POST HARVEST PESTS AND DISEASES
RESPIRATION IN HARVESTED PRODUCE

- Carbon dioxide lost to air
- Water vapour given off (transpiration)
- Energy given off as heat

oxygen taken in, used in breakdown of carbohydrate

PHOTOSYNTHESIS IN GROWING PLANT

- Carbohydrates - starch and sugar - are formed from carbon dioxide and water, accumulate in all plant parts
- Sunlight falling on leaves provides energy for carbohydrate production
- Carbon dioxide from air enters leaves
- Oxygen is released from plant to air

water in

water enters roots
Abiotic Damage
Respiration

• Respiration is the process by which plants take in oxygen and give out carbon dioxide, a basic reaction of all plant material, both in the field and after harvest.
• Respiration uses stored starch or sugar and will stop when reserves of these are exhausted; ageing follows and the produce dies and decays.
Ripening of fruits

Two characteristic types of fruit ripening

- Non-climacteric fruit ripening-refers to those fruits which ripen only while still attached to the parent plant. Their eating quality suffers if they are harvested before they are fully ripe because their sugar and acid content does not increase further. Respiration rate slows gradually during growth and after harvest. Maturation and ripening are a gradual process. Examples are: cherry, cucumber, grape, lemon, pineapple.

- Climacteric fruit ripening-refers to fruits that can be harvested when mature but before ripening has begun. These fruits may be ripened naturally or artificially. The start of ripening is accompanied by a rapid rise in respiration rate, called the respiratory climacteric. After the climacteric, the respiration slows down as the fruit ripens and develops good eating quality. Examples are: apple, banana, melon, papaya, tomato.

- In commercial fruit production and marketing, artificial ripening is used to control the rate of ripening, thus enabling transport and distribution to be carefully planned.
The effect of ethylene on post-harvest fresh produce

- it can be used commercially for the artificial ripening of the climacteric fruits. This has made it possible for tropical fruits such as mangoes and bananas to be harvested green and shipped to distant markets, where they are ripened under controlled conditions;
- natural ethylene production by fruits can cause problems in storage facilities. Flowers, in particular, are easily damaged by very small amounts of the gas. Ethylene destroys the green colour of plants, so lettuce and other vegetables marketed in the mature green but unripe state will be damaged if put into storage with ripening fruit.
• ethylene production is increased when fruits are injured or attacked by moulds causing decay. This can start the ripening process and result in early ripening of climacteric fruit during transport. All produce should be handled with care to avoid injuries leading to decay. Damaged or decaying produce should not be stored;

• citrus fruit grown in tropical areas remains green after becoming fully ripe on the tree. It develops full colour after harvest only if "degreened" by the use of (manufactured) ethylene gas. The gas concentration, temperature, humidity and ventilation have to be carefully controlled in specialized rooms, so degreening is economically viable only for high-value export or domestic markets. In most tropical countries fully ripe green citrus fruit is acceptable to local populations
Biotic Damage
• Field Infection (Infestations) to the storage damage
• Transportation – storage damage
• Storage damage due to pests and diseases
Post Harvest Insect Pests
• Imago of fruit fly lay eggs when the fruits are young or immature
• With the development of fruit ripening the eggs of fruit fly hatch and the larvae emerged to feed on the inside of fruit
• The damage of the fruit due to the larvae of fruit flies may continuing to the post harvest stages and in the storage
Grain Storage Pests

- Birds
- Rodents
- Insects
- Fungus
- Moisture
The storage possibilities and problems associated with difference grain moisture contents.

<table>
<thead>
<tr>
<th>Grain moisture content (%)</th>
<th>Safe Storage</th>
<th>Possible Problems</th>
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</thead>
<tbody>
<tr>
<td>&gt; 40</td>
<td></td>
<td>Germination</td>
</tr>
<tr>
<td>18</td>
<td>2 weeks</td>
<td>Fungal growth</td>
</tr>
<tr>
<td>&gt; 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-14</td>
<td>1 year&gt;</td>
<td></td>
</tr>
<tr>
<td>&gt; 8</td>
<td></td>
<td>Insect damage</td>
</tr>
<tr>
<td>8-10</td>
<td>&gt; 1 year</td>
<td></td>
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</tbody>
</table>
Rodent post harvest (storage) pest
Root – Tuber Borers

The adult insects may lay eggs in the soil or in the stem. Then the emerged larvae may getting into the root or Tubes and the damage is continued to the post harvest stages.
The main storage pests, apart from rodents, are beetles and moths.

- **Rice Weevil**: *Sitophilos oryzae* (L)
- **Angoumois Grain Moth**: *Sitatroga cerealella*
- **Lesser Grain Borer**: *Rhyzopertha dominica*
- **Flat Grain Beetle**: *Cryptolestes pusillus* (S)
Fruits and Vegetables
Fruit Fly (Lalat Buah)
Anthracnose
Colletotrichum spp. / Gloeosporium spp. / Glomerella spp. / Sphaceloma (Elsinoe) spp

Avocados Bananas Beans Cashew
Cassava Citrus plants Cotton Cowpea
Cucumber Eggplant Green gram Mango
Onion Peas Peppers Pumpkin Sorghum
Soybean Spinach Sugarcane Tomato
Watermelon Wheat Yam Zucchini/Courgette
Banana antrachnose, *Colletotrichum musae*
Manggo Antrachnose
Bacterial Soft Rot of Vegetables
Pectobacterium (Erwinia spp)
Disease Cycle of bacterial soft rot
Java black rot, *Diplodia gossypina*,

Charcoal rot, *Macrophomina phaseoli*,

Bacterial soft rot, *Erwinia chrysanthemi*
Black rot of sweet potato, *Ceratocystis fimbriata*

Fusarium root rot

Rhizopus rot
Phytophthora infestans

Black leg n soft rot of potato,
Erwinia chrysanthemi ssp. atroseptica

Phytophthora infestans

Tuber late blight of potato,
Phytophthora infestans

Phytophthora infestans

Phytophthora infestans
Antrachnose, *Colletotrichum sp*
Some common methods of controlling pests of stored produce

Fruits crops:
The use of low temperatures by storing in refrigerators or cold room has proved effective. Drying is also helpful to preserve some fruits from pest damage: tomato, chili pepper, beans etc.
• For grains
• Storage under dry condition with the grains dried to about 14% moisture content
• Storage under cool conditions in cold room has helped to maintain seed viability or storability
• Storage in air in tight conditions at moisture content of about 14% in drums or even Jerry cans have been used over time
Cylos for grain storage
Cold storage for vegetables and fruits
Dry Storage