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Guide for the Trainer

Production and Processing of Organic Mangosteen in Thailand

By

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Preface

This handbook is made for the purpose of reading knowledge for training the trainers on the production and processing of organic mangosteen in Thailand to meet the standards of Thai organic agriculture and international organic agriculture standards for export. The target groups of trainers are farmers leaders, entrepreneurs, government officials, teachers, and others related to the organic agricultural product chain in production, processing, transportation, export, etc. The main objective of the training of the trainers in this project is to extend the knowledge on this training topic to farmers, entrepreneurs or those involved and create a network of cooperation of those involved in the organic production chain. The content in this manual consists of concepts, principles, techniques and production methods of organic mangosteen, Thai and international organic standards for both production and processing, application for group organic certification, including training techniques and being a trainer. In addition to the content on the various topics mentioned above, there are also links to additional resources and documents on each topic, along with examples of training activities for trainers to use as alternatives to organize training with farmers, entrepreneurs or interested people.

The development process of this manual emphasizes participation in the knowledge of multi-sectoral organizations consisting of farmers, the committees of groups and Community Enterprises, Chanthaburi Horticultural Research Center Horticulture Research Institute Department of Agriculture, National Bureau of Agricultural Commodity and Food Standards (ACFS) International Trade Center (ITC) Foundation for Organic Agriculture Standards, CERES South East Asia Co., Ltd. and Maejo University. Including the body of knowledge in documents, information, books from various websites as referenced in the book. The team who created the guide would like to thank you all and all the aforementioned units

The authors hope that this manual will be useful to trainers on organic mangosteen production and processing. However, if there are any errors in this manual, the authors would like to accept and apologize.

Authors

Manual for being a trainer for organic mangosteen production

Training Manual Instructions

This training manual is a guide for farmers to act as trainers for organic mangosteen production and it consists of 6 main topics:

1. **The introduction to the lesson** Included the principles of organic agriculture, the importance of the quality assurance system, product standards and presented to the target farmers before bringing them into the lesson as an incentive to continue learning and accepting.
2. **Presentation of Thai organic standards and international standards** It contains important contents of Thailand's organic standards, examples of international standards for export, who in the production chain must be of the standard. To enable target farmers to know the organic standards, realize their roles in the production chain, and choose to apply for certification correctly.
3. **Request for certification** It contains a form of accreditation and provides recommendations on the process of obtaining accreditation. This chapter focuses on collective certification to encourage target farmers to create networks both in terms of exchanging production factors and internal auditing techniques.
4. **Presentation of techniques for organic mangosteen production** It consists of general principles and practices for managing production to meet Thai and international organic standards, and techniques for taking care of mangosteen to ensure quality and meet organic standards. This section is presented in the form of a mangosteen production calendar, comparing conventional mangosteen production with organic production as a guideline for target farmers who want to switch to organic production, easy to understand and follow.
5. **Organic food processing** It consists of practices for processing organic food to meet Thai and international organic standards as information for farmers or related entrepreneurs to prepare properly.
6. **Preparation of a plan to transfer knowledge to target farmers** which includes suggestions for planning knowledge transfer and alternative activity for transferring knowledge appropriate to the topic and target group. There is also a review form for broadcasting management planning to be used as a guideline for further training.

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Principles of Organic Agriculture and Quality Assurance Product Standards

1.1 The principle of organic farming is not just the use of chemicals.

The first thing people think about organic agriculture is:

Organic agriculture = No chemical fertilizer
No chemical additives

However, from the origin of organic agriculture, it developed from the need to have a production model that can create good food and minimize the impact on the ecosystem to be a sustainable production system.

Figure 1 The 4 Principles of Organic Farming

The International Federation Organic Agriculture Movement (IFOAM) drafted organic farming practices, which are accepted around the world, and it consist of 4 principles:

1 Health Organic agriculture should maintain and promote soil health, plants, animals, humans under the concept that the world is one and inseparable. Therefore, the use of fertilizers should be avoided, pesticides, animal medicines and food additives harmful to health should be avoided

2 Ecology The design of Organic farming systems should attain ecological balance through habitats and maintenance of genetic and agricultural diversity. Local natural mechanisms to increase productivity based on the principle of resource and energy efficiency and reuse for sustainable farming.

3 Fairness Organic agriculture should build relationships that ensure fairness for all stakeholders, from farmers to consumers, both now and for future generations, to have a good quality of life, including the well-being of animals in the system in accordance with their natural behavior.

4 Empathy Organic agriculture should be managed carefully and responsibly to protect the health and well-being of current and future generations and the

environment by choosing appropriate technologies and rejecting long-term unpredictable technologies such as genetic modified (**GMOs**).

Summary definition of organic production system

Physical

1 Biodiversity Systems
2 Improvement of Soil Fertility.
3 Achieve sustainability by minimizing external factors.

Social

1 It is a system with a large production chain that includes processing, distribution of products, raw materials, as well as the retail market to consumers.
2 To give consumers confidence that the organic products are produced strictly according to standard regulations in every process.
3 Consider the environment as well as the welfare of animals.

1.2 Global Market for Organic Products

According to the collection of 2022 organic farming data, 76.4 million hectares of organic farmland are occupied by 191 countries around the world. Australia, accounting for 48% of the world's organic farmland, followed by Europe, South America, Asia, North America and Africa respectively. According to data from the past 20 years from 2000 to 2020, there has been a tremendous 4 times increase in organic farmland on all continents of the world and in Asia alone by 60 times. (Source: FiBL survey 2023).

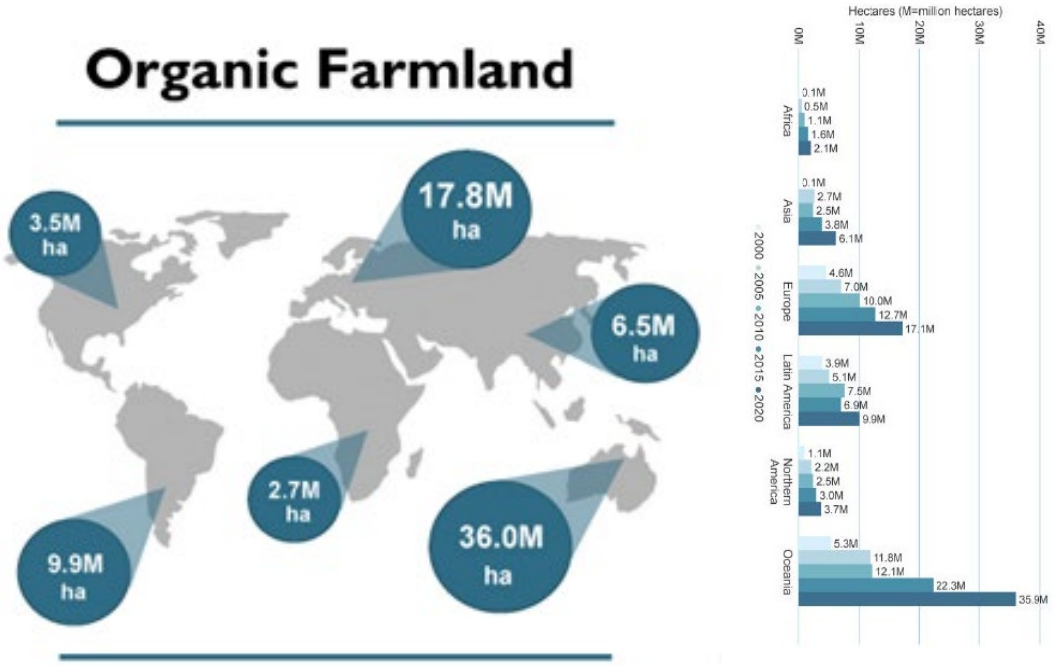


Figure 2 World map showing organic farmland on each continent. In 2021 (area unit M = million ha) and the bar graph shows the growth of organic farmland from 2000 – 2020.

The market value is very high and the demand for organic agricultural products increases every year. From the data collected in 2001, it was found that the value was 21 billion US dollars (715.7 billion baht) and increased to 135.5 billion US dollars (4,617.8 billion baht). Organic has grown more than 7 times in 20 years, and during the outbreak of Covid 19, consumers' interest in organic products has increased, this make food sales and organic beverages rose as high as 15%, the highest growth ever reported was valued at 17 billion dollars (596 billion baht) (Source of data: FiBL survey 2023)

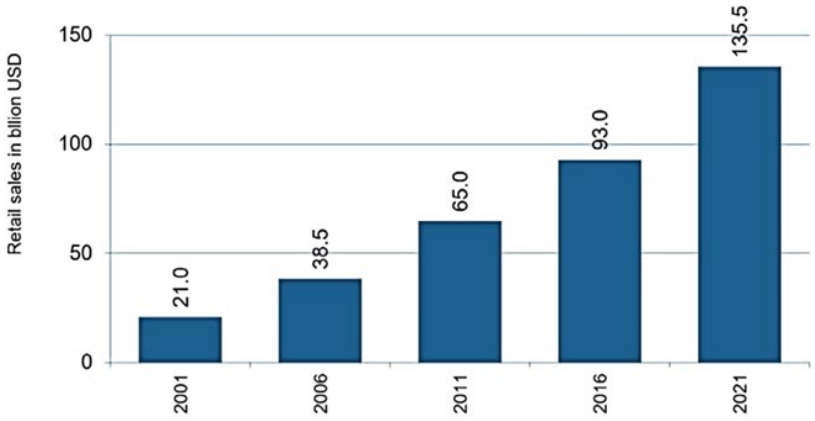
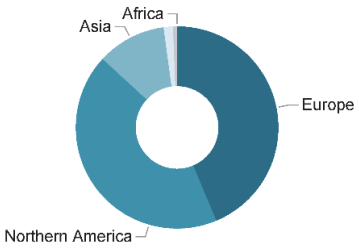


Figure 3 The chart shows the growth of the world's organic food and beverage products since 2001 – 2021

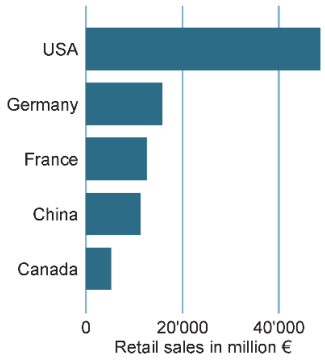
When considering market value by continent, it was found that the European continent had the highest market capitalization of 54.5 billion euros, followed by, North America which is valued at 53.9 billion euros and Asia at 13.7 billion euros. When considering the market for organic products from the overall market value of each country. It was found that the United States had the highest market value at 48.6 billion euros, followed by Germany, France and China. (Source: FiBL survey 2023)

The largest single market was the USA with 48.6 billion (bn) €, followed by the European Union (46.7 bn €). By region, Europe had the lead (54.5 bn €), followed by Northern America (53.9 bn €) and Asia (13.7 bn €).



Distribution of retail sales by region 2021.

The countries with the largest markets for organic food were the USA with 48.6 billion (bn) €, Germany (15.9 bn €), France (12.7 bn €) and China (11.3 bn €).



The five countries with the largest markets for organic food in 2021.

Summary of the global market situation

North America and Europe alone account for 87.7% of the global organic market. The export of organic products to both continents must be certified to organic standards according to the compulsory laws of the destination country.

Products that have been certified by organic standards from Thailand to Europe are:

- Rice and products from rice such as; rice vinegar, rice flour, rice bran oil, crackers and others.
- Vegetables, fruits and herbs (fresh, dried, frozen) such as asparagus, baby corn, sweet corn, apple, custard apple, banana, dragon fruit, durian, guava, jackfruit, lychee, longan, mango, mangosteen, papaya, pineapple, passion fruit, plum, pomegranate, rambutan, sapodilla, bamboo shoot, basil, ginger, galangal, eggplant, pumpkin, tamarind, lemon, spinach, okra, bergamot, chili, beans, coriander, tomato etc.
- Sugar cane
- Coconut products (desiccated, coconut milk and water)
- Palm Oil
- Soy sauce, Miso
- Cashew nuts
- Coffee
- Cassava
- Tea

Figure 5 shows organic rice products.

Source: https://www.kingfreshfarm.com/

Quality Assurance for Organic Products

Standards, regulations and certifications are set up to protect consumers and farmers who produce organic products according to standards.

Nowadays, many countries set the conditions for "organic agriculture" products. and set a logo to show the symbol of certification as a legal requirement. Although the standards of each country differ in detail. But overall, there are similarities with the main intention.

"To protect the food industry, which is one of the fundamental factors for human livelihood."

The production of organic agricultural products and related standards can be divided into 4 levels as follows:

1. Production for **family consumption**, no certification required.
2. Production for **sale in local markets**, may not require certification standards or require Participator Guarantee Systems (PGS)
3. Production for **sale in the domestic market**, may require Thai Organic Agriculture Standard (TAS 9000 – 2021)
4. Production for **sale in international markets**, standards set by the destination country are required.

It is evident that the market and standards go hand in hand. The greater the distance between manufacturers and consumers, the more the Standards important.

For **sell in international markets**

Source: https://www.marketwatch.com/story/is-organic-food-really-healthier-2016-12-01

For **sell in domestic market**

Source: https://www.lemonfarm.com/th/blog/organic-from-the-grower.html

For **sell in local markets**

For **family consumption**

Figure 6 shows the production of organic agricultural products and related standards divided into 4 levels.

Forms of conveying activities in addition to the content of the chapter.

#1 Tell the story of the trainer or involved team about the inspiration for organic farming.

1. Introducing the name of trainers and agencies or network groups or farm name
2. Occupation before coming to organic farming.
3. Reasons for picking interest in organic farming.
4. Where to find knowledge about organic farming? How did he finally do it?
5. How many years have he/she has been doing organic farming?
6. Where to get organic agriculture certification standard
7. What are the benefits from organic farming from your own experience?

The concept of the activity is:

- The communication of the trainers based on actual data makes it easy for the target farmer to understand.
- To make the trainer's communication be himself, Natural and sincere

#2 Let the target farmer introduce themselves and tell their story.

(In case the number of participants does not exceed 30 people) The content of the story should consist of:

1. Recommendation of the name of the target farmer and the organization or network group or name of the farm.
2. Current occupation
3. Why are you interested in organic agriculture?
4. Has he/she ever been certified to organic standards and which standards?
5. What is the goal of attending the training?

The concept of the activity is:

- To give all the trainers and target farmers an opportunity to get to know each other and build networks in the future.
- It is an opportunity for the trainers to get to know the basics of the target farmers. To provide appropriate methods of conveyance and examples to the audience.

Documentation

PowerPoint Presentation File

Title Chapter 1 Principles of Organic Agriculture and Quality Assurance Product Standards

Data sources

- https://www.ifoam.bio/
- https://www.fibl.org/en/

Chapter

2

Thai Organic Standards and International Standards for Export

Organic Standards

These are the minimum requirements and conditions that producers and entrepreneurs must meet for them to obtain organic standards certification.

It is divided into 2 groups according to law enforcement:

Compulsory standards by law

This is the standard or regulation of the country in which the manufacturer, exporter, importers must comply when they want to sell organic products in such countries. For example, European Union (EU), USA (NOP), Canada (COR) and Japan (JAS), etc.

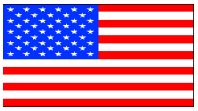
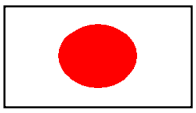
Country/Group of Countries	Marks of Certification	Relevant laws
		(EC) 834/2007, (EC) 848/2018
		NOP/USDA
		Japanese Agricultural Standards (JAS)
		Canada Organic Products Regulation SOR/2009-176
		Chinese Organic Standard GB/T19630

Figure 7 shows the standards or regulations of the country where the manufacturer, exporter Importers must follow when they want to sell organic products in that country.

Voluntary Standards

It is a standard that is well known to consumers in that country, such as:

Voluntary standards of the public sector

Germany

France

Voluntary standards of the private sector

Fair Trade Standards

Standards of Agricultural Product Group

Figure 8 shows an example of government voluntary standard emblem, private sector voluntary standard, fair trade standard, and agricultural product group standards.

Examples of Thailand Organic Standards, IFOAM, European Union, United States and Japan

1 Thailand's Organic Standards

The National Bureau of Agricultural Commodity and Food Standards sets the standard together with all sectors involved in the production of organic agricultural products, which includes government agencies, private sector, consumers, and farmers. This standard is the minimum requirement that domestic producers must meet and is used by certification bodies to evaluate production and make decisions on the certification of farms that have met the criteria. The aim was to drive organic agriculture within the country to develop continuously and be more in line with international organic standards. However, in 2021, the standard of organic crop production was revised from TAS 9000 Volume 1 -2009 to TAS 9000 – 2021 according to the specification.

Agricultural Product Standard 9000 - 2021

Organic agriculture: production, processing, labeling and distribution of organic produce and products.

Scope of Coverage

1) Crop production: crop cultivation, mushroom cultivation, harvesting of natural products. Seed production and parts used for propagation.

2) Aquaculture and algae

3) Livestock farming

4) Beekeeping and edible insects

The main structure of the standard covers the principles, objectives, terms applicable to all groups of goods and appendix.

Furthermore, Appendix A defines the list of substances allowed for organic production, while the methods of handling and producing specific products for each group are prepared as appendices. as follows.

Appendix B Management of Organic Crop Production

Appendix C Management of organic aquaculture and organic algae

Appendix D Organic Livestock Farming Management

Appendix E Management of organic beekeeping and organic edible insects

Key issues to address related to organic crop production.

1. Combine the organic agriculture standard TAS 9000 Volume 1 to 6, including the production of organic sea shrimp, into one volume by organizing the production of each product group as an appendix.

Management of organic crop production is at **Appendix B**

2. In the standard, objectives are determined. Principles of production, processing, labeling, transportation and distribution of organic produce and products covering both plants and animals**. In terms of crop production, this includes crop cultivation, mushroom cultivation, harvesting of natural products, seed production and its propagation.**
3. Increase clarity on certain requirements and objectives to meet ASEAN standards.
4. Revised document requirements of the inspection and certification system were combined into a document: Organic Agriculture Certification Procedures.
5. Change the definition of organic agriculture by Organic Agriculture TAS 9000-2021 (New Book) to "A holistic agricultural production management system that helps enrich agricultural ecosystems. This includes biodiversity, biological cycles, and biological activity in the soil. Organic farming focuses on the use of management methods within the farm rather than the selection of inputs from outside the farm, considering the conditions of different regions that require adapting the system to local conditions. However, when possible, this can be accomplished using common methods, biological and mechanical methods instead of using synthetic materials". Including biodiversity, biological cycles, and biological activities in soils.

   The new definition is in addition to the original definition in TAS 9000, Volume 1-2009 (old volume), by focusing on using management methods within the farm rather than selecting inputs from outside the farm and adjusting the system. compatible with local conditions

Summary of TAS 9000 – 2021 content *standard*

Principles of Organic Plant Production

1. Pay attention to the systems and cycles of nature.
2. Responsible use of energy and natural resources
3. Production of a wide range of high-quality foods; By using a process that does not harm the environment, human health, plant health, or animal health and welfare.
4. Ensure the organicity of organic production at all stages of production, such as processing and distribution of food and animal feed.
5. Design and manage optimal biological processes with the following methods:
   1) Use living organisms and mechanical methods to produce.
   2) The case of land planting, use soil-related crop cultivation according to the principle of using sustainable resources.
   3) The use of genetically modified organisms is excluded.
   4) Based on risk assessment and precautionary measures
6. Limit the use of external inputs in case it is necessary to use external inputs. Consumption is limited to the use of the following factors of production.
   1) Factors of production from organic production
   2) Natural substances or substances derived from nature.
   3) Mineral fertilizers with low solubility
7. Consider the hygiene and balance of the ecosystem in each region on climatic and local conditions.

2 International Organic Standards

1. The International Federation of Organic Agriculture Movements (IFOAM) Organic System Standard

This is a quality assurance system for organic farming standards. Developed by an organic movement comprising organic producers and stakeholders from around the world gathered together under the name of The International Federation of Organic Agriculture Movements (IFOAM). IFOAM initiated the Organic Agriculture System Certification Program to provide accreditation services to various organic certification bodies. It currently has 800 members in 120 countries around the world. The headquarters is in the United States. The Contents of IFOAM standards for organic production and processing are as follows:

The 10 main objectives are as follows:

1. Long-term organic agriculture management based on ecosystem and systematic management.
2. Soil fertility must be long-term and soil organisms must be considered.
3. Avoid/reduce the use of synthetic chemicals at all stages of the organic product chain. Be aware of people's exposure and environmental contamination from chemicals that can be harmful in the long run.
4. Reduce pollution and degradation of production units/production processes and the surrounding environment from production/production activities.
5. Some technologies that have not been proven Unnatural and harmful are isolated from the system.
6. Animals are treated responsibly.
7. Promotes and takes care of the natural nature of animals.
8. Product organicity is maintained throughout the supply chain.
9. Organic labels throughout the supply chain
10. Fairness, respect and fairness, equal opportunity and non-discrimination against employees and workers.

2. EU Organic Standards Regulation

There are two regulations to follow: (EC) 834/2007 which governs the Basic Regulations, and (EC) 889/2008 and (EC) 1235/2008. On details of organic farming production, labeling, import controls and rules. All products identified as organic and sold in the European Union must be manufactured under these regulations.

A distinctive feature of the EU standard is its emphasis on **sustainable production processes. Environment**, **Quality** and **Animal Welfare**

TH-BIO-140
Thailand Agriculture

TH-BIO-121
Thailand Agriculture

A correct display of the EU Organic Standard seal must include the EU certification body number, which specifies the country of the certification body along with the country of origin of the organic product under the standard seal.

New Standard Regulation (EU) 2018/848

After many years of consultation and preparation, the new regulation (EU) 2018/848 was published on 30 May 2018. This regulation has been in force in the European Union since 1 January 2022 and replaces (EC) 834/2007, (EC) 889/2008 and (EC) 1235/2008.

The main areas that are resolved are:

- To strengthen the precision of organic agricultural production, especially imported products.
- The rules for group certification have been reconsidered. It is now part of the regulations.
- EU and global entrepreneurs use the same regulations.

Overview of key changes for the Group: Establishment and Internal Audit System

Group of entrepreneurs: composition and dimensions

• Maximum number of organic members up to 2,000
• A group of entrepreneurs consists of members who do it organically or only in the transition phase., Members with limited space size or sales
• The Group must have legal status as a legal entity.

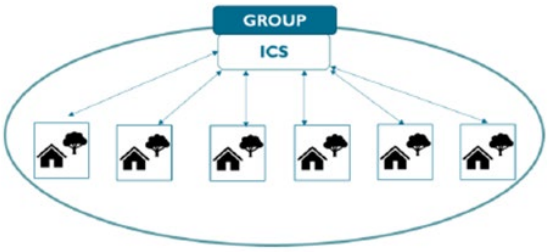


Figure 9 Group of entrepreneurs:

Control details for the internal audit system

• It needs to be more detailed and clearer.
• **The Internal Audit Manager** is the key to many responsibilities and can directly give orders.

The new Regulation (EU) 2018/848 contains more than 30 relevant subordinate regulations.
You can learn more from IFOAM's website at this link.
https://www.organicseurope.bio/what-we-do/eu-organic-regulation/
This link will take you to the EU website at try to find Current consolidate version to reduce confusion.

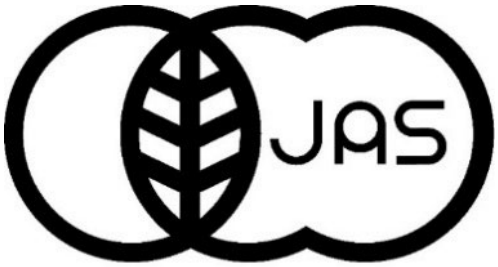
3. U.S. Organic System Standards

The National Organic Program (NOP), under the supervision of the United States Department of Agriculture (USDA), introduced an organic certification system in 2002

The differences between EU and US organic standards include:

- NOP requires manure to be fermented prior to use, as well as a fairly clear time limit for fermentation in the regulations.
- NOP buffer lines are compulsory (unless found to be risk-free). Whereas the EU requires risk consideration first.
- NOP has multiple labels (e.g. 100% organic and organic).

4. Japanese Agricultural Standard Organic (JAS)



It is supervised by Japan's Ministry of Agriculture, Forestry and Fisheries.

Differences between Japanese Organic Standards and EU Standards

- For the most part, the production process is similar to Europe and the United States, but with slightly different documentation and procedures.
- Japan requires management and grading (JAS own unique system) – Quite a lot of paperwork compared to EU and US standards.
- Japan requires compulsory training for managers and grading managers.

What to consider when choosing international standards for export

Most markets want to get products that are certified according to EU organic standards together with those of the U.S.

For JAS, it is advisable to request more only if there is already a clear buyer.

Canadian and Australian Organic Standards are accepted in the United States of America and the European Union. If certified, US or EU organic standards, when exporting to Canada and Australia no need for further tests.

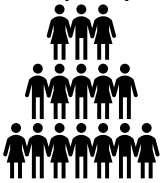
In the production of organic agricultural products for export. Who needs certification?

Comparison of EU standards with US standards

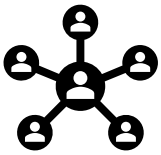
Farm-level production

Single Farm

Farms under a company



Group of Farmers



Exporting produce from the farm

Middleman

Product Collector

Initial Packaging

Processing

Processors (Factory)

OEM Factory Subcontractors

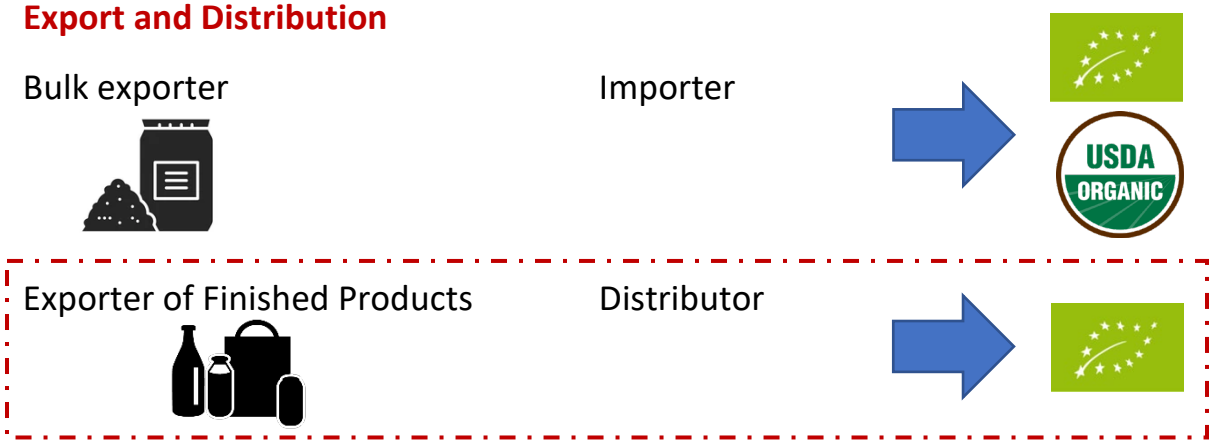


Figure 10 shows a comparison of EU standards with US standards.

Preparation for the production of organic agricultural products for export

This is because at every stage of the chain, it must be guaranteed that certified organic materials will not mix with others, and organic products are not contaminated. There is traceability of product integrity at every stage. Therefore, it is not only manufacturers that need to be inspected and certified. Processors and exporters must also be certified.

What will be examined in the certification application includes:

- Origin of organic raw materials
- Separation between raw materials and organic products, including raw materials and general products.
- Examine the reasonableness between the amount of organic raw materials used and the end product from the processing of organic raw materials.
- Labeling

The certification body for the export of organic agricultural products should have the following capabilities:

- Inspection and certification of farms, processing industries and export facilities according to farmers' target markets such as the European Union, United States, Japan, Switzerland
- Check additional standards of manufacturers associations such as Bioland, Naturland, Demeter and British Soil Association.

Understanding Review Activities of Target Farmers

Readiness Survey Before applying for certification of organic agriculture standards.

Question	Answer
1. What products would you like to be certified?	
2 Where is the market? (Export, what country?)	
3. What is your status manufacturer/processor/seller/other?	
4 Which organic standards certifications do you want to get?	
5 Is there a production data storage and recording system?	
6 Are you ready to be audited by a third party?	

** Target farmers are advised to complete this survey 2 times, both **before** and **after** the training. To test the knowledge and understanding of the target farmer.

Documentation

PowerPoint Presentation File
Title: Chapter 2 Thai Organic Standards and International Standards for Export

Data sources

- National Bureau of Agricultural Commodity and Food Standards
- Organic Standards Foundation
- Ceres South East Asia Company Limited
- https://www.organicseurope.bio/what-we-do/eu-organic-regulation/
- https://kb.mju.ac.th/assets/img/articleFile/256401210f587ef760e24f42869114b549ffc8ec.pdf
- https://www.ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014. pdf2020-04/

Chapter

3

Applying for Certification

Individual and group certifications

Individual Certification: Farmer => Comply with organic agriculture standards => Submit a request => Verify information request by certification body => Certified

Group Certification: Group of Farmers => Comply with Internal Control System and Organic Agriculture Standards => Verify all group members by internal group inspectors => Submit a request = Verify the group and randomly inspect farmers by certification body => Certified

Why request group certification?

- Smallholder farmers are large and produce a variety of crops.
- Save time and budget on certification
- Strengthen the group in gathering product, as a result, there is a large total production and continuous production. Lastly it increases bargaining power.
- Easier to procure or manage production and harvesting, such as purchasing or producing seeds, fertilizers, pesticides used within the group, effective management of labor and harvesting tools.

Internal Control System

Internal Control System refers to the system established by the Group to ensure that farmers' crop production, activities, members and other related activities in the group comply with organic production standards. However, in the group, the farmers must appoint an internal inspector to examine each member annually. And external certification body will be responsible for assessing the effectiveness of the internal control system, as well as randomly inspecting a number of farmers to provide certification to the group of farmers.

Type of group to request certification.

1. A group of farmers whose members gather to produce organic crops according to specified conditions.
2. Juristic person, which can be a company, cooperative community enterprise, foundations, exporters or NGOs responsible for managing the group in purchasing, distributing or exporting agricultural products from the Group.

Definition of farmers' group

From the criteria and conditions of the assessment of organic crop production (RE-8), Department of Agriculture

A group of farmers with at least 5 members and grouped together to produce organic produce and products in different areas, where a group organization or company is responsible for the internal control system and seeks certification for organic crop production standards on behalf of group organization or company.

Eligibility for Group Certification Application

From the criteria and conditions for certification of organic crop production (RE-7), Department of Agriculture

(1) Members of the farmer group are owners or have the right to use the production area or receive land use rights from government agencies.

(2) A group of farmers with producer members and grouped together to produce a member 5 people or more.

(3) The Group shall have an effective production system and internal control system to ensure that the production activities of farmers Members and other related activities in the group meet established and reliable standards.

(4) The group may be operated by members who gather together for cultivation, or by a juristic person or an independent organization responsible for the farmer/farmer group by being a buyer, distributor or exporting agricultural products of the group of farmers/farmers.

(5) It must be a group that voluntarily seeks certification and agrees to comply with the criteria and conditions for certification of organic crop production as specified by the Department of Agriculture.

(6) Must not be a group whose certification has been revoked by the Department of Agriculture or any certification body with equivalent standards of the Department of Agriculture, except after a period of 1 year has elapsed from the date of revocation.

Requirements for group producers for EU standards (EU) 2018/848 Chapter V Article 36 has the following additional conditions as follows:

- Each group member must have an annual income of not more than 25,000 euros (approximately 970,000 baht/year, exchange rate on June 26, 2023 is 38.80 baht per 1 euro.) or an agricultural area of not more than 31.25 rai.
- Farmer groups are juristic persons.
- Consist of only members whose production activities are in similar areas.

Criteria and conditions related to the preparation of the internal audit system of the Department of Agriculture

1. Preparation before setting up the system

- The Department of Agriculture assesses and certifies the group organic production standard system to a qualified groups of group certification applicants.
- Group certification is a certification of all activities in the group, from production on the plots of producer members, packaging, collection, processing, and distribution of produce or products in similar areas.
- This organic farming group can be managed by a group of farmers or a juristic person. The group will be certified and receive a certificate from an accreditation body, while farmers who are members of the group will not receive a certificate.
- The type of production within the scope of the requested certification may include the production of more than one product. Group leader must ensure that member farmers have the same production and management style.
- In the event that any inconsistencies are found during the group inspection, it is considered as the group evaluation result. The group will not be certified until the non - compliances found by group's member are corrected.
- In case of duplicate group producer names, the inspection department will grants title rights to the group producer that is properly registered with government agencies.
- The group leader must be responsible for the production of member farmers to meet organic crop production standards. The group must have an appropriate mechanism for inspecting the production of members to meet standards.
- Individual certified farms, cannot be repeated apply for group certification.
- Group and individual certification cannot be used simultaneously on the same crop in the same plot.
- If you have an individual certificate and would like to request a group certification, the original certificate must be revoked after group certification is obtained.
- The group applying for certification must be a group that has established and implemented an internal control system in the group to guarantee the quality of the group's organic plant production and products.

2. Implementation of Internal Control System

2.1 Administration and management of the organization

1) The structure of the group is created to provide an overview of the different parts of the position within the group structure as follows:
   - Internal Control Coordinator/Internal Control Manager.
   - Internal Quality Inspector
   - Certification Committee/Certification Officer
   - Group Leader
2) The responsibilities of various positions are defined under the structure.
   - The Internal Control Coordinator/Internal Control Manager is responsible for coordinating the internal control system, and is responsible for organizing internal quality audits, also responsible for liaising with certification bodies.
   - The internal quality inspector is responsible for inspecting the group's internal control system and inspecting members' plots. Notify the members of the results of the inspection, follow up on correcting any non - compliances found and must not have a conflict of interest with the inspector.
   - Certification Board/Certification Officer is responsible for certifying farmers' plots based on the results of the audit and must not have a conflict of interest/no stake with the judging member.
3) The internal control system is reviewed by the group leader at least once a year by analyzing the results of the internal quality audit and the results of the members' plot audit. Problems, obstacles and non - compliances found in the preparation of internal control systems should be in compliance with the Group's working procedures and standards set by the certification body. There is a process for punishing members who do not comply with the standards and conditions of the group.
4) Evaluate risks that may adversely affect the quality of the product at every step. By assigning responsible persons to carry out the work and must have measures to reduce risk. An initial risk assessment must be completed before the group begins production for sale. However, the risk assessment depends on the scope used for certification.

2.2 Contracts/Application/Certification and Groups' Terms and Conditions

1) Contract/Application/ Certification of joining the group between the farmer and the group. The document must state that the farmer/the producer agrees to comply with organic crop production standards, criteria and conditions set by group and department of Agriculture Certification Body.
2) Group criteria and conditions must include:
   1. Qualifications of Members
   2. The duties of the members, including the group members, are to consent to the Group's internal inspectors and certification bodies' panel to inspect the production site.
   3. Member's production control.
   4. Penalties for members who do not comply with the rules and conditions of the group.
3) In the event that the Group employs an organization/third party to perform the internal control system, there must be a contract or agreement between such organization/third party and the Group.

2.3 Training

1) Members must be trained in knowledge of organic crop production standards.
2) Need to get a manual on
   - Organic Crop Production Standards
   - Criteria and conditions for certification from the Department of Agriculture
   - Group Terms and Conditions

The Group may prepare up-to-date abbreviated standards covering all issues related to production for its members.

2.4 Document and Record Control

1) The Group's document control guidelines include:
   1. All documents controlled must be reviewed and approved by the authorized signatories. The issue and effective date must be specified before publication.

2. Outdated or cancelled documents must be removed from the workspace or if they need to be kept for reference. The document must be specified as a cancelled document.

2) Guidelines for controlling the record of the group includes:

1. Keeping records related to production and quality control of the group for at least 1 certification cycle so that it can be verified.
2. Record information about members who joined the group, including:
   - Member List
   - Citizen ID number or government-issued ID number
   - Member Address
   - Plot Location, Map of Plot Location and Size of Production Area
   - Crop seeking certification
   - Group production plan
   - Estimate member productivity
   - List of inputs (e.g., plant varieties, fertilizers, etc.) of the group
   - Name of Internal Quality Inspector, Date of Audit, and Audit Results
   - Certification status, or status where non - compliances are still found

2.5 Handling complaints

1. Guidelines for receiving complaints related to crop production systems of group members
2. Investigation of the cause
3. Determination of solutions
4. Follow-up on corrections
5. Response to the Complainant

2.6 Preparation of the Group's Internal Quality Audit or documents that specify the internal audit process.

1. An internal inspection is conducted at least once a year to cover the inspection of the control system within the central office/location of the group and all certified plots.
2. The Group's internal control checklist and the member's organic crop assessment standard are examined and prepared as evidence.
3. The qualifications of the Group's internal quality inspectors are determined, which may be personnel from organizations hired by the Group to perform internal control systems, or farmers who are members of the Group. However, Internal quality inspectors must have knowledge

of organic production standards and audit techniques. Including having no conflict of interest with the examinee.

4. Internal quality monitoring methods must ensure that group members comply with organic crop production standards according to specified criteria and conditions.
5. There is a systematic follow-up and correction of the found non - compliances, If the results of the monitoring reveal non - compliances at the central office/location or any farmer, the Group leaders must investigate the problem and solve it to cover other farmers who are also affected.

3. Preparation for the Audits and Practices When Certified

3.1 Group certification audits include a pre-visit.

This will be done at least 1 time before the inspection at the group central office and/or the applicant shall submit the information to the Inspection Division prior to every inspection. To collect preliminary data from the group, to assess the effectiveness of the internal control system, assess risks, and determine the number of samples of farmers to be randomly tested.

Criteria for selecting sample plots during pre-visit

Formula $Y = \sqrt{N}$

Y = Number of sample plots evaluated

N = Total number of group plots requesting certification

In case of inspection for certification $Y = \sqrt{N}$

In case of inspection for renewal $Y = 0.8\sqrt{N}$

If the result of calculation contains fractions, round up the fractions up to a whole number.

If any of the issues listed in the Organic Plant Risk Assessment Table is found during the pre-visit, the number of sample plots shall be increased to 1.5 times the original calculated amount, or more, at the discretion of the Chief inspector.

$$Z = 1.5Y$$

or $Z = 1.5Y + X$

where *Z = number of plots to be randomly inspected*.

Y = Number of sample plots evaluated

X = positive integer is at the discretion of the Chief inspector. If the result of the calculation has a fraction, round up the fraction to a whole number.

Table 1 Shows the Group's risk assessment.

Risk Assessment	Considerations
High risk	• Planting area near conventional farmland. • The planting area is produced in parallel. • Historically, the area does not have continuous organic farming • Production areas with infestations of weeds, diseases and pests in the past season • The water sources used in the production come from sources that are in an environment that is vulnerable to chemical contamination, microorganisms and heavy metals that are harmful to humans, animals, and environment • Storage, sorting, and transportation systems are not clear. • There is no history of growing crops in past seasons. • There is no method of maintenance, cleaning, production lines, machinery or agricultural equipment that is used in conjunction with conventional production. • The internal control system is not reliable, such as: 1. There is no audit plan within the group. 2. There are no results of internal audits in all plots. 3. There is no production cycle reference code and farmers directing on products and various documents in every stage such as purchase/sales receipts, farm records, purchase records, etc., making it irrespective of traceability. 4. The qualifications of internal inspectors are not in line with the Group's requirements. 5. There is no process to correct and prevent non - compliances, or duplicate non - compliances are found in the same issue. 6. Failure to clearly define the group's rules and conditions, including penalties for members who do not comply. 7. There is a discrepancy between the results of the internal group audit and the actual results of the audit conducted by the Department of Agriculture. 8. The group's record of compliance with the group's organic production system is incomplete. 9. There is document and record control system. 10. There is no system review by group leader.

3.2 Selection of sample plots will be determined as follows:

1. 75% of sample plots (Y) are selected from high-risk plots.
   Based on the following information:
   - The results of the group internal control system or the results of the group sample analysis (if any) for that plot many non - compliances have been found, and they have not been successfully corrected, or the solutions have not been effective.
   - Plots with complaints in the year
   - Assessment results or results of analyzing samples from agencies outside the group in that year. Deficiencies found from the assessment.
   - New plots or plots that have not been randomly assessed
2. 25% of sample plots were sampled independently.
   Certification bodies may change the sampling rate and random number as appropriate. This must not be less than the specified number of samplings.

3.3 If there are changes within the group, such as:

- Changes in the type of cultivated plants Increase / decrease plant type, size of the growing area.
- Product changes, Changes in processing methods, and product management.
- Renovation of the establishment
- Change in group members
- Change in the control system within the group.
- Change in the administrator or operator
- Change in the area or place of production, transfer of business, relocation of production site, or place of operation
- Machinery and Tool Replacement.
- In case of using production aids for processing, or use of cleaning agents.
- Inputs used to improve soil nourishment and control pests that do not come from organic production systems.

Group leaders must submit the changed documents to the Department of Agriculture certification body for further consideration on a case-by-case basis.

3.4 In case the group finds that the farmers/producers of the group do not comply with the standards or criteria and conditions for certification specified by the Department of Agriculture.

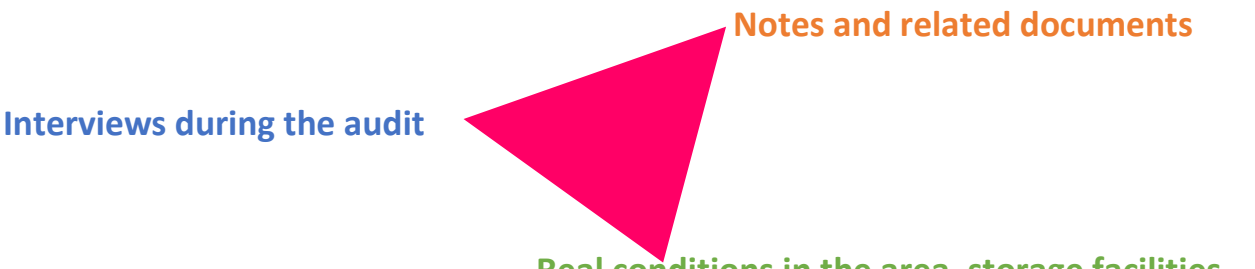
The group leader shall inform the Department of Agriculture in writing of such details and corrective measures.

3.5 During the process of conducting audits for certification. The Applicant cannot request to recertify/cancel the certification for any member who finds the non - compliance.

In the event that any member who finds a non - compliance or others does not wish to continue joining the group. The Department of Agriculture certification body will conduct all new sampling and assessments. The group must submit information about changes in group members.

Efficient Inspection Techniques

Information Triangle



interview	Document Inspection	Observation/Evidence Collection
- Non-suggestive open-ended questions: Who, what, where, when, how much? How? Why? **Avoid questions "yes" or "no"** - Start with a simple question and then give them chance to answer fully. - The question is clear enough	- Inspection Report for Previous Year - Farm records - Plot Registration / Production Contract - Plot Map /Farm Map - Receipts for inputs such as fertilizers, seeds, etc. - Produce sales receipts	- House - Storage room - Yield Storage - Garden - Neighboring gardens ** Go by appointment + go without notice** Try asking other people in the neighbor's house/neighbor's garden.

Summary of 15 steps under internal control system and documentation

1. Organize training to educate farmers
   => Evidence of farmer training
2. Members fill out the application form and register their paddy field
   = > Application form and registration of members of the group.
3. Determine the organic production criteria of the group
   => Standard requirements
4. Make an Internal Audit Manual
   => Group Internal Audit Guide
5. Farmers sign contracts
   => Contracts that farmers sign
6. Prepare the Group's Organic Management Plan
   => Group Management Plan
7. Farmers prepare records and store documents
   => Farm activity logs and farmers' receipts
8. Selection and training of internal inspectors
   => Group internal inspector register and evidence of internal inspector training
9. Prepare location map and farm plan
   => Farm map and farm plan of each plot of the group member.
10. Internal audit and report preparation
    => Member conversion report
11. Evaluate the internal audit report and approve it.
12. Prepare a list of farmers who have received certify status and sanction status
    => Summary report of group plot audit results
13. Harvesting and post-harvest management of group.
14. Issue receipts for purchase/sale of produce, record of purchases and codes of produce purchased from member farmers in each cycle
    => Group receipts and records of purchases.
15. Prepare labels according to the standards received
    => Group labels

Forms of conveying activities in addition to the content of the chapter

Role-play activities as internal inspectors of the group

The activities are as follows:

1. Divide farmers into groups of 4-5 people
2. Walk to inspect organic mangosteen plots, samples and interview farmers.
3. Fill in the transformation information and present at the training.
4) Jointly analyze the answers and make recommendations.

The concept of the activity is:

- To review the understanding of the internal control system.
- By giving the target farmers practical training, they will be able to remember, understand, and put back into practice.

Link: Video on Internal Control System in accordance with Organic Standards

1) Internal Control System Step 1: Assessment of the potential and readiness of the group https://www.youtube.com/watch?v=ZuSZxgUVtiE
2) Internal Control System Step 2: Documentation of Group Internal Control System https://www.youtube.com/watch?v=8YnSVHqx6Ho
3) Internal Control System Step 3: Experimenting with the Group's Internal Control Handbook https://www.youtube.com/watch?v=pgrrVfas4eU&t=27s
4) Internal Control System Step 4: Assessment of Internal Control System https://www.youtube.com/watch?v=92GLxJAzhzU
5) Internal Control System Step 5: Preliminary Audit https://www.youtube.com/watch?v=2FK-B3QzNoc

Documentation

PowerPoint Presentation File

Topic Chapter 3: Production Certification Standards

Data sources

- Criteria and conditions for certification of organic crop production (RE-7), Department of Agriculture, announced on June 28, 2021
- Criteria and conditions for auditing organic crop production (RE-8), Department of Agriculture, promulgated on 31 January 2019
- Training Documents for Internal Control System Trainer Development Course for Group Organic Crop/ Rice Production System Certification, ISO certification institute
- European Union Organic Agriculture Standard (EU) 2018/848

Chapter

4

Organic Mangosteen Production Technique

Basic rules for the production of organic mangosteen for organic certification

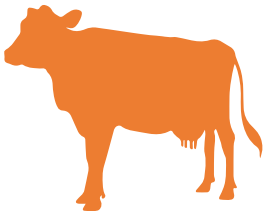
In summary, the practice can be divided into 10 follows:

1. Fertilizer

- Maximize nitrogen tightness with legumes
- Conserve and increase organic matter in the soil.
- Encourage the use of self-produced fertilizers on farms.

Use of manure

i. Use with plants without risk.



- Use more than **3** months before the first harvest: No fermentation is required.
- Not more than **3** months: It must be completely fermented.

ii. Used on plants with risk, plants which yield touches the soil.

- Use more than **4** months before the first harvest: No fermentation is required.
- Not more than **4** months: Must be completely fermented and must be able to display the composting record as well as the temperature record of the manure pile over 15 days.

- Manure must not come from industrial farms.
- Completely focused on the fermentation process.

For a list of permitted substances, see **Appendix A, Table A.1**.

- Manure must not come from industrial farms.
- Use manure not exceeding 170 kg N/ha per year or cow manure 2,176 – 2,720 kg/rai/year

For a list of permitted substances, **Implementing Regulation (EU) 2021/1165 ANNEX II Article 24(1) of Regulation (EU) 2018/848**

- Completely focused on the fermentation process.

For a list of permitted substances, see https://www.omri.org/omri-search.

Caution

Inputs from outside the garden, including the use of green manure and ground cover crops are necessary to obtain approval from a certification body and make a record to comply with organic production regulations.

Frequently encountered problems

still use chemical fertilizers (Always say just a little use) in the part that doesn't sell to the group / for self-consumption

"I'm afraid that I won't get the product." "I'm still not confident. Let me use it a bit."

government sector or a project to distribute organic fertilizers to use

Believe the merchant or neighbor that it is organic fertilizer. Misunderstanding that it can be used

It must be checked from the authorization list of the standard and must always seek approval before use

2. Pest and weed control

- **Do not use any chemical** pesticides such as herbicides, insecticides, and plant diseases.
- Use natural enemies
- Use machine tools
- But if there is a need to use anti-pesticides, they must be of natural origin.

For a list of permitted substances, see **Appendix A, Table A.3**.

For a list of permitted substances, see **Implementing Regulation (EU) 2021/1165 ANNEX II Article 24(1) of Regulation (EU) 2018/848**

For a list of permitted substances, see https://www.omri.org/omri-search

3. Sustainable and environmentally friendly production

- It is forbidden to burn debris in the garden.
- Do not destroy protected/conserved forest areas.
- There are ground cover plants between the planting rows to prevent soil erosion.
- There is a variety of plants in the garden according to their use.

Figure 11 shows the variety of plants in the garden.

Source: https://www.technologychaoban.com/agricultural-technology/article_112259

4. Seed and seedling varieties

Mangosteen seedlings and other plants are grown in the area.

- Use seedlings produced by yourself or from gardens certified according to organic standards that need to be certified.
- It is permitted to use seedlings of non-organic varieties. If there is data that shows that organic seedlings are not found.
- If common seedlings are used from general sources when there is an organic seedling production source,

  Penalties: Revert the status to a new conversion period.

Frequently encountered problems

- No evidence is provided in case the source of organic seedlings cannot be found.
- Missing record/purchase document/source

Other seeds were planted in the area.

- Use seeds from organic sources that are certified according to organic farming standards who wish to apply for certification, if it is not possible to find it, there must be evidence confirming the attempted search but the organic seed source of that plant cannot be found.
- The seeds must not be mixed with chemicals.
- Do not use genetically modified seeds.

For EU standards

- Approval is required before use.
- If permission was not asked before planting 3 times, **penalties** are to cancel the certification

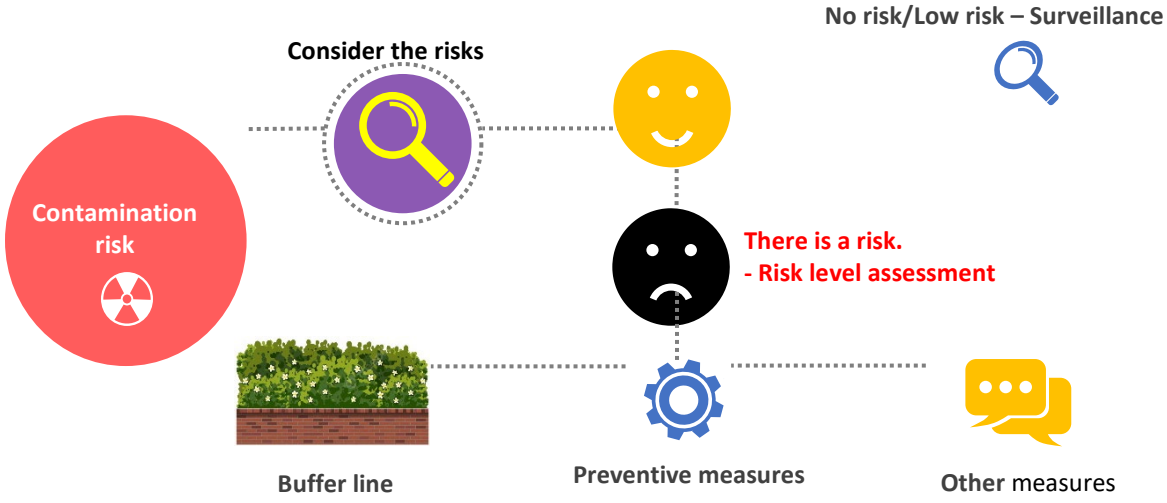
Frequently Encountered problems

- Grow for self-consumption, grow a little, grown by subordinates, but the owner of the farm did not follow up.
- It was distributed or taken from a neighbor.
- Do not ask permission before use.
- Use seeds that are mixed with drugs.
- Missing record/purchase document/source

Recommendations and precautions for practice

- They should form a group to buy or produce together within the group itself.
- Do not be complacent, even if it is a plant grown for self-consumption.
- The source and planting of all plants in the garden must be documented.
- If you are not sure whether the seeds used meet the certification standards, ask the inspection unit first or keep some seeds for the inspector to review during the visit.

5. Avoid contamination



What are the risks?

• When agricultural chemicals are used in neighboring plots. The level of risk depends on **Frequency, kind of chemical, concentration, instruments used, wind direction, spacing, and Type of plant** (sprayed and bumper)

• In sloping areas, there may be a chance that the chemicals used (chemical fertilizers and chemicals) from the upper plot flows down the water.

What can be a buffer line?

1. Planting crops as a buffer line, such as grazing grass, and fast-growing plants.
2. Cash crops / or crops that are not certified
3. Roads or empty area that is spaced from the boundary line
4. The same kind of plant that has been certified, but sold separately in the general market. (Be careful! produce must be separated, labeled, and recorded.)

Other measures

- ✓ Talking to neighboring plots to jointly find a solution.
- ✓ The signing of mutual agreements (in combination with other measures)
- ✓ Community regulation, etc.

6. Parallel production

In the case of farmers having many plots, such as **organic mangosteen** production plots are parallel to other plots that plant **other crop** and have not yet been certified or use of chemicals in cultivation.

Permitted with the conditions:

- If organic and chemical planting areas are adjacent to each other. There must be a barrier to prevent chemical contamination to organic plots.
- Different harvesting, transportation and packaging containers must be arranged or packaging equipment must be cleaned before using them to packaged organic products. Cleaning records must also be provided.
- Tools and equipment must not mix together. They must be kept separately or in case cleaning is required and make records.
- Keep the production input factor (chemicals, fertilizers, seeds) separately and clearly labeled.
- Keep records that production units and products are separated.

In the case that farmers are unable to change their mangosteen cultivation to be organic at the same time Resulting in **organic mangosteen** plots and other plots in **conversion period** or **conventional production** have yield in the same year.

Permitted with the conditions:

- If organic and chemical planting areas are adjacent to each other. There must be a barrier to prevent chemical contamination to organic plots.
- Tools and equipment must not mix together. They must be kept separately or in case cleaning is required and make records.
- Must be harvested on different dates **or** use clearly **separated** methods.

- Different transportation and packaging containers must be arranged or packaging equipment must be cleaned before using them. Cleaning records must also be provided.
- Store organic produce separately from products from transition period and products from chemical used production by
  - Separate storage area
  - Put a label indicating the organic status (organic, conversion or conventional) of the produce on the containers.
- Keep records showing that production units and products are separated efficiently.

Not permitted in case of conversion to **conventional mangosteen**.
Permitted In case the other plots are **conversion** period and there is a good post-harvest sorting system.

Frequently encountered problems

The case of **organic** parallels with **conventional**

- Information is not disclosed / Concealed
- Misunderstood / Miss out
- Sell them together

The case of Organic parallels with **conversion**

- Harvest simultaneously
- Harvested together / No specified label
- Sell them together

7. Conversion phase

Table 2 shows the adjustment time of mangosteen to achieve certification according to various organic standards.

A conversion period of mangosteen	**18 months before harvest**	**36 months before planting**	**36 months before harvest**
Beginning of the conversion period	Date of application for certification with the inspection agency	The date the contract is signed or the date of the first internal audit.	Last day to use banned substances

In case there is evidence of not using prohibited substances in the previous period, the duration of the conversion period can be reduced.

8. Separation of output and labeling

- Organic produce must be displayed separately from other production at all stages, from harvesting and storage, it must be labeled to see the organic product symbol during storage and transportation every time.
- In cases where the product is stored in separate bins, a label symbol must be made, and the symbol must indicate the source (e.g., name, farmer ID, plot ID). Status (e.g., organic or adjusted) and certification providers.
- Use only new packaging and display labels to store organic produce.
- Do not use old fertilizer bags or bags that are not used for food containers.
- Separate them during the production of "conversion" and "organic" produce.

Table 3 shows examples of organic product labels.

Product	Organic Mangosteen
Source Production ID	Chanthaburi Organic Mangosteen Producers Club Mrs. Yindee Sukjai 3-2-78-11 T2
Status	Yield from second-year conversion (T2)
Certification provider	Certified by certified by: CERES GmbH TH-BIO-140

The label must contain:

- Type of output, product
- Status (organic or conversion or 100% organic in the case of NOP)
- Source (your company name) The manufacturer's name is sometimes used (to receive raw materials, or customer name, if it is defined in the case of the importer).
- Weight
- Certification Providers
- Production code for verification

9. Preparation of records and related documents

Prepare records and related paperwork for farm records and verification, and preserve a record of the goods you bought.

- These records can be in a simple form that suits the farmer.
- But it is necessary to keep the record current and regularly.
- At the time they should be kept for internal and external inspections.
  The standard requires the farmers to keep records of their farms and production such as:
  - Farm records
  - Farm Location Map
  - Record of yields and distribution
  - Purchase and sales receipts

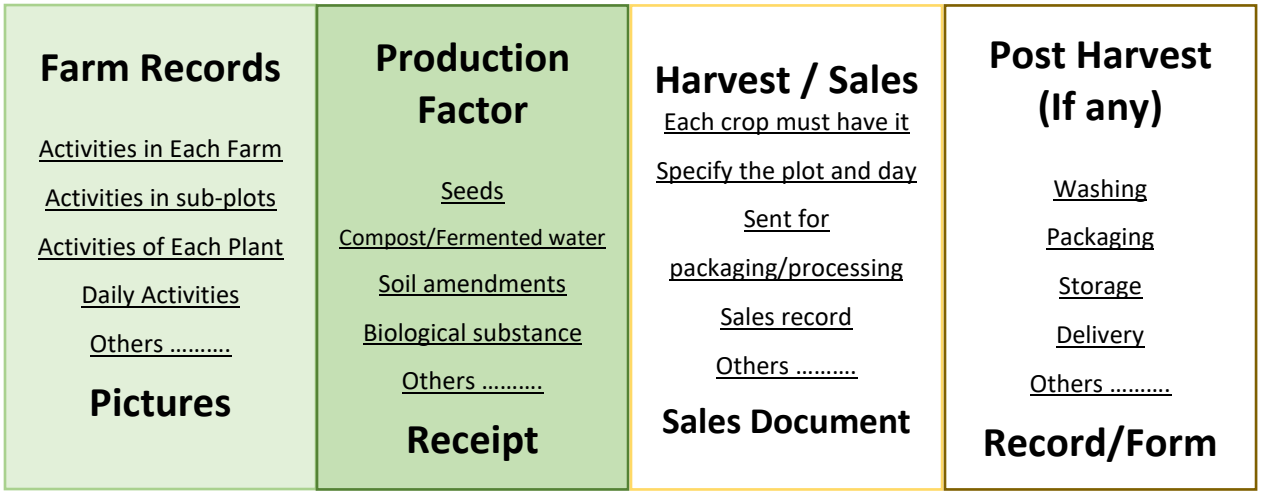


Figure 12 shows examples of farm records, farm location maps, and records of production and yield, including various sales receipts

10. Cooperate in internal and external inspections.

To ensure that farm operations and inspections are in accordance with standards. They should do the following:

Knowledgeable

✓ There must be a standard document that the farmer will use in requesting certification or specification documents from the farmer's group, where he/she is a member, and study them for proper understanding.

✓ Must have sufficient knowledge of both organic farming regulations and techniques.

Monitoring, tracking

✓ Should operate Daily

✓ Record tracking log

Cooperate

✓ Internal inspection of group that farmers are members.

✓ External inspection of certification body inspectors.

Summary of 10 Practical Guidelines

1 Do not use any synthetic chemical fertilizers.

2 Do not use synthetic chemicals to get rid of pests.

3. High diversity, Protect the environment, and do not burn.

4 Use organic seeds

5 Prevent contamination

6. Prohibit parallel production of the same plant that is organic with chemical

7 Must pass through the conversion period

8 Separate yields/output and display label

9 Make records and keep the documents

10.Understand and cooperative

The production of organic mangosteen to achieve good yield and standard requires attention throughout the year.

It is divided into 4 steps:

1. **The process of preparing the plants to be ready for flowering** (July to October)
2. **The process of inducing flowering and controlling the number of flowers per plant appropriately** (November to December)
3. **The process of promoting the development of fruits and increasing the quantity of quality output** (January to April)
4. **The process of preventing crop damage** (May to June)

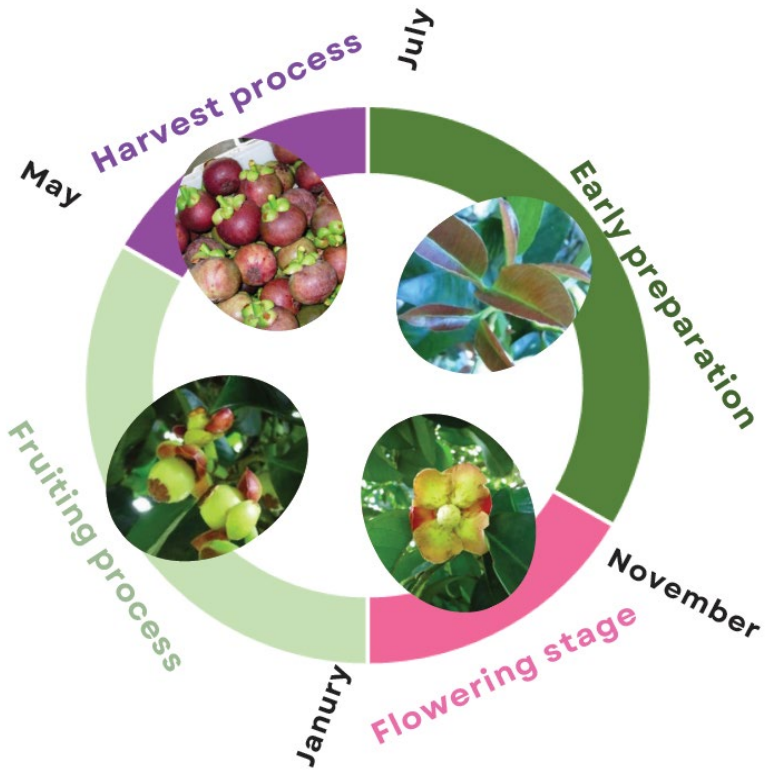


Figure 13 Shows the production calendar of organic mangosteen.

July

The process of preparing the plants to be ready for flowering

Manage the fertilizer process to induce the breaking of young leaves.

After harvest

1 Add manure or compost that has undergone a complete composting process. The rate is about 20-60 kg/plant, depending on the canopy size of the tree and soil fertility. The soil should be analyzed once a year.

2 Foliar spraying with animal or plant bio-fermented water or animal or plant extracts at the rate of 1 liter / 1,000 liters of water.

3 Pour bio-fermented water from animals or plants or extracts from animals or plant through the soil or give way to the water system at the rate of 3 liters / 1,000 liters of water to increase beneficial microorganisms and increase fertility to the soil and mangosteen trees.

Weeding

After harvest

1 Mow the grasses/weeds 2-4 times a year as necessary, and according to the early age, it should be cut before flowering and before harvesting. Grass/weeds should not be mowed in the rainy season to preserve soil structure, and it should grass/weeds not be taken off completely, to maintain the ecological balance within the garden.

2 Grow medicinal plants in the mangosteen garden such as turmeric, chaplu, citronella, etc.

Pruning to control the canopy size

After harvest

1 Trim once a year to allow light into the canopy.

2 Cut off the shoots that exceed the height needed not more than 1 meter per year, cut 2-3 overlapping branches per year or as appropriate, and cut off the outer branches in the canopy shape that exceeded what is needed by about 50 centimeters.

3 Cut branches to allow light to enter from both east and west.

Cut off the shoots that are too high

Leave the top apex as shade.

Cut the branches in overlapping canopy 2-3 times a year or as appropriate.

Cut the outer branches in the canopy of the tree, that exit requirement.

Figure 14 Shows pruning to control the size of the canopy.

Pruning recommendations

For pruning the top of very tall plants, they must be gradually pruned by cutting them no more than 1 meter in the first year and raising new branches on top of the branches to prevent the upper branches from drying, cracking, and damaging due to sunburn.

August – September

The process of preparing the plants to be ready for flowering

Manage the fertilizer to induce young leaf breaking.

After harvest

1 Spray animal or plant bio-fermented water or animal or plant extracts at the rate of 1 liter / 1,000 liters of water foliar way.

2 Pour bio-fermented water from animals or plants or extracts from animals or plant through the soil or give way to the water system at the rate of 3 liters / 1,000 liters of water to increase beneficial microorganisms and increase fertility to the soil and mangosteen trees.

Manage fertilizers to promote fertility.

11 – 12 weeks after harvest

1. Spray egg hormone marinade and/or marinade from shrimp, crab, and shellfish.

2. Pour fermented juice from yellow fruits or give to the water system at the rate of 3 liters / 1,000 liters of water 2-3 times before flowering.

Survey the infestation of mangosteen enemies when young leaves are broken.

Assess enemy infestation and choose to take action or combine the following methods:

1 Thrips

◆Plant extracts with pesticide properties such as neem, dead worms, Siam weed, sweet flag, turmeric, citronella, calendula, pakagong, galangal, sweet leaf, deep lee, etc. By fermenting/extracting separately and using alternately.

◆Bioproducts such as Beauveria and Metarhizium

◆Natural enemies such as *Plesiochrysa ramburi* (Schneider), beetles, striped turtle beetles Long-legged flies, thrips hounds' spiders.

◆Spray water using a mini sprinkler to increase humidity, and repel thrips.

2 Worms that feed on young leaves

◆Plant extracts with pesticide properties such as neem, dead worms, siam weed, and water vera, turmeric, citronella, calendula, pakagong, galangal, custard apple leaves, etc. by fermenting/extracting separately and using alternately.

◆This type of worm hides on the soil, grass clippings, and weeds under the base of the tree during the day and comes up to eat the leaves at night. The use of grass clippings under the root of the mangosteen tree for the worms to take shelter and destroy them during the day can help reduce the outbreak.

◆Natural enemies such as red ants, assassin bugs, long stink bugs, hornets, worms, *Bracon hebetor*, and *Pteromalus puparum* L.

◆Bioproducts such as Beauveria and Bt (*Bacillus thuringiensis*)

3 Young leafworm

◆Use bioproducts and plant extracts as well as prevent leafworm infestations.

◆Natural enemies such as hornets, worms

4 red mites (found destroying the leaves)

◆Use the same pesticide prevention methods as thrips.

◆Sprayed with sulfur. Choose only the necessary range, since the mixture is heated.

5 White mite

◆Sprayed with sulfur.

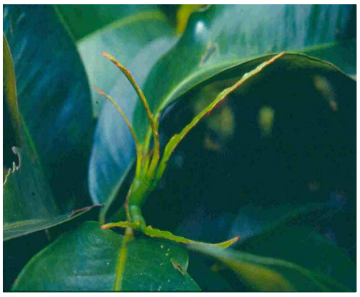
6 Leaf spot disease, **rust spot**, **anthracnose or edge blight Algae leaf spot and black mold disease**

◆Prune the branches to be airy.

◆Plant extracts with protective properties to eliminate plant diseases such as Siam weed, water vera, turmeric, citronella by fermenting/extracting separately and using them alternately.

◆Bioproducts such as Trichoderma and BS (*Bacillus subtilis)*

Worms feed on young leaves.



Leaf shoots are destroyed by leaf-eating worms.

Young leaves are destroyed by leafworms.

Thrips

Young leaves are destroyed by thrips.

Leaf spot disease

Figure 15 Shows plant *pests* and *diseases and the appearance of mangosteen leaves when they break young leaves.*

Recommendations for spraying pesticide

1. Several types should be used together to increase pest toxicity.
2. Spraying should be done to prevent insect infestation.
3. Active ingredients or active substances in plant extracts easily decompose when exposed to heat and sunlight. Therefore, spray must be done in the absence of strong sunlight (morning or evening).
4. Protective equipment should also be used just like when spraying chemical substances, but must not be used together.

Don't forget to get permission from a certification body before use

October

The process of preparing the plants to be ready for flowering

Manage the fertilizers to prepare the plant for larvae.

14 – 16 weeks after harvest

1. Spray egg hormone marinade and/or marinade from shrimp, crab, shellfish.
2. Pour marinade from yellow fruit or give to the water system at the rate of 3 liters / 1,000 liters of water 2-3 times before flowering.

Figure 16 Shows shoots over 9 weeks old ready for flowering.

November

The process of inducing flowering and controlling the number of flowers per plant appropriately

Induce flowering

Before flowering

1. Upon observation that the soil surface is dry, start watering (around mid-November).
2. Measure soil moisture before irrigation, and should find additional suitable spots of each area.
3. Do not rake out the leaves.

caution

The mangosteen tree must be allowed to pass the period until the stalk between the last nodes of the shoots shows signs of wilting and the last pair of leaves begin to show signs of falling leaves, then it should be watered. Thus, if there are no such symptoms, the water will not be given

Figure 17 Shows the *stem between the joints of the mangosteen branch. That shows signs of wilting.*

December

The process of inducing flowering and controlling the number of flowers per plant appropriately.

Manage water to control flowering

When mangosteen begins to flowers

Increase the water more than before as appropriate for any given area.

Survey for pests that **destroy flowers**.

After flowering

Spray with organic matter for prevention and pest removal.

Thrips spray protection with organic substances such as:

- Plant extracts with pesticide properties such as neem, stemona, siam weed, sweet flag, and water vera, turmeric, citronella, calendula, pakagong, galangal, and custard apple leaves. They are fermented/extracted separately and selected alternately.
- Bioproducts such as Beauveria and Metarhizium
- Spray water using a mini sprinkler to increase humidity, and repel thrips.

Figure 18 Shows the condition of the mangosteen flower.

January

The process of promoting the development of fruits and increasing the quantity of quality output

Survey pests that destroy the fruits.

After the fruiting

Spray with organic matter for prevention and pest removal.

1. Thrips spray protection with organic substances such as:

- Plant extracts with pesticide properties such as neem, stemona, siam weed, sweet flag, water vera, turmeric, citronella, calendula, pakagong, galangal, and custard apple leaves. They are fermented/extracted separately and selected alternately.
- Bioproducts such as Beauveria and Metarhizium
- Spray water using a mini sprinkler to increase humidity, repel thrips.

2 white mites, spray with sulfur

Complete mangosteen flowers and fruits

Mangosteen fruit destroyed by thrips

Recommendations for spraying pesticide

1. Several types should be used together to increase pest toxicity.
2. Spraying should be done to prevent insect infestation.
3. Active ingredients or active substances in plant extracts easily decompose when exposed to heat and sunlight. Therefore, spray must be done in the absence of strong sunlight (morning or evening).
4. Protective equipment should also be used just like when spraying chemical substances, but must not be used together.

Don't forget to get permission from a certification body before use

Figure 19 Shows the condition of the *flowers and fruits* of mangosteen and the *condition of the mangosteen fruit destroyed by thrips.*

February

The process of promoting the development of fruits and increasing the quantity of quality output

Manage fertilizers to promote fruitful development

Fruits age of about 4 weeks after **flowering**.

1 Add manure or compost that has undergone a complete composting process. The rate is about 20 – 60 kg/plant depending on the canopy size of the tree and soil fertility.

2 Spray bio-fermented water or animal or extracts from plants and animals to the leaves at a rate of 1 liter / 1,000 liters of water.

3 Pour bio-fermented water from animals such as fermented fish or plants such as fruits or animal or plant extracts through the soil or water system at the rate of 3 liters / 1,000 liters of water to increase beneficial microorganisms and fertility to the soil.

Survey pests that destroy the fruit.

After-fruiting

Spray with organic matter for prevention and pest removal.

1 thrips and

2 White mite

***Follow the same process as January ***

Control the amount of fruit per plant appropriately.

After **flowering**

Water controls the amount of fruit per plant to cause the fruit to fall to about 35-50% of the total shoots.

March

The process of promoting the development of fruits and increasing the quantity of quality output

Manage water to promote the development of fruits

After **flowering** onwards

Water 200 – 600 liters per plant every other day, depending on the canopy size of the tree, area, and weather.

Figure 20 Shows the condition of the *mangosteen* fruit *in March.*

Manage fertilizers to increase yield quality

Post-fruiting

1 Spray bio-fermented water or animal or plant extracts to the leaf at the rate of 1 liter / 1,000 liters of water.

2 Pour bio-fermented water from animals or plants or animal or plant extracts through the soil or give to the water system at the rate of 3 liters / 1,000 liters of water to increase beneficial microorganisms and increase fertility to the soil and mangosteen tree.

April

The process of promoting the development of fruits and increasing the quantity of quality output

Manage fertilizers to increase yield quality

After **flowering** onwards

1 Spray bio-fermented water or animal or plant extracts to the leaf at the rate of 1 liter / 1,000 liters of water.

2 Pour bio-fermented water from animals or plants or extracts from animals or plant through the soil or give to the water system at the rate of 3 liters / 1,000 liters of water to increase beneficial microorganisms and increase fertility to the soil and mangosteen tree.

Figure 21 Shows the condition of the *mangosteen* fruit *in April.*

Manage water to promote the development of fruit.

Fruits age about 10-13 weeks after **flowering**.

Water 200 – 600 liters per plant every other day.

May

The process of promoting the development of fruits and increasing the quantity of quality output

Manage water to promote the development of fruits.

Fruits age about 10-13 weeks after **flowering**.

Water 200 – 600 liters per plant every other day.

Figure 22 Shows the condition of the May mangosteen fruit.

May – June

The process of preventing crop damage

Prevent crop damage during harvest

When the fruit is about 13 weeks old after **flowering** onwards.

Harvest using tools that prevent mangosteen fruit from falling off or violent impact, being careful not to break the terminals or bruise the calyx. Choose to collect only fruits that have ripe only at the pedigree stage.

Prevent crop damage after harvest

After harvesting the mangosteen fruit, store it in the shade, clean the fruit, and sort the quality before selling.

Figure 23 Shows the *color level of the mangosteen fruit when it reaches the maturation stage.*
Source: https://kasetgo.com/t/topic/ 712394/4

Figure 24 Shows the tools and methods of collecting mangosteen fruit.

Figure 25 Shows the *mangosteen yield after harvest.*

Forms of conveying activities in addition to the content of the chapter.

Field visits to certified organic fields

The learning content is as follows:

1. Interview farmers about how to manage the area.
2. Visit organic mangosteen plots, Look at the buffer line. Diversity of plants and insects
3. Visit the production of fertilizers and pesticides used in the plots.
4. Question and answer, including exchange of experiences

The concept of the activity is:

- After training in the standard content, there may be some farmers who are hesitant to do organic farming because there are many rules and practices. Therefore, it is important to visit the actual organic plots that have been certified so that they can see that compliance with the standards is practical and not difficult.
- Allow target farmers to ask questions and exchange experiences with organic farmers. This question may not have been raised during the discussion of the contents of the standard, but seeing the real thing will give a visual image, encourage them to learn more, and be able to put it into practice by themselves.
- Build a network for target farmers to get to know organic farmers who have already applied for base certification for further inquiries in the future.

Link more knowledge in fertilizer production Fermentation and pest control in organic farming

Production of 3 types of fermented water with 7 types of microorganisms
https://www.youtube.com/watch?v=ok6bvb_TmZY&list=PLHG0U3OvUZUSEZifDdRz6Ugn5SFWMeHca&index=1
Production of white fungus
https://www.youtube.com/watch?v=sqzxbBe0y5U&list=PLHG0U3OvUZUSEZifDdRz6Ugn5SFWMeHca&index=4
Pest control by Chivintry (Trichoderma)
https://www.youtube.com/watch?v=2PGDFwrkgU8&list=PLHG0U3OvUZUSEZifDdRz6Ugn5SFWMeHca&index=7
Production of organic fertilizer non-reversible pile
https://www.youtube.com/watch?v=-naw7gH2o64&list=PLHG0U3OvUZUSEZifDdRz6Ugn5SFWMeHca&index=8
production of non-reversible organic fertilizers, piles in mesh rings;
https://www.youtube.com/watch?v=9RV5jl9GwpY&list=PLHG0U3OvUZUQDPVX278TTT2R0XUTMpKW6&index=4
Bio-Control Technology
https://www.youtube.com/watch?v=_w89OsreyxQ&list=PLHG0U3OvUZUQDPVX278TTT2R0XUTMpKW6&index=7

Documentation

PowerPoint Presentation File

Title: Chapter 4 Organic Mangosteen Production Technique

Data sources

National Bureau of Agricultural Commodity and Food Standards
Organic Standards Foundation
Ceres South East Asia Company Limited
Chanthaburi Horticultural Research Institute Department of Agriculture
Agricultural Product Standard 9000-2564
https://www.acfs.go.th/files/files/commodity-standard/20211127154547_899058. pdf
EU Organic Standards
Organic regulations, rules for organic products - IFOAM Organics Europe
Compliance Regulations (EU) 2021/1165
32021R1165 - EN - EUR-Lex (europa.eu)
American Organic Standards
https://www.ams.usda.gov/rules-regulations/organic
External sources permitted and not permitted for use by U.S. Organic Agriculture Mata
https://www.omri.org/omri-search
Major Natural Enemies Academic Papers Department of Agricultural Extension Ministry of Agriculture and Cooperatives
https://esc.doae.go.th/wp-content/uploads/ 2018/12/Major Natural Enemies.pdf
Academic papers on the technology of producing quality mangosteen
Chanthaburi Horticultural Research Center Department of Agriculture

Chapter

5

Organic Food Processing

Basic instructions on how to process organic food to meet organic standards

According to Thailand's Organic Standards 9000 – 2021, Europe (EU) 2018/848 the European Parliament and the Council, Organic production and labeling of organic products and repealing Council Regulation (EC) No 834/2007 and Organic Foods Production Act Provisions, The Code of Federal Regulations (CFR)

The Process of Organic Food Processing

- It must be traceable and transparent.
- Must have a good documentation system
- Good post-harvest management is required so that contamination does not occur to organic products.
- Limit the use of processing aids and do not allow the use of genetic modified technology for any purpose.
- No use of raw materials, or foods containing and/or containing engineering nanomaterials, and ionizing radiation is not permitted.

Who needs to be certified as a processor of Organic food?

Anyone who needs to process, dry, freeze, clean, mix, package or label all organic products need to be certified according to standards. Packing and labeling are not counted as "processing" but are considered "preparation" operators.

Summary of Organic Product Processing Procedures

Source of raw materials

- Only raw materials certified according to organic standards can be used to process organic products.
- Raw materials certified according to European standards can only be processed for the European market. The same applies to the American market, where raw materials must be certified by American standards only. Therefore, processors must request a copy of the standard certificate that has not expired from the raw material supplier every time.
- The process of obtaining organic raw materials must be established in accordance with the requirements, including inspection of packaging, labeling, invoices, and transport documents.

- The risk of raw material suppliers must be assessed. If there is a high risk, the raw material must be tested for chemical residues.

Separation The important key to organic processing

Yield Separation System: The system clearly separates organic products from conventional products at every stage related to those products, from raw material receipt, storage, processing, and distribution.

Processors processing both organic and conventional products must use a clear separation system.

The best separation is “space separation”. It is separated between a storage unit and a production line dedicated to organic products.

If it cannot be separated by the production line.

- Processors can use different periods of separation. The process of organic products is different from general products, and the production line must be cleaned before processing organic products every time.
- It must be recorded that the production line has been cleaned before processing organic products, as well as that this cleaning can be verified through the cleaning record.
- In the case of continuous production, at the beginning of the production line of organic products, the processor must arrange a certain number of organic products to clean the production line, take notes, and then sell them as general products.

If it is not possible to separate the storage

- It must be effectively separated (separated by bags, packaging, boxes) and display labels to distinguish between goods, packaging, organic and general raw materials.
- They must be placed at an appropriate distance from general products, such as lining up or separating storage racks.

Additional required guidelines

- Establish every step cleaning the production line, cleaning process and understand the responsible staff (internal training record).
- Have a form to clean the line according to the procedure set by the factory.
- If the line is cleaned with organic ingredients, it should be recorded separately, so as to separate it as a general product and there is evidence of where it was stored.
- There is a record of cleaning the relevant lines prior to the production of organic lots.
- If there is parallel production, labels must be displayed to distinguish between products, organic and general raw materials at all stages (bags, packaging, cartons, etc.).

Documentation and labeling

- Organic product processors must prepare "Organic Product Management Plan" and "Organic Product Management Guide" to all stakeholders at all levels.

Recommendations for the preparation of quality manuals on organic agricultural products. Processors who have certified processing plants according to other standards such as GMP, HACCP, BRC can use those documents as the basis for preparing various documents related to organic raw materials products as well, such as procedures, documents related to receiving goods, preparing stock of products without the need to prepare a quality manual for organic raw materials separately. However, specific relevant document codes for organic raw material goods must be defined, as well as records related to "organic" must be identified. "Status" or clearly distinguish from "general" and other details as required by organic standards approved by the operator.

- Organic product labels must be displayed on bags, packaging, cartons or others at every step in the processing plant.
- The Processors must keep a copy of the supplier's certificate and related documents such as product receipts, etc. Processing records, storage records, stocks, etc., provided that they are referenced or identified as "organic" on such documents.

- In the case of standard goods, Europe must specify the inspection code on labels, invoices and documents related to the sale of organic products.
- The processor must establish a good accounting system. Able to estimate the quantity of raw materials used or purchased in accordance with the quantity of the final product sold.
- If the raw material is not in proper packaging and there is no correct label on the raw material. The processor must return the raw materials to the supplier, except in the case of raw materials sent directly from the farm.

Traceability

For the organic market to continue improving consumer confidence, entrepreneurs must be able to trace back their products to the farmer's farm.

Traceability of products with various processing steps, such as dairy products, oil, or noodle mills, is not as easy as a tracing of fresh products (it is not difficult to trace them back to the farms). However, traceability should be possible at all stages.

General Principles of Traceability

One step back ⬅◎➡ One step forward

Each unit product must be traceable to at least one step before and after every organic product and raw material is required to be traced to the origin of goods

Every time a product has an "organic" status and the quantity produced of organic producers corresponds to the quantity sold

Practical Guidelines

Prepare documents to control the movement of goods, such as:

List of procurement/receipt of raw materials specified in the purchasing lot, date, list of farmers who purchased organic mangosteen, quantity, status

Processing report indicating the processing date, indicating the raw material lot, the amount of organic mangosteen used to clean the machine (if produced after the general product), the quantity of the product obtained.

Distribution Report specify buyer name, date, type of goods sold, lot of goods, status, quantity, invoice, ...

All reports must be linked through a code, such as an item lot number.

Give an example of a document link for traceability.

Receipts of raw materials ⇔ record the amount of mangosteen in the storage ⇕

Record 1st stage of product processing ⇔ Record the cleaning of production line ⇕

Record 2nd stage of product processing ⇔ Record product packaging ⇕

Sales receipt ⇔ Record the quantity of product in the storage.

In the case of goods, products with complex production.

A production report must be prepared for each lot that includes the source of raw materials, produced lots, time and quantity control methods, such as from the number of raw materials to the number of final products, and attached documents for requesting inspection certificates.

The European Union strengthens the traceability of organic products by considering “summary documents related to each batch of production”

Ingredients, additives, processing agents

General understanding in the case of processed goods "Raw materials must be certified to at least 95% of organic standards" to be certified as "organic" and the remaining 5%

Additives and processing aids can be used in the processing of organic products, but are limited to those permitted by each standard, see the following documents

TAS 9000-2564 Appendix A Table A.6

(EU) 2021/1165 (Annex V)

§ 205.605, 205.606

Table 4 provides a summary of labeling requirements according to organic standards TAS 9000 – 2021 Thailand

<table>
<tr><th>Organic</th><th>Made from organic food ingredients.</th><th>Product or products during adjustment phase to organic.</th></tr>
<tr><td>At least 95%* of raw materials come from organic farming.</td><td>At least 70%* of raw materials come from organic farming</td><td rowspan="3">Produce or products that have been inspected by the inspection unit to be certified as organic production according to this standard and contain ingredients consistent with organic products.</td></tr>
<tr><td>The remaining 5%* must not come from GMOs or irradiation or use substances not specified in TAS 9000-2021 Annex A Table A.6</td><td rowspan="2">The remaining must not come from GMOs or irradiation or use substances not specified in TAS 9000-2021 Annex A Table A.6</td></tr>
<tr><td>It must not contain the same non-organic raw materials as certified raw materials.</td></tr>
<tr><td>Use logo

Also,
specify the name and/or code of the certification body.</td><td colspan="2">Do not use logos</td></tr>
</table>

*% of components excluding water and salt

Table 5 provides a summary of labeling requirements according to organic standards (EU) 2018/848 European Union

Organic	**With organic ingredients** Raw materials from organic farming.
• At least 95%* of raw materials come from organic farming. • Use only natural flavors that come from such ingredients. Such as: “natural lemon seasoning”. It means that such seasoning is obtained from at least 95% lemon.	• In accordance with EU Regulation 2018/848, There is no minimum % of ingredients from organic farming. • Processed foods must comply with the production regulations in Articles 1.5, 2.1(a), 2.1(b) and 2.2.1 of Annex II part IV (EU) 2018/848.
The remaining 5%* are non-organic raw materials, as specified in Annex V part B of (EU) 2021/1165.	There is no requirement for non-organic ingredients, but they must not be genetically modified.
Non-agricultural raw materials and processing aids must comply with Annex V part A of (EU) 2021/1165.	
Only refer to organic things in the list of ingredients and do not refer (display) them to the general label.	
Use logo and must always include the code of the certification body are underneath. Always logo TH-BIO-140 Thailand Agriculture	Do not use logos

*% of components excluding water and salt

Table 6 provides a summary of labeling requirements according to organic standards NOP USA

<table>
<tr><th>100% organic</th><th>Organic</th><th>Made with organic</th><th>Refer to organic components.</th></tr>
<tr><td rowspan="2">Only organic ingredients no processing aids are used.</td><td>At least 95%* of raw materials come from organic farming.</td><td>At least 75%* of raw materials come from organic farming.</td><td rowspan="2">Less than 70% of ingredients come from organic farming*</td></tr>
<tr><td colspan="2">• All non-organic raw materials must not be produced by unauthorized means.
• Uncertified agricultural raw materials may be used only as specified in the appendix. 205.606.
• Non-agricultural raw materials and processing aids shall be used only as specified in Annex 205.605.</td></tr>
<tr><td>Use logo
 

and indicate on the label.
“100% Organic”</td><td>Use logo
 

and indicate on the label.
“Organic”</td><td colspan="2">Do not use logos</td></tr>
</table>

*% of components excluding water and salt

Hygiene Management

Water

- Water in contact with products, organic raw materials, water used as food ingredients, water used to clean raw materials, and production line, at least the quality should be comparable to "Drinking water"
- Show annual water analysis results of the factory
- The detection of chlorine residues in the water shall be in accordance with the laws of the destination country where the product is to be sold.

Cleaning

- Cleaning and sanitizing equipment, tools, production lines, and storage rooms is not explicitly stated in the laws related to organic agriculture.
- NOP requires notification of substances or anything used in cleaning and sanitizing, as well as steps to prevent yield of organic products to be exposed to such substances.
- Substances to be used for cleaning and disinfection shall comply with the regulations.

MGS 9000-2564 Appendix A Table A.8

(EU) 2021/1165 (Annex IV)

The National List of Allowed and Prohibited Substances

Any device with facial skin exposed to organic yield. After applying the chemical that meets the requirements, it must be thoroughly rinsed with water.

Insect and Contamination Control

Entrepreneurs must endeavor not to allow products, organic raw materials at any time to come into contact with contaminants such as fuels, pesticides, wood treatment oils, mold, and cleaning agents.

Pest Control Procedures of Organic Standards

1. The plant carries out insect and pest control by using the first method of prevention.
2. In case of control by means of protection is ineffective. The factory allows the use of chemicals in accordance with the requirements.
3.  MGS 9000-2564 Appendix A Table A.3

    (EU) 2021/1165 (Annex II)

    § 205.271
4. In the case that the control in Article 2 is inefficient, the facility permits the use of permissible chemical pesticides in accordance with general food factory requirements. There is a precaution against contamination of such chemicals to raw materials, and organic products.

Certification Of Organic Standards and Standards Related To Good Food Hygiene

GHPs (Good Hygiene Practices)

It is a basic criterion or requirement that is necessary in production and control for manufacturers to comply with and enable safe production of food. It focuses on preventing and eliminating risks that may cause food harm, poisoning or unsafety to consumers.

The principles of GHPs cover from

- Place of business, Building structure
- Safe good production process, that meets the quality and standards in every step from the beginning of production planning.
- Control system from raw materials during production, finished products, Storage, quality control and transportation to consumers

- Record keeping system, inspect and monitor product quality.
- Good management system in terms of hygiene, maintenance, sanitation and personal hygiene.
- Training for stakeholders

HACCP (Hazard Analysis and Critical Control Points)

Hazard Analysis and Critical Control Points in Food Production where:

HA analyzes or assesses food hazards from raw materials, production processes, to consumers.

CCP defines critical control points that should be controlled to eliminate or reduce the causes of harm.

The 7 principles of HACCP

1. **Conduct hazard analysis**: Identify potential hazards at every stage of the production process by assessing potential hazards and identifying measures to control them.
2. **Find critical points that need to be controlled**: Define operational points and procedures that can be controlled to eliminate hazards or reduce the likelihood of hazards. It is called the CCP procedure point, which can be carried out by expert judgment or using the principles of decision mapping.
3. **Determine critical value**: To ensure that CCP points are under control, a CCP point may have one or more critical limit (CL) values. In order to limit such a crisis, the experience of HACCP team is required. Advice from expert, data from scientific papers, various food requirements and standards, or data from experimental tests.
4. **Establish a system to monitor and assess the control of critical control points**: Establish a system for monitoring critical points by defining a test plan or monitoring various measurements to be controlled, and assessing whether critical points to be controlled are under controlled conditions. The inspection method may rely on the principle of answering the following questions about the monitoring as follows: What, How, When, Why, Where, Who and Record.

5. **Determine corrective measures, upon inspection, it was found that one of the critical points that need to be controlled is not under control**: During

operational monitoring and surveillance, there may be cases where the critical limit to be controlled may be deviated. It is necessary to establish a corrective action method both in the production process and the product. The HACCP team must determine the corrective action for the deviation based on the guidelines for corrective actions as follows: In part of the production process, such as informing decision-makers to correct and in terms of products, such as remanufacturing or disposing of problematic products.

6. **Determine the verification method to confirm the operational performance of HACCP system**: Verification is the use of methods, method of operations, tests and evaluations in addition to monitoring to determine compliance with the HACCP plan.
7. **Determine appropriate document-keeping measures related to practices and records based on these principles and their application**: Documents and records related to the HACCP system should have a system for establishing control and keeping documents as evidence and checking whether the operation is correct as specified in the HACCP PLAN.

The process of setting up the HACCP system

1. Set up HACCP team
2. Describe the details of the product
3. Identify the purpose for which the product is used.
4. Make a chart of the production process
5. Verify the production chart at the actual point of production.
6. Identify all kinds of hazards that may occur, analyze hazards, and consider control measures.
7. Determine critical control points (CCPs)
8. Configure the critical value of each CCP that needs to be controlled.
9. Define a surveillance system for each CCP
10. Define corrective actions
11. Determine the verification method
12. Determine how to document and keep records.

Organic Control Critical Point

Based on the HACCP principle, it not only analyzes critical points to control safe feeding, but also analyzes critical points that may occur at every stage during processing that risk the loss of organicity, such as: Improper cleaning of the device before using organic products results in mixing with non-organic products left in the device, or the use of prohibited pesticides when organic products are present, resulting in contamination with prohibited substances, etc.

Documentation

PowerPoint Presentation File

Topic: Chapter 5 Organic Food Processing

Data sources

- National Bureau of Agricultural Commodity and Food Standards
- Organic Standards Foundation
- Ceressouth East Asia Company Limited
- Agricultural Product Standard 9000-2564 https://www.acfs.go.th/files/files/commodity-standard/20211127154547_899058. pdf
- EU Organic Standards Organic regulations, rules for organic products - IFOAM Organics Europe
- Compliance Regulations (EU) 2021/1165 32021R1165 - EN - EUR-Lex (europa.eu)
- American Organic Standards https://www.ams.usda.gov/rules-regulations/organic
- External search sources permitted and not permitted for use by the United States https://www.omri.org/omri-search

Chapter

6

Training skills for trainers, and Training Planning

Training of trainers and training methods

The definition of a trainer

Trainer = Knowledgeable
+ making the participants understand
+ Changer of attitudes and behaviors of the participants

The steps to effectively convey the content of training are:

1. **Determine the objectives of the training.**
   - Start by setting goals or results that:
     "What benefits will the learners get?"
     - ✓ Know and understand the content conveyed
     - ✓ Skilled and proficiency
     - ✓ Values, attitudes and motivations
     - ✓ Achieve targeted behavior changes.
   - Clearly define objectives to prepare the content correctly.

2. **Get to know the training participants**
   - What groups do the participants consist of?
   - What are their expectations or need?
   - How much knowledge or experience do they have on this topic?
   - What benefits should the participants gain from training?
   - What kind of training method is suitable for the participants?
   - How should participants participate in training?

3. **Design content to suit the training period**

   Preparing time-appropriate content is based on the concept of "must know, should know, interesting". The most necessary thing to convey is "must know", which means that if you do not know this, you will not be able to perform or the quality of work will decrease. Once the lesson plan is made, if there is time left, add more "should know" and "interesting" things respectively.

4. Presentation Content

The presentation should be divided into 3 phases, allocating approximate time as follows:

Introductory period 10 – 15 %

It consists of self-introduction, building of credibility and interest, tell the goals and priorities of the presentation, and define the presentation roughly.

Content period 70 – 80 %

Prepared by

- Prepare all the information and equipment you want to present.
- Clearly define the topics or issues to be proposed and in line with the goals of the training.
- Distinguish the key points that you want your audience to "must know, should know, interesting ".
- Arrange the order of content appropriately and easily to understand.
- Set the right time for each topic.

Summary period 10 – 15 %

- Concise review of all content
- Highlight the points you want your audience to remember the most.
- Give the audience the opportunity to ask.
- Answer the questions and recap.

5. The proper way of conveying or transfer of knowledge

Table 2 shows examples of teaching methods according to objectives.

Objective	Teaching Methods
Participants have a better understanding.	Lecture & Demonstration
Participants have analytical skills.	Case Studies & Activities
Participants develop skills and expertise.	Hands-on activities
Participants develop attitudes consistent with training goals.	Lecture & participation in training such as playing games
Participants come up with new ideas for their work.	Brainstorming
Participants remember and do it.	Role Playing

Presentation materials, such as:

- computer
- Power Point Presentation Program
- Projection and screen
- Microphone and audio system
- Pointer
- Poster-sized paper and stand-size, or whiteboard and chemical pen
- Presentation Materials

Guidelines for selecting presentation media

- No best media, there are only suitable media for the trainer or media they are good with
- If it is necessary to use media that the trainer is not good at, practice first.
- There should be a backup plan in the presentation in case of any disruptions.
- Important factors in media selection are: Message to be delivered, audience, location of the presentation and aptitude

6. Training Assessment

The popular method of assessment to know that the results meet the set goals such as; understanding of the participants, they learn something, change in behavior, additional operational skills, etc.

- Observe by asking or answering of questions during the training.
- Test with a quiz
- Practical test
- Observe changes in behavior or greater engagement.

Techniques for becoming a trainer

Using voiceover in presentations

- Be clear
- Exciting, lively tone
- Monotonous and flattering tones should be avoided.
- Use messages that are polite and respectful to your audience.

The body language that should be presented

- Be enthusiastic and sincere to the listeners.
- Move your hand to see the picture.
- Hold the mic steady.
- Expressive face
- Make eye contact with learners

Things to avoid in the presentation

- Dress too casually or too formally.
- Inappropriate gestures such as hands in pockets or swaying
- Make little or too much eye contact with the listener.
- Frowning, not smiling.
- Use of inappropriate humor

Question management

- Be respectful to the questioner by listening carefully to the question and not laughing at or insulting it.
- Use the trainer's questions as a guide for further teaching improvements.
- Summarize the questions and answers at the end.
- Gather unanswered questions and answer them later.

Summary of training management guidelines

Planning phase

- Set objectives
- Target participant
- Lay out the task format.
- Plan how to spend money on training
- Organize teams and divide duties
- Coordinate with relevant parties

Locations and equipment

- Check the availability of the facility.
  - The size of the venue is suitable for the number of participants.
  - A place suitable for the nature of the activity
  - Easy access to the, is there enough parking space.
- Check availability of the document
  - Registration Form
  - Schedule
  - Training Materials
  - Pre-training assessment sheet
  - Post-training assessment sheet
  - Comment Sheet
  - Receipts and important documents accompanying receipts
- Check the availability of the device.
  - Presentation equipment such as computers, projectors, monitors
  - Audio equipment, such as microphones, trainers.
  - Internet connection (if required)
  - Various stationary equipment
  - Prepare enough food and drinks for the number of people.

During the training

- Coordinate with external parties and team members
- Control the time of training for each topic to meet the deadline.
- Store important documents
- Stay alert and solve immediate problems

Examples of transfer activities used to change farmers' attitudes towards the production and processing of organic products to meet standards.

My Farm Game

It is a game that focuses on farmers to try their hand at farming management plans. There are 4 types of agricultural land model simulations, 5 types of supporting factors, both in terms of production, processing and marketing, and obstacles that may occur during farming

It can be played by 4 – 5 players at a time and it takes about 30 minutes.

HOW TO PLAY

- At the beginning of the game, every player will have 3 baht and 1 paddy rice card.
- Each player turns to roll the dice, with every player in the game will receive and earn money based on the result of the dice and the cards they have at hand. The person who rolls the dice at each turn will be able to purchase 1 additional card.
- The game will be over whenever any player has a money worth 500. That round will be the final round and the player with the highest money wins.

Types of cards

Farming card: There are 20 cards of each, can be purchased until the card stock runs out.

Supporting factor card: You can buy 1 card per person.

fertilizers and chemicals

Price 10 baht
Productivity x 2
every round

organic farming

Price 15 baht
Productivity x 2
every round

* When you have this, the chemical card will not be active.

Processing

Price 20 baht
Productivity x 2
every round

* Use to multiply with the yield after multiplying with chemical or organic

market

Price 15 baht
Product price x 2 chemistry
Product Price x 3 Organic

* Used to multiply with the last output

water reservoir

Price 15 baht
Save the crop from Drought (dice = 3)

Meaning of Dice Points

1. **Farmer sick**
   - have a **chemical use card** -1/2 of your money
   - No **chemical use card** -1/3 of your money
2. **Flood -2 per farm card**
3. **Drought, no water reservoir card -2 baht per 1 farm card.**
4. **Diseases and pests roll the dice again for select farm type for pandemic**

   Rice Crop Vegetable Fruit orchard

   no pandemic

   No chemical and organic cards -2 per 1 farm card
5. **Normal = nothing happen**
6. **Check for toxicity contamination,** have a chemical use card **-10**

Documentation

PowerPoint Presentation File

Topic: Training planning and preparation as a trainer

Data sources

Documents for the training of herbal plant trainers organized by the National Bureau of Agricultural Commodity and Food Standards