Lesson 23. Causes of spoilage in storage

Following are the various sources causing spoilage in the stored food and corrective measures are required to be exercised to minimize the effect to alleviate the effects.

23.1 Mechanical Damage

Causes

- incorrect harvesting methods
- Poor handling, threshing, shelling, cleaning, sorting or drying
- Bad transport and loading practices (e.g. use of hooks)

Effects

- Losses in weight
- Losses in quality (germination power, nutritional value)
- increased vulnerability to infestation from insect pests, fungi and rodents

Countermeasures

- Pay attention to maximum temperatures when drying
- Use safe techniques in harvesting, transport, processing and storage
- Take care when handling bags
- Repair or replace damaged bags
- Do not use hooks to carry bags
- Repair pallets (e.g. protruding nails!)

23.2 Heat

Causes

- Unsuitable storage structures (false location, insufficient shade and ventilation facilities, lack of heat insulation)
- Mass reproduction of storage pests and fungi
- Lack of aeration of store
- High moisture content of the grain

Effects

- Losses in weight
- Losses in quality (nutritional value, germination power)
- Good conditions for pest development
- Condensation with subsequent development of fungi

Countermeasures

- Build suitable storage structures
- Provide shade for stores or silos (e.g. by means of wide eaves or shading trees)

- Keep temperatures as low as possible (aerate storage facility)
- Conduct treatments for pest control
- Store bags on pallets in order to improve aeration
- Maintain spaces of 1 m around all bag stacks

23.3 Moisture

Causes

- insufficient drying before storage
- High relative humidity
- Constructional faults and damage to the store (unsuitable materials, unsealed floor, walls and roof, holes, gaps, etc.)
- imbalances in temperature (e.g. day/night) in storage facility with subsequent condensation
- Produce stored on the floor or touching the walls
- Mass reproduction of pests

Effects

- Losses in quality
- Losses in weight
- Development of fungi and formation of mycotoxins
- improved conditions for the development of pests
- Swelling and germination of seeds
- Damage to storage structures

Countermeasures

- Dry produce sufficiently before storage
- Repair and seal storage facility
- Keep relative humidity as low as possible in storage facility (perform controlled ventilation)
- Store bags on pallets
- Maintain spaces of 1 m around all bag stacks
- Conduct pest control treatments
- Avoid temperature fluctuations (day/night) in store by means of shade and ventilation

23.4 Insect Pests

Causes of infestation

- introduction of infested lots
- Cross infestation from neighboring lots or stores
- Migration from waste or rubbish
- Hiding places in stores (cracks, fissures)
- Use of infested bags

Effects

- Losses in weight
- Losses in quality (impurities such as droppings, cocoons and parts of insects, reduction of nutritional value, reduction in germination power)
- increase of temperature and moisture

Countermeasures

- Harvest at the right time
- Choose tolerant varieties
- Keep means of transportation clean
- Remove infested cobs, panicles or pods before storage
- Ensure that produce is dry before storing
- Prevent pest introduction by checking for infestation before storing
- Clean the store daily
- Keep the temperature and relative humidity as low as possible (perform controlled ventilation)
- Prevent any pest infiltration by sealing the store (windows, doors, ventilation facilities; e.g. with the use of insect gauze)
- Repair any damage to the store immediately
- Store old and new lots separately
- Clean empty bags thoroughly and treat them against insects if necessary
- Perform pest control treatments
- Rotate stocks: 'first in first out'

23.5 Microorganisms

Causes of infestation

- High moisture content of stored produce
- High relative humidity in store
- Condensation
- Humidity and moisture produced by insects

Effects

- Loss of quality (smell, taste, colour, nutritional value, germination power)
- Formation of mycotoxins
- Slight loss of weight (mould)
- Further increase in temperature and moisture
- Further condensation

Countermeasures

- Dry produce sufficiently before storage
- Keep relative humidity as low as possible in storage facility (perform controlled ventilation)
- Store bags on pallets
- Maintain spaces of 1 m around all stacks
- Conduct pest control treatments

23.6 Rodents

Causes of infestation

- Penetration through badly closing doors, windows, ventilation openings, holes
- Lack of barriers
- Lack of hygiene in store and surrounding area (possible hiding and breeding places)

Effects

- Loss of weight
- High losses in quality due to contamination of produce with faeces and urine
- Contamination of produce with pathogenic agents (typhoid, rabies, hepatitis, plague, etc.)
- Damage of material and facilities (bags, doors, electric cables)

Countermeasures

- Prevent entry of rodents by sealing store rat-proof
- Keep store and surrounding area clean
- Place traps
- Carry out rodent control measures

23.7 Birds

Causes of infestation

- Open or broken doors, windows, ventilation openings or roofs

Effects

- Losses in weight
- Damage to bags
- Contamination of stored produce with droppings and pathogenic agents

Countermeasures

- Bird-proof stores (carry out repair work, fit grilles or nets)
- Remove any nests of granivore birds from the store and surrounding area

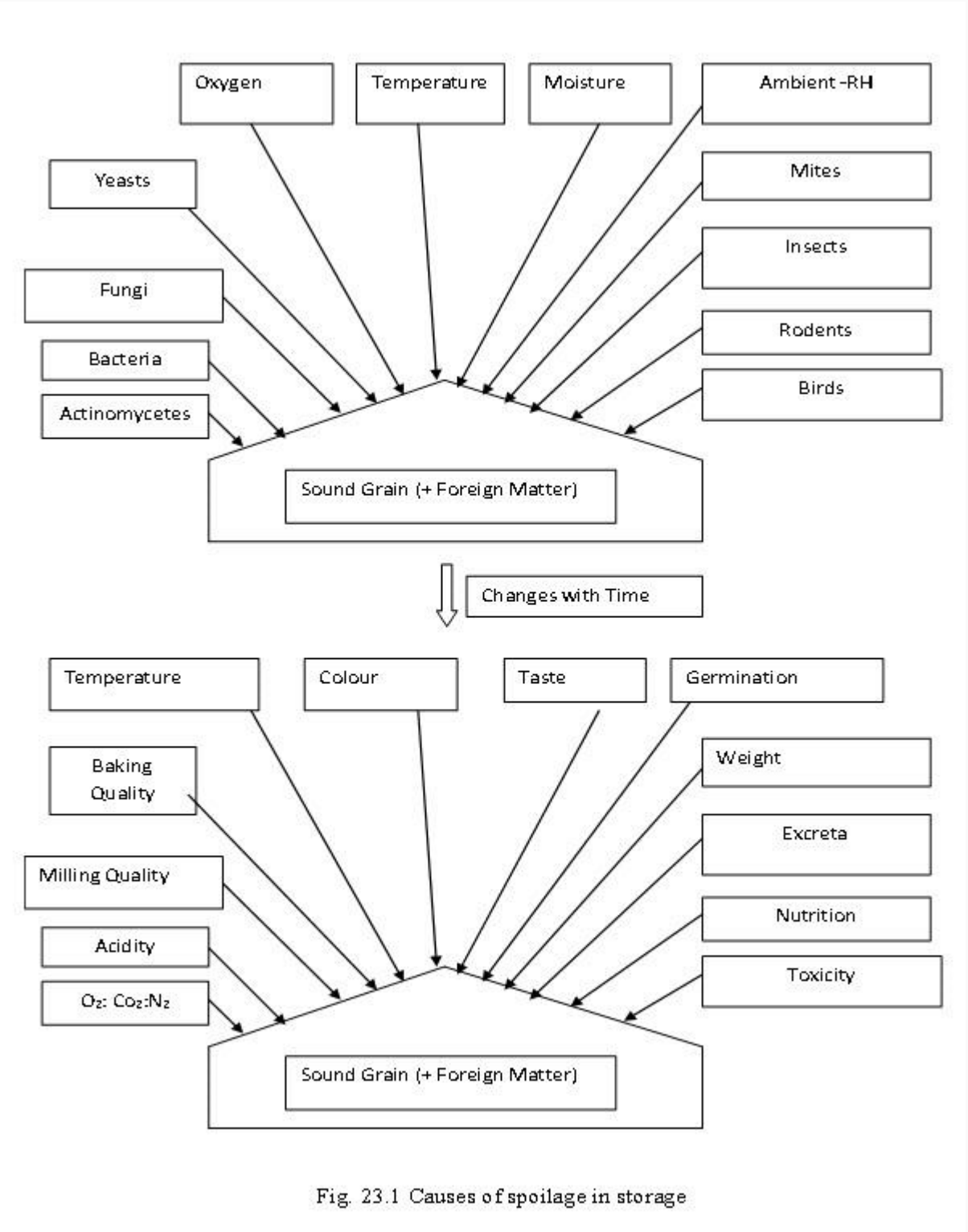

Fig. 23.1 Causes of spoilage in storage

23.8 References

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