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Introduction to Postharvest Technology

Edited by

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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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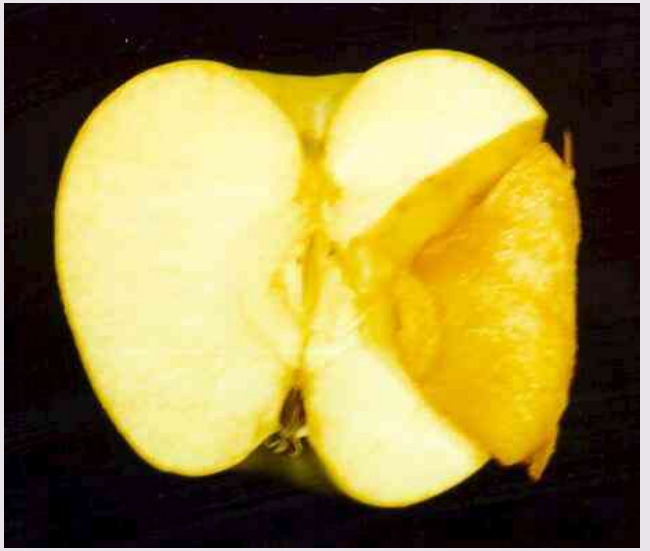
Biological and microbiological cause

Green mould rot: *Penicillium italicum*



Internal watery tissue

Increased watery spots

Codling moth(*Cydia pomonella*) Larvae tunnel into the fruit to feed on the seeds

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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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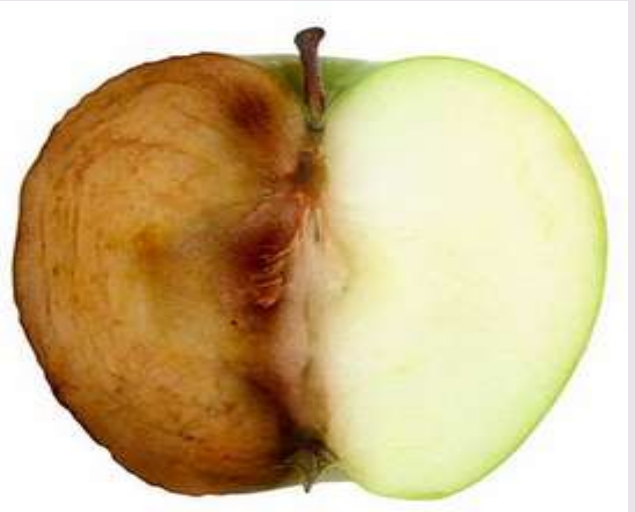
Chemical and biochemical cause

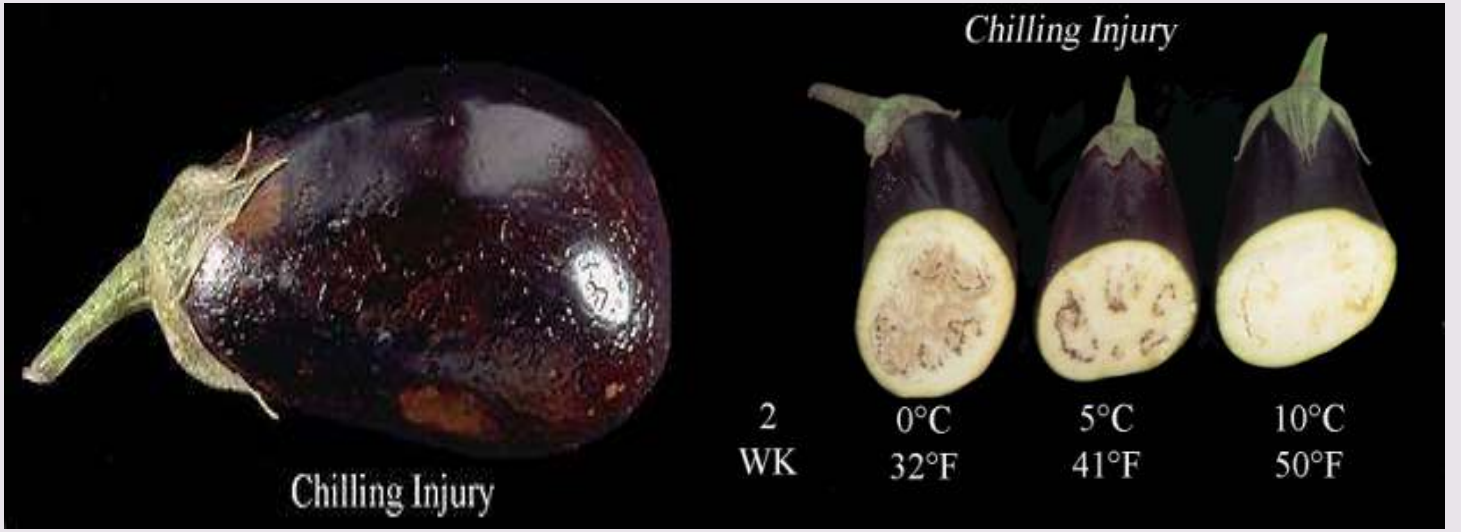


Oxidation results in browning

Mechanical cause

Bruised Peaches

Physical cause (Temperature related)



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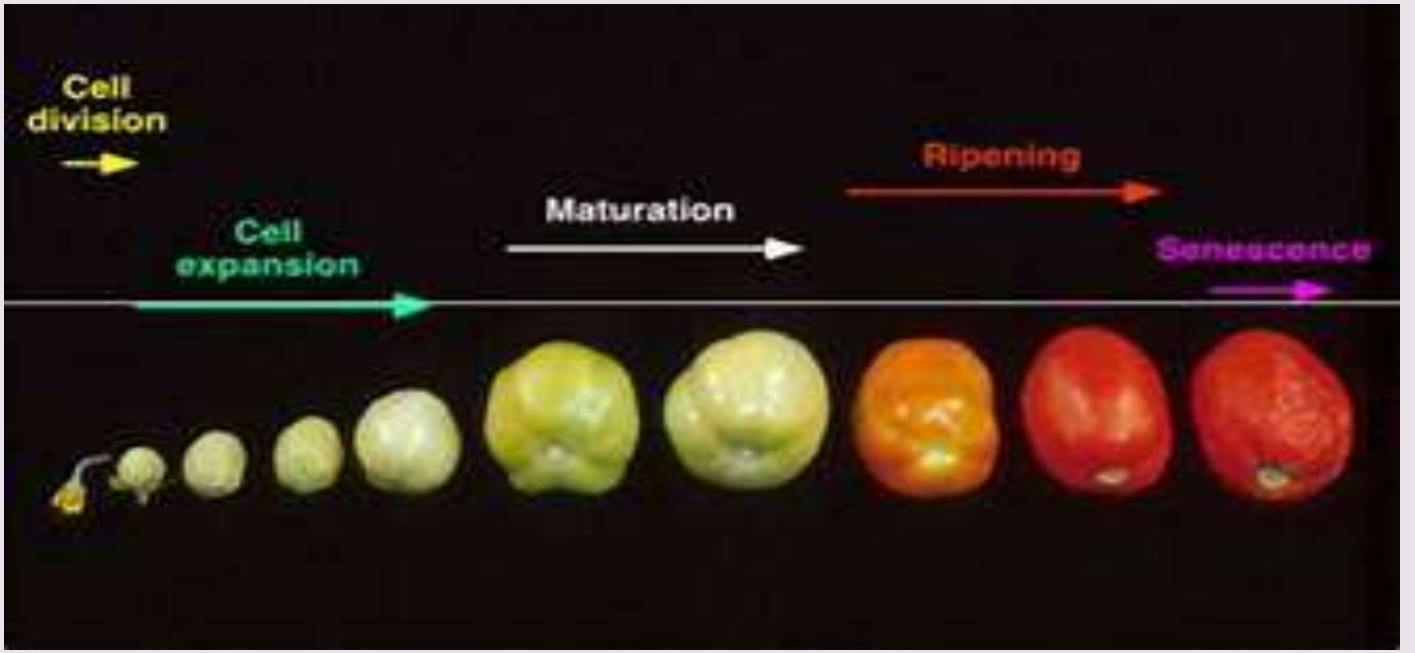
Physiological cause

Sprouting



Senescence

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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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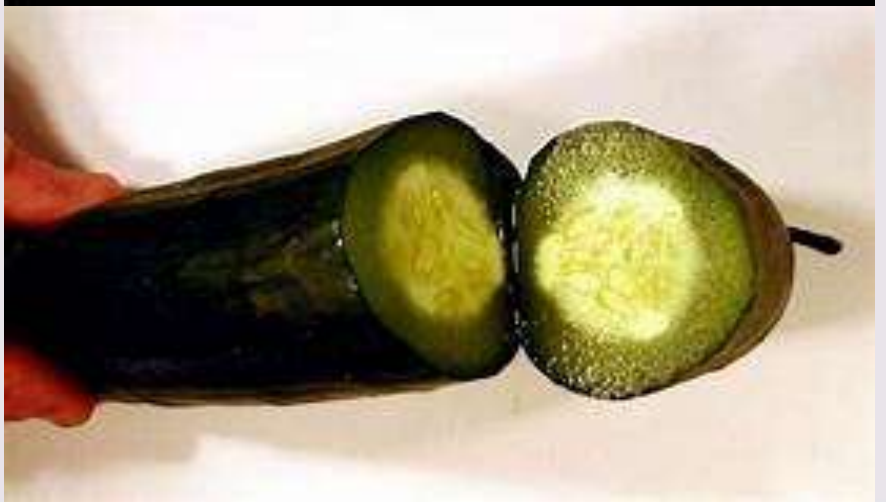
Physiological breakdown



Freezing injury

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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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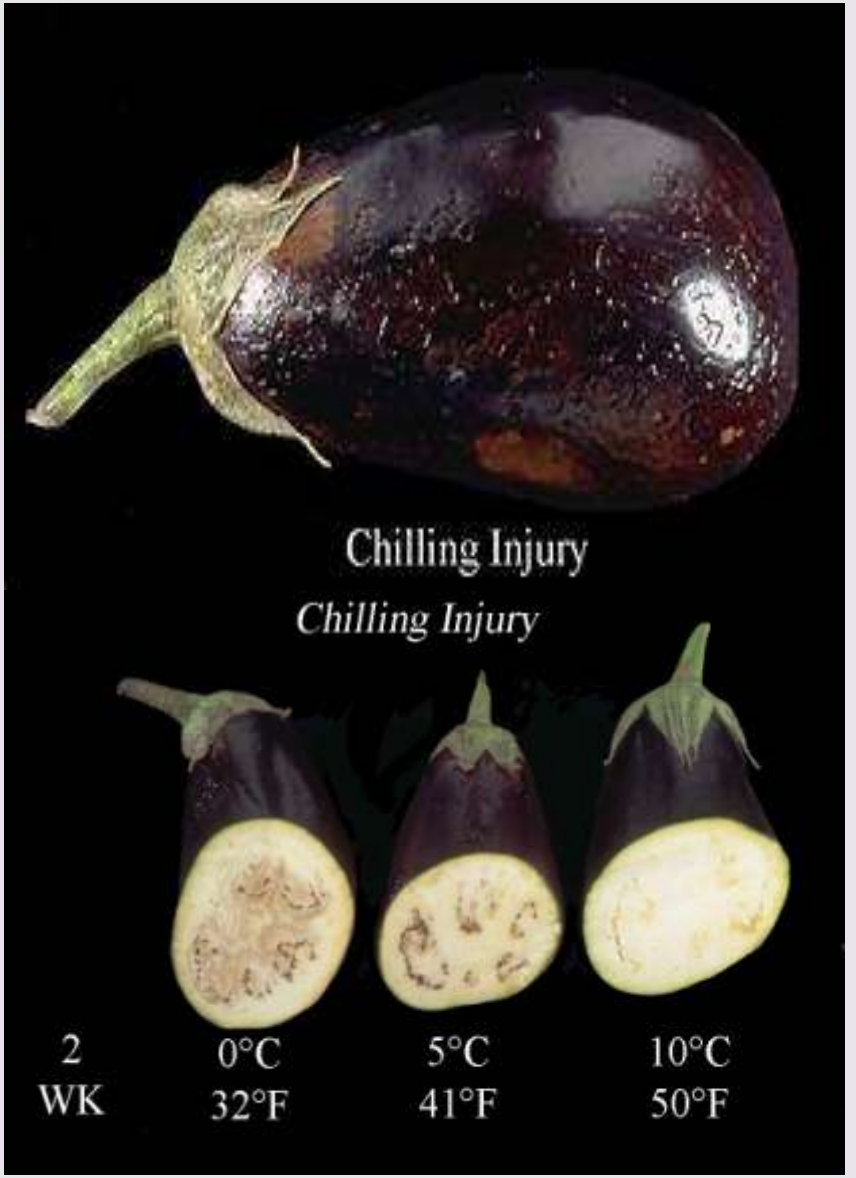
Physiological breakdown



Chilling injury

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Physiological breakdown

Heat injury

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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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Post harvest losses

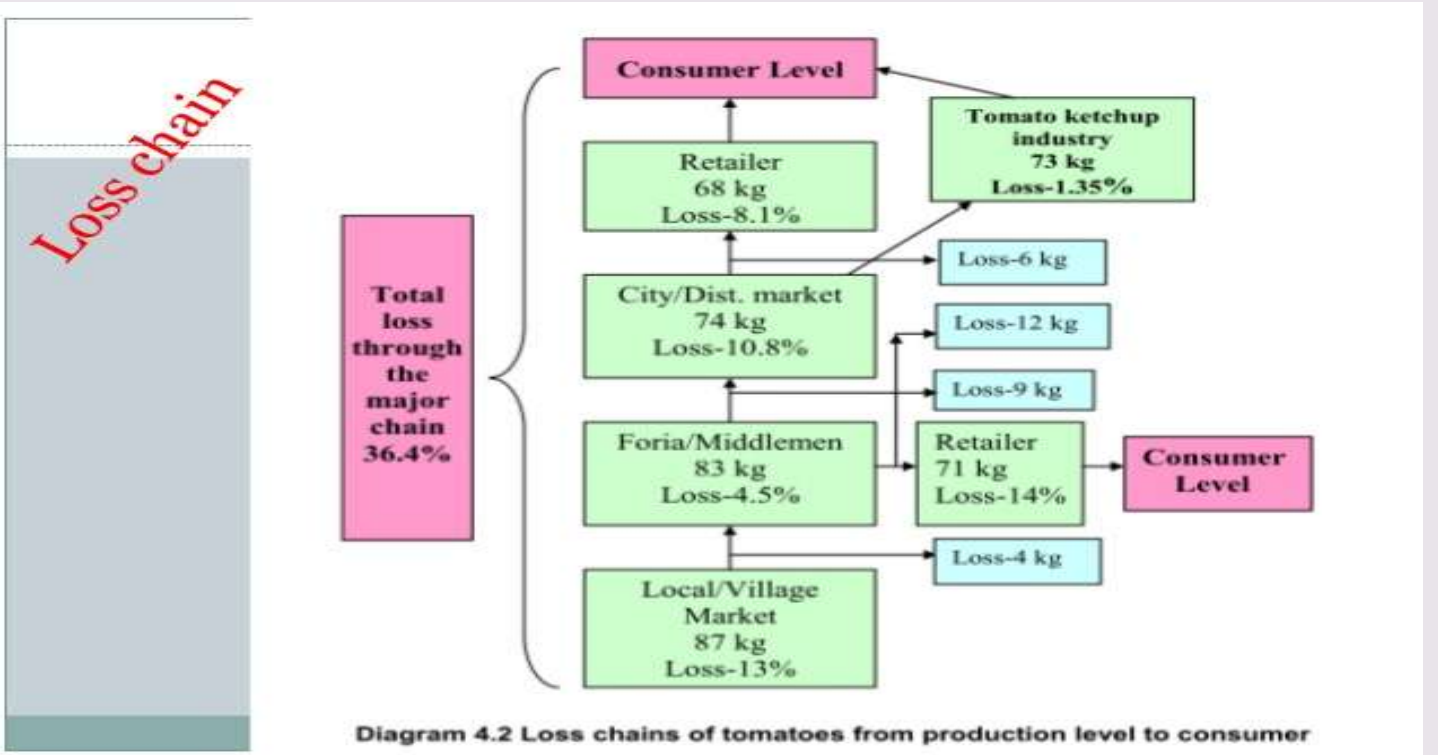
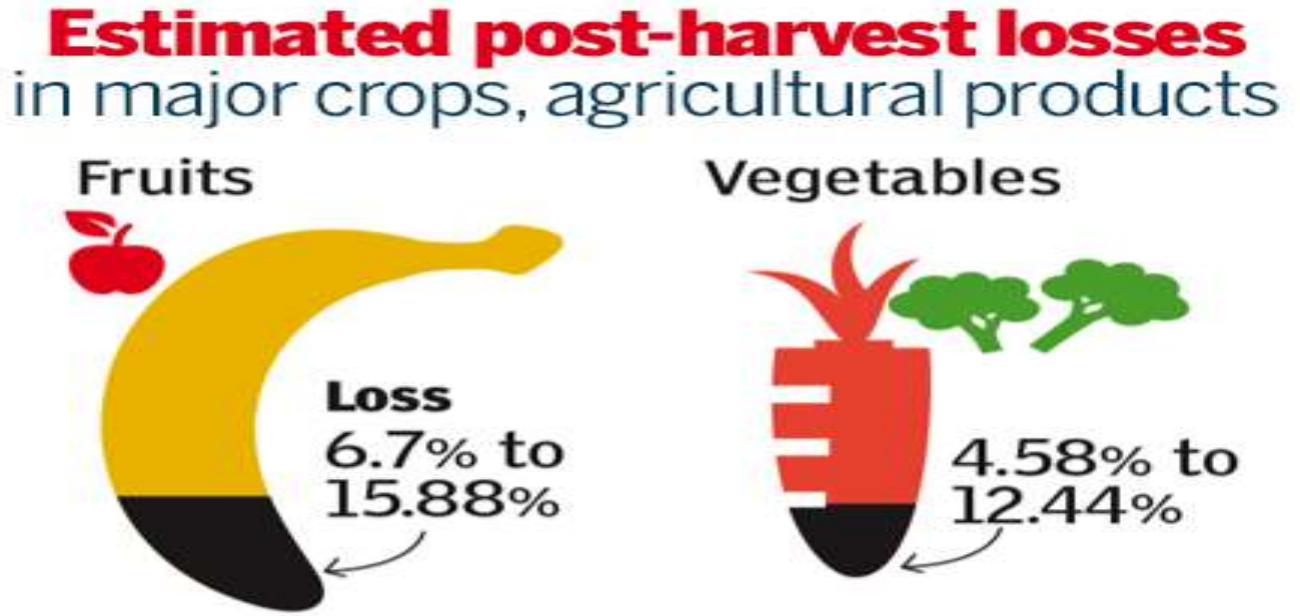


Diagram 4.2 Loss chains of tomatoes from production level to consumer



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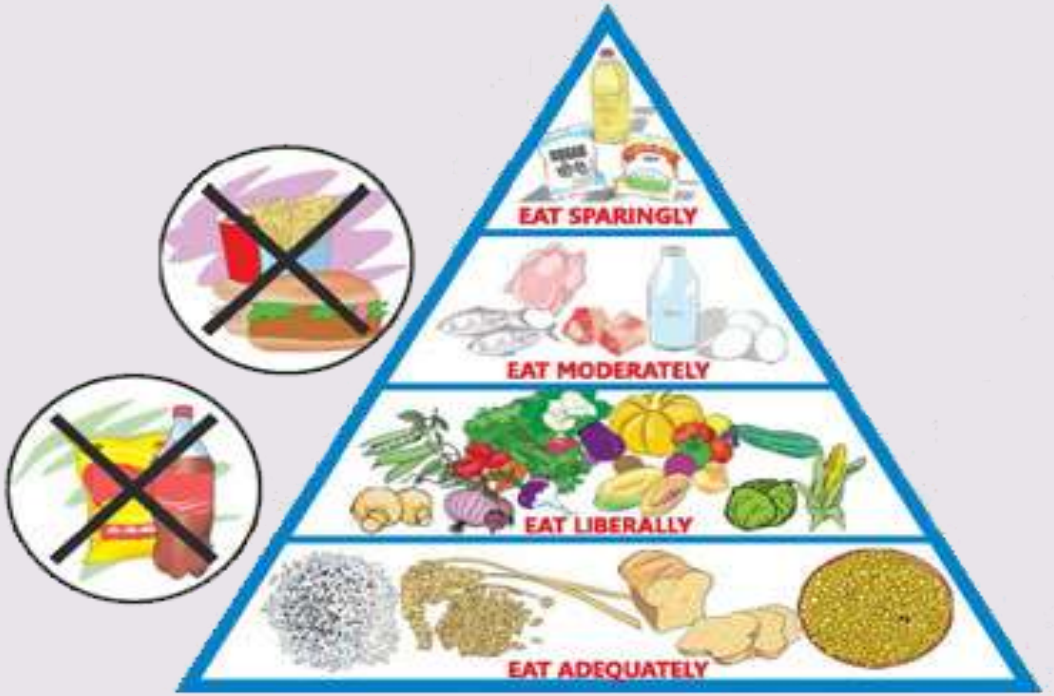
Reducing malnutrition



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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 very place in the country. Apples can be made available through out the year although the cropping season is just for 2-3 months. Thanks to the advancement made in the filed 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.

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Space Fruits

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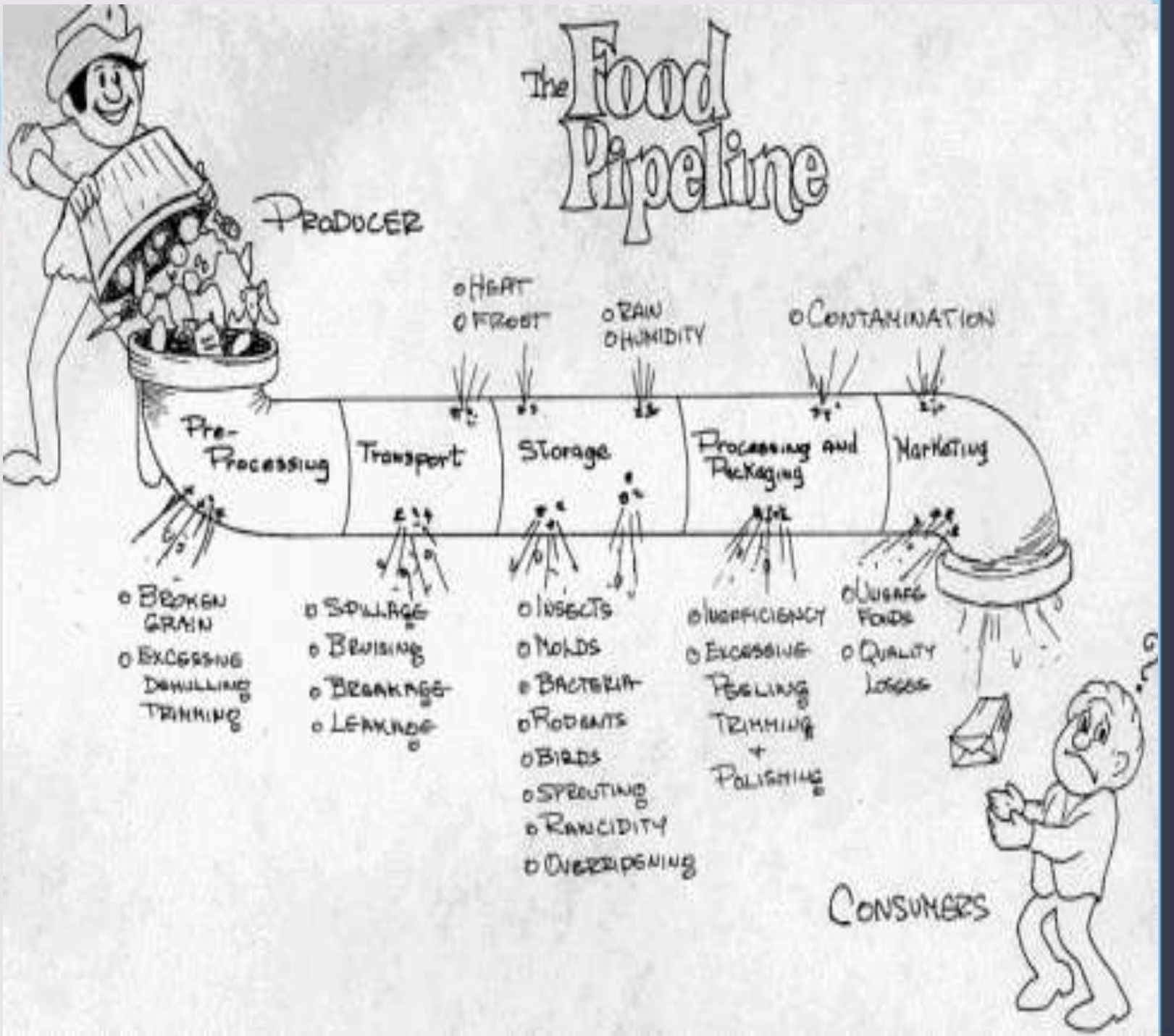

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