



## LOSS ASSESSMENT ON SELECTED VEGETABLES AND FRUITS



# OUTLINE OF PRESENTATION

**Brief presentation about Philippines**

**Postharvest losses of crops:**

- Lettuce
- Carrots
- Cabbage
- Banana
- Calamansi



# PHILIPPINES

- **Land Area** – 300,000 sq km
- **Population** - 100 M
  - Luzon
  - Visayas
  - Mindanao
- **Archipelago** - 7,100 islands
- **Topography** – Up to 60% highland
- **Typhoons** – 20 to 27 per year



## Importance of Agriculture to the Philippine Economy

- Agriculture - provide 33 percent of the total employment (NSO, April 2012)
- Agro-based products accounted for
  - 7.1% of the total exports
- About 12.5% of the gross domestic product in the first quarter of 2012 came from the agriculture, hunting, fishery and forestry industries (NSCB, 1st Quarter 2012 National Account)

# Philippine Center for Postharvest Development and Mechanization

Department of Agriculture



# Industry Thrusts & Programs

- ✓ Improving the postharvest handling and systems to reduce high postharvest losses.
- ✓ Increasing farmers productivity through efficient marketing system and supply chain.
- ✓ Provision of government policy and infrastructure support system.
- ✓ Enhancing the capability of the industry to undertake export marketing of selected fruits and vegetable.



## DEFINITION OF TERMS

Postharvest harvest system

Spurgeon says, **post-harvest system encompasses the delivery of a crop from the time and place of harvest to the time and place of consumption, with minimum loss, maximum efficiency and maximum return for all involved"** (The Hidden Harvest, 1976).



Postharvest harvest losses- "Losses are a measurable reduction in foodstuffs and may affect either quantity or quality" (Tyler and Gilman, 1979).

## Quantitative loss (Physical)

- structural physical damage )
- evaporation of intercellular water

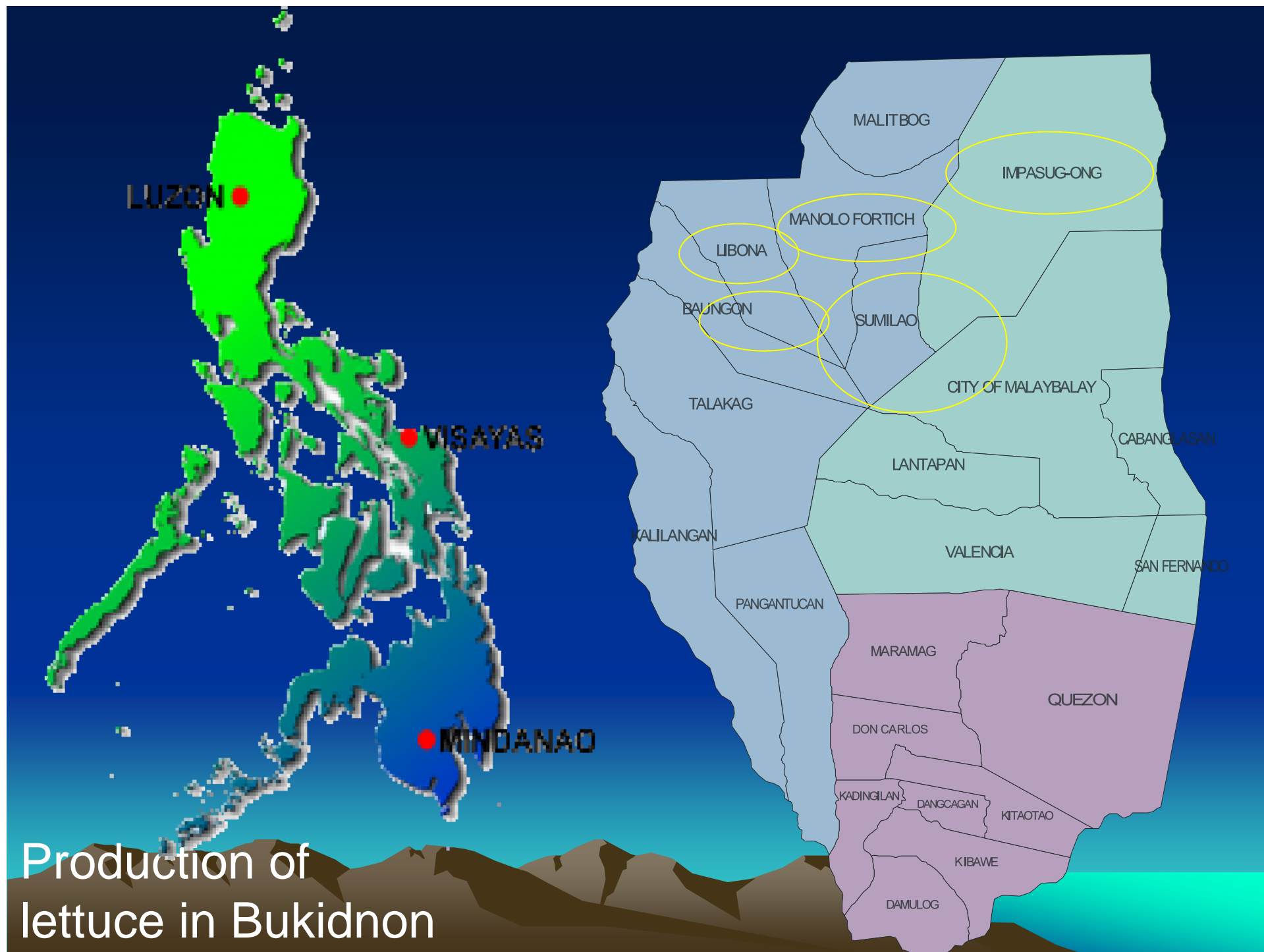
## Qualitative loss (Physical)

- Physiological changes – appearance, taste and texture





# ***LETTUCE PRODUCTION***



LUZON

VISAYAS

MINDANAO

MALITBOG

IMPASUG-ONG

MANOLO FORTICH

LIBONA

BAUNGON

SUMILAO

TALAKAG

CITY OF MALAYBALAY

CABANGLASAN

LANTAPAN

KALILANGAN

VALENCIA

SAN FERNANDO

PANGANTUCAN

MARAMAG

QUEZON

DON CARLOS

KADINGILAN

DANGCAGAN

KITAOTAO

KIBAWÉ

DAMULOG

Production of  
lettuce in Bukidnon



# POSTHARVEST HANDLING PRACTICES



harvesting of lettuce



lettuce in plastic crates



loading of crates



lettuce loaded in cart

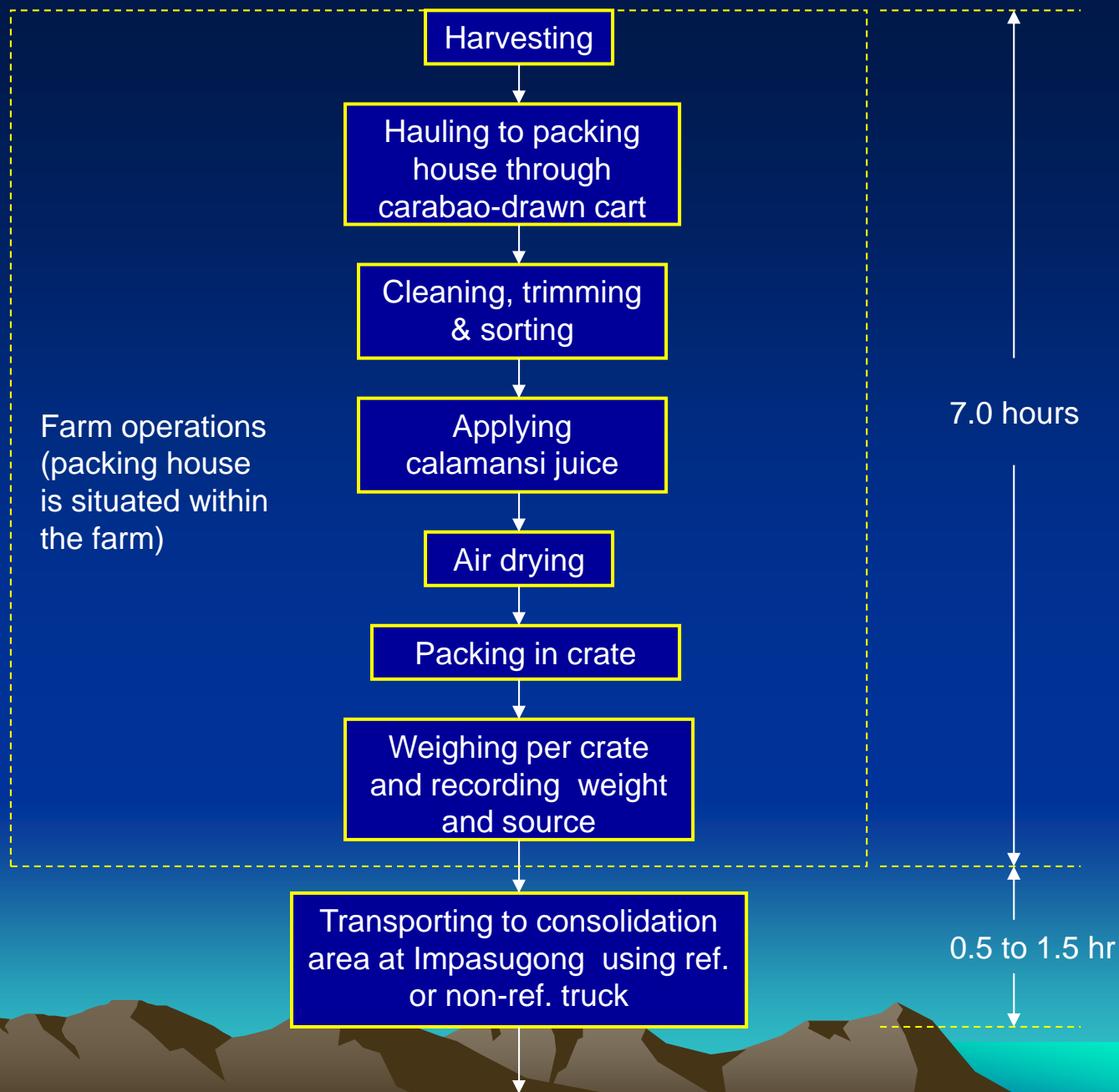


application of calamansi

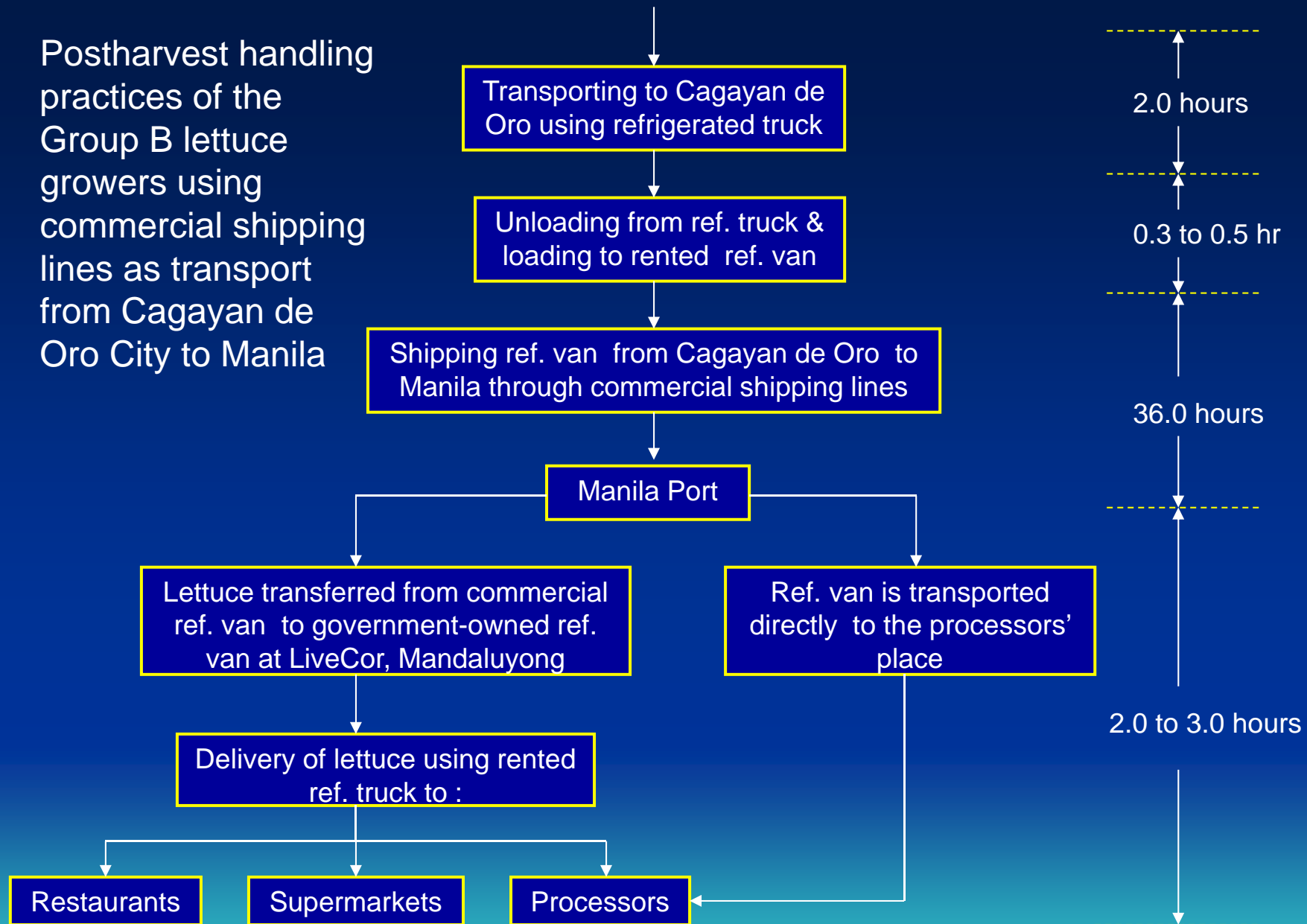


air drying for 2-4 hours



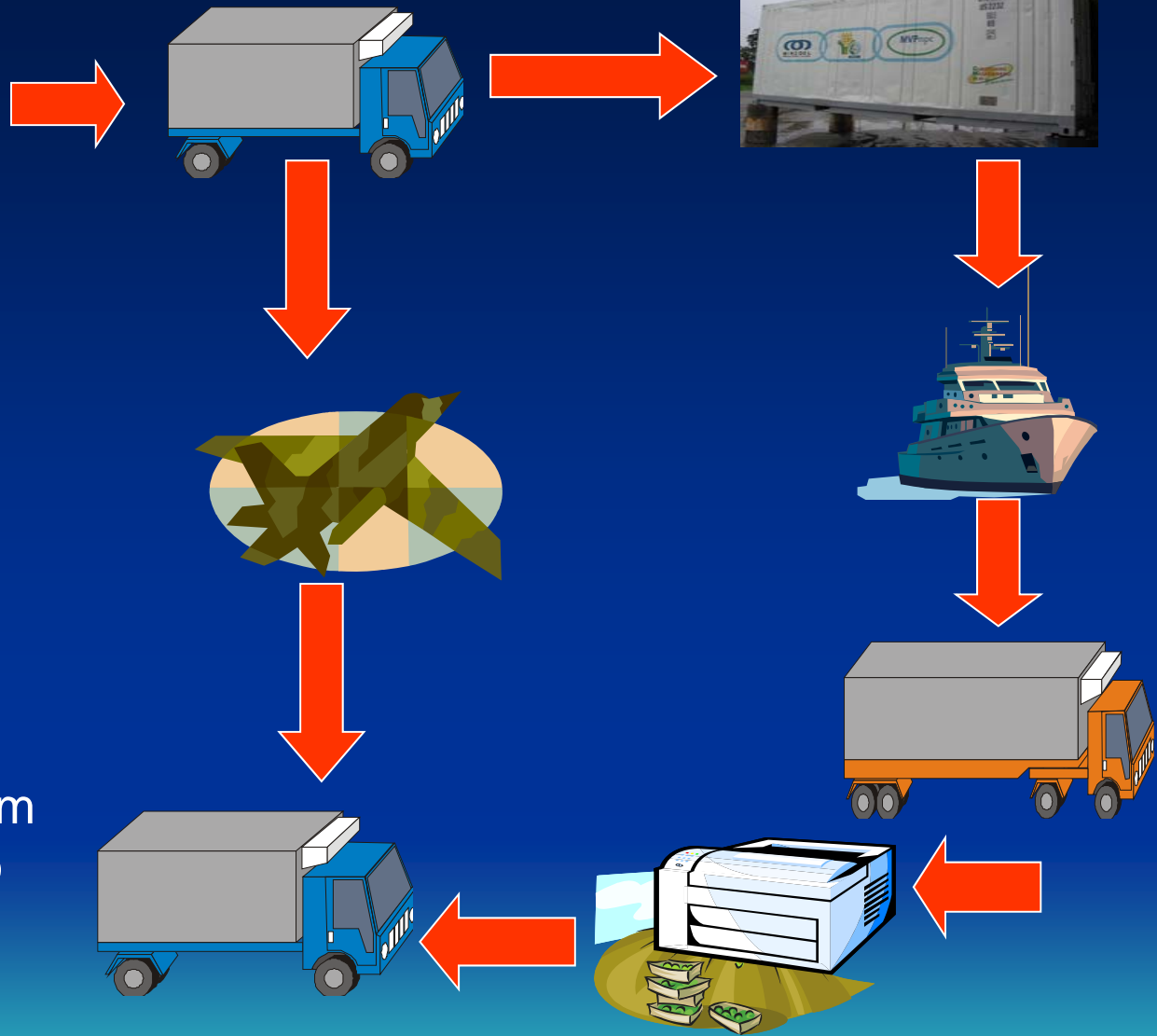


Postharvest handling practices of the Group B lettuce growers using commercial shipping lines as transport from Cagayan de Oro City to Manila





Flow of lettuce from  
Bukidnon farms to  
Manila



QUALITY INDICATOR	CONDITION OF LAND TRANSPORT		DIFFERENCE	t- TEST & p VALUE
	Open truck (31°C, 61% RH)	Ref. truck (4°C, 51% RH)		
Loss of weight (%)	20.94	19.54	1.40 <sup>ns</sup>	0.799 p = 0.508
Loss of weight due to trimmings (%)	24.69	17.64	7.05*	5.670 p = 0.048
Percent recovery	32.01	37.30	-5.29*	-4.916 p = 0.050

# Cabbage and carrots





# I. Carrots



**HARVESTING**



**TRIMMING/PRE SORTING**



**HAULING**



**LOADING/PACKING**



**TRANSPORTING**



**TRADING POST**

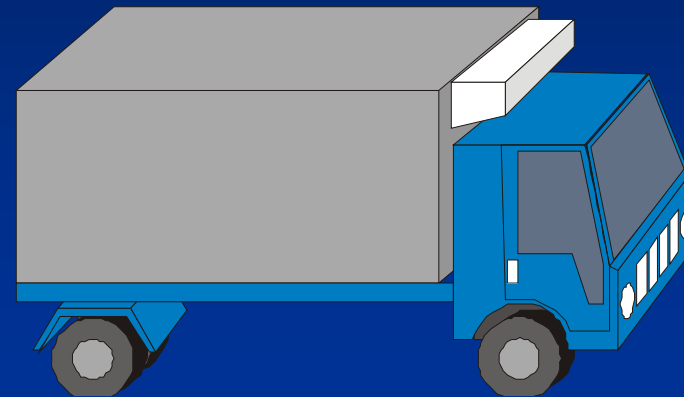


Typical postharvest operations of carrot growers

# Evaluation



Ordinary truck



Ordinary truck

# LOSS MEASUREMENTS

## Pre-harvest Defects

- Greening
- Forking
- Growth cracks
- Mishapen
- Pale
- Scarface

## Postharvest Defects

- Bruised
- Cut
- Sunken area
- Broken tip

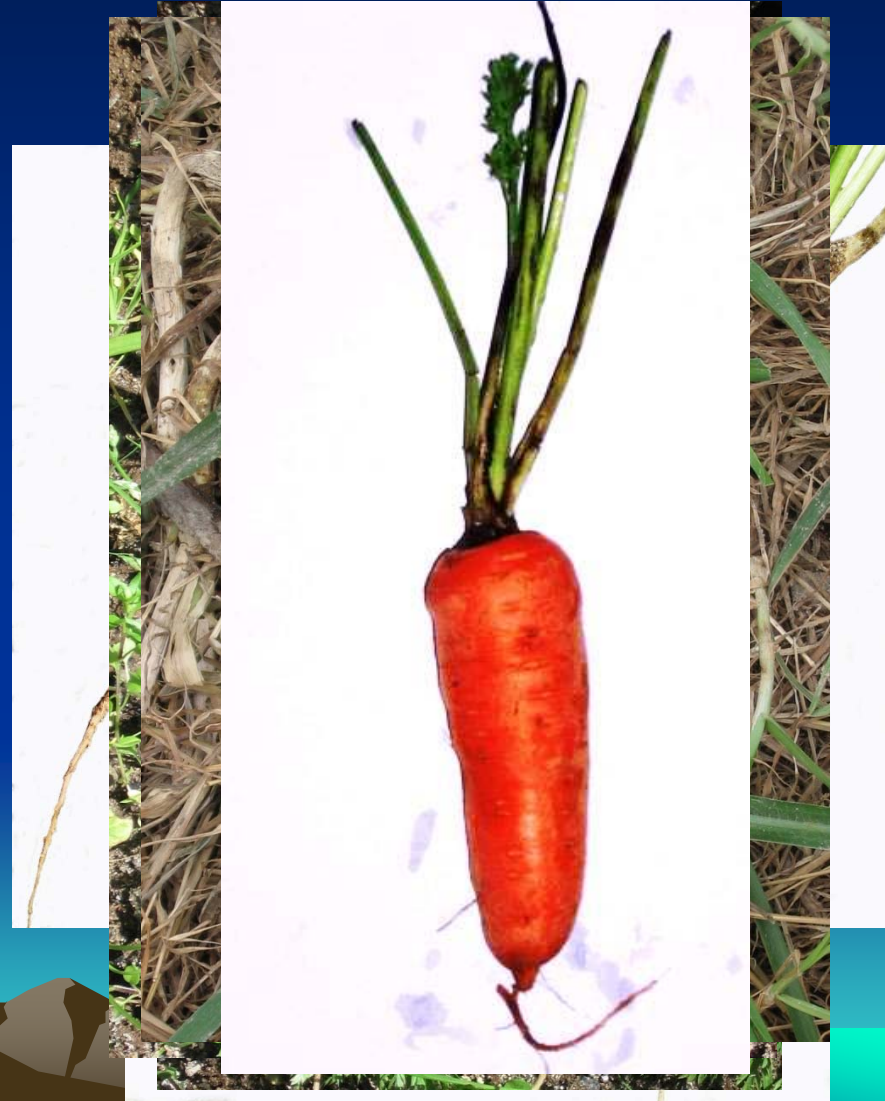


Table 1. Summary of postharvest losses of carrots, with intervention, Benguet to Manila

<sup>s</sup> Loss	Farm/Assembly Area (washed)	WS1- Ordinary truck	WS1 Refrigerated truck
Trial 2			
Weight loss	0.00	7.35	7.33
System loss	0.00	7.35	7.33
Trial 3	0.00	0.56	0.17
Weight loss	0.00	0.56	0.17



# CABBAGE



**HARVESTING**



**TRIMMING/PRE SORTING**



**HAULING**



**LOADING/PACKING**



**TRANSPORTING**



**TRADING POST**



Typical postharvest operations of cabbage  
Sources: In-house Report of FVLA, 2007

## Benguet trading post

Cabbage packaged in plastic bag and transported refrigerated truck

Weight loss  
=0.0%

VQR 7.81 %

Cabbage packaged in plastic bag and transported in non-refrigerated truck

Weight loss  
=0.46%

VQR 7.29%

## Benguet trading post

Total quantity loss during transport = nil  
Change in VQR  
=0.05  
(7.86 - 7.81)

Total quantity loss during transport = nil  
Change in VQR  
=0.05  
(7.86 - 7.81)

Source: Ma. Elizabeth Ramos thesis

# Recommendations

- Good harvesting practice – harvest at right maturity , handling with care
- Use of modified atmosphere packaging, polyethylene bag with 0.05 mm thickness with 160 diffusion holes/22 kg fruits
- Use of refrigerated truck
- Avoid delays



# Calamansi

## Traditional practice

Farm

Ordinary  
Truck

Ship  
(container van)



## Intervention

Farm  
MAP –  
Modified  
Atmosphere  
Packaging

Ordinary  
Truck

Ship  
(container van)





# Calamansi

	Without intervention		With intervention	
	Quantitative		Quantitative	
	Kg	%	Kg	%
Trial 1	527	10.50	426.11	8.48
Trial 2	1,631	32.54	510.67	10.19



# Recommendations

- Good harvesting practice – harvest at right maturity , handling with care
- Use of modified atmosphere packaging, polyethylene bag with 0.05 mm thickness with 160 diffusion holes/22 kg fruits
- Use of refrigerated truck or use of ice blocks



# Banana



## Ordinary truck and close van

# Postharvest losses

Practices	Ripeness
1. Close van	81 percent
2. Open truck	69 percent



# Postharvest losses

Practices	Percentage losses
1. Traditional practice (Bulk loaded inside close container van with out ethylene scrubber	16.06
2. With technology intervention	15.94
3. Open tuck (bulk loaded without scrubber )	20.09
4. Crates inside container van	6.62

# Beneficial effect of ethylene scrubber

- Reduction of weight loss (2.65 %-0.26%)
- Proportion of ripe fruit ( 70-10%)
- Recommendations:
  - - Use of ethylene scrubber – beneficial but further studies are needed if we use it in a commercial scale



# Projects



# HUWARANG PALENGKE

*Linking organized farmers, animal growers, fisherfolks to market their products directly to food retailers in Public Markets of Metro Manila*





# COLD CHAIN PROJECT

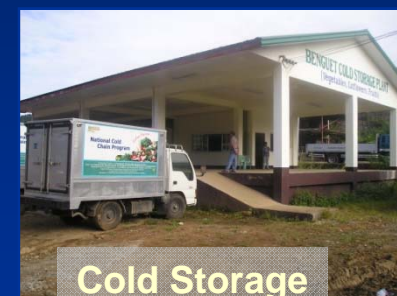
*To extend the  
freshness and  
extend the  
shelf life of  
fruits and  
vegetables*



Pre Cooler



Plastic crates



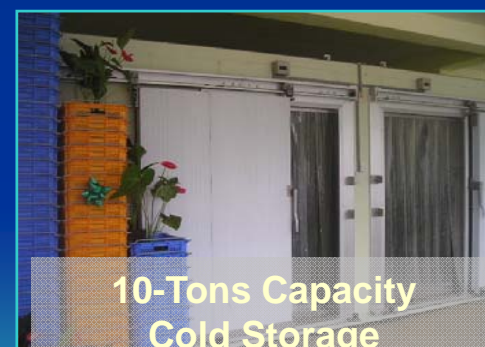
Cold Storage



Reefer Vans



20-ft ref truck  
16-ft ref truck  
10-ft ref truck



10-Tons Capacity  
Cold Storage

# FOOD LANE PROJECT

*Exempting food deliveries to Metro Manila from the “truck ban” and the “color coding” traffic schemes*





# "MAY GULAY"

*Product development and testing of ready-to-cook vegetable mixes using MAP*



## References:

- **Quantitative and Qualitative loss Assessment on Selected High Value Crops Report**
- **Ma. Elizabeth V. Ramos, Thesis**
- **Feasibility Study of a Cold chain System for Transporting Lettuce from Bukidnon to Metro Manila- MCAntolin and Renita SM del Cruz**



- **Postharvest, Quality and Food Safety for Fruit and Vegetables in the Philippines – Raul R. Paz and Rodelio G. Idago**

