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Introduction to Postharvest Technology





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IMPORTANCE OF FRUITS AND VEGETABLES

- **Fresh fruits and vegetables (F&V) have been part of human diet since the dawn of the history.**
- **The systematic nutritional value of the some F & V was recognized in the early 17th century in England.**
- **One example is the ability of the citrus fruit to cure scurvy, a diseases wide spread among naval personnel.**
- **F & V are rich in antioxidants, phenolic compounds and dietary fiber which are considered to be beneficial in reducing risk of various cancers.**



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IMPORTANCE OF FRUITS AND VEGETABLES

- **Fruits and vegetables are being rich in vitamins and minerals, known as protective foods.**
- **Due to their high nutritive value, ready availability, and being inexpensive they make significantly contributes to human well-being.**
- **Realizing the worth of fruits and vegetables in human health ICMR recommend consumption of 120g of fruits and 280g of vegetables per capita per day.**



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IMPORTANCE OF FRUITS AND VEGETABLES

- **Ascorbic acid: Aonla, Citrus, Barbodos cherry rich in vitamin C and cure scurvy since humans cannot synthesize vitamin C. Vitamin C acts as an antioxidant.**
- **Fruits and vegetables are rich in beta -carotene (provitamin A) which is essential for the maintenance of eyes health;**
- **Fruits and vegetables are excellent source of and folic acid which prevents anemia. These also prevent degenerative diseases which are prevalent in people with sedentary lifestyle. Concern about obesity and coronary heart diseases have led to reduced levels of fat intake.**



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IMPORTANCE OF FRUITS AND VEGETABLES

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The systematic nutritional value of the some F & V was recognized in the early 17th century in England.

One example is the ability of the citrus fruit to cure scurvy, a diseases wide spread among naval personnel.

They are considered as protective food since they have nutritional and medicinal properties.



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More Reasons to Eat Fruit



Strawberries can potentially fight against cancer and aging



Bananas are great for athletes because they give you energy



Cherries help calm your nervous system



Grapes relax your blood vessels



Pinapples help fight arthritis



Blueberries protect your heart



Peaches are rich in potassium, fluoride, and iron



Apples help your body develop resistance against infections



Kiwis increases bone mass



Mangos protect against several kinds of cancer



Watermelon helps control your heart rate



Oranges help maintain great skin and vision

REASONS TO EAT YOUR VEGGIES



An eggplant's peel can fight against cancer and aging.



Carrots help the body maintain connective tissue, teeth, and gums.



Cucumbers can help reduce constipation.



Broccoli protects you from cancer.



Tomatoes can help lower the risk of cancer.



Cauliflower is an excellent source of Vitamin C.



Lettuce can help increase bone mass.



Yams help maintain your night vision!



Onions can reduce high blood pressure.



Artichokes are a great source of fiber.



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EXTENT OF POSTHARVEST LOSSES





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EXTENT OF POST HARVEST LOSSES

- A considerable amount of fruits and vegetables produced in India is lost due to improper post-harvest operations; as a result there is a considerable gap between the gross production and net availability.
- Post harvest losses in fruits and vegetables are very high (20-40%). About 10-15% fresh fruits and vegetables shrivel and decay, lowering their market value and consumer acceptability.
- Important sites where post-harvest losses are noticed in India are: Farmer's field (15-20%), Packaging (15-20%), Transportation (30-40%), Marketing (30-40%)



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Estimated loss of fruits

Crop	Estimated loss (%)
Papaya	40-100%
Grapes	27%
Banana	20-28%
Citrus	20-95%
Avocado	43%
Apple	14%

Estimated loss of Vegetables

Onion	25-40%
Garlic	08-22%
Potato	30-40%
Tomato	5-34.7%
Cabbage & cauliflower	7.08-25.0%
Chilli	4-35,0%
Radish	3-5%
Carrot	5-9%



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POSSIBLE CAUSES OF POST HARVEST LOSSES

The different causes may be broadly grouped as primary and secondary (Bourne, 1977; Salunke and Desai, 1984):

•Primary Causes

1. *Biological and microbiological*: Consumption or damage by insects, pests, animals and microorganisms (fungi and bacteria).

2. *Chemical and biochemical*: Undesirable reactions between chemical compounds present in the food such as browning, rancidity, enzymatic changes, etc.



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3. *Mechanical*: Spillages, damages caused by abrasion, bruising, crushing, puncturing, etc.

4. *Physical*: Improper environmental and storage conditions (temperature, relative humidity, air speed, etc.)

5. *Physiological*: Sprouting, senescence, other respiratory and transpiratory changes.

6. *Psychological*: Human aversion or refusal due to personal or religious reasons.



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- **Secondary Causes**

1. *Respiration*: breaks down organic matter into simple end-products with release of energy and CO₂. The result is loss of organic matter, loss of food value and addition of heat load. The higher the respiration rate of produce, the shorter is its shelf-life.

2. *Ethylene production*: can trigger physiological activity even in trace amounts. Most living commodities produce ethylene as a natural product of respiration.

3. *Compositional changes*: occur during storage, some desirable and some undesirable. Development of carotenoid pigments, changes in carbohydrates, proteins and all other food components.



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4. *Growth and development*: is continued even after harvest. Characteristic activities are sprouting of potatoes, onions and garlic, elongation of asparagus, seed germination in fruits like tomatoes, lemons, etc.

5. *Transpiration*: refers to water loss resulting in shriveling and wilting due to dehydration and is undesirable due to loss of appearance, salable weight, texture and quality.

6. *Physiological breakdown*:

- *Freezing injury* or frost damage in commodities subjected to temperatures below their freezing point which can occur in the field or during transportation/storage.



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- *Chilling injury* is mainly associated with tropical and subtropical commodities held for prolonged periods at temperatures between 5°C and 15°C.

- *Heat injury* can result in commodities exposed to direct sunlight or excessively high heat for prolonged intervals.

7. *Other factors:* include physical/mechanical damage to the produce during harvesting, handling, storage and transportation, as well as spoilage due to pathological causes (attack by microorganisms such as bacteria and fungi). The environmental factors include temperature, relative humidity, atmospheric composition, light and other factors (fungicides, growth regulators, etc).



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ROLE OF POSTHARVEST TECHNOLOGY

1. Reduction in post harvest losses:

Post harvest technology ensures reduction of losses in what has already been produced. So, reduction of post harvest losses is an alternative way of increasing production of agricultural and horticultural crops.

2. Reduction of cost of production:

Post harvest technology reduces cost of production, packaging, storage, transportation, marketing and distribution, lowers the price for the consumer and increases the farmer's income.

3. Reducing malnutrition:

Proper post harvest technology ensures availability of sufficient food to all thus reducing malnutrition and ensuring healthy growth of the nation. It also extends the season of availability of a particular commodity.



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4. Economic loss reduction:

Reduces economic losses at grower level, during marketing and at consumers end.

5. Availability:

Had there been no knowledge of post harvest technology, apples would not have ever reached Kerala and Banana in H.P. or Kashmir today. Today we can get perishable commodities like Banana, tomato etc. throughout the year and in almost every place in the country. Apples can be made available throughout the year although the cropping season is just for 2-3 months. Thanks to the advancement made in the field of post harvest technology. The increasing exports of fruits and vegetables have become possible only by the interventions made in post harvest technology.



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6. Employment generation:

The food processing industry ranks first in terms of employment generation with approximately 15 lakhs persons employed. Employment potential in post harvest and value addition sector is considered to be very high. Every one crore rupee invested in fruit and vegetable processing in the organized sector generates 140 persons per year of employment as compared to just 1050 person days of employment per year in small scale investment (SSI) units. The SSI unit in food industry employs 4, 80,000 persons, contributing 13% of all SSI units employed.

7. Export earnings:

Export of fresh and processed horticultural commodities also attracts valuable foreign exchange.



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8. Defence and astronaut's requirements:

Defence forces posted in remote border areas as well as astronauts who travel into space have special requirements of ready to eat and high energy low volume food. The requirements are fulfilled by processing industries.

9. Infant and sports preparations:

To day special infant and sports drinks and other processed preparations are available for use especially by these people. These preparations are done especially to meet the specific nutritional requirements of their body.