suitable method for harvesting of the produce is Necessary otherwise bruises or injuries during harvesting may later manifest as black or brown Patches making them unattractive. Latex coming out of stem in mango should not be allowed to Fall on fruits as it creates a black spot. Injury to peel may become an entry point for Microorganisms, causing rotting. Some harvesting gadgets have been developed, e.g. mango Harvester in Lucknow (CISH).

• **Stage of harvesting**: Fruits and vegetables must be harvested at right stage of maturity. A Very common cause of poor product quality at harvest and rapid deterioration thereafter is Harvesting immature vegetables. Vegetables harvested immature or over mature usually do not Keep long. Fruit vegetables harvested too early lose water fast and are more susceptible to Mechanical damage and microbial attack. An over mature vegetable is more susceptible to Decay, has passed its best eating quality, and deteriorates fast.

• **Consumer demand:** Harvesting time and harvest maturity can be altered by the requirement of the consumer's demand which may affect the quality of the produce at some extent.

c) Post-harvest factors:

• Curing: Curing is done immediately after harvesting. It strengthens the skin. The process is induced at relatively higher temperature and humidity, involving suberization of outer tissues Followed by the development of wound periderm which acts as an effective barrier against Infection and water loss. It is favoured by high temperature and high humidity. Potato, sweet Potato, colocasia, onion and garlic are cured prior to storage or marketing. Potato tubers are Held at 18°C for 2 days and then at 7°—10°C for 10—12 days at 90% relative humidity. Curing also reduces the moisture content especially in onion and garlic. Drying of superficial leaves of Onion bulbs protects them from microbial infection in storage. Degreening: It is the process of decomposing green pigment (Chlorophyll) in fruits usually Applying ethylene or similar metabolic inducers to fruit. It is applicable to banana, citrus and Tomato. Degreening is carried out in special treating rooms with controlled temperature and Humidity in which low concentration of ethylene (20 ppm) is applied. Pre-cooling: High temperatures are detrimental to keeping quality of fruits and vegetables, Especially when harvesting is done during hot days. Pre-cooling is a means of removing the Field heat. It slows down the rate of respiration, minimizes susceptibility to attack of micro Washing and drying: Most of the fruits and vegetables are washed after harvesting to Improve their appearance, to prevent wilting and to remove primary inoculum load of Microorganism. Hence, a fungicide/bactericide should be used in washing water. Washing, Improves shelf life of bananas by delaying their ripening. After washing, excess of water should Be removed which would otherwise

encourage microbial spoilage. Sorting and grading: Fruits and vegetables require sorting and grading for uniform packing at Field level. Sorting is done on the basis of size and colour while grading practice is performed as Per the defect or on the basis of marketable and unmarketable produce. Disinfection: Papaya, mango, melon and other fruits are susceptible to fruit fly attack. Disinfection is done either by vapour heat treatment (VHT) at 43°C with saturated air with water Vapour for 6-8 hr by Ethylene dibromide fumigation. Waxing: Fruits and vegetables have a natural layer on their outer surface which is partly Removed by washing. An extra discontinuous layer of wax applied artificially with sufficient Thickness and consistency to prevent anaerobic condition within the fruits provides necessary Protection against decay organism. Waxing also improves the appearance and glossiness, Making them more acceptable. Packing: It means more than carrying multiples of an object. Packing not only protects the Horticultural produce but also makes a favourable impression on the buyers and May able to Fetch higher income. Delivery: Moving the harvest produce from the farm to the customer in good condition is Important. All efforts up to delivery can be invalid if the fresh fruits and vegetables reach the Destination in poor condition. Care should be taken to protect the produce and it becomes Necessary when mixing load of fruits and vegetables to prevent violating the compatibility.