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**The importance of post-harvest management: best practices**

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# What is postharvest handling?

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In agriculture, postharvest handling is the stage of crop production immediately following harvest:

- Field handling
- Transporting to packing house
- Operations at the packing house
  - cleaning
  - Sorting/grading
- packaging
- storage (temporary and long term)
- Transportation
- The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate.
- Postharvest treatment determines final quality, whether a crop is sold for fresh consumption.

# Purpose of postharvest management

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- The activities in the post harvest system ensures that quality produce reaches the marketplace.
- The food safety and hygiene issues and controls that are taken there of.

The are two aims of postharvest practices:

- Maintain quality of harvested produce (appearance, texture, flavour, nutritive value and safety).
- Reduce loss (quantitative & qualitative) between harvest and consumption.

**Important** Quality of any produce cannot be IMPROVED during the PH chain but only MAINTAINED. Hence, Importance of the production of Good Quality produce

# What is postharvest handling?

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There are typical two types of crop postharvest systems:

- (1) Durables and (2) perishables
  - **For durables**, largely depended on storage facilities for months or even years.
    - Examples of durables are cereals/grains (maize, wheat, sorghum etc) and legumes (beans, nuts, peas etc)
  - **Perishables**, which are generally not stored for long but depend on an effective cold chain.
    - Examples of perishables are tubers, fruit and vegetables
  - Some perishables can be dried and packaged and then stored for longer periods.

# Why postharvest handling

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- The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate.
- Postharvest treatment determines final quality, whether a crop is sold for fresh consumption or spoilt.

## Goals of post-harvest handling:

- are keeping the product cool/fresh
- to avoid moisture loss
- Slow down undesirable chemical changes
- Avoiding physical damage such as bruising
- To delay spoilage

# Climate change and Postharvest

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Climate change is expected to result in:

- A rise in global temperatures, Southern Africa by 1°C by 2030 and another 1°C - 2°C by 2050
- Some areas will receive more rainfall associated with increased evaporation e.g. East Africa
- Other areas will receive less rainfall, Southern African 10% less
- More extreme weather;
  - periods of heavy rainfall (within a year or flash floods)
  - frequent droughts
  - and hot weather are likely to be longer.
- More variable and therefore less predictable weather

# Impact of climate change

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- Most food is grown by small scale farmers under rain-fed annual cropping systems in Southern Africa.
- **Climate change is likely to reduce the length of the growing season.**
- This might force large regions of marginal agriculture out of production.
- Different places affected differently but overall a deficit.
- Efforts have to be made that whatever is harvested is preserved and reaches the consumer.
- Need to focus on preserving the limited produce : reduce postharvest losses to cover deficit.
- Therefore losses should be minimised through control or elimination of factors that cause postharvest losses.

# Factors affecting postharvest systems

- Environmental factors:
  - Temperature;
  - Relative humidity
  - Gas composition
- Technical factors:
  - lack of skilled manpower
  - and long storage time.
- Biological and Chemical factors
- Mechanical factors:
  - Poor harvesting practices
  - Careless handling: dropping, throwing, stamping
  - Inappropriate packaging or containers with splintered wood, sharp edges.
  - Over/under packaging of containers



# Temperature and relative humidity

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- Climate change will affect all the factors earlier on:
- Environmental factors will be influenced more
- From the environmental factors temperature will be influenced more (it will rise)

## Changed levels of environmental factors:

- seed viability.
- storage insect pest survival and reproduction
- storage protectant performance.
- Shelf-life of different food products
- Energy requirements for drying and cooling

# Effect of increased temperature

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- High temperatures lead to:
  - PHL are accelerated at higher temperatures and with longer storage durations.
  - increased rate of microbial changes, activating enzymatic reactions in produce.
  - Respiration rate, metabolic processes and ethylene biosynthesis of some fruit increase with air/room temperature.
  - rot organisms spread most rapidly at warm harvest temperatures
  - Respiration rates can double, triple or even quadruple with every increase in temperature at certain levels....

**Precooling of fresh produce will be required**

# Pre-cooling of fresh produce

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– rapid removal of field heat,

Result?

- Reduces heat produced by respiration
- Reduces production of moisture and accumulation on vegetables,
- Slows ethylene production
- Reduces water loss
- Limits growth of decay organisms
- Decreases rate of deterioration

Pre-cooling methods are energy intensive and since the temperatures will rise as a result of global warming the cooling load will be high. **How is energy produced?**

# Energy requirements of pre-cooling

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- Mechanical refrigeration
- Vacuum cooling
- Hydro-cooling
- Forced air cooling
- Including evaporation cooling
  
- High ambient temperatures meaning high energy requirements to cool fresh produce to storage temperatures.
- This is an opportunity for use of solar energy!

# Impact of an increase in temperature on postharvest activities

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## ***Harvesting and drying***

- Increased rate of crop drying, in the field and homestead
- Increased fire risk of mature crop or stored crop

## ***Primary processing***

- Heat stress during laborious manual activities (shelling / threshing; dehulling)

## ***Pest & disease management***

- Faster reproduction of insect pests and diseases (shorter lifecycles due to higher temperatures) in field leading to more rapid build-up of insects and fungi in stored produce
- Increased risk of fungal rot and mycotoxin contamination of stored products.
- Efficacy of some grain protectant active ingredients decrease and others increase

# Increased temperature

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## ***Storing***

- Higher pest incidence and carry-over during 'cold season'
- Increase in the need for thorough storage structure hygiene and management of residual infestation prior to storing new crop
- Increased pest reproduction and mobility leading to need to re-winnow, sort and re-treat grain mid-way through storage period **(storage costs will increase)**
- Increased moisture migration and condensation resulting in rotting zones in grain bulks with excess free moisture
- Increase risk of seed viability/damage especially for some legumes e.g. ground nuts

# Effect of Increased Temperature

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## ***Secondary processing***

- Increased bio-deterioration leading to shorter shelf life of products
- Overheating of machinery reduces profits resulting in longer down time.

## ***Transportation***

- Heat stress (of humans, livestock, & vehicles) while transporting crops

# Overall Impact of Climate Change

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- Africa's population will be 2 billion by 2050
- Food production has to increase in line
- 65% of food insecurity resultant from climate change by 2050 will be in Africa.
- Africa will largely be depended on food imports.
- **To meet deficit postharvest losses have to be reduced.**
- **This means that postharvest management is one of the critical issues that as a region we need to focus on!!!**



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Thank you