



International
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กระทรวงพาณิชย์
Ministry of Commerce

Organic Rice

for Trainer

Production and Processing in Thailand



MJU-IC
Maejo University International College





Preface

This manual is intended to be a reading accompaniment to the trainer's training. On the production of organic rice in Thailand in accordance with Thailand's organic standards and international organic standards for export. The target group of trainers are leaders of farmers, entrepreneurs, government officials, lecturers, and others related to the organic agricultural product chain. Both in terms of production, harvesting, processing, transportation, export, etc. The main objectives of the training for this project are to extend knowledge on this training topic to farmers, entrepreneurs or related parties and create a network of cooperation of those involved in the organic agricultural production chain. The contents of this manual, contains content on both concepts, principle, techniques and methods of organic rice production of Thailand and International organic standards in production and processing, certification of organic agricultural standards, including training techniques and techniques on being a guest trainer.

In this manual, in addition to the contents of the aforementioned topics, there are also links to resources and additional documents on each topic, as well as examples of training activities for the trainers to use as an alternative to organizing training for farmers, entrepreneurs or those who are interested in the future.

The development process of this manual emphasize knowledge sharing of multi-sectoral organizations, consisting of personnel from various sectors in Phayakkhaphum Phisai District, Maharakham Province, such as Organic Rice Community Enterprise, milling entrepreneurs, personnel of the District Agriculture Office, together with personnel of Khon Kaen Rice Research Center, The Rice Department, Organic Agriculture Certification, CERES GmbH Thailand Co. Ltd., Institute of Product Quality and Standardization Maejo University "IQS", National Bureau of Agricultural Commodity and Food Standards and International Trade Centre "ITC"). As well as the body of knowledge in book information documents from various websites as referenced in the manual. The authors of this manual would like to thank all of you, and all departments as mentioned above.

The authors hope that this manual will be useful to trainers on organic rice 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 rice production

Training Manual Instructions

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

- 1 Introduction** It consists of the principles of organic agriculture, the importance of quality assurance system, product standards, and presents them to targeted farmers before bringing them into the lesson as motivation to learn and further acceptance.
- 2 Presentation of Thai Organic Standards and International Standards for Export** It contains the key contents of Thailand's organic standards. Examples of international standards for export, who in the production chain needs standardization, in order for the targeted farmers to know organic standards, realize their role in the production chain, and choose to certify the standards correctly.
- 3 Certification** consists of the form of certification and feedback. This chapter focuses on group certification to encourage targeted farmers to build networks in terms of exchanging inputs and practical techniques, internal audits, and expanding market opportunities.
- 4 Presentation of organic rice production techniques** consists of general principles and practices in managing production to meet Thai and international organic standards, and techniques for caring for quality rice and meet organic standards, this section will be presented in the form of an organic rice production calendar as a guide for targeted farmers who want to switch to organic production to understand and follow easily.
- 5 Organic food processing** consists of organic food processing practices to meet Thai and international organic standards in order to be information for farmers or related entrepreneurs to prepare properly.
- 6 Preparing a plan to transfer knowledge to target farmers** It contains recommendations for planning knowledge transfer. Activities that can be used as an alternative to transfer knowledge to suit topics and target groups, and there is also a form for reviewing the transfer management plan to be used as a guideline for further training management.

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Chapter

1

**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.



The Principle
of Health.



The Principle
of Ecology.



The Principle
of Fairness.



The Principle
of Care.

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).

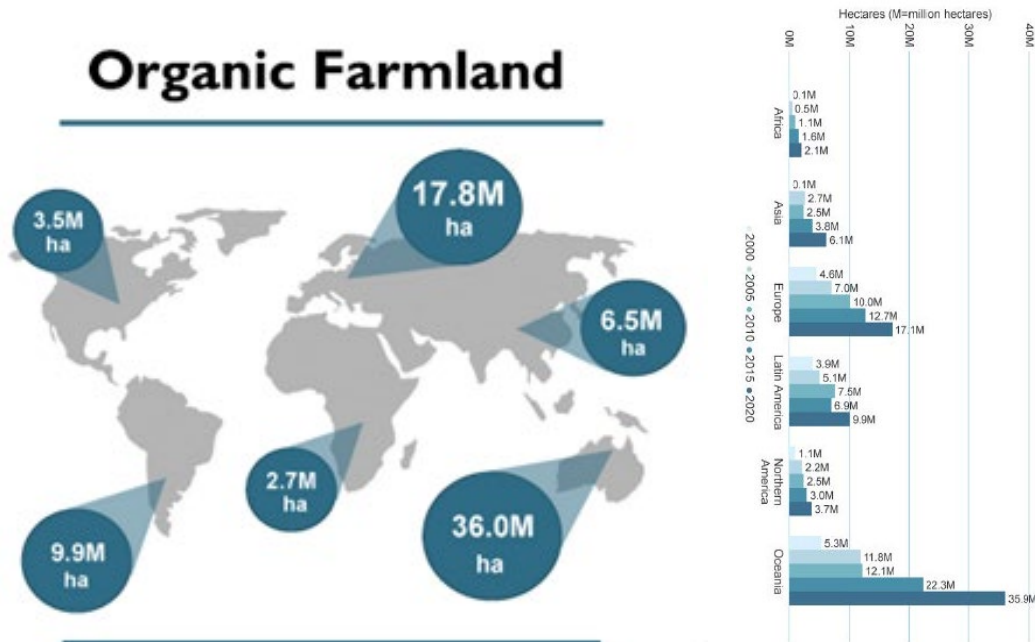
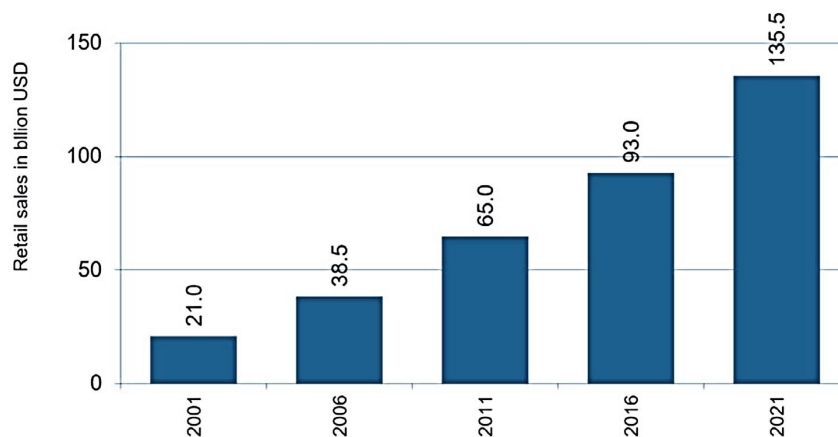


Figure 2 World map showing organic farmland on each continent. In 2021 (area unit M = million ha) and the bar graph shows the growth of organic farmland from 2000 – 2020.

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)

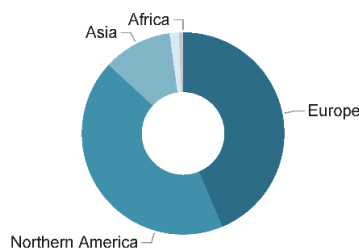


When considering market value by continent, it was found that the European continent had the highest market capitalization of 54.5 billion euros, followed by, North America which is valued at 53.9 billion euros and Asia at 13.7 billion euros. When considering the market for organic products from the 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)

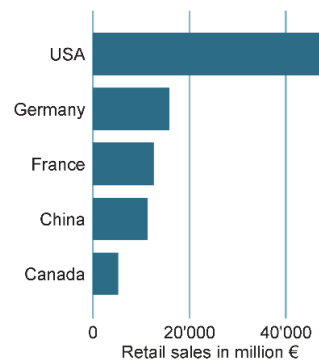


The largest single market was the USA with 48.6 billion (bn) €, followed by the European Union (46.7 bn €). By region, Europe had the lead (54.5 bn €), followed by Northern America (53.9 bn €) and Asia (13.7 bn €).

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 €).



Distribution of retail sales by region 2021.



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, 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.



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



SRP



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

2.1 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.

2.2 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.

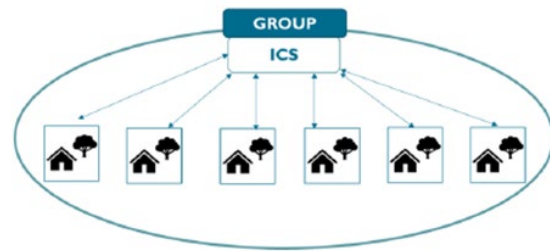


Figure 9 Group of entrepreneurs:

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.

2.3 U.S. Organic System Standards

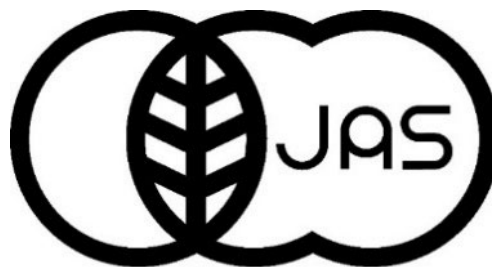
The National Organic Program (NOP), under the supervision of the United States Department of Agriculture (USDA), introduced an organic certification system in 2002



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).

2.4 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?**

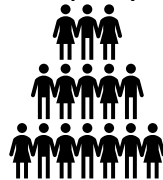
Comparison of EU standards with US standards

Farm-level production

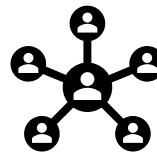
Single Farm



Farms under a company



Group of Farmers



Exporting produce from the farm

Middleman



Product Collector



Initial

Packaging



Processing

Processors (Factory)



OEM Factory Subcontractors



Export and Distribution

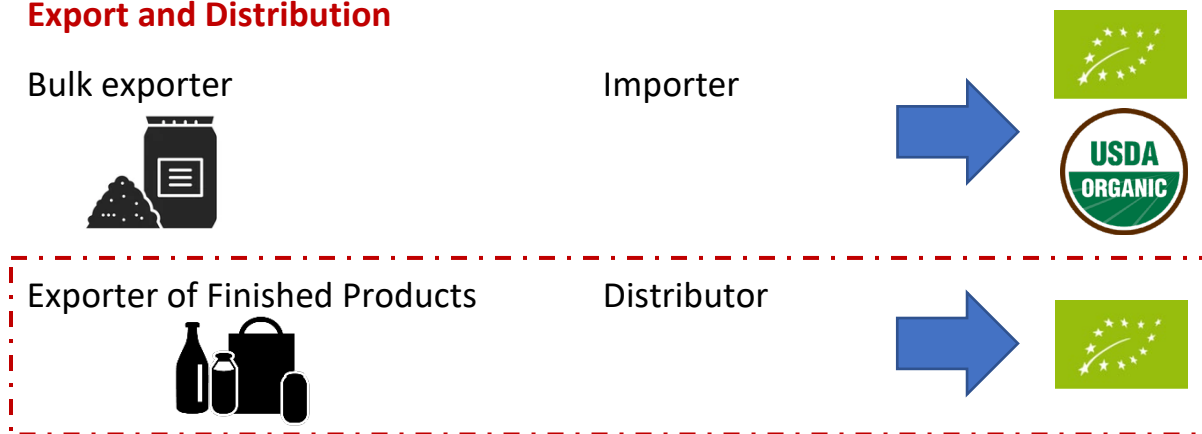


Figure 10 shows a comparison of EU standards with US standards.

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.pdf

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 or varieties of rice and varieties.
- 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

$$\text{Formula} \quad Y = \sqrt{N}$$

Y = Number of sample plots evaluated

N = Total number of group plots requesting certification

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

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

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.

$$Z = 1.5Y$$

$$\text{or} \quad Z = 1.5Y + X$$

where $Z = \text{number of plots to be randomly inspected.}$

$Y = \text{Number of sample plots evaluated}$

$X = \text{positive integer is at the discretion of the Chief inspector.}$ 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	<ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 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

Interviews during the audit

Notes and related documents

Real conditions in the area, storage facilities...

interview	Document Inspection	Observation/Evidence Collection
<ul style="list-style-type: none"> - Non-suggestive open-ended questions: Who, what, where, when, how much? How? Why? <p>Avoid questions "yes" or "no"</p> <ul style="list-style-type: none"> - Start with a simple question and then give them chance to answer fully. - The question is clear enough 	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - House - Storage room - Yield Storage - Garden - Neighboring gardens <p>** Go by appointment + go without notice**</p> <p>Try asking other people in the neighbor's house/neighbor's garden.</p>

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 rice 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=pgrVfas4eU&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 Rice Production
Techniques**

To be able to produce quality organic rice and to meet organic farming standards, organic Thailand, and international standards, farmers should learn and understand the concepts and techniques of organic rice production as follows:

Ecosystems and food chains in rice fields

Ecosystems in rice fields are the relationship between living organisms, living organisms and the environment within the rice fields. The consumer and the decomposers are in one way or the order eating each other, as well as the circulation of nutrients, minerals and energy Transfer (Institute of Biodiversity, 2022)

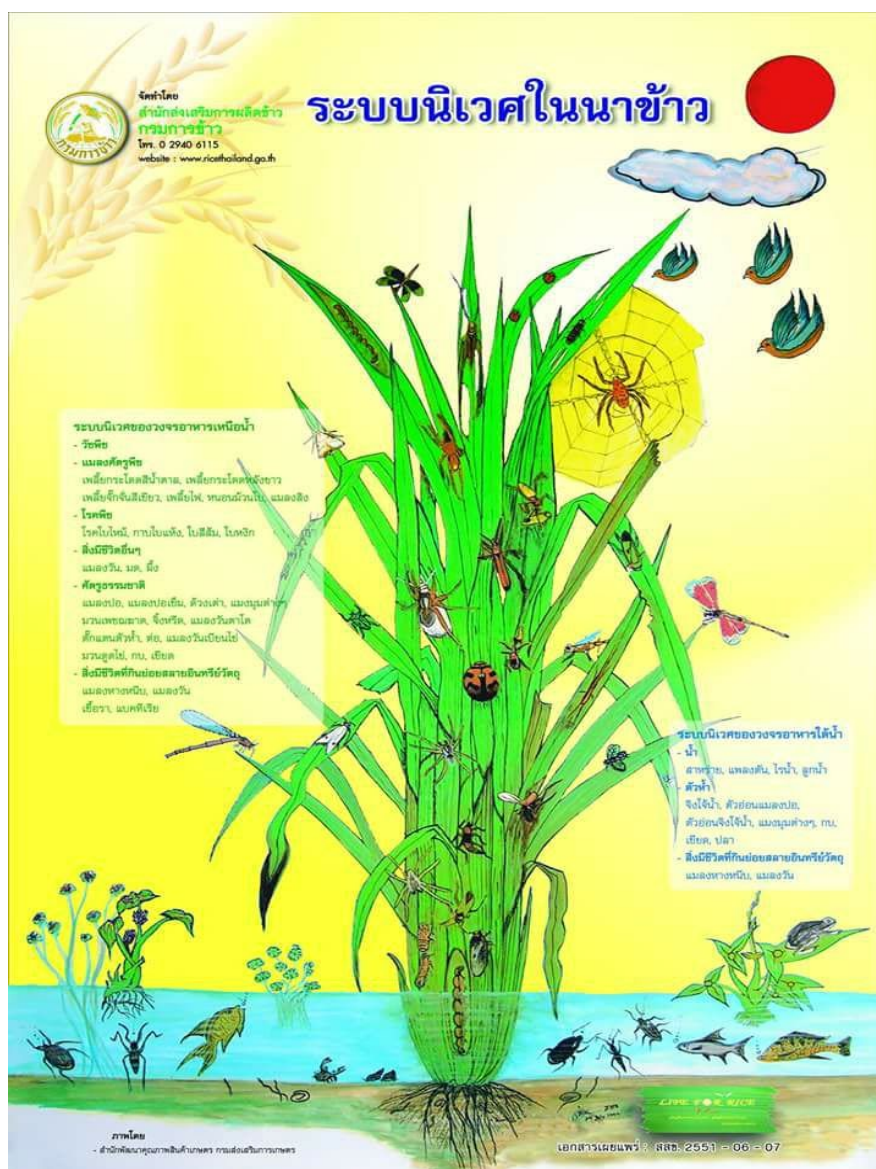


Figure 11 Ecosystem in rice fields

Source: Rice Production Promotion Bureau Department of Rice, 2008

Rice Field Producer, those who create food for other living things, that is, in addition to the rice plant, are the main producers in the ecosystem. Crops that usually grow in rice fields such as water clover, *Sesbania*, lotus, morning glory, weeds, reeds, spreading dayflower, duckweed, including phytoplankton and some bacteria can create food for other organisms in rice fields.

Consumers such as fish, frogs, snail, Channeled applesnail, embryo of dragonfly, beetle, aphid worms, sucking insects, birds or even duck raised to feed on the fallen rice after harvest and eat Channeled applesnail, which are enemies of rice.

Decomposers include various microorganisms in the soil or the presence of mushrooms that often occur along the ridges of the rice fields. After harvesting, the straw decomposes naturally, creating mineral circulation in the fields for the next planting season.

The essential nutrients, of living organism in the rice field has only a small percentage of dissolving in the water, most of them are accumulate in form of muddy sediment, or in the composition of the organism itself. The release rate of these nutrients into the ecosystem depends on the physical environments such as: temperature, light, humidity, acidity/alkalinity, and others (Upper Northern Research Management Network, 2013; Biodiversity Institute 2022)

Food chain examples

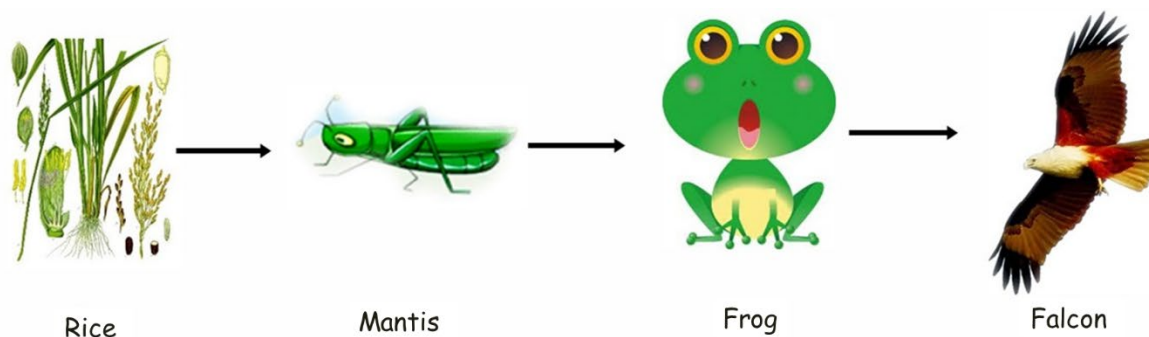


Figure 12 The example of the food chain in rice fields

Source: <https://yuinongluk.files.wordpress.com/2013/07/e0b8a3e0b8b9e0b89be0b8a0e0b8b2e0b89e11.jpg>

From the diagram, it can be seen that eating is intermittent in this food chain. Start with rice plant, followed by grasshoppers eating the leaves of the rice plant, frogs eat grasshoppers, and hawks eat frogs.

Summary

A healthy ecosystem is the balance of all types of organisms in the food chain. If any categories are too much or too little, that ecosystem will lose its balance and will affect other organisms.

Basic rules on organic rice production for organic certification

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

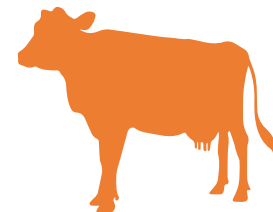
1. fertilizer

- Conserve and increase soil organic matter
- Encourage the use of self-produced fertilizers on farms.

Use of manure

i. Use on plants that are not at risk.

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



ii. Use on plat that are at risk, plant that its yield touches the soil.

- Use more than **4** months before the first harvest: No fermentation 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 a period of 15 days.**

Conditions for the use of manure of each standard



- Manure must not come from industrial farms.
- Complete emphasis on the fermentation process.



- Complete emphasis on the fermentation process.



- 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

Use of Compost

Compost is organic fertilizer obtained by fermenting organic matter with microorganisms that act to decompose organic matter, to decompose and partially decay. However, it can be plant residues such as rice straws, bean husks, bean stalks, corn stalks, sugarcane leaves, cotton stalks and leaves, various leguminous plants, fresh and dry grass, all kinds of leaves, burnt organic materials, may mix animal carcasses or may mix with manure.

Types of compost

Compost can be classified into 2 types: general compost and bio-compost.

- 1) General compost is a fertilizer obtained by composting various types of organic materials according to natural processes without the addition of microbial germs to accelerate fermentation.

Common composting methods

- Start by mixing plant residues and animal manure in a ratio of 100: 10 stacks in layers. Each layer consists of plant residues that are watered until they are saturated and then sprinkled manure over it.
 - Compost pile procedure, separate non-degradable and harmful materials or plant residues and pile them on the soil in a pen or pit in alternating layers, starting from the bottom layer of a pile of plant debris or materials down to the width of the designated pile about 25 centimeters high.
 - Water thoroughly, then compacted tightly to allow water to seep into plant debris or material.
 - Sprinkle with accelerants, such as fertilizer, manure or soil in a ratio by weight of plant residues to manure equal to 5 : 1.
 - Stack alternately until the pile is about 1 meter high, then sprinkle with soil about 1 inch thick on the top layer to prevent birds from ferreting, prevent heat and maintain the moisture of the fertilizer pile.
 - The Fermentation period is 5 – 7 months.
- 2) Bio-compost is a composting method that has been developed to allow rapid decomposition by adding microbial concentrators or EM to accelerate the composting process.

How to make bio-compost

Materials and ingredients: 1 part finely chopped dry straw about 10 kg, 1 part raw husk/calced rice husk – molasses 100 cc, microorganism 20 cc, water 10 liters

Directions: Mix straw and rice husk together in a well-mannered. If it's too much, kindly mix them separately and then combine them into one pile big again. Mix EM and molasses with water. After that, pour and mixed together with other materials to ferment in buckets, and sacks.

Principles of ready-to-use compost.

- 1) Compost fertilizer usually have a dark brown to black color.
- 2) The temperature throughout the compost pile is about the same as the outside temperature.
- 3) If you use your fingers to crumble lumps of fertilizer, it will easily break apart.
- 4) Mushrooms, mycelium or other plants are found.

Use of green manure

Green manure is a type of organic fertilizer obtained by cutting, chopping or plowing legumes during flowering or other crops into the soil with the aim of improving soil fertility. After that, it must be left for about 2 weeks to decompose. It will provide plant nutrition and add organic matter to the soil, which will be beneficial for the plants to be grown (Department of Land Development, 2014; Upper Northern Research Management Network, 2014).

Table 2 Macronutrients in green manure

Green manure type	Nitrogen (%N)	Phosphorus (%P ₂ O ₅)	Potassium (%K ₂ O)
Rice straw	0.59	0.08	1.72
Narong acacia leaf	1.58	0.10	0.40
Eucalyptus leaves	0.68	0.07	0.03
Hyacinth	1.55	0.46	0.49
Africa Sesbania	1.68	0.15	2.40
Sesbania India	2.25	0.35	3.03
Soybean	2.71	0.56	2.47
Green bean	1.85	0.23	3.00
Corn cob	1.78	0.25	1.53
Corn stalks	0.71	0.11	1.38
Cassava stem	1.23	0.24	1.23

Example of fertilizer application guidelines in rice fields to increase production efficiency based on soil fertility

- Organic fertilizer is applied to the soil preparation stage by plowing into the soil before planting rice.
- Green manure, such as legumes, African Sesbania, Sunn Hemp, and plowing before preparing the soil for rice planting, helps restore soil fertility, improves soil structure, and increases rice yield.
- **Compost:** is used in soil preparation/plot preparation stages, by sprinkling 2 – 3 handfuls of bio-compost on the plot before plowing the soil for the second cycle or before plowing the furrows.
- Soil samples are taken after harvest for analysis by sending them to government agencies such as land development stations, Department of Agriculture, universities with Faculty of Agriculture and research centers all over the country.
- Time to fertilize rice: Photosensitive rice should be 2 times, the first time during transplanting/in the field 15 – 20 days after germination of rice and the stage when rice originates inflorescences, while in rice that are not photosensitive, should be 3 times: the first time during transplanting/in the field 15 – 20 days after rice germination, the period when rice tillering peaks and the stage when rice originates inflorescences.
- How to apply fertilizer: Use appropriate methods for effective fertilizer use, such as after applying fertilizer, rake the soil before transplanting, or apply the fertilizer when the rice begins to grow. The rice maturation phase and the soft growth stage.
- Planting Method: There are many ways to plant, such as sowing dry rice, sow in water, transplant, parachute seedling. These methods will determine the type of fertilizer, time to apply the fertilizer, including the appropriate input rate.

This is because virtually all organic fertilizers have a relatively low concentration of nutrients. Therefore, it must be used in very high quantities, and if it is not properly managed, it will increase production costs.

"Make it happen in the area, put it little by little, regularly."

Data source of permitted substance for each standard.

- For a list of permitted substances, see [Appendix A, Table A.1.](#)



- 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>

Caution

External inputs include the use of green manure and cover crops. It is necessary to obtain approval from a certification body and make a record to comply with organic production regulations.

Common 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

Prevention and elimination of diseases and pests

Use of microorganisms

1) Fungus that destroys insect pests.

They consist of *Beauveria* and *metarhizium* fungus, they destroy insects by molding their spores to come into contact with the body of the insects. Their spores grow through body walls of the insects. The fungus will grow into fibers in the insect and damage the tissue until the insect dries out and dies in about 3-7 days.

- **Beauveria** fungus destroys many insect pests such as Brown planthopper, aphid, thrips, etc.

How to use Beauveria fungus

- Apply pure fungus grown on rice or grains, then mix with water, filter out the rice or grain out. Put the spore water into the spray tank, apply it in the afternoon to evening.
- Before spraying, thoroughly survey the plot. Watch the number of pests and natural enemies. If there are 5 pests per 1 natural enemy. No spraying required. If the number of pests is more than 5 per 1 natural enemy and the environment is suitable for pest infestation, spray the fungus at the rate of 200 grams mixed with 20 liters of water. Which is the amount of water used for spraying per 1 rai of land.
- Inspect the plot 3 days and 7 days after spraying to see if the pests have been destroyed by mold. By observing the pests will remain still and begin to show abnormal symptoms, or there may be white mold starting to cover the pests.



Figure 13 Beauveria fungus piercing spores from insects

Source: <https://biologicwine.co.za/wp-content/uploads/2018/05/>

- **Metarhizium fungi** destroy many insect pests, especially capable of destroying soil pests well.

How to use metarhizium fungus

- Prepare a 2 x 2 x 0.5 meter compost pile and leave until the material in the compost pile decomposes.
- Sprinkle the fungus thoroughly into the compost pile, about 15 cm deep from the surface, at the rate of 1kg of fungus per 1 compost pile, making 1 compost pile, 2 plantation rai
- Increase the humidity in the compost pile so that the fungus can grow well by watering and covering with coconut paths to retain moisture. The fungus will be effective in getting rid of pests for about 6-12 months.



Figure 14 *Metarhizium fungus* that pierce spores from insects

Source: <https://kasetlove.com/wp-content/uploads/2021/09>

2) Fungus that destroys plant pathogens.

Such as *Trichoderma asperellum*) is classified as an Antagonist fungi, that destroys pathogens of many plant diseases, especially those that are in the soil. This fungus creates mycelium to pierce the plant pathogen fibers. It creates toxins and gastric juice, to kill, and destroys plant pathogens.



Figure 15 *Trichoderma*

Source : <https://www.allkaset.com/>

How to use trichoderma fungi to control plant pathogens

- Mix it with the seeds or soak the seeds with it before planting to control fungal infections attached to seeds at the rate of 10 grams or about 1 table spoon, mix 10 ml of water with 1 kg of seeds. This will help prevent mold from damaging newly sprouted plant roots.
- In terms of soaking, it with rice seeds, use it at the rate of 1 kilogram, mix 100 liters of water, filter out only the spore parts, soak 100 kilograms of rice seeds that have been soaked in water for half an hour in 1-2 nights before sowing the rice.

- Use for sowing and supporting the bottom of the hole in the field with fungal disease outbreaks. Use trichoderma fungi at the rate of 1 kg per rai of 4 rai and 100 kilograms of compost. Mix thoroughly, and use it as a starter culture in fungal diseased fields at the rate of 80-100 kg/rai.
- For spraying, use 1kg of Trichoderma mixed with 200 liters of water, filter out only spore water, Spray on plants or water the soil or plant material in an area of 1 rai.

3) Bacteria that destroy insect pests and plant pathogens.

namely

- 1) *Bacillus thuringiensis* or Bt destroy pests, by ingesting it. When pests in the worm stage ingest bacteria, it will paralyze the worm, they will stop eating, they will have septicemia, become convulsive and die within 5-7 days.

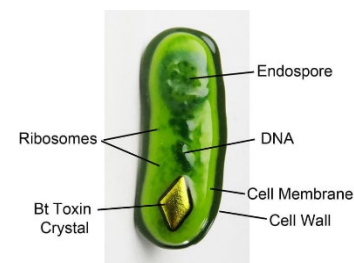


Figure 16 *Bacillus thuringiensis*

Source : <https://u.osu.edu/>

- 2) *Bacillus subtilis* or BS destroys many plant pathogens, both fungi and bacteria. It kills them by competing for food and space for growth. Then create antibiotics and enzymes that destroy plant pathogens, causing plant pathogens to die.

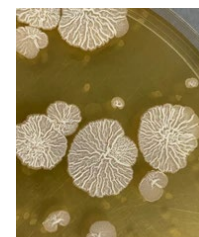


Figure 17 *Bacillus subtilis*

Source : <https://www.shutterstock.com/>

4) Virus that destroys insect pests.

Nucleopolyhedro Virus or NPV destroys pests in the worm stage. The NPV virus damages the organs of the worm, causing the worm to die within 5-7 days. The NPV virus is highly specific to insects, such as the NPV virus of Onion Cutworm, will only destroys Onion Cutworm. The NPV virus common cutworm will only destroys common cutworm.

Table 3 Natural enemies of rice pests

Parasite	Predator
Insects feed on the host insects, just like parasites or worms	<i>Insect-eating insects</i>
<ul style="list-style-type: none"> - <u><i>Elenchus yasumatsui</i></u> - <u>Parasitists and planthopper predators</u> - <u><i>Anagrus flaveolus</i> planthopper.</u> - <u><i>Oligosita yasumatsui</i></u> - <u><i>Gonatocerus</i> sp.</u> - <u><i>Telenomus rowani</i></u> - <u><i>Temelucha stanqi</i></u> - <u><i>Psix</i> sp.</u> - <u><i>Snellenius</i> sp</u> - <u><i>Argyrophylax nigrotibialis</i></u> - <u>Rice gall midge egg parasitist</u> - <u>Rice gall midge pupa parasitist</u> - <u>Rice leaffolder pupa parasitist</u> - <u>Parasitiod - Rice leaffolder</u> 	<ul style="list-style-type: none"> - <u>Mirid Bugs.</u> - <u><i>Chinese black mirid</i></u> - <u><i>Ochthera brevitibialis</i></u> - <u>Predatory Cricket</u> - <u>Rove beetle</u> - <u><i>Ophionea ishii ishii</i></u> - <u>Lady beetles</u> - <u>Long- horned Grasshopper</u> - <u>Long-jawed Spider</u> - <u>Lynx Spider</u> - <u>Wolf Spider</u> - <u><i>Argiope catenulata</i></u> - <u>Damselfly</u> - <u>Dragonfly</u>

Rice Pests

Rat as an enemy of rice

There are 7 types of mice in rice fields: **Greater Bandicoot Rat, Lesser Bandicoot Rat, Rice Field Rat, Lesser Ricefield Rat, Roof Rat, Ryuku Mouse, Fawn- and Coloured Mouse.**

Destructive Nature

Rats damage rice from the beginning of planting by eating germinated grains. When the rice begins to germinate to the tillering stage, the rat will bite the rice plant. When the rice stalk begins to grown, the rat will eat the stem or neck of the stalk, and remove the seed from the trunk. In addition, they also stored rice stalks in their burrow for food after the harvest season.

Prevention of rats and rodents, which are rice pests

1. Trapping, by using different types of traps
2. Rat digging, for rice growing areas with enough labor and time.
3. Siege against the rats in the post-harvest period.
4. Making a fence or fencing together with the use of stealth or trap cages.
5. Using natural enemies such as snakes, barn owl, and owls to help get rid of rats and rodents.

Channeled apple snail

Destructive Nature

Fully grown channeled apple snail of 3 months old can mate and lay eggs. Their eggs are pink in color, sticks together in clusters. Each cluster consists of 388 – 3,000 eggs. The mother channeled apple snail will lay eggs in a dry place above water level, and the eggs will hatch in 7 – 12 days. Channeled apple snail like to eat young rice stalks, from germinated rice or from pre-transplant to tillered rice.

Prevention

1. Choose indirect seedling method, by using seedlings of 25 – 30 days
2. Soil preparation phase: Make artificial trenches around the plot to lure channeled apple snails in a place, then destroy them.
3. Every time you pump water into the rice field, use a splint to block the scum, including big Channeled apples nails, then block another layer with a narrow mesh, to collect the channeled apple snails, then weep them out so as not to obstruct water flow into the rice field.
4. Eliminate the channeled apple snails and its eggs from previous planting season and prevent new ones from entering the field.
5. Stab down a bamboo tree along the side of the field to lure them to lay eggs, collect and destroy the eggs.
6. Collect the channeled apple snails and its egg at least one a week, at the same time can also use plant such as papaya leaves to lure them together, them destroyed everything.
7. Use natural enemies, such as letting ducks, (after harvesting or before farming).

Birds as a pest for rice

There are 10 species of birds, including Scaly-breasted Munia, White-rumped Munia, Eurasian Tree Sparrow, Plain-backed Sparrow, House Sparrow, Baya Weaver, Asian Golden Weaver, Zebra Dove, Spotted Dove, and Rock pigeons

Destructive Nature

The bird begins to destroy the grain from the early stage to the pre-harvest stage.

Prevention of Birds from Rice

1. By chasing them away
2. **By using sound:** This will scare the bird and flee, such as firecrackers.
3. **Use of Vision,** such as using things that move when the wind blows, or objects that can reflect light, or using scarecrows. Using a moving puppet is more effective than a non-moving puppet, and it works best, if it moves with sound.
4. **Preventing birds from entering,** such as using nets

**These methods only work in a short period of time. When used for a long time, birds will get used to it and are not afraid of these things because birds are intelligent animals that can learn and remember quickly. The combination of multiple methods of bird pest control is likely to be more effective than using only one method.

Weed

In Thailand, there are many different methods of rice farming. Each method has many types of weeds that are resistant to that particular environment, therefore, it is difficult to avoid them from occurring at all. Narrow-leaved weeds of various species cause more problems than broadleaf weeds and aquatic weeds.

Weeds in rice fields may refer to *Oryza granulata*, white flowered rice, goose weed, pickerel weed, umbrella sedge etc that grow in rice fields or may be other varieties of rice such as volunteer rice plant or weedy rice. Furthermore, all these said weeds compete for nutrients with the rice planted on the field as they grow simultaneously, which in turn causes a decrease in the yield and quality of the rice.

How to control weeds in rice field

1. Choose rice varieties that can compete with weeds, such as jasmine 105, has a tall shape, long leaves and a wide spread that prevents the weeds from growing fully, or reduce their quantity.
2. In terms of soil preparation, crop rotation, plowing before the weeds bloom, so as to control their growth and turn them into green manure.
3. Seed rate, 1– 2 seeds or about 10 -20 kilograms per rai.
4. Determining the planting period of rice, such as: Jasmine White Rice 105 and RD6 variety, that are planted around mid-July will produce the highest yield lower weeds in the field, if compared to planting these 2 varieties of rice early at the beginning of the year. Because It will cause the rice to experience drought conditions or intermittent rain and severe weed problems.
5. Weeding by hand plucking for at least 2 times per 15 and 30 days after the rice germinate will increase rice yield by about 84 percent. Compared to no weed control.

Summary of pest and weed control requirements

1. **Do not use** any pesticides such as herbicides, insects and plant diseases.
2. Choose rice varieties that are resistant to disease, but must not be GMOs.
3. Use [natural enemies](#)
4. Use machine tools
5. 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

- Do not burn stubble, rice straw and organic waste in the fields because it destroys organic matter and other beneficial soil microorganisms.
- Stubble, straw and organic waste should not be removed from the fields.
- The soil should be analyzed every year and correct the pH of the soil to suit the growth of rice plants (about 5.5 – 6.5). If it is found that the soil is highly acidic, use wood ash to improve the soil condition.
- Have varieties of plants and animals in the fields according to their uses, such as:
 - The diversity of natural pests of insect pests such as dragonflies, spiders, insectivorous birds, etc.
 - Planting of grazing grass or lemongrass on the ridges as a buffer line.
 - Rearing of animal such as shrimp and fish in the rich field.
- Crop rotation is the planting of different crops on the same area in rotation, without leaving the land empty. Thus, the soil surface will be fertile, reduces pest infestation and increases crop yields.

Principles for selecting plants for use in crop rotation system.

- 1) Plant deep root crop and alternate with shallow roots. To improve soil structure, air circulation/ventilation, water retention and drainage.
- 2) Plant legumes crops in rotation with plants that need a lot of nitrogen, to help create balance in the accumulation and use of nitrogen from the soil, between different plants.
- 3) Grow crops that can intimidate weeds to disrupt their life cycle, and reduce some weed populations.
- 4) Plant crops that are resistant to different diseases and pests, to break the life cycle of diseases and pests.
- 5) Plant crops suitable for soil and climatic conditions, so that plants can grow well.
- 6) Plant forage and money-making crops in order to get a cropping system in line with good economic and ecological conditions.

4. Varieties of rice seeds and seedling

Rice varieties are one of the first priority factors to increase rice production efficiency without increasing production costs. If there are varieties of rice with high yields and quality that meet the market demand, resistant to insect diseases, and is suitable for the local environment, this will be a very good way of reducing the cost of rice production.

Rice seeds and other crops planted in the area.

- Do not mix with chemicals.
- Must not be genetically modified seeds
- Use self-produced seedlings or from certified farms according to the same organic standards.
- If using seeds from general sources, with both organic seedling production sources.

For EU standards



- Approval is required before use.
- If permission is not requested for 3 times before planting, **penalty** from the certification body will be to revoke their certification.

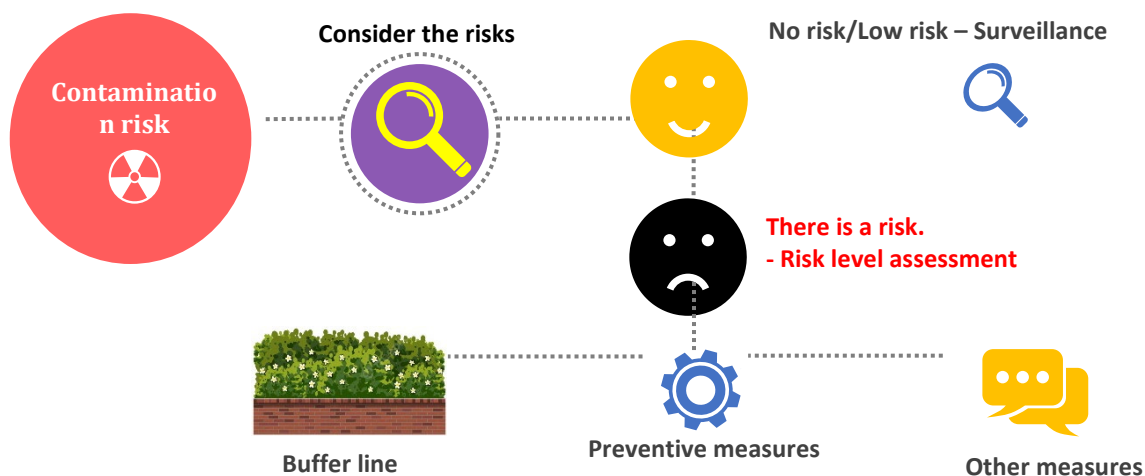
Common problems

- Propagation comes with nursery soil.
- No evidence is provided in case the source of organic seedlings cannot be found.
- Missing record / purchase document / source cannot be found.
- Self-grown, grow little, grown by workers, but the farm owner did not follow-up.
- It was given freely, from friends and neighbor.
- Permission was not asked before use.
- Mix the seeds with drugs.
- Missing records / purchase document / source of origin

Recommendations and precautions

- Should be bought in groups, or produced together within the group.
- Do not be complacent, even if it is a plant grown for self-consumption.
- The source of origin of all plants must be recorded.
- 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 visit.
- Rice seed should be soaked in neem water for 2 days to get rid of gall midge and other insects from the seeds.

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 flow down the water.

What can be a buffer line?

1. Planting crops as a buffer line, such as grazing grass, fast growing shrub.
2. Cash crops / or agricultural crops that are not certified
3. Roads or ridges that are farther away from neighboring plots of at least 1 meter

4. Rice planted as a buffer line, must be a different breed with noticeable difference. (Be careful! produce must be clearly separated, labeled, and recorded.)

Measures to avoid contamination of water used in rice fields

- Water sources should conserve water used in rice fields. The water used for planting must be obtained from a source that does not have an environment that contributes to hazardous material contamination.
- There should be a water reservoir, water filtering plants should be planted.

Other measures

- ✓ Talking to neighboring plot to jointly find solution.
- ✓ 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 rice** 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 rice cultivation to be organic at the same time Resulting in **organic rice** plots with other plots that grow **conversion period** or **conventional production** rice.



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 conversion period and products from conventional 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 the case of other conversion use **conventional rice**.

Permitted in case the other plot is **conversion** period and there is a good post – harvest sorting system.

Common 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
- Harvest the together / No specified label
- Sell them together

7. Conversion period

Table 4 shows the conversion time of rice to achieve certification according to various organic standards.



Conversion period of rice	12 months before harvest	24 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 produce 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 conversion) 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 production "conversion" and "organic" produce.

Table 5 shows examples of organic product labels.

Product	Organic rice
Source	Payakphum Phisai Organic Rice Producer Club
Production ID	Mrs. Yindee Sukjai 3-2-78-11 T2
Status	Yield from first year conversion (T1)
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 a simple form that suits the farmer.
- But it is necessary to keep the record current and on 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

<p>Farm Records</p> <p><u>Activities in Each Farm</u></p> <p><u>Activities in sub-plots</u></p> <p><u>Activities of Each Plant</u></p> <p><u>Daily Activities</u></p> <p><u>Others</u></p> <p>Pictures</p>	<p>Production Factor</p> <p><u>Seeds</u></p> <p><u>Compost/Fermented water</u></p> <p><u>Soil amendments</u></p> <p><u>Biological substance</u></p> <p><u>Others</u></p> <p>Receipt</p>	<p>Harvest / Sales</p> <p><u>Each crop must have it</u></p> <p><u>Specify the plot and day</u></p> <p><u>Sent for</u></p> <p><u>packaging/processing</u></p> <p><u>Sales record</u></p> <p><u>Others</u></p> <p>Sales Document</p>	<p>Post Harvest (If any)</p> <p><u>Washing</u></p> <p><u>Packaging</u></p> <p><u>Storage</u></p> <p><u>Delivery</u></p> <p><u>Others</u></p> <p>Record/Form</p>
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Figure 18 shows examples of farm records, farm location maps, 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 for certification or specification document from the farmer's group, where he/she is a member and study them for proper understanding.
- ✓ Must have sufficient knowledge of both regulations and techniques of organic farming.



Monitoring, tracking

- ✓ Should operate Daily
- ✓ Record tracking log



Cooperate

- ✓ Internal inspection of groups that farmers are member of.
- ✓ 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 Create 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 go through conversion period
- 8 Separate yields/output and display label
- 9 Make records and keep the documents
- 10 Be understanding and cooperative

The production of organic rice to obtain good yields and meet standards requires careful care.

It is divided into 4 steps:

1. The process of planning the production of Organic Rice.

In rice cultivation, farmers need to understand the "rice production season" to help them in make decisions. Rice production planning is important, that is, the selection of rice variety, understand the varieties of rice are in that area, which in most cases are divided according to the flowering characteristics and it can be classified into 2 types, such as: photoperiod sensitivity rice (in-season rice) and Non-photoperiod sensitivity Rice (can be grown all year round), as shown in Figure 19 showing the production cycle of 105 jasmine white rice, which is photoperiod sensitivity rice as you can see, it can be grown from April, and starts flowering in October (Boonrat Jongdee, 2021)

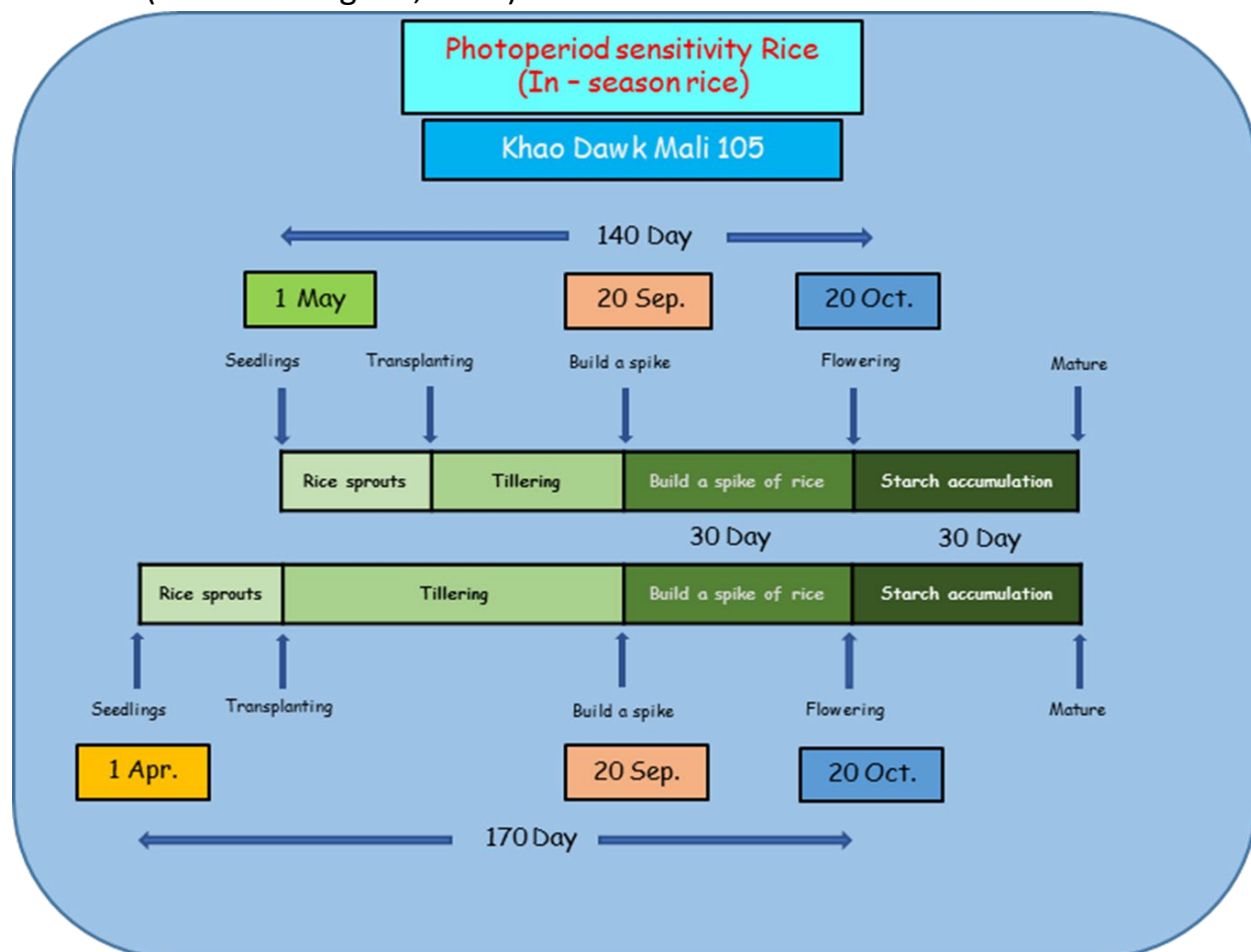
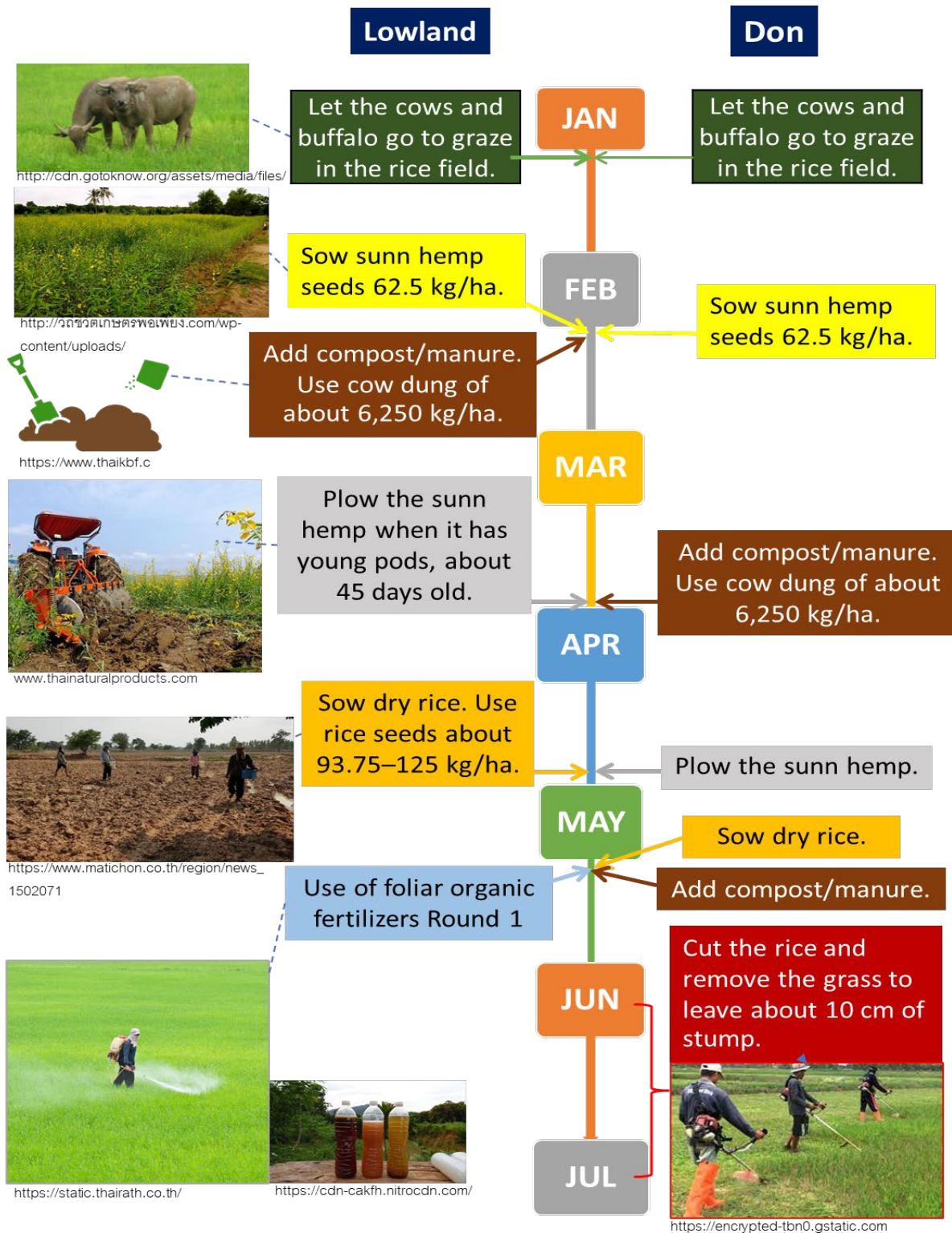


Figure 19 Photoperiod sensitivity rice (in-season rice)

An example of a standard organic rice planting plan in a rain-fed area in a **lowland** and **Upland** of the Northeast will have the following rice production cycles as follows:



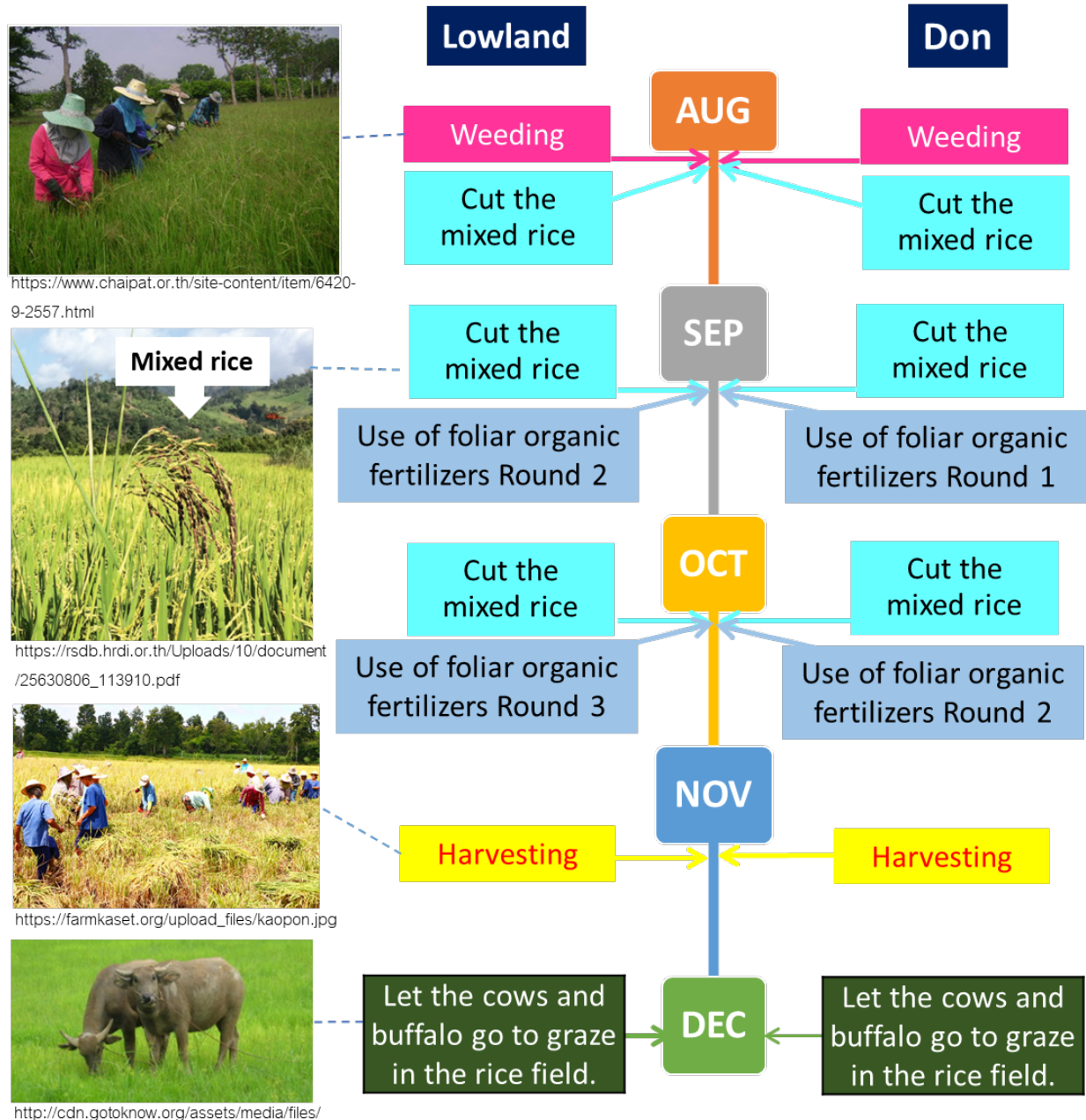


Figure 20 shows an example of a standard organic rice cultivation plan in the rainwater paddy fields in the lowlands and on the don of the

Planning the rice production of farmers or groups of farmers will help farmers to be clear what activities they have to engage on, what production factor needs to be prepared for use during the production cycle of each season. For example:

Compare the plantation of *on the don* organic rice with *lowland*

Commonly found issues: There are less water and lots of weeds *on the don* than *lowland* organic rice field

Plan on solving the problems

1. Choose drought tolerant varieties they grow fast.
2. Sow dry rice seed and wait for rain.
3. Planting *on the don* rice later than *lowland* rice, to be in rainy season, therefore *on the don* will have more water in the field at the beginning of planting period.
4. *On the don rice field* both rice and weeds will germinate and grow together, after sowing the rice for about 1 month, cut the rice and weed to remain 10 centimeters, after that, the rice will grow faster than the weed. The previously cut weed and rice stems can be used to feed cows.

2. The process of growing organic rice.

There are several ways to grow rice, for example:

Transplanting of Rice Seedlings

- It is most suitable for organic rice production, because of the soil preparation, and controlling the water level in the rice fields reduces the number of weeds and helps the rice compete with weeds.
- Seedlings used for transplanting should be about 30 days old. Choose healthy grown seedlings that are free from diseases and pests.
- Use a frequent planting spacing more than the general recommended planting spacing for rice cultivation, i.e., the distance between plants and rows should be about 20 – 30 centimeters. The number of seedlings should be 3 – 5 plants per hole. However, if the fertility of the field soil is low, it is recommended to use a narrower distance.



Figure 21 shows the transplanting of rice seedlings

Source: <https://sites.google.com/site/dekaaaaapha/kar-pluk-khaw>

Single line transplanting of rice seedlings.

It is a method of rice cultivation that has become more popular in modern times with the following principles:

- (1) Do a single line transplanting of the rice seedlings when the rice are not more than 14 days old.
- (2) Plant the rice in a way that the roots are parallel to the ground. Reduce the spacing, such as 30 x 30 centimeters.
- (3) Improve soil fertility with organic matter.
- (4) Reduce and control irrigation such as, alternating between wet and dry irrigation. But there's often a problem of labour shortage, which delays the planting.



Figure 22 show single line transplanting of rice.

Source: <https://www.hrdi.or.th/Articles/Detail/17>

Sowing dry rice seeds

This method is commonly done in rainwater fields, where dry grain is sown in dry soil conditions because it has not rained yet. After the last plowing, the grain is sown without rake. The seeds will fall between the surface of the soil. The rice will begin to grow immediately after its rain, in some area after sowing dry rice, it is raked or ploughed. In addition, they sown after plowing. By sowing in a rainy condition, and the water begins to trap in the rice field. Once plowed, the grain is sown and raked over immediately.



Figure 23 shows the sowing of dry rice.

Source: <https://www.youtube.com/watch?app=desktop&v=SCZagsYQVnE>

Sowing of germinated rice or Flooded rice field

By taking the seeds that have been cultivated to germinate (with roots germinating about 1-2 mm) to sow into the field. The soil is prepared until it becomes like a mountain range.



Figure 24 Sowing of germinated rice or Flooded rice field

Source: <http://www.ricethailand.go.th/rkb3/title-index.php-file=content.php&id=2-8.htm>

Sowing of flooded rice fields that will yield good results should be done as follows:

- Uniformize the fields, because the grain often dies if it falls into a puddle or waterlogged pit.
- Surround the rice field with ridge, so can control the water. Soil preparation should also be done in the same way of the seedlings transplant.
- After harvesting the rice, allow the fallen grains in the field to germinate into the rice and then plow to reduce the problem of chalky grains or weed rice in the field.
- Always let enough water in to the rice field to keep the soil moist for about 5-10 days. This is to allow the weed seeds to grow into destroyed young plants before releasing water into the fields, then plow and rake to destroy the weeds. Do this 1-2 times, leaving a gap of 4 - 5 days.
- After the plowing and raking are completed. Keep water in the field for about 3 weeks, to allow water weeds such as water hyacinth, *Pontederia vaginalis*, Water chestnut, *Sphenoclea zeylanica*, and *Elegant cyperus*, etc to grow into destroyed young plant, then rake them thoroughly, the weeds will stick to the rice field and can be scooped out.
 - Once raked, drain the water and adjust the mountain range to level. For those who use tandem disk harrow make sure it tramples the rice straw into the ground instead of tilling. After trampling, soaked the rice straw in

water to become rotten, until the heat is exhausted for at least 3 weeks before trampling again. Because the gas generated from rotten straw will harm the rice plant, causing the rice to have a black root and not been able to search for food and nutrients. After that, drain the water to adjust the high level.



Figure 25 shows a straw trampling tandem disk harrow

Source: <https://www.lazada.co.th/products/-i3491352703.html>

3. The process of managing organic rice during the tillering, gestation and budding stages.

The next stage of managing organic rice after farmers have finished planting is to find a way to nourish the rice to flourish, germinate and flowers, so that the rice can accumulate enough food nutrients in building up its grain. Taking care of the growth of rice plants can be divided into 3 stages as follows (Division of Education and Expansion of Royal Development Projects, 2019).

Stage 1: The growth of stem and leaves includes:

- The seedling stage starts from the rice germinating from the seed until tillering. This phase takes about 20 – 30 days. day
- The tillering phase starts from tillering until it starts to produce flowers, and when the rice plant begins to have up to 5 leaves, however, this period depends on the rice species, such as jasmine rice 105, which takes 40 – 60 days.

Maintenance at this stage, if soil is nourished enough to have good fertility from the beginning. Then the only thing to do is just keep an eye on the water level so that it does not rise too high, and watch out for insect diseases. But if sprayed with fermented hormone it will help the tillering process.

Stage 2 Flowering growth

Starting from flowering, to pollination, the period depends on the rice species, such as Jasmine Rice 105. It takes 20 – 30 days.

Maintenance at this stage, if soil is nourished enough to have good fertility from the beginning. Then the only thing to do is just keep an eye on the water level so that it does not rise too high. But if sprayed with fermented hormone it will help the reproductive growth

State 3 Seed growth

After pollination of the rice flowers, the grain starts to become milky and starchy until the grain is fully developed, taking 25-30 day. This however, depends on the rice species.

Maintenance in this stage, mixed varieties of rice should be taken out of the plot, to enable get desired variety of rice and keep watch on the water level when the grain is about to be fully grown to more aroma to the rice.

Management of Mixed Rice

The separation of mixed rice is by removing rice plants that grew from another variety of rice, and mixed with the rice seed planted on the field.

How to check for removal of mixed rice

- The trench should be set aside for the inspection of the plot because the inspection of the rice plot must be done regularly.
- When other varieties of rice are found to have mixed with the planted rice, they must be uprooted even if the rice has already sprout.
- Mixed Rice should be cut off from the plot for about 4 – 5 times according to the growth stage of rice as follows (Department of Rice, 2022)
 - 1) **Seedling stage:** notice the difference in leaf color height or disease
 - 2) **Tillering stage:** Observe the height difference, the color of the plant, red rice.
 - 3) **Flowering stage:** Observe whether flowering occurs before or after, comparing it with the main rice varieties grown, and

notice the color and height that are different from the rice grown, as well as having different clump shapes.

4) **Curved Panicle stage:** observe the color, tail and characteristics of different seed and panicle

5) **Pre-harvest stage:** Re-check the rice plants with different characteristics before harvesting.

However, a good separation mixed rice will allow the rice seeds to pass the rice seed quality inspection process according to the following rice seed standards:

- Obtain at least 95% pure rice seeds according to the varieties.
- Impurities not more than 5%
- If there is red rice/glutinous rice, it should not be more than 0.2%
- Rice seeds that have passed germination tests must have a germination rate of at least 85%.
- Seed moisture must be 14%

4. Post-harvest handling procedures

In general, pre- and post-harvest management focuses on preventing quantitative and qualitative losses from being reduced or reduced to a minimum.

Quantitative rice loss is a decrease in the yield or weight of rice that should have been obtained due to the untimely harvest. Falling during harvest, too early or too late, or even unfinished harvest, trampling that have seeds mixed with straw, including being destroyed by pests, etc.

Qualitative rice losses, such as a decrease in the percentage of whole grain and stalks. Yellow grain rice with mold, unpleasant smell, rice with dark color, or in case of seeding, such as deterioration of germination quickly. There is substandard germination and seed strength decreases, etc.

Proper handling after harvest can reduce losses to a certain extent. The processes related to post-harvest management are as follows: (Department of Rice, 2012)

1) Harvesting and dehumidification

After the rice plants in the field has been fully treated and maintained well until it blossomed, accumulate enough in the seeds until it become fully ripen. Physiologically, the seed will be complete with all the components such as: size, accumulation of dry weight, color, moisture content, germination, viability, vigor as well as the structure and biochemical composition of the seed. Harvesting in such a period will yield the best quality rice grains. But the moisture content in the seeds will still be high, at about 28-33 percent. However, if found that some rice varieties were not fully ripe yet, there still have some green rice around the base of the ear, it will take about more 5-7 days to harvest. At this stage, the moisture in the rice grains will be about 22 - 25 percent. Counting the flowering days of rice is still necessary in every rice ecosystem, that is, harvesting rice for high yields and the best quality seeds. Rice in the field needs to grow, flowers and ripening consistently after pollination. The rice flowers have the highest weight accumulation within 3 weeks or 21 days, and the whole ear of rice flowers takes about 7 days to be pollinated thoroughly depending on the species. Therefore, the rice takes about 28 - 30 days to be fully ripe and ready for harvesting

2) Threshing and cleaning

Harvesting and cleaning rice is one step after harvesting that causes the grain to fall off and fall apart. A good threshing must not crack or break the grain. The threshed grain must be clean. Contamination such as: rice leaves, straw, soil, stones, or weed seeds must be less or completely not present.

Nowadays, it is popular to use combine harvesters, most of which have a cleaning machine built in, making it convenient and fast. It is suitable for farmers who have a lot of farming, but organic threshers must be separated from general thresher. It must use only for organic rice. If there is no threshing machine for organic rice, and it's necessary to use combine harvester, the machine must be washed and the farmers must separate the washing machine for the standard inspector to see.

3) Storage

Storage is the final step before being sold, processed or made into planting seeds the following year. Good storage prevents quantitative losses and keeps rice quality from decreasing even more. If stored in a barn, it must be separate from general rice. The floor should be moderately elevated, and there should be a carriage inside for the rice sack for the purpose of good ventilation. The main cause of loss during storage consists of care practices during storage, condition of storage containers, climatic conditions in the storage, and insects, pests, as well as various microorganisms. All of these factors affect the quantity and quality of rice stored. In addition, temperature variability in highlands and relative humidity are another factor that determines the storage length of rice.

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

Field visit to certified organic fields

The learning content is as follows:

1. Interview farmers about how to manage the area.
2. Visit organic rice 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.
- Give target farmers an opportunity to ask questions and exchange experiences from 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 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 for 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 micro-organism (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 Rice Production Techniques

Data sources

- National Bureau of Agricultural Commodity and Food Standards
- Organic Standards Foundation
- Ceressouth East Asia Company Limited
- Knowledge on rice: Department of Rice
<https://www.ricethailand.go.th/rkb3/>
- 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](https://www.ifoam.org/organic-regulations-rules-for-organic-products/)

- Compliance Regulations (EU) 2021/1165
[32021R1165 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eli/reg/2021/1165/oj)
- American Organic Standards
<https://www.ams.usda.gov/rules-regulations/organic>
- A search engine for allowed and disallowed external factors for US organic standards.
<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](https://esc.doae.go.th/wp-content/uploads/2018/12/Major-Natural-Enemies.pdf)

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, processors 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 factories, 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 rice, quantity, status

Processing report indicating the processing date, indicating the raw material lot, the amount of organic rice 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 rice 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 6 provides a summary of labeling requirements according to organic standards

TAS 9000 – 2021 Thailand

Organic	Made from organic food ingredients.	Product or products during adjustment phase to organic.
At least 95%* of raw materials come from organic farming.	At least 70%* of raw materials come from organic farming	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.
The remaining 5%* must not come from GMOs or irradiation or use substances not specified in TAS 9000-2021 Annex A Table A.6	The remaining must not come from GMOs or irradiation or use substances not specified in TAS 9000-2021 Annex A Table A.6	
It must not contain the same non-organic raw materials as certified raw materials.		
Use logo  Also, specify the name and/or code of the certification body.	Do not use logos	



*% of components excluding water and salt

(EU) 2018/848 European Union

Organic	With organic ingredients
<ul style="list-style-type: none"> 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. 	<p>Raw materials from organic farming.</p> <ul style="list-style-type: none"> 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.
<p>The remaining 5%* are non-organic raw materials, as specified in Annex V part B of (EU) 2021/1165.</p>	<p>There is no requirement for non-organic ingredients, but they must not be genetically modified.</p>
<p>Non-agricultural raw materials and processing aids must comply with Annex V part A of (EU) 2021/1165.</p>	
<p>Only refer to organic things in the list of ingredients and do not refer (display) them to the general label.</p>	
<p>Use logo and must always include the code of the certification body are underneath. Always logo</p>  <p>TH-BIO-140 Thailand Agriculture</p>	<p>Do not use logos</p>

*% of components excluding water and salt

NOP USA

100% organic	Organic	Made with organic	Refer to organic components.
Only organic ingredients no processing aids are used.	At least 95%* of raw materials come from organic farming. <ul style="list-style-type: none"> • 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. 	At least 75%* of raw materials come from organic farming.	Less than 70% of ingredients come from organic farming*
Use logo  and indicate on the label. “100% Organic”	Use logo  and indicate on the label. “Organic”	Do not use logos	

*% 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
- Ceres South East Asia Company Limited
- Agricultural Product Standard 9000-2564
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- 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 7 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

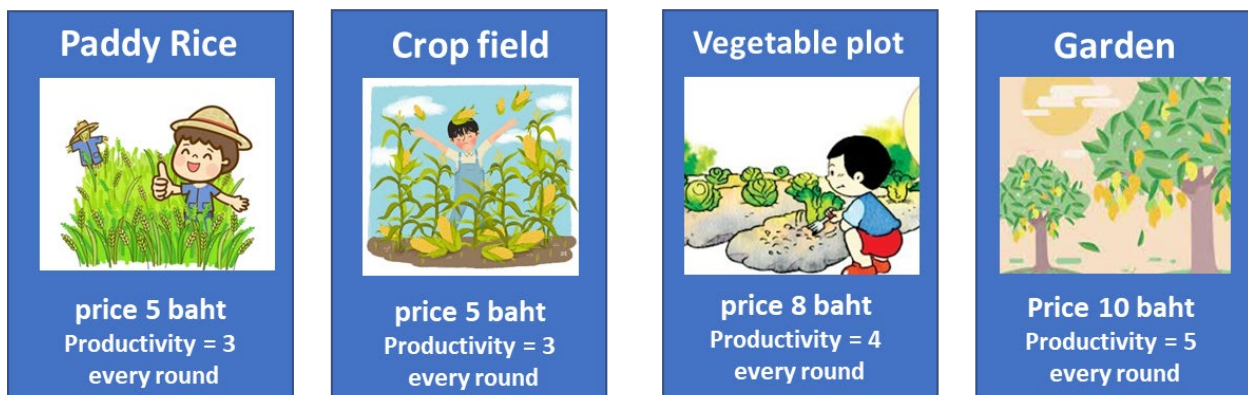
It can be played by 4 – 5 players at a time and it takes about 30 minutes.

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

Processing



Price 20 baht
Productivity x 2
every round

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

* 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: Chapter 6 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