

Diseases of fruits after harvest

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After harvesting the fruit, if the storage conditions are unsuitable, diseases develop which deteriorate the quality of the produce. In the case of mechanical injuries to the fruit, damage from hail, insects or diseases, certain infectious diseases penetrate and develop. High air humidity and a wide temperature range favour the development of the following diseases:

Soft rot – genus *Penicillium*

Grey mould – genus *Botrytis*

Bitter rot – *Trichotecium roseum*

Core rot *fungi of the genus Alternaria*

Infectious diseases

Soft rot – genus *Penicillium*

On the affected fruit, yellow to light brown, sharply defined spots develop, with watery and soft tissues, an unpleasant mouldy odour and an alcoholic taste. The rot quickly penetrates in depth and affects the entire fruit. It softens and is easily crushed when pressed. Under humid conditions, a dense mould growth is visible on the rotten parts of the fruit. Rotting around the seed cavity is observed only after cutting the fruit.

Grey mould – genus *Botrytis*

The disease manifests itself by the development of brown spots on the fruit, whose tissue is firm and the fruit retains its shape. At high humidity, a white delicate mould growth of the mycelium and spores of the fungus forms on the damaged fruit. The disease develops in foci due to its rapid spread to adjacent fruit.

Bitter rot – *Trichotecium roseum*

Usually the fruit appears healthy externally, but when it is cut, it can be seen that the tissue around the seed cavity is affected by brown rot. In the cavities of the core, a white cottony mycelium is visible, on which scattered pink clusters of the fungus spores are present. Characteristic of this rot are the bitter taste and the unpleasant mouldy odour.

Core rot *fungi of the genus Alternaria*

When the fruit is cut, dark rot is observed in the area of the seed cavity and around it, accompanied by the formation of a grey mould growth. The disease appears after a prolonged storage period at low temperature followed by subsequent holding at room temperature.

Strategy for disease control during fruit storage

For good fruit storage, it is of great importance that the fruit be harvested at technological maturity, by careful picking (if possible during the cool hours of the day), with fruit stalks, preserved wax coating and separation of pest-infested and injured fruit. Storability and quality of the fruit are greatly improved if immediately after harvesting they are transported and stored at temperatures from -0.5 °C to 1 °C and under good ventilation conditions.

In order to prevent the risk of the above-mentioned diseases during storage and to maximally extend the storage period – for apples from 90 to 240 days, for pears from 60 to 90 days, the following conditions must be created in the fruit stores:

1. Fruit harvesting should be carried out at the most favourable time for the given cultivar and at the achieved technological maturity.
2. Different cultivars should be stored in separate rooms or in separate crates. The fruit of some cultivars adversely affects the storage of other cultivars, causing physiological disorders – browning of the flesh, of the fruit peel, etc. Cultivars that ripen earlier may accelerate this process when stored together with cultivars that reach physiological maturity more slowly.
3. Medium-sized fruit, with stalks, without wounds or spotting and with a maximally preserved wax coating should be selected for storage.
4. The optimum storage temperature for apples is 0 °C, and for pears between -1 °C ± 1.5 °C. Large temperature fluctuations adversely affect quality.
5. Disinfection of storage facilities and packaging is mandatory.
6. The relative air humidity should be maintained at about 90 – 95% in order to avoid fruit wilting. At lower humidity, the peel of the fruit becomes wrinkled, especially when they have been harvested before the required maturity. Air humidity can be increased by spraying the floor and walls with water or by placing containers with water. On the other hand, very high humidity may cause condensation on the walls and favour the various types of rot.
7. Gas composition of the air. The composition of the air also affects ageing processes and the occurrence of physiological disorders and rot. They appear when the oxygen content decreases and the carbon dioxide (CO₂) content increases. The optimum oxygen content depends on the temperature. At 0 °C the oxygen content should not be below 2–3%.
8. Air circulation. Through air movement, uniform distribution of temperature, humidity and gas composition is achieved. The temperature, humidity, composition and circulation of the air must be controlled throughout the entire storage period. It is advisable to cool the fruit before placing it in storage facilities and to continuously monitor for optimum temperature conditions of storage and good ventilation.