



# Minimal Processing

Future Concept For Marketing

Tropical Fruits

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**MALAYSIA**



# Content of presentation

- 1. Introduction of minimal processing**
- 2. Status of Malaysian fruits -  
export (2007) & production 2010**
- 3. Handling operations – R&D (MARDI)**
- 4. Packaging & storage**
- 5. Food safety**
- 6. Conclusion**



# Minimally processed fruits



# Nature of the minimally processed produce



**Pineapple**



**Durian**



**Jackfruit**

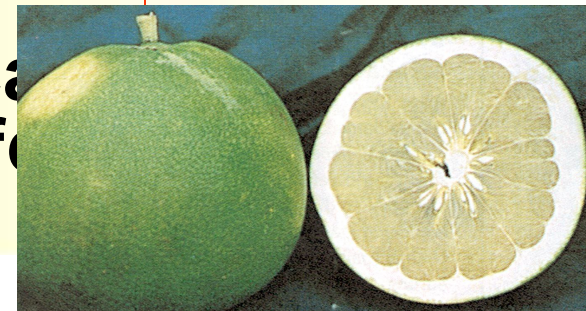
# Market potential

- Market demand ↑ as consumers more conscious in their food choices but have less time to prepare
- The market outlet for minimally processed products has expanded from traditional to exclusive outlets such as supermarkets, hotels, airlines catering services
- A need for suitable handling operation as the product is very perishable



# Minimally processed fruits

- More perishable than the intact produce
- -Been subjected to physical stress such as peeling, cutting, slicing, etc
- Tissues are still living
- The preparation entails physical wounding- ↑ ↑ respiration, ethylene production and biochemical changes - limit the shelf life

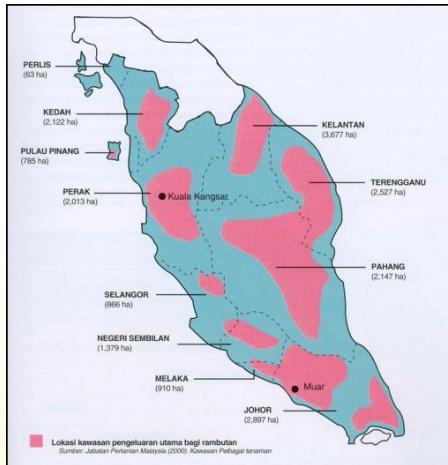




# Shelf life limitations to minimally processed produce

1. **Microbial spoilage**
2. **Dessication**
3. **Oxidative browning**
4. **Loss of colour, bleaching**
5. **Loss of textural integrity**
6. **Off-flavour or off odour development**

# Export 2007



**Singapore, Hong Kong,  
Europe, United Arab  
Emirates**

**55,000mt-2010 (P)**

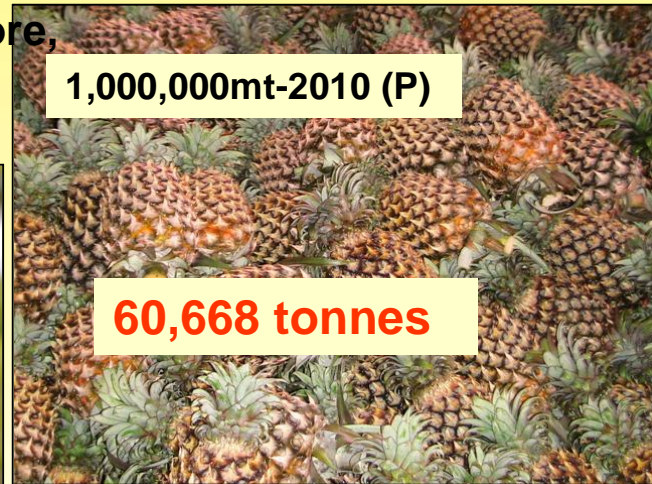
**2,553 tonnes**



**Singapore, Indonesia,  
Brunei, Australia**

**1,000,000mt-2010 (P)**

**60,668 tonnes**



**375,000 mt-2010 (P)**

**22,351 tonnes**





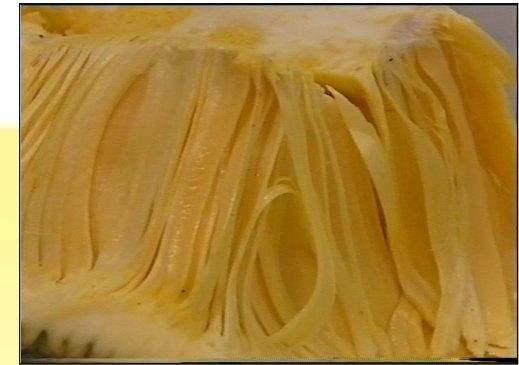
# Jackfruit suitable for MP



Huge size, uncertain of the internal quality & difficulties in designing the packing box



Difficulties in cutting



Thick centre core, epidermal layers & skin



Latex problems



Big inedible portions



Recovery portions  
-40%



## Durian suitable to be marketed in the form of minimally processed

- Thick & thorny skin-difficulties in cutting & assessing the internal quality
- Big inedible portions. Recovery portion only 30%.
- High cost of air transportation
- Strong aroma-not allow for export by air shipment
- Several physiological disorders in durian severely reduce their quality; e.g. granulation of fruit pulp, internal browning of the pulp core, wet core and tip burn problems.





## Minimally processed durian has the following problems

- Short shelf life. 1 day at ambient. 3-4 days at hypermarket
- Prolonged storage resulting in slimy surface & off odour
- Packing system- causes impact damage



# Handling of produce

Quality of minimally processed fruits depend upon:

- » quality of the intact commodity
- » its maintainance until preparation
- » method of preparation
- » subsequent handling operations\*



\* Should not be viewed as a way to utilize inferior quality, overmature, or defective commodities that cannot be marketed as whole fruits



# Fruits for minimal processing

- Only good quality intact produce should be used in order to assure good quality for the consumer
- Produce received from the farm must be carefully inspected according to the required specification.

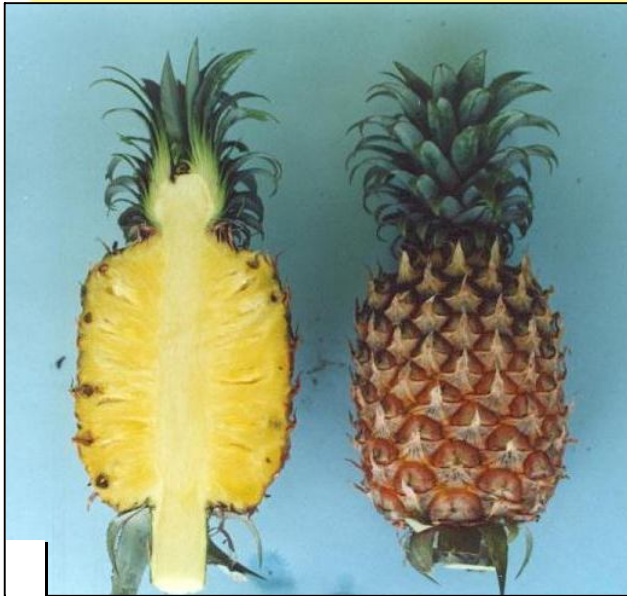


# Sorting

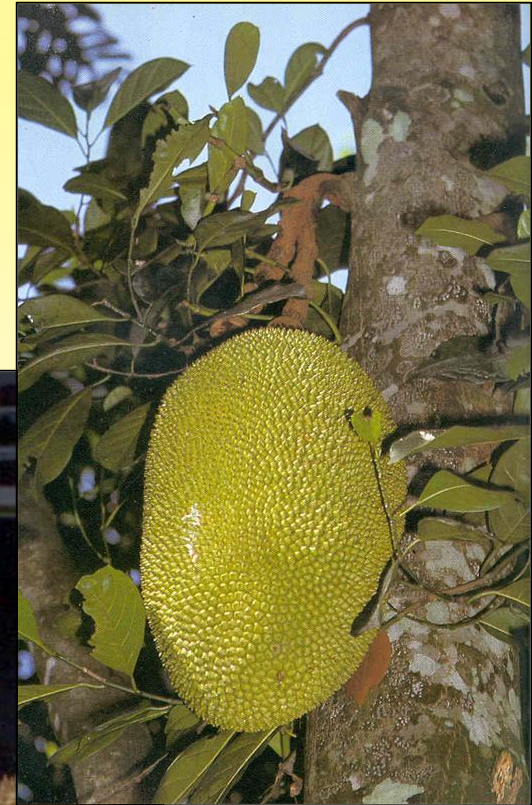
Reject injured/disease infected fruits immediately to avoid cross contamination



# Selection of variety



- Texture
- Flesh colour
- Taste





# Fruit maturity:

- Selection of the optimum maturity is essential to provide the best combination of eating quality & postharvest life.



**Jackfruit**



# Minimal processing operation

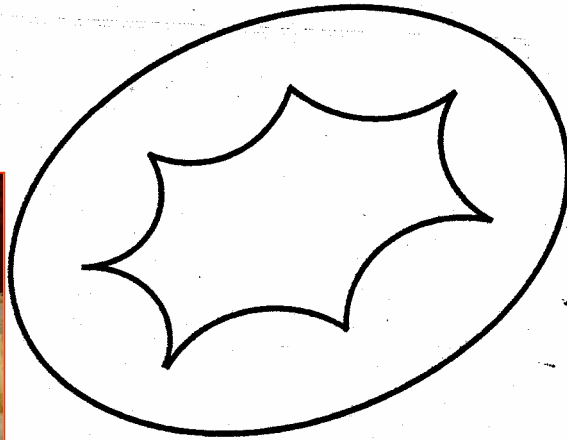
Hygienic processing room -  $\pm 15-20^{\circ}\text{C}$   
Basic operations: (depend on fruits/vegetables) **skin peeling, trimming, immersed in chilled water, cutting, pre-treatments, drying**



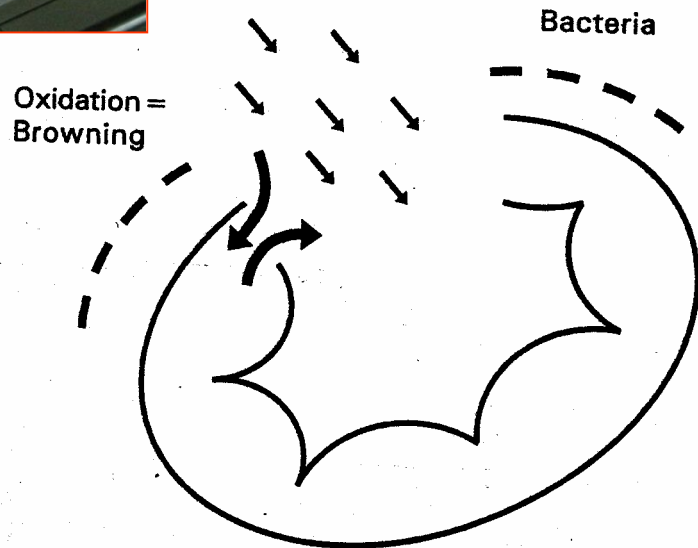
# Cutting: use suitable tools

- Accelerates respiration process
- Mechanical shock to tissue
- Bruises, cracks, fractures in tissue
- Removal of protective epidermal layer
- Alter gas diffusion
- Provides entry for contaminants
- Cell fluids on cut surface
- Reduced gas diffusion
- Provides substrates for microbes
- Exposure to contaminants
- Physical & chemical change





Intact Cell



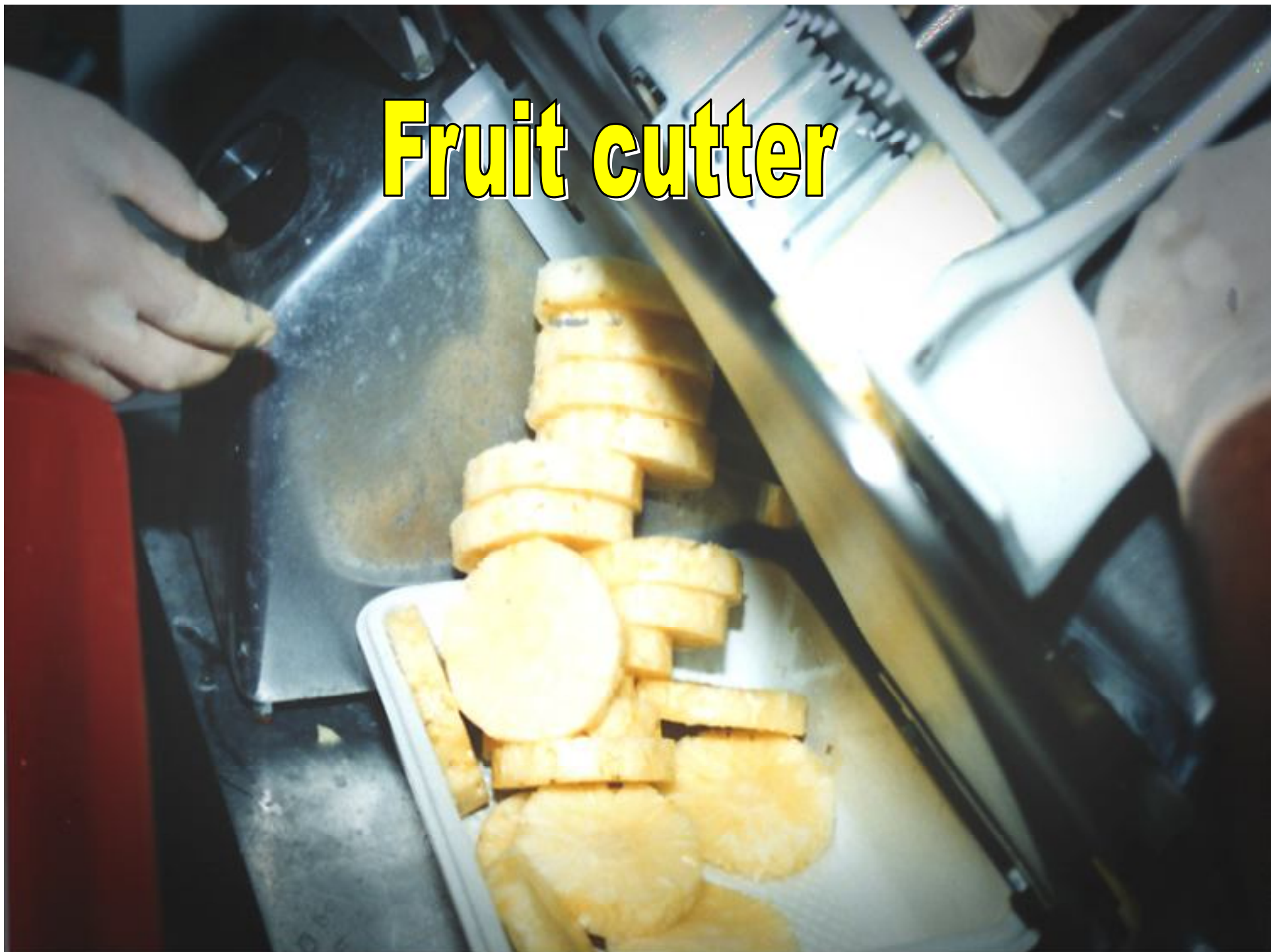
Oxidation =  
Browning

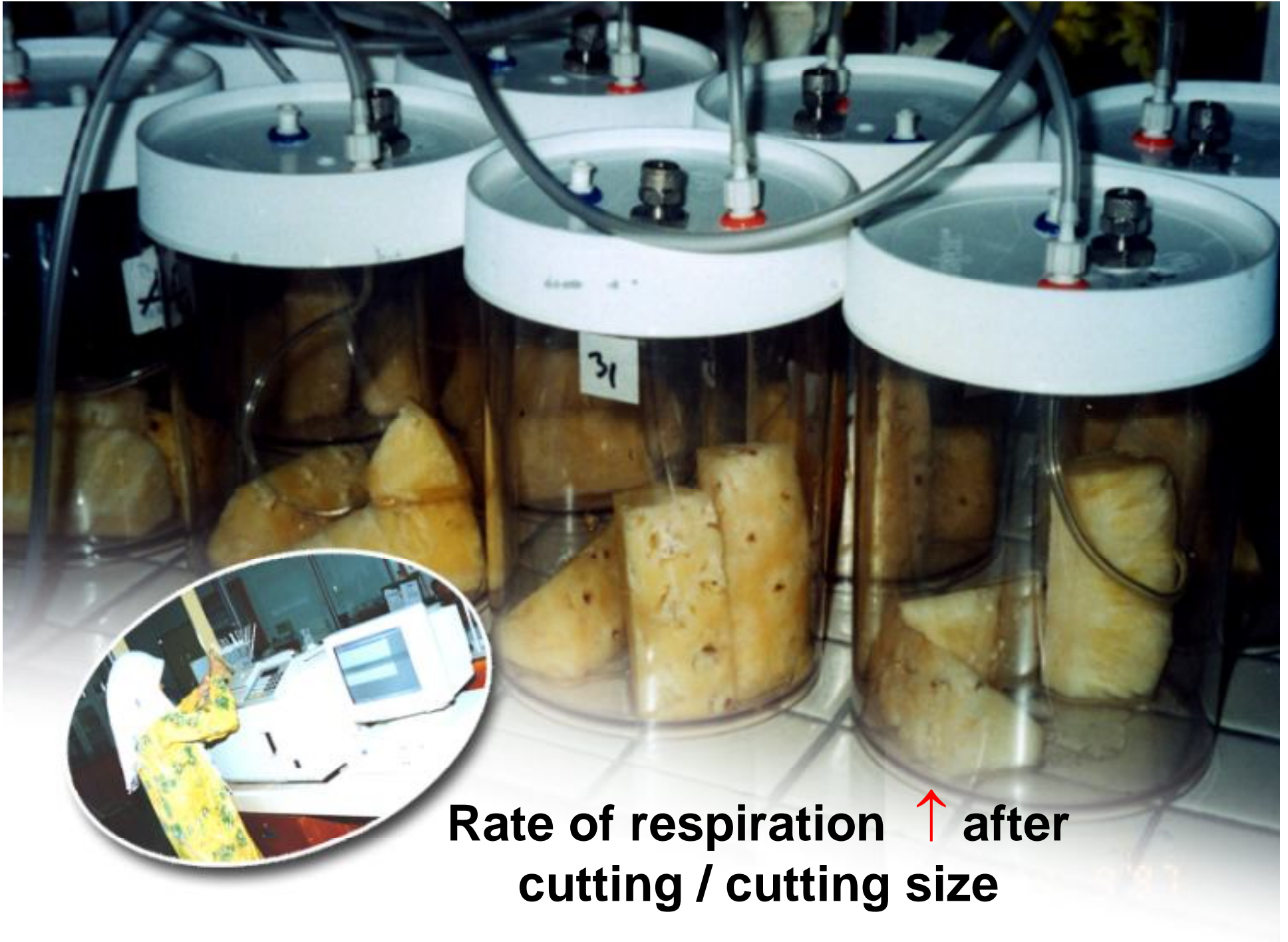
Bacteria

B

Cut Cell

# Fruit cutter





Rate of respiration ↑ after cutting / cutting size

9:27



# Prevention of oxidative browning

**Refrigeration (slows enzymatic reactions)**

**Exclusion of oxygen (CA, MAP, edible coating)**

**Inhibition of PPO**

**Use of reducing agents (ascorbic acid, etc)**

# Acid ascorbic treatment



- **Oxidative browning**
  - is caused by the PPO
- **Ascorbic acid used**
- **to prevent oxidative - browning as:**
  - It plays the unique role of a reducing agent (convert phenolic cpd to their reduced form)
  - It lowers the pH of the product



# Coating treatment



The use of edible coating create a barrier that can retard loss of desirable flavour volatiles and water vapour, while restricting the exchange of CO<sub>2</sub> and O<sub>2</sub>. These will create MA → slow down respiration & ethylene production

→ maintain the quality & shelf life extension of minimally processed products



## **Suitable packing system**

**\*\*protect the product**

**\*\*ensure of food safety**

**\*\*maintain the quality**

**\*\*Consumer attraction**

# Major requirements:

Control moisture loss, gas transfer,  
**Protection against external physical or mechanical damage**

-Compliance with regulatory requirements and guidelines

**-Cost effective**

- Facilitate transport, handling, storage and marketing



# PACKAGING:

- Provide sufficient gas exchange
- Rigid packages- reduce physical injury



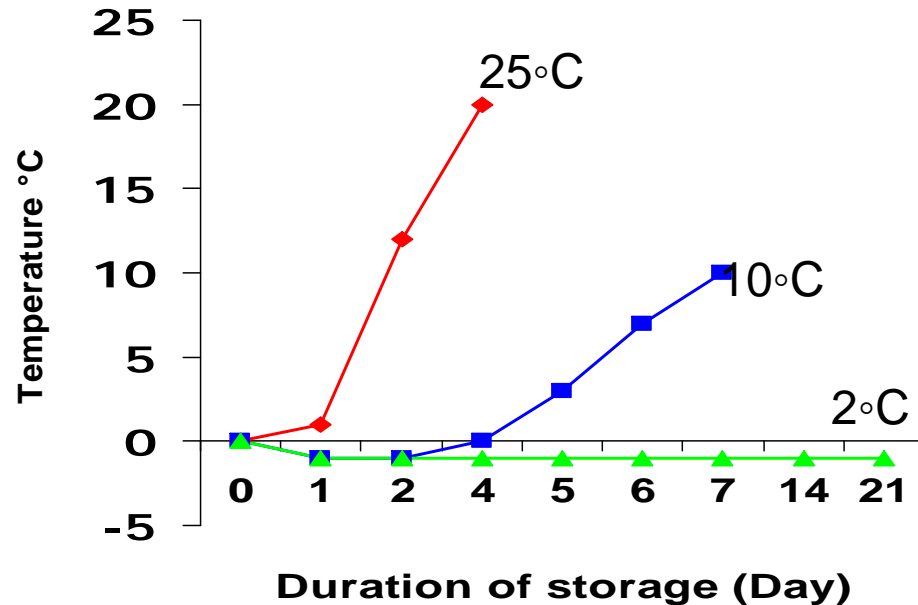
# **Polypropylene container**

- » **Easy to handle**
  - **packing faster**
  - **can be stack**



# Bulk packing:

- Low temperature - provide cool environment to preserve the quality & freshness during transportation & marketing





# Temperature affects all causes of deterioration

1. **Metabolic changes; respiration, ethylene, texture, aroma, etc**
2. **Transpiration**
3. **Mechanical injury**
4. **Physiological disorders**
5. **Decay, microbial growth**

# Signs of deterioration in fresh cuts produce



- **Bruished** - packaging too tight/rough handling
- **Wilting** - excessive drying/water loss
- **Mushiness** - excessive tissue softening
- **Development of off colour**- enzymatic browning
- **Undesirable odour/fermented aroma**- accumulation of ethanol





**M.O may accumulate during handling & packing operations  
The consequence of M.O. causes :**

- Spoilage, off odours & flavours**
- Become serious if pathogenic bacteria grow to numbers sufficient to cause disease.**

**Product safety**

Minimally processed products are generally safe, healthy food. There are, however, several microbiological concerns with minimally processed products:

- They are prepared and consumed raw with no intervening critical steps for pathogens.

- Temperature abuse may occur during distribution and market display

**Total counts,  
mould & yis,  
patagenic org**

***must be low &  
within  
acceptable limit  
based on the  
Food Regulation***



# Product safety

A photograph showing several workers in a food processing facility. They are wearing blue protective suits, hairnets, and face masks. They are working at a table with red baskets, likely handling food products. The scene is brightly lit, and the workers are focused on their tasks.

- **Effective sanitation programme is vital**
- **Strict adherence to GMP should be practise:**
  - **working area**
  - **personnel health**
  - **equipments**

# Food Safety Requirements

- Meticulous cleanliness of equipments, employees and raw material
- Rigid maintenance of refrigerated temperatures
- Complete integrity of packages
- Strict adherence to product use by dates & handling instruction





# Minimally processing

Storage life at 2°C : Pineapple -2 wks. Durian and  
**Jackfruit-3wks**

- **Wider range for market planning-**
- \* **Convenient to eat/carry:**
- **Provide more uniform & constant quality**
- **Require less storage space :**
- **Allow consumer to inspect closely & reassure of the quality**
- **Ensure of product safety**
- **Overcome waste disposal problems at the importer ends.**
- **The consumer can see the product to be eaten**
- **Reassure quality and freshness (retain colour, flavour & aroma**



# Export Potential:

- Air shipment to Middle East, Europe, Australia & China
- Sea shipment to Hong Kong & Taiwan as shipping time is only 6-7 days





COSMO FRUITRADE (M) SDN. BHD.

HONEY

JACKFRUIT

Net Weight  
500gms

NETHERLAND

DAY 4



No. 5, Jalan Velox 2, Taman Velox Rawang  
Tel: +(60)3-6093 6402 Fax: +(60)3-6093 6403



No. 5, Jalan Velox 2, Taman Velox Rawang  
Tel: +(60)3-6093 6402 Fax: +(60)3-6093 6403





NETHERLAND



DAY 4

Nett. 2.0 kg  
CUCUMBU FRUITRADE (M) SDN. BHD.  
No. 1, Jalan Nangka 2, Taman Nangka, 40000 Rawang, Selangor Darul Ulu, Malaysia  
Tel: +603-40913342 Fax: +603-4073 2288  
E-mail: fruit@fruitrade.com.my

# Schiphol

derlandse Spoorwegen

Amsterdam Airport Schiphol



- Zurich
- Amsterdam
- Rotterdam

Today export  
activity - 1080  
PP/500g/wkly



- Belgium





**Dubai:1800 PP/500g/wkly**

**Sea shipment of minimally processed durian  
-Hong Kong-**



# Minimal Processing

Consumer demand for convenience and added value means that minimally processed fruits with extended shelf life will play a significant role in the FRUIT INDUSTRY in the future.

-Application of strict sanitation in processing, improved technology in packaging, and intense commitment to strict attention to maintaining correct low temperatures throughout the cold chain - from distribution, storage, and display to handling and use by the consumer.

Success will ultimately depend on providing a safe, wholesome product with FRESH-LIKE quality at the consumer's table

## Future Concept For Marketing

## Tropical Fruits





# Acknowledgements

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MARDI  
YOU

THANK