International Trade Centre

ARISE+ Thailand
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กระทรวงพาณิชย์
Ministry of Commerce

Organic Rice

for Farmer

Production and Processing

in Thailand

MJU-IC
Maejo University International College

Maejo University
Institute of Product Quality and Standardization

Preface

The world's agricultural and food systems have come to a crossroads. While our current food system has increased agricultural productivity over the past several decades, it also has negative effects on the environment and society. Soil degradation, biodiversity loss, water pollution, climate change, ocean dead zones are just some of the challenges we face.

Organic farming can be a transformational path to the solutions needed for sustainable food systems and climate resilience. It is also an accessible, affordable and empowering system for farmers as the system is largely dependent on the use of biodiversity and local resources and has little external costs. Organic agriculture can be a viable solution to not only hunger but also other challenges such as poverty, water use, climate change and unsustainable production and consumption.

“Organic farming starts from the heart. Where are you trying? success is there.”

Authors
Manual for a trainer for organic rice production

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Organic Food Processing

What is Organic Agriculture?

The first thing that people think of is organic agriculture.

Organic agriculture = No synthetic fertilizers

No synthetic chemicals

But the origin of organic farming is developed from the need to have "A production model that produces good food and minimizes the impact on the ecosystem for a sustainable production system."

Figure 1 The four principles of organic farming
Source: International Federation of Organic Agriculture Movements

Health

Avoid the use of fertilizers and pesticides that are harmful to health.

Ecology

It takes advantage of the diversity of flora and fauna, local natural mechanisms, efficient and reusable use of resources and energy to enable sustainable agriculture.

Fairness

Guarantee the fairness of all involved people, from farmers to consumers, to have a good quality of life, including the well-being of the animals in the system in accordance with the natural behavior of that animal.

Empathy

Choose the right technology and reject unpredictable long-term technologies such as genetic modified (GMO) and nanotechnology.

Where are you planting and selling?

For sell in foreign markets

HTTPS://WWW.MARKETWATCH.COM/STORY/IS-ORGANIC-FOOD-REALLY-HEALTHIER-2016-12-01

For sell in domestic marke

HTTPS://WWW.LEMONFARM.COM/TH/BLOG/ORGANIC-FROM-THE-GROWER.HTML

For sell in local markets

For family consumption.

Figure 2 shows the production of organic agricultural products and related standards divided into 4 levels.

Why does it need to be certified?

Standards, regulations, certification standards are set up to

"Protect consumers and protect farmers The real organic producer"

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

1. Production for **family consumption**, no certification require.

2. Production for **sale in the local market**, may not require certification standards or require Participator Guarantee System (PGS).

3. Production for **sale in the domestic market**, may require Thai Organic Agriculture Standards (TAS 9000 - 2021).

4. Produced for **sale in foreign market**, standards set by the destination country are required.

It can be seen that the market and standards come together. The greater the distance between the producer and the consumer, the more important the standard.

Thailand Organic Standard

FIGURE 3. THAILAND ORGANIC CERTIFICATION MARK

The National Bureau of Agricultural Commodity and Food Standards sets standards in collaboration with all sectors involved in the production of organic agricultural products, including government agencies, the private sector, consumers and farmers. This standard is the minimum requirement that farmers in the country must comply with and the certification body will use as a basis for auditing.

According to the requirements

Thai Agricultural Standard TAS 9000 - 2021

Organic Agriculture: Production, processing, labeling and distribution of organic produce and organic products.

Coverage

1) Crop production: crop cultivation, mushroom cultivation, harvesting of natural produce, seed production and parts used for propagation.
2) Aquaculture and seaweed farming
3) Livestock farming
4) Beekeeping and edible insects.

The main structure of the standard covers principles, objectives, requirements applicable to all product groups.

The annexes related to organic crop production are:

Appendix A lists substances permitted for use in organic production.

Appendix B Management of organic crop production

Thailand Organic Standard

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. Climatic and local conditions

Organic agriculture standards of other countries

It is divided into 2 groups according to law enforcement:

1. Compulsory standards by law
2. Voluntary Standards

Compulsory standards by law

It is a standard or regulation of a country that producers, exporters, importers must comply with when selling organic products in that country, such as

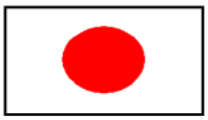
Country/Group of Countries	Marks of Certification	Relevant laws
		Rule (EU) 2018/848 Pratice (EU) 2021/1165
		National Organic Agriculture Program (NOP) United States Department of Agriculture (USDA)
		Japanese Organic Agriculture System Standard (JAS)
		CANADA ORGANIC PRODUCTS REGULATION SOR/2009-176
		CHINESE ORGANIC STANDARD GB/T19630

Figure 4 shows standards or regulations of countries that producers, exporters and importers must comply with when selling organic products in that country.

Organic agriculture standards of other countries

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**

Fair Trade Standards

Voluntary standards of the private sector

Standards of Agricultural Product

Figure 5 shows an example of a voluntary standard emblem.

Which country is good to export to?

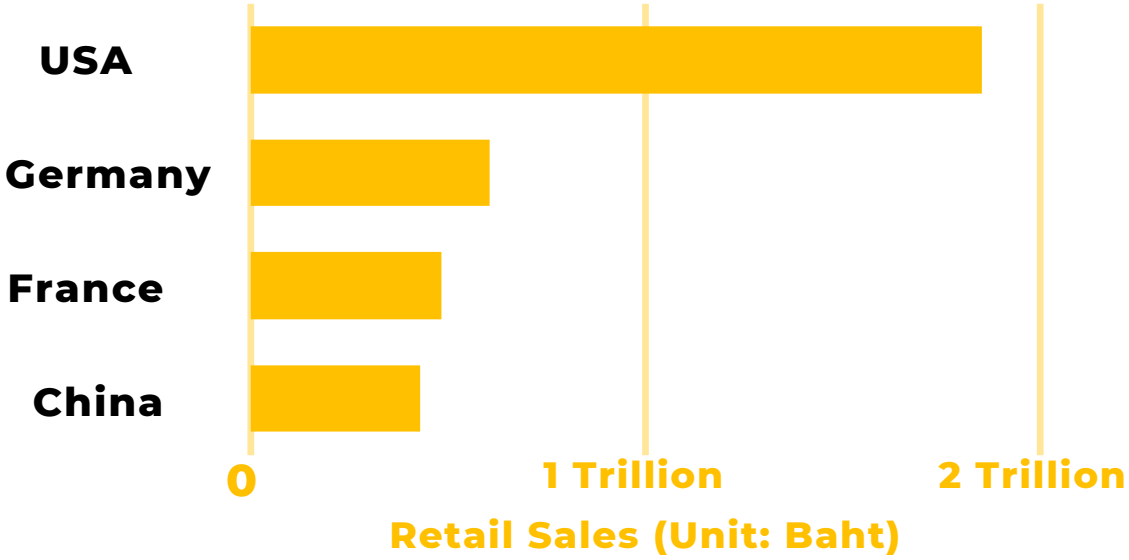


Figure 6 Shows the market value of organic products in the 4 countries with the highest value in the world in 2021.
Source: FiBL survey 2023

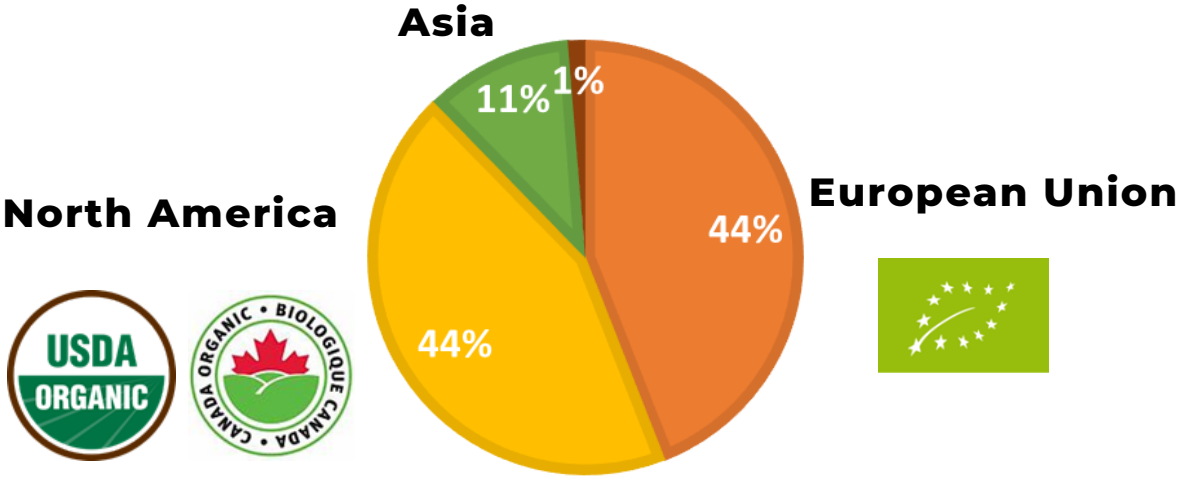


Figure 7 Shows the market value of organic products by continents in 2021 and the certification mark.
Source: FiBL survey 2023

From the world market situation

North America and Europe alone account for 87.7% of the global organic market.

In exporting, who has to apply for certification?

Comparison of EU standards with US standards

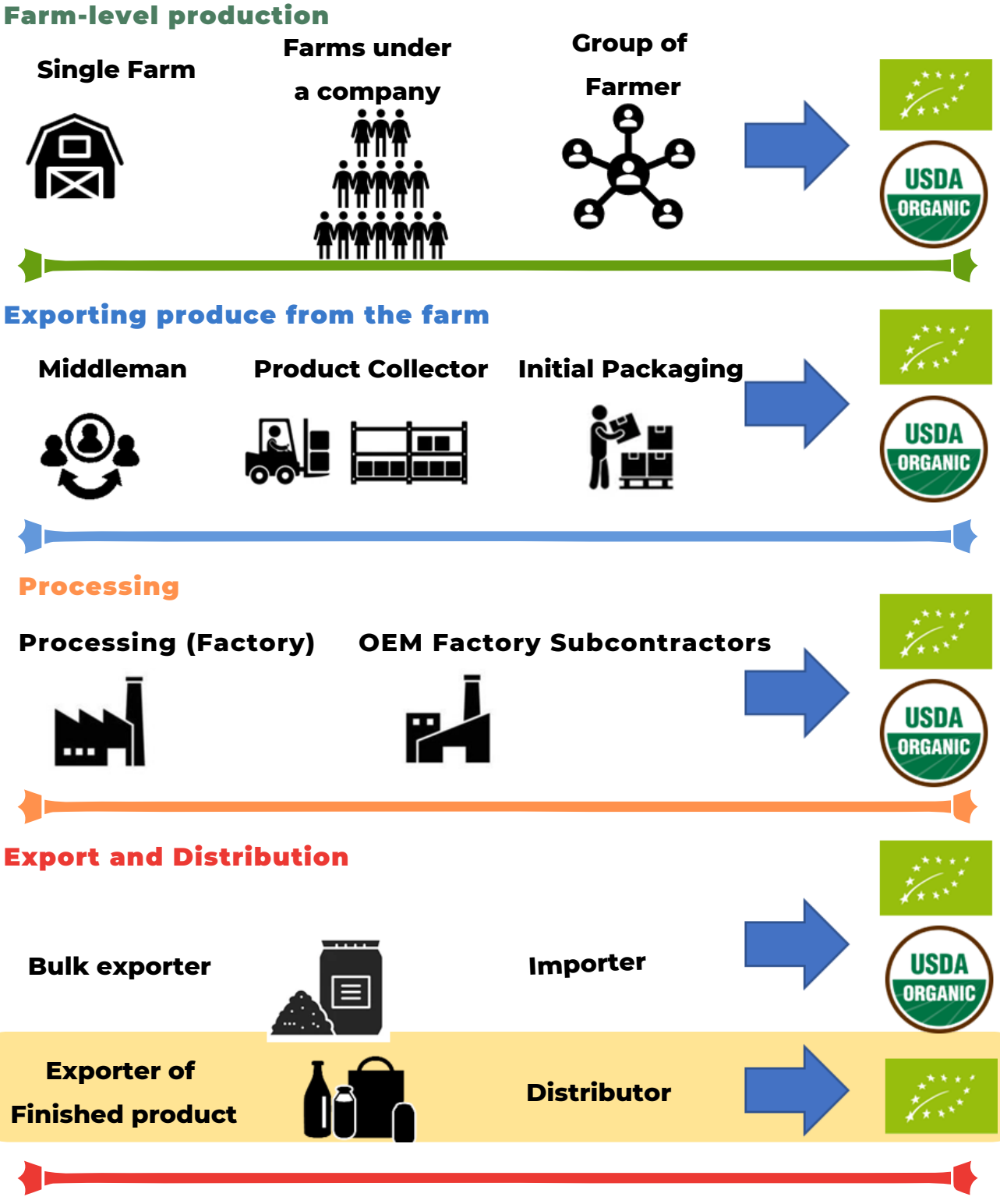


Figure 8 Shows a comparison of the EU's organic standards and the United States' organic standards.

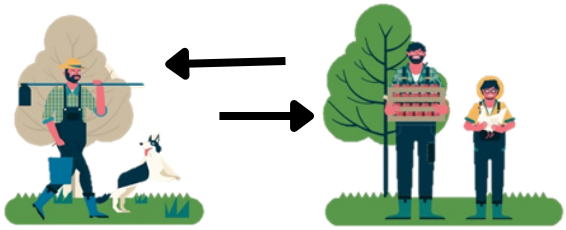
Applying for Certification

Single Certification

Farmers are directly inspected by the inspector.

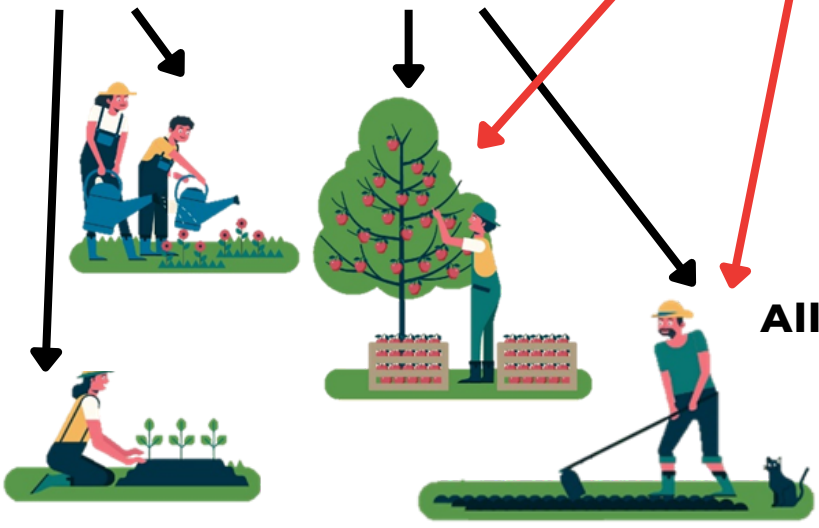
Group Certification

Internal control system



Group internal inspector

The internal control system and some farmers were randomly inspected by the inspector



All farmers are inspected by internal inspector

HTTPS://WWW.UIDOWNLOAD.COM/TH/VECTOR-DHRXE/DOWNLOAD

Figure 9 shows the standard examination for single certification and group certification.

Group Certification

Group Certification

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

- A group of farmers with at least 5 members.
- The production of organic plant products in the same area conditions.
- The group is responsible for the internal control system.
- The group requests certification of organic crop production standards on behalf of the group.

INTERNAL CONTROL SYSTEM

Refers to the internal quality control system established by the group to ensure that the crop production activities of member farmers and other activities related to the Group meet organic production standards.

Why request group certification?

- Smallholder farmers are numerous and produce a wide variety of crops or varieties of rice.
- Save time and budget for accreditation.
- Strengthen the group's ability to gather output, resulting in a large amount of total output and continuous production, increasing trade bargaining power.
- It is easier to procure or manage production and harvesting, such as the purchase or production of seeds, fertilizers, pesticides, and effective use within labor and harvesting equipment management groups.

What are the key positions in the group?

Position and duties of each position in the group.

Internal Control System Coordinator/ Internal Control Manager

- Responsible for coordinating the internal control system
- Arrange for internal quality monitoring.
- Acting as an agent to coordinate with the certification body

Internal Auditor

- Examine the group's internal control system.
- Check member conversions.
- Notify members of the inspection results
- Follow up on bug fixes found.
- must not have any conflict of interest with the examinee

Certification Board/ Certification Officer

- It is responsible for certifying farmer plots from the assessment results.
- There must be no conflict of interest/no conflict of interest with the member making the decision.

*If the number of members is small, the internal control manager can certify.

In doing the internal control system, who has to do what?

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
   => Prepare the Group's Organic Management Plan
7. Farmers prepare records and store documents
   => Farm activity records and farmers' receipts
8. Selection and training of internal auditors
   => 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

In doing the internal control system, who has to do what?

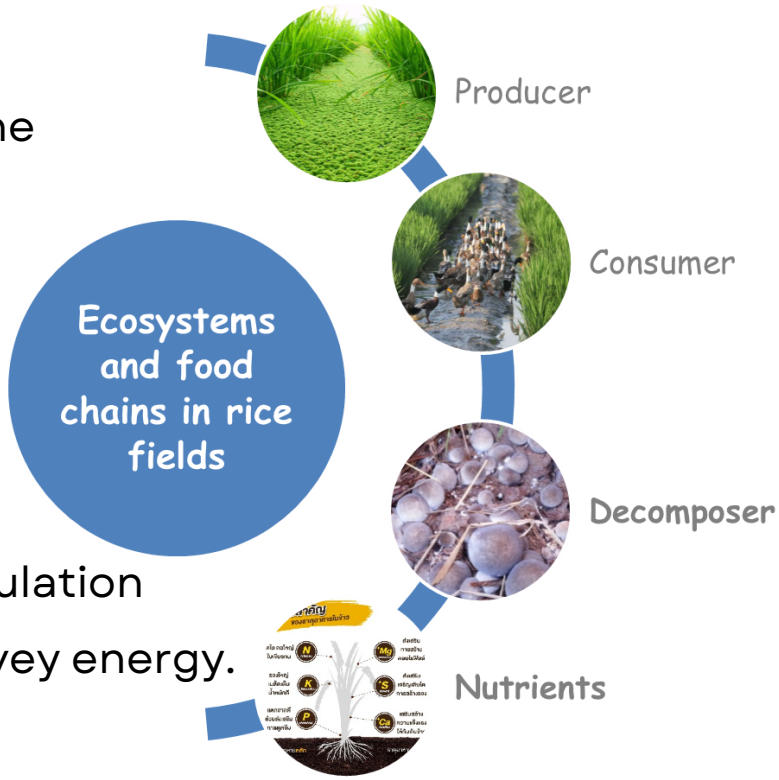
Summary of 15 steps under internal control system and documentation

11. Evaluate the internal audit report and approve it.
12. Prepare a list of farmers who have received certification 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**

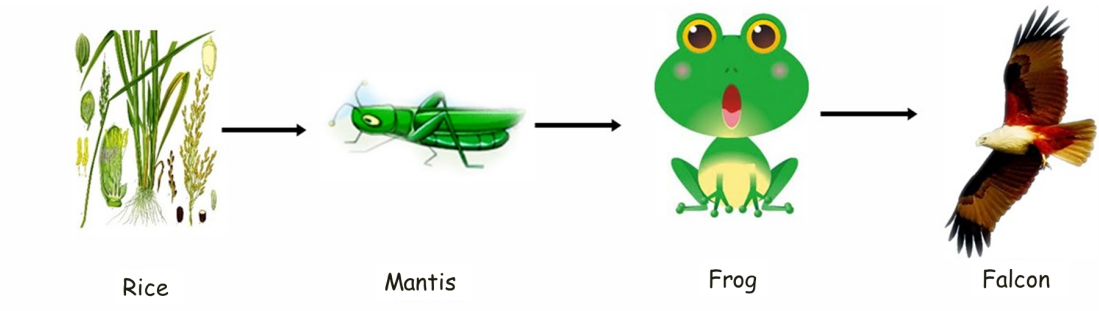
HTTPS://WWW.MITRPHOLMODERNFARM.COM/NEWS/2020/04/YOUNG-SMART-FARMER

Organic Rice Production Techniques

The rice paddy ecosystem is the relationship between living beings and living things and the environment in the paddy field, where consumers and decomposers are intertwined, as well as the circulation of nutrients, minerals and convey energy.



food chain example



Interactions in this food chain begin at the rice plant followed by grasshoppers eating the leaves of the rice plants, frogs eating grasshoppers and hawks eating frogs.

A complete ecosystem is a balance between all living things in the food chain. If there is too much or too little of any one type, the ecosystem will become out of 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 Do not use any synthetic chemical fertilizers.

2 Do not use any synthetic chemical pesticides.

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

4 Use organic seeds

5 Prevent contamination

6 Prohibit parallel production (organic vs conventional)

7 Must go through a conversion period

8 Separate the organic produce from other and display the label.

9 Make records and store documents.

10 Understanding and cooperation

Basic rules on organic rice production for organic certification

1 Fertilization

- **Do not use any synthetic chemical fertilizers.**
- **Increase nitrogen fixation with legumes.**
- **Conserve and increase organic matter in the soil.**
- **Encourage the use of farm-produced fertilizers.**

Use of manure

Must not come from industrial farms

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 overa period of 15 days.

List of substances allowed to be used

Thailand's Organic Standards : Appendix A Table A.1

EU Organic Standard : Implementing Regulation (EU) 2021/1165 ANNEX II Article 24(1) of Regulation (EU) 2018/848

US Organic Standards: https://www.omri.org/omri-search

Basic rules on organic rice production for organic certification

Examples of fertilizer application guidelines in rice fields to increase production efficiency according to soil fertility

- Organic fertilizers are applied during soil preparation by plowing into the soil before planting rice
- Green manure, such as legumes, African Sesbania, Sun Hemp are plowed before preparing the soil for rice planting.
- Compost is used during soil preparation/plot preparation by applying bio-compost on the plot 2-3 handfuls/square meter before tilling the soil for the second round or before plowing.
- Take a sample of the soil after harvest for analysis and send it to the government for inspection.

Time to fertilize

- **Photoperiod sensitive rice** Should be applied 2 times, the first time during the transplanting period/in the sowing field 15-20 days after the rice germinates and the time when the rice is inflorescence
- **Rice is not sensitive to photoperiod** Should be applied 3 times, the first period during seeding/in the sowing field 15-20 days after rice germination, during the period of maximum tillering and the period when rice is inflorescence.

Fertilizing methods such as sowing fertilizer and raking before planting, or sowing when rice begins to grow, when rice matures and when the ear is soft.

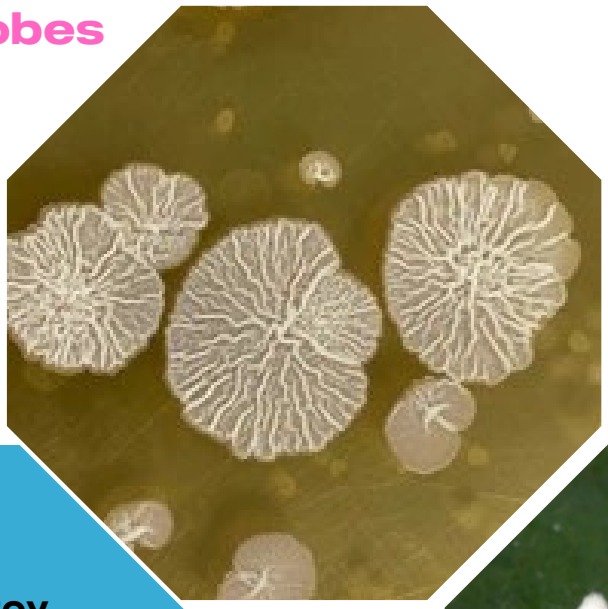
Cultivation methods such as sowing dry rice, sowing sludge, transplanting paddy field

Caution

External inputs, including the use of green manure and cover crops, need to be approved by the certification body and documented in order to comply with organic production rules.

2 PEST AND WEED CONTROL

The use of microbes



Bacteria destroy insect pests and plant pathogens.

Bacillus thuringiensis (Bt)

Bacillus subtilis (Bs)

The fungus destroys insect pests.

- Beauveria fungus
- Metarisium fungus

2 PEST AND WEED CONTROL

The use of microbes

The fungus destroys plant pathogens.

Trichoderma asperellum

The virus destroys insect pests.

Nucleopolyhedro Virus

2 PEST AND WEED CONTROL

Using natural enemies of rice pests


Needle dragonfly


Hexagon eyed spider

Parasite Insects feed on the host insects, just like parasites or worms	***Predator*** *Insect-eating insects*
-*Elenchus yasumatsui* -Parasitists and planthopper predators -Anagrus flaveolus planthopper. -*Oligosita yasumatsui* -*Gonatocerus* sp. -*Telenomus rowani* -*Temelucha stangi* -*Psix* sp. -*Snellenius* sp -*Argyrophylax nigrotibialis* -Rice gall midge egg parasitist -Rice gall midge pupa parasitist -Rice leaffolder pupa parasitist -Parasitiod - Rice leaffolder	-Mirid Bugs. -Chinese black mirid -*Ochthera brevitibialis* -Predatory Cricket -Rove beetle -*Ophionea ishii ishii* -Lady beetles -Long- horned Grasshopper -Long-jawed Spider -Lynx Spider -Wolf Spider -*Argiope catenulata* -Damselfly -Dragonfly

2 PEST AND WEED CONTROL

Animal enemy of rice

Pest of rice rats such as:

Big vole

Small voles

Big field rat etc.

Destructive manner

- Damaged since the beginning of planting to eat the germinated rice grains.
- The rice germinated until the tillering stage.
- The grain breaks off the stalks or necks and eats the seeds from the ears.
- Collecting ears of rice in the nest for food after the harvest season.

Rice pest control

- Trapping using different types of traps.
- Rat Digging
- Rat siege
- Making fences
- Use of natural enemies such as snakes to help get rid of rats.

2 PEST AND WEED CONTROL

Channeled snails

Animal enemy of rice

- The adults are 3 months old, breeding and laying eggs.
- The eggs are pink, clinging together in groups.
- Eggs are laid in dry places above water level.
- The eggs will hatch in 7-12 days.

Destructive manner

Likes to eat the young rice from the germinated rice or from before the transplant to the tillering rice

Prevention

- Choose the method of transplanting using seedlings aged 25-30 days.
- Remove shellfish and egg clusters from the season.
- Collect mollusks and egg clusters at least once a week.
- Create artificial channels around the plot to attract snails to congregate and destroy.
- To pump water into the field, use a splint to block the scum and large clams first and then block the other layer with a mesh net.
- Plant bamboo along the sides of the rice fields to lure snails to lay eggs and collect them to destroy them.
- Release ducks to chase the field down to eat shellfish.

Basic rules on organic rice production for organic certification

2 PEST AND WEED CONTROL

Animal enemy of rice

Rice Pest Bird

- Kratied pied lark
- White-rumped Kratied
- House sparrow
- Tan sparrow
- Great sparrow
- Common sparrow
- etc

Destructive manner

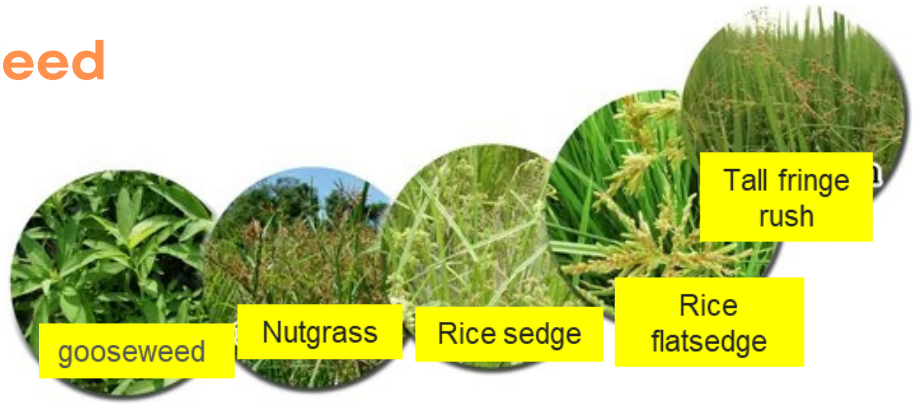
•The birds will destroy the rice from the beginning of the new sap until the pre-harvest stage.

Prevention of rice pest birds

- The use of repellents
- Using sounds to scare birds away, such as using firecrackers.
- Use vision, such as using objects that move when the wind blows. or objects that can reflect light
- Preventing birds from entering, e.g. using netting

2 PEST AND WEED CONTROL

Weed



- Narrow-leaved weeds, grass genera, are more of a problem than broad-leaved and aquatic weeds.
- Weeds in paddy fields may refer to paddy rice, paddy rice, paddy field vegetables, paddy legs, sand sedges, etc. that grow in paddy fields.
- It could be other rice varieties such as leer rice and weed rice.

Methods for controlling weeds in the field

- Choose a rice variety that can compete with weeds.
- Crop rotation plowing before the weeds bloom.
- Use about 10 - 20 kg of seed per rai.
- Determine the rice planting period.
- Weeding by manual weeding twice at 15 and 30 days after germination.

Basic rules on organic rice production for organic certification

2 PEST AND WEED CONTROL

- Do not use any chemical pesticides such as herbicides, insecticides and disease-causing agents.
- Use natural enemies
- Using machine tools
- If it is necessary to use pesticides, they must be natural.

List of substances allowed to be used

Thailand's Organic Standards : Appendix A Table A.3

EU Organic Standard : **Implementing Regulation (EU) 2021/1165 ANNEX II Article 24(1) of Regulation (EU) 2018/848**

US Organic Standards : **https://www.omri.org/omri-search**

Basic rules on organic rice production for organic certification

3 Sustainable and environmentally friendly production

- **Do not burn stubble, rice straw and organic waste in the rice fields.**
- Stubble, straw and organic waste should not be removed from the fields.
- The soil should be analyzed annually and the pH of the soil should be corrected to suit the growth of the rice plants.

- There are a variety of plants and animals in the rice fields according to their utilization, for example:
  - Diversity of natural enemies of insect pests such as dragonflies, spiders, snail-eating birds, etc.
  - Planting grass or lemongrass on the rice fields is a buffer line.
  - Raising animals such as shrimp and fish in the fields

3 Sustainable and environmentally friendly production

- Crop rotation is where different crops are planted on the same area in rotation without leaving the soil empty.
  - Selection of crops for use in the crop rotation system.
    - Crop rotation, alternating deep roots with shallow roots.
    - Rotate legumes with plants that need more nitrogen.
    - Plant plants that can suppress weeds.
    - Cultivate plants that are resistant to different diseases and pests.
    - Grow plants suitable for soil and climate conditions.
    - Cultivate balanced forage and money crops

Basic rules on organic rice production for organic certification

4 Seed

Rice seeds and other crops planted in the area.

- Do not mix the chemicals
- Do not use genetically modified seeds
- Use seeds from organic sources that are certified according to the organic standards for you are applying for certification. If you can't find it, you must have evidence.

If using seeds from general sources, even though there are organic seed production sources

- For EU standards
  - Approval is required before use.
  - If used without applying for permission before planting 3 times, certification will be canceled.

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.

Basic rules on organic rice production for organic certification

4 Seed

Common problem

- 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 ask before use.
- Mix the seeds with drugs.

5 Avoid contamination

Upon inspection, it was found that there was a chance that external chemicals could contaminate our produce.

Practice guidelines

- Plant other fast-growing and taller plants, such as pasture grass, as buffer zones.
- Distance from the contaminant source with rice fields or empty space.
- Use rice grown as a buffer line. Must be different varieties that can be observed and sold separately in the general market, but the produce must be clearly labeled and recorded separately
- **Measures to avoid contamination of water used in rice fields**
  - Water sources should be conserved, the water used in the fields, the water used for cultivation must come from sources without environmental conditions causing hazardous substance contamination.
  - There are ponds and water filter plants.
- Talking with neighboring plots to find solutions together

Basic rules on organic rice production for organic certification

6 Parallel production

Plot of Organic rice with other plots growing other crops chemically

- Different harvesting, transportation and containers are required.
- Do not mix tools.
- Keep production factors separate and clearly labeled.

Plot of Organic rice with other plots that grow non-organic rice.

- must notify the inspectorate unit in advance
- Harvest on different days, place the produce separately and clearly label it.
- Have a clear harvest record
- Use the same practices as in the case of other chemically grown plots.

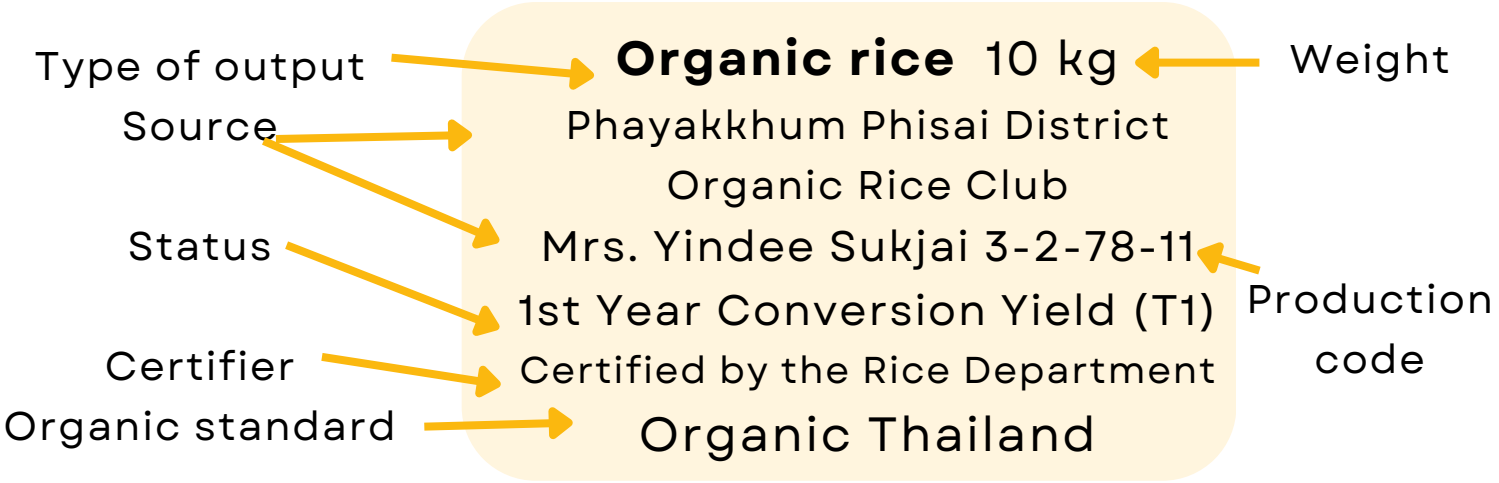
7 Conversion period

A conversion period of rice	12 month before harvest	24 month before Planting	36 month before harvest

8 Separation of output and labeling

- Store organic produce separately from other status products at all stages.
- Harvest and store Organic produce labels and symbols must be displayed during storage and transportation at all times.
- Use only new packaging, do not use old fertilizer bags.
- There is a distinction between “modified”, “organic” and “non-organic” produce.

The label must contain



Basic rules on organic rice production for organic certification

9 Prepare records and related documents

- Prepare records and keep relevant documents for verification and farm records.
- Collect evidence of trading factors of production and output.
- Save it as a simple form suitable for farmers.
- Records must be kept up to date and recorded regularly.
- Keep it for internal and external auditing.

These documents must be kept for at least 5 years.

Farm Records	Production Factor	Harvest / Sales
○ Activities in Each Farm ○ Activities in sub-plots ○ Activities of Each Plant ○ Daily Activities ○ Others	○ Seeds ○ Compost/Fermented water ○ Soil amendments ○ Biological substance ○ Others	○ Each crop must have it ○ Specify the plot and day ○ Sent for packaging/processing ○ Sales record ○ Others .....
Pictures	Receipt	Sales Document

10 Cooperate in internal and external inspections.

The process of producing quality organic rice

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

It is divided into 4 steps as follows:

1. **The process of planning the production of organic rice.**
2. **The process of growing organic rice.**
3. **The process of managing organic rice during the tillering, gestation and budding stages.**
4. **Post-harvest handling procedures**

The process of producing quality organic rice

1.The process of planning the production of organic rice.

Should understand "rice production season cycle"

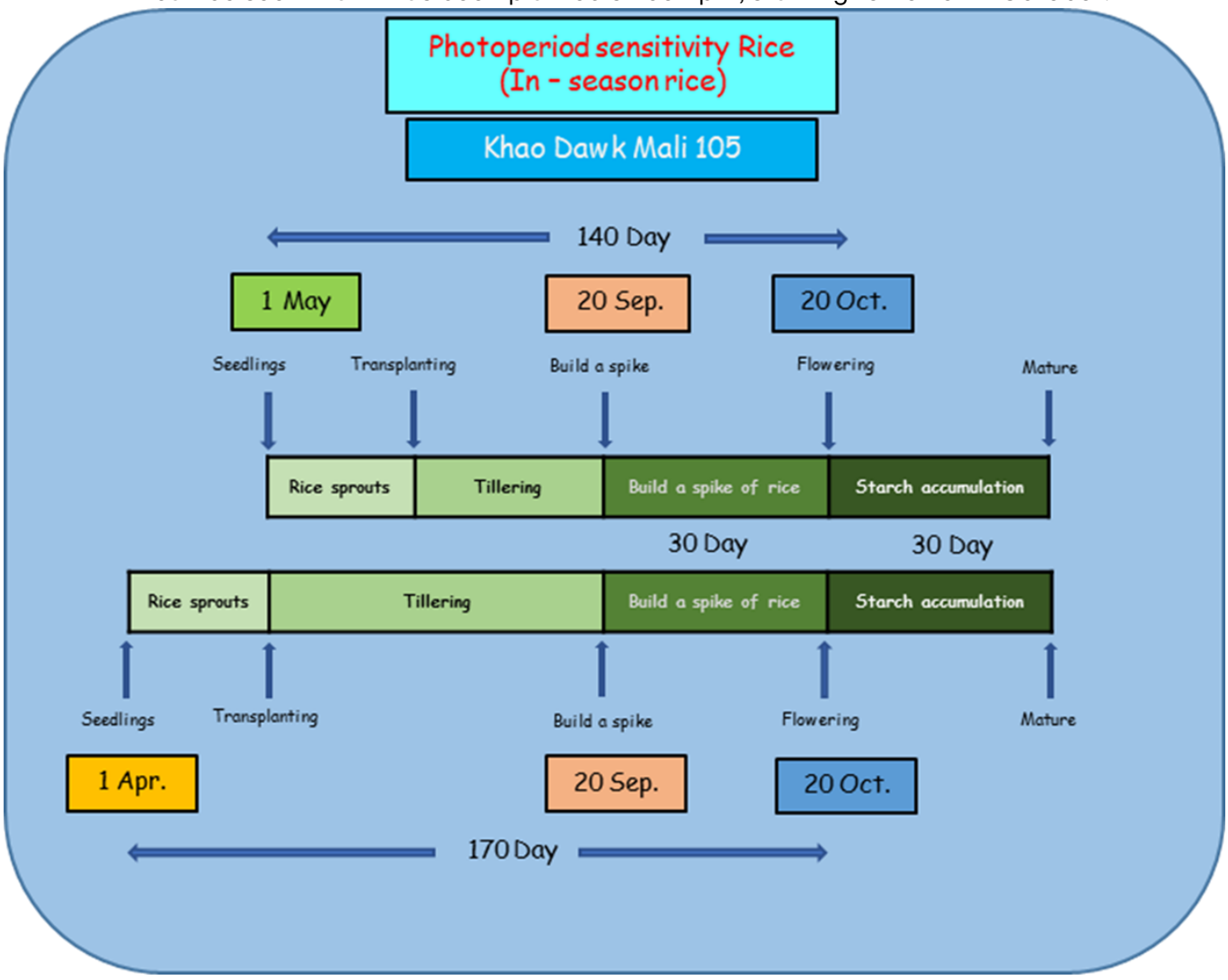
What are the rice varieties selected for planting in that area?

Divided according to the characteristics of flowering that can be classified into 2 types:

Photoperiod Sensitive Rice (National Rice)

Rice is not sensitive to photoperiod (Can be grown all year round)

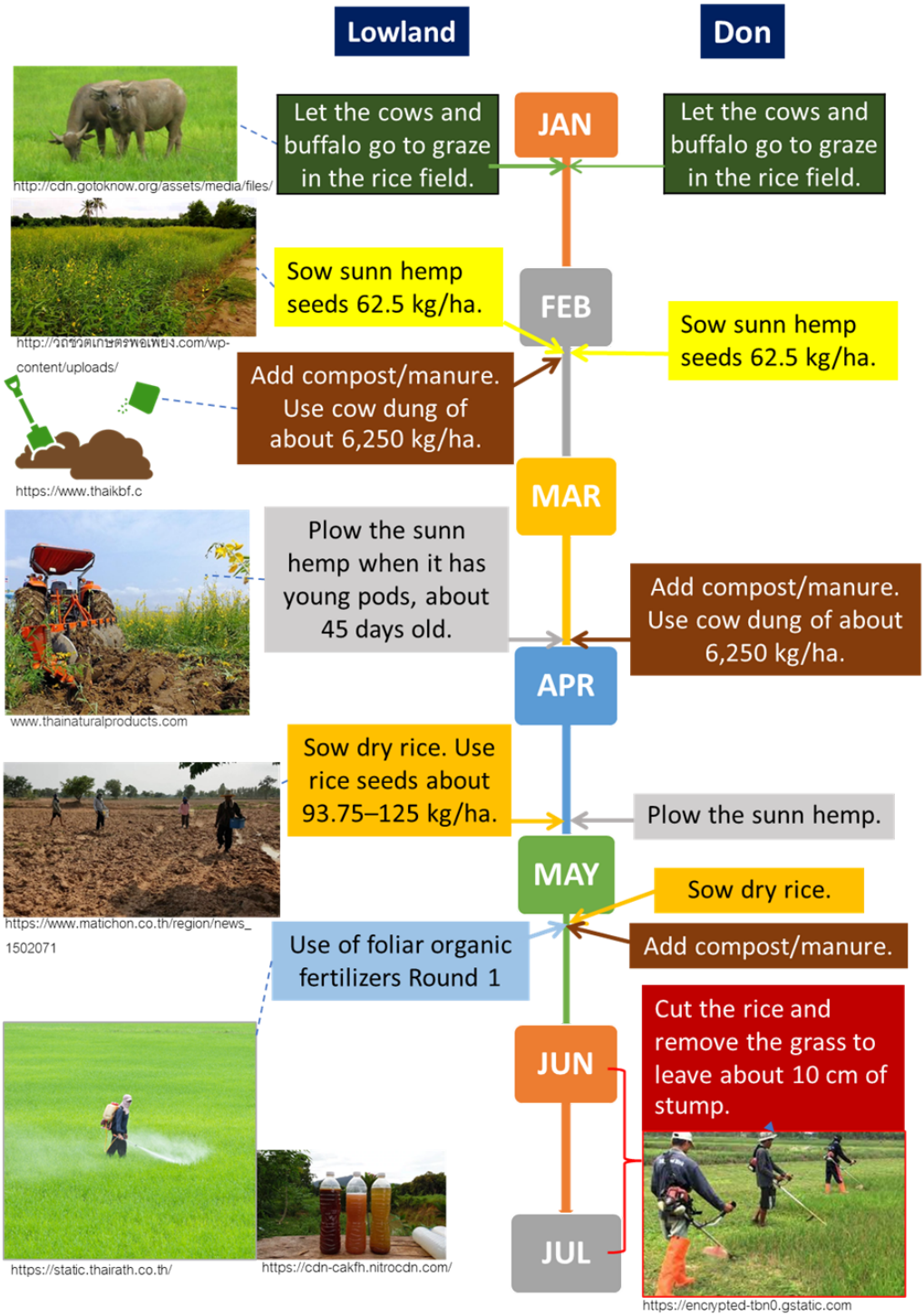
Showing the production cycle of Khao Dawk Mali 105 rice, which is a rice that is sensitive to photoperiod, it can be seen that it has been planted since April, starting to flower in October.



The process of producing quality organic rice

1.The process of planning the production of organic 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:



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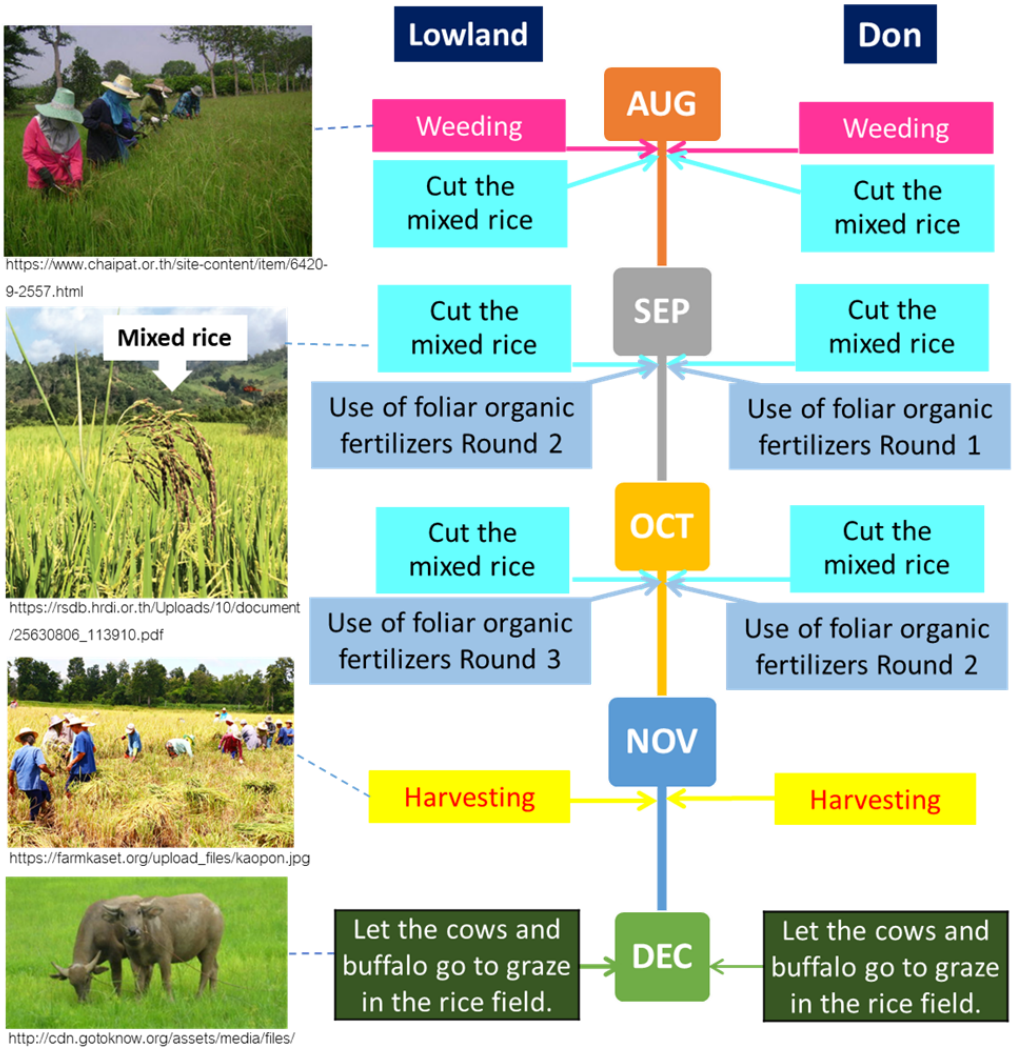


The process of producing quality organic rice

1.The process of planning the production of organic rice.

Rice production planning for farmers or farmers groups helps farmers to be clear on what activities they will do and what inputs to use in each phase of the rice production cycle.

For example

Organic rice cultivation on the don compared to lowland area

Problems encountered: less water, a lot of weeds.

Problem solving planning

1. Choose drought tolerant varieties that grow fast.
2. Sowing dry rice to wait for rain
3. On the don rice is planted later than to Lowland area rice in order to stay in the rainy season and have more water in the uplands.
4. In upland fields, rice and grass grow together about 1 month after sowing. Cut the rice and grass at the same time, leaving about 10 cm of stubble.

The process of producing quality organic rice

2. The process of growing organic rice

There are many ways to grow rice.

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 transplant 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.

Transplanting of Rice Seedlings

The process of producing quality organic rice

2. The process of growing organic rice

There are many ways to grow rice.

Single line transplanting of rice seedlings.

It is a way of growing rice that is becoming more and more popular in modern times with the following principles:

- Transplant a single strand of rice when the rice seedlings are not more than 14 days old.
- How to plant rice by planting it in the ground so that the roots are parallel to the ground Reduce the distance, such as the distance of 30x30 centimeters.
- Improve the soil to be fertile with organic matter.
- Reduce and control watering, for example wet and dry watering, but there is often a problem of labor shortages causing delays in planting.

Single line transplanting of rice seedlings.

The process of producing quality organic rice

2. The process of growing organic rice

There are many ways to grow rice.

Sowing dry rice seeds

This method is commonly done in rainwater fields

- 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
- In some area after sowing dry rice, it is raked or ploughed.
- In addition, they sown after plowing. By sowing in a rainy conditions. The water begins to trap in the rice field. Once plowed, the grain is sown and raked over immediately.

Sowing dry rice seeds

The process of producing quality organic rice

2. The process of growing organic rice

There are many ways to grow rice.

Sowing of germinated rice or Flooded rice field

Taking the seeds that have been cultivated to germinate to sow into the field

Sowing of germinated rice or Flooded rice field

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

- Uniformize the fields
- Surround the rice field with canals, so can control the water.
- After harvesting the rice, allow the fallen grains in the field to germinate into the rice and then plow.
- Always let enough water in to the rice field to keep the soil moist. 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.

The process of producing quality organic rice

2. The process of growing organic rice

There are many ways to grow rice.

Sowing of germinated rice or Flooded rice field

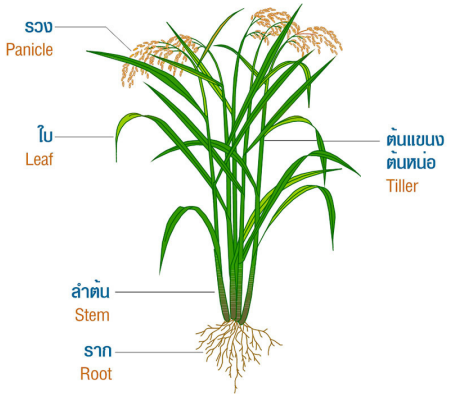
Sowing of flooded rice fields that will yield good results should be done as follows:

- After the plowing and raking are completed. Keep water in the field for about 3 weeks, to allow water weeds to grow into destroyed young plant, then rake them thoroughly, the weeds will stick to the rice field and can be scooped out.
- When harrowing, drain the water and adjust the slopes evenly. For those who use rice straw to smash or knead rice straw to sink into the soil instead of plowing, after treading, water should be soaked to allow the straw to rot until the heat is exhausted, at least 3 weeks and then start again

Pressing straw

The process of producing quality organic rice

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

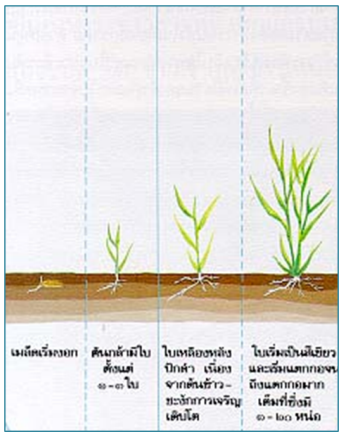


Taking care of rice after the rice farmers are finished planting is finding a way to nourish the rice to grow well so that the rice can accumulate enough food to produce the rice grain.

Taking care of the growth of rice plants can be divided into 3 stages as follows

Stage 1 The growth of stem and leaves

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



Maintenance at this stage

- Nourish the soil to have good fertility.
- Make sure the water level is not too high and be careful of insect diseases.
- Spraying the fermentation hormone will help the tillering process.

The process of producing quality organic rice

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

Stage 2 Flowering growth

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

Maintenance at this stage

- Nourish the soil to have good fertility.
- Make sure the water level is not too high and be careful of insect diseases.
- Spraying water hormones will help the rice grow.

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, depends on the rice species.

Maintenance at this stage

- Mixed varieties of rice should be taken out of the plot, to enable get desired variety of rice.
- Keep watch on the water level when the grain is about to be fully grown to more aroma to the rice.

The process of producing quality organic rice

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

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

- Seedling stage: Notice the difference in leaf color height or disease.
- Tillering stage: Observe the height difference, the color of the plant, red rice.
- Flowering stage: Observe whether flowering occurs before or after, comparing it with the main rice varieties grown.
- Curved Panicle stage: Observe the color, tail and characteristics of different seed and panicle.
- Pre-harvest stage: Re-check the rice plants with different characteristics before harvesting.

The process of producing quality organic rice

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

Management of Mixed Rice

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%

The process of producing quality organic rice

4. Post-harvest handling procedures

Harvesting

- Rice in plots that have been maintained until flowering will have starch accumulation in the seed until maturity.
- The rice grains will have all the components intact. Harvesting at this stage will yield the best quality rice grains.
- But the moisture content in the seeds was still high, about 28 - 33 percent. It was found that some rice varieties were not fully ripe yet.
- Counting the flowering days of rice is still necessary in every rice ecosystem
  - To harvest rice for high yields and the best quality of seeds, rice in the field must have consistent growth, flowering and maturity.
  - After pollination, the maximum weight was accumulated within 3 weeks or 21 days.
  - The whole ear of rice flowers takes about 7 days to be thoroughly pollinated, depending on the variety.
  - Therefore, the rice takes about 28 - 30 days to be fully ripe and ready for harvesting

The process of producing quality organic rice

4. Post-harvest handling procedures

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 cause the kernels to crack or break clean, with little or no impurity or weed seeds.
- 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
- The organic threshing machine must be separate from the general threshing machine.
- If there is no threshing machine dedicated to organic rice and it is necessary to use a general combine harvester, the machine must be washed first and the farmers must separate the rice to be washed for inspection by the organic standard inspector.

The process of producing quality organic rice

4. Post-harvest handling procedures

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 the barn, it must be separate from other rice. The floor should be raised to a moderate height and inside there should be a cradle for supporting the rice sack for good ventilation.

- The main cause of loss during storage consists of:
  - rice to be stored
  - Handling during storage
  - House condition or storage container
  - Storage climate
  - Pests of insects and microorganism

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.

Principles of organic food processing

introductory instructions

According to the organic agriculture standards of Thailand TAS 9000-2021, European Union (EU) 2018/848 and USA

Principles of organic food processing

- A processing management system must maintain organicity at every step from raw material to final product.
- Only certified organic raw materials must be used.
- Good post-harvest management is required to avoid contamination of chemicals or other non-organic materials to organic products.
- Process food by biological, mechanical or physical processes such as shelling, milling, fermentation, crushing, pressing, drying, baking, freezing, mixing, packaging.
- Only the extraction process with water, ethanol, vegetable or animal oils, vinegar, carbon dioxide and nitrogen is permitted.
- Restrict the use of processing aids and do not allow genetically modified technologies for any purpose.
- No raw materials, or foods containing/or containing engineered nanomaterials are used and ionizing radiation is not permitted.
- There must be good documentation and labeling at every step.
- Can be traced back at every step that the raw materials are organic and the quantity produced is consistent with the quantity sold.

How to clean it without contamination?

Water

- Water that comes into contact with organic raw materials is used as a food ingredient, used to clean raw materials at production lines, at least equal in quality to “Drinking water”.

Cleaning

Substances to be used to clean and disinfect equipment, equipment, production lines and storage rooms must meet the following requirements:

Thai: TAS 9000-2021 Appendix A Table A.8
European Union: (EU) 2021/1165 (Annex IV)
United States: The National List of Allowed and Prohibited Substances

- Prepare a manual for cleaning the production line in every step and understand it with the staff in charge (internal training notes).
- There is a form to clean the production line according to the procedures specified in the manual.
- If the production line is cleaned with organic raw materials, there is a separate record for generic products and evidence of where it is stored.

PEST CONTROL AND CONTAMINATION

- Do not let the raw materials come into contact with various contaminants such as fuels, pesticides, wood preservative oils, fungi, cleaning agents.
- Control insects and pests using prevention-first methods.
- Permits the use of pest control substances according to the same requirements as those used on farms.

Organic food processing requires 100% organic ingredients?

THAILAND ORGANIC AGRICULTURE STANDARD TAS 9000–2021

THE LABEL STATES THE WORD "ORGANIC" AND USES THE LOGO.

COMPONENT

AT LEAST 95%

- IT'S ORGANIC.

NOT MORE THAN 5 %

- IT IS ANOTHER TYPE OF RAW MATERIAL THAT IS NOT ORGANIC, BUT MUST NON-GMO AND IRRADIATED.
- IT IS A SUBSTANCE LISTED IN TAS 9000 - 2021 APPENDIX A, TABLE A.6.

European Union (EU) Organic Standard 2018/848

The label states the words "Organic" or "Bio" and uses the logo.

component

at least 95%

- It's organic.
- Really use natural flavors produced from that ingredient.

For example, lemon flavor is made from real lemons.

Not more than 5 %

- Be as specified in Annex V part A and B of (EU) 2021/1165.

Organic food processing requires 100% organic ingredients?

UNITED STATES ORGANIC STANDARDS

THE LABEL SAYS "100% ORGANIC" AND USES THE LOGO.

COMPONENT

- IT IS 100% ORGANIC INGREDIENTS.
- NO PROCESSING AIDS

THE LABEL STATES THE WORD "ORGANIC" AND USES THE LOGO.

COMPONENT

AT LEAST 95%

- IT'S ORGANIC.

NOT MORE THAN 5 %

- IT IS A SUBSTANCE LISTED IN § 205.605 AND § 205.606.

Organic food processing and food hygiene standards

Principles for handling organic food processing should include either **Good Hygieniec Practices (GHP)** or **Good Manufacturing Practices (GMP)** ıto meet the requirements of Good Hygiene on Production food should include **Hazard Analysis and Critical Control Points (HACCP)** by analyzing or evaluating hazards affecting food from raw materials, production processes until reaching consumers and determine critical control points to create a control system to eliminate or reduce causes that cause harm.

In addition to food safety, the organic food processing process must also be standardized. The system must also guarantee that there is no loss of organicity during production. Therefore, an analysis of the risk of loss of organicity and the Organic Control Critical Point must be added since raw materials, production process until reaching the consumer as well.