

# Annual International Training Course:

## AITC

### Theme 3: Food Security

# Faculty of Agro-Industry, Chiang Mai University

Annual International Training Course

on

Reducing Postharvest Losses and Maintaining the Postharvest Quality of  
Fruits, Vegetables, and Grains throughout the Supply Chain  
as Well as Creating Value-added Products

## 1. Course Title

Reducing Postharvest Losses and Maintaining the Postharvest Quality of Fruits, Vegetables, and Grains throughout the Supply Chain including Creating Value-added Products

## 2. Duration

9 – 20 August 2021 (30 hours)

## 3. Background and Rational

The United Nations predicted that the world population will reach 9.8 billion in 2050 (UN, 2017). Increasing numbers of people impact demand for food. Food availability and accessibility can be increased by increasing production, improving distribution, and reducing the losses. Therefore, reduction of post-harvest food losses is a critical component of ensuring future global food security (Aulakh and Regmi, 2014). A total of 1.8 billion tons of food is either lost or wasted each year (Gustavsson et al., 2011).

Postharvest losses can be defined as the degradation in both quantity and quality of a food production from harvest to consumption. Quality losses include those that affect the nutrient composition, the acceptability of consumers, and the edibility of a given produce.

These losses are generally more common in developed countries (Kader, 2002). Quantity losses refer to those that result in the loss of the amount of a product. The quantity losses are high in developing countries. A recent FAO report indicates that at global level, volumes of lost and wasted food in high income regions are higher in downstream phases of the food chain, but just the opposite in low-income regions where more food is lost and wasted in upstream phases (FAO, 2013). Therefore, it is very significant to reduce both quantity and quality in developing countries in Asia. In order to maintain fresh vegetables quality and reduce quantity after harvest, the good postharvest management process of handling is very important with the aim of stopping or slowing down spoilage such as loss of quality, edibility or nutritional value.

Good Practice in postharvest usually involves preventing the growth of microorganism that caused spoilage of fresh produces as well as human pathogen. Good postharvest practice also includes good handling processes and technologies which inhibit natural discoloration that can occur during fresh produce preparation, such as the enzymatic browning reaction in fresh cut vegetables after the cutting process. Many handling processes and technologies designed to reduce postharvest losses and maintaining produce quality. Furthermore, for the produce that cannot be sold fresh, many food preservation methods can be applied in order to maintaining or creating nutritional value, texture and flavor, which is an essential aspect of value added to the postharvest losses of the produces.

This course will review the principle of postharvest, apply good practice to reduce postharvest losses and maintaining good produce quality. Food preservation and quality control will also be discussed to implement appropriate technologies to certain produce. Moreover, it will review and evaluate the different techniques used for postharvest, preservation and quality control to enhance food security.

This course program will provide both theoretical and practical trainings in the use of postharvest management along the supply chain; from farm to fork, including transporting vegetables from hilltop, processing, to packaging. Moreover, participants will learn the processing methods for fruits and vegetables that have some of defect or oversupply to create value-added vegetable products which can be commercialized using food innovation. Fruits and vegetables used in practice section are commonly available throughout the world such as banana and mango.

Due to the coronavirus disease (COVID-19) pandemic, this program will be held online through virtual meeting platform such as Zoom. Participant will be provided with the Zoom meeting ID in order to join both lectures and practices. To avoid networking and other unplanned problems, lectures and practices will be professionally recorded and edited, and launched at the meeting time. Each lecture and practice will be approximately 1.5-3 and 1 hour long respectively. At the end of each topic, lecturers will wrap up and answer participants' questions.

For this program, Faculty of Agro-Industry is in collaboration with organizations specialized in postharvest management: Postharvest Technology Research Center, and Postharvest Technology Research Center. The Faculty also have has experiences in hosting the international conferences and trainings such as Food and Applied Bioscience Conferences in 2012, 2014, 2016, 2018, and 2020 as well as International Training of the Trainers on Food Processing during 2010 and 2012. Therefore, it can be ensure that this program will be a success and all of its objectives will be achieved.

Finally, this program supports the United Nation's Sustainable Development Goals to end poverty, protect the planet, and ensure prosperity. According to the meeting on the 25<sup>th</sup> of September 2015, this program supports Goal number 12 (Responsible consumption and production) and Goal number 17 (Partnerships for the goals).

#### 4. Objectives

The program is designed to

- Train and transfer the best postharvest practices in order to reduce postharvest losses, and maintain quality of fresh produces and grains throughout the supply chain, including how to select appropriate technology to extend shelf life of the produces.
- Train and practice food processing technology in order to create value added products.
- Be able to promote collaboration and communication, as well as encourage a professional network among participants.

#### 5. Course Contents

##### 5.1 Course outline (19 hours)

##### 5.1.1 Postharvest technology and Cold chain management (5 hours)

- a) Reducing Postharvest losses: Factors impacting produce quality throughout the fruit and vegetable supply chain and case studies
- b) Postharvest best practice to reduce postharvest losses: Quality and safety in vegetables and fruits supply chains
- c) Postharvest best practice to reduce postharvest losses: Packing house handling operation
- d) Fresh produces shelf life extension using Precooling technology
- e) Cold chain management

##### 5.1.2 Create value added products using food processing technology (7 hours)

- a) Drying and dehydration technology
- b) Frying technology
- c) Fermentation technology
- d) Thermal processing
- e) Product development technology

5.1.3 Sensory evaluation (2 hours)

5.1.4 Shelf life evaluation (2 hours)

5.1.5 Fresh produces shelf life extension using packaging technology (3 hours)

5.2 Practices (7 hours)

5.2.1 Fresh-cut practice and Precooling practice (1 hour)

5.2.2 Fermented food (1.5 hours)

- a) Kimchi
- b) Kombucha
- c) Mushroom

5.2.3 Fruit, vegetable, and grain products (4.5 hours)

- a) Banana 2 products
- b) Mango 2 products
- c) Pineapple 2 products
- d) Rice 2 products
- e) Mixed fruit/vegetable juice 1 product

5.4 Advance Assignments

5.4.1 Country Report

Participants are required to submit the country report relating to the current postharvest losses in their home country. Topics may include current situations, policy, statistics, technology, major issues and problems. The country report should be between 5-10 pages in length, excluding tables/figures. Participants

need to submit this report 1 week prior to departure. Participants are expected to make a 10-minute presentation.

#### 5.4.2 Reading Assignment

Participants are required to read references or documents related to postharvest losses

#### 5.4.3 Project Assignment

Participants are required to submit a project proposal within 3 months after the training course is finished.

### 6. Participants Criteria

The governments of the following countries will be invited to nominate applicant(s) to attend the Course: Cambodia, Laos PDR, Myanmar, Pakistan, Kenya, Nigeria, Timor-Leste, Bhutan, Sri Lanka and Thailand. The total number of participants is 20 participants.

Participants are expected to possess the following qualifications:

Age	Under 50 years old
Experience	At least 5 years of experience in related areas
Education	University degree or equivalent qualification in food science, food engineering, agro-industry, bio-technology, and other related fields
Language	Proficient in spoken and written English
Health	In good health both physically and mentally
Attendance	Be able to participate in the training course for the full time
Nomination	Be nominated by their respective government

## **7. Venue**

Online via virtual meeting platform such as Zoom

## **8. Expected Results**

Upon complete all training sessions, participants will be able to apply knowledge, experience, and skills learning from this training in reducing the postharvest losses and maintaining the quality throughout the supply chain, as well as properly apply technology to maintain fresh vegetables quality or create value added to products.

## **9. Evaluation**

This program will be evaluated using the following criteria

1. Class attendance – participants are required to attend all activities organized during the course
2. In-class participation and discussion
3. Pre-test and post-test – participants are required to take a pre-test and a post-test
4. Final presentation – at the end of the course, participants are required to make a presentation on project planning to improve postharvest handling in order to reduce postharvest losses in participants' home country
5. Project follow-up online – participants are expected to share the progress on their project periodically with Course Organizer and fellow participants using online networks such as Facebook
6. Project progress report – participants are required to submit a project progress report on postharvest losses and handling within 1 year after the training course is finished and



## 10. Institution

### 10.1 Executing/Implementing Agency

#### 10.1.1 Organization title:

Faculty of Agro-Industry, Chiang Mai University

#### 10.1.2 Organization address:

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Muang District, Chiang Mai, Thailand 50200

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#### 10.1.3 Focal persons and contacts:

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#### 10.1.4 Website

<http://www.agro.cmu.ac.th/>

### 10.2 Collaborative Organizations

- Postharvest Technology Research Center, Faculty of Agriculture, Chiang Mai University
- Postharvest Innovation Center

# TENTATIVE PROGRAM OF THE TRAINING

Day	Topic/Activity
<b>Day 1 – 9 Aug 2021</b>	
9.00 – 10.00	Opening Ceremony/Pre-test
10.00 – 11.00	Lecture – Reducing Postharvest losses: Factors impacting produce quality throughout the fruit and vegetable supply chain and case studies
11.00 – 12.00	Lecture – Postharvest best practice to reduce postharvest losses: Quality and safety in vegetables and fruits supply chains
<b>Day 2 – 10 Aug 2021</b>	
9.00 – 10.00	Lecture – Postharvest best practice to reduce postharvest losses: Packing house handling operation
10.00 – 11.00	Lecture – Fresh produces shelf life extension using Precooling technology
11.00 – 12.00	Lab – Fresh-cut practice (Ready to eat fresh salad) Lab – Precooling practice (Ice cooling and hydro cooling)
<b>Day 3 – 11 Aug 2021</b>	
9.00 – 10.00	Lecture – Cold chain management
10.00 – 11.00	Lecture – Drying and dehydration technology
11.00 – 12.00	Lab – Product development (Deep fried banana) Lab – Product development (Pineapple candy) Virtual site visit 1
<b>Day 4 – 12 Aug 2021</b>	
9.00 – 10.00	Lecture – Frying technology
10.00 – 11.00	Lecture – Fermentation technology
11.00 – 12.00	Lab – Product development (Mango fruit leather) Lab – Fermented food – Kimchi

Day 5 – 13 Aug 2021	
9.00 – 11.00	Lecture – Thermal processing
11.00 – 12.00	Lab – Fermented food – Kombucha Lab – Product development (Nata de ricey)
Day 6 – 16 Aug 2021	
9.00 – 11.00	Lecture – Product development technology
11.00 – 12.00	Lab – Fermented food (Fried mushroom patty <plant-based> ) Lab – Product development (Banana candy)
Day 7 – 17 Aug 2021	
9.00 – 11.00	Lecture – Sensory evaluation
11.00 – 12.00	Lab – Product development (Vacuum fried pineapple) Lab – Product development (Mango candy)
Day 8 – 18 Aug 2021	
9.00 – 11.00	Lecture – Shelf life evaluation
11.00 – 12.00	Lab – Product development (Thai rice cracker) Lab – Product development – Mixed fruit/vegetable juice
Day 9 – 19 Aug 2021	
9.00 – 12.00	Lecture – Fresh produces shelf life extension using packaging technology
12.00 – 12.15	Virtual site visit 2
Day 10 – 20 Aug 2021	
9.00 – 12.00	Project presentation Post-test Certificate Presentation Closing Ceremony