



# Guide for the Farmer

# Production and Processing of Organic Mangosteen

## in Thailand



By



MJU-IC

Maejo University International College



# Preface

The world's agriculture and food systems have come to a crossroads, and although our current food system has increased agricultural productivity over the past several decades, it has also taken a toll on the environment and society through soil degradation. Biodiversity loss, water pollution, climate change, ocean dead zones. It's just part of the challenge we face.

Organic farming can be a transformational path to the solutions needed for sustainable food systems and climate resilience. It is also a system that is accessible, affordable, and empowers farmers. This is because most systems depend on the use of local biodiversity and resources and have 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 you are trying, success is there.**

”



**Authors**  
**Manual for a trainer for  
organic mangosteen production**

# List of contents

## Organic Agriculture and Organic Agriculture Standards

- 01** What is Organic Agriculture?
- 02** Where should I plant and sell it?
- 03** Why does it need to be certified?
- 04** Thailand's Organic Agriculture Standards
- 06** Organic agriculture standards of other countries
- 08** Which country is good to export to?
- 09** In exporting, who needs to request certification?

# List of contents

## Applying for organic certification

- 10** Request for certification
- 11** Group certification
- 12** What are the key positions in the group?
- 13** In doing the internal control system, who has to do what?

## Organic mangosteen cultivation techniques

- 15** Basic practices for mangosteen production to meet organic standards
- 19** Organic mangosteen production calendar



# List of contents

## Organic Food Processing

- 36** Principles of Organic Food Processing
- 37** How to clean it without contamination?
- 38** Organic food processing requires 100% organic ingredients?
- 40** Organic food processing and food hygiene standards

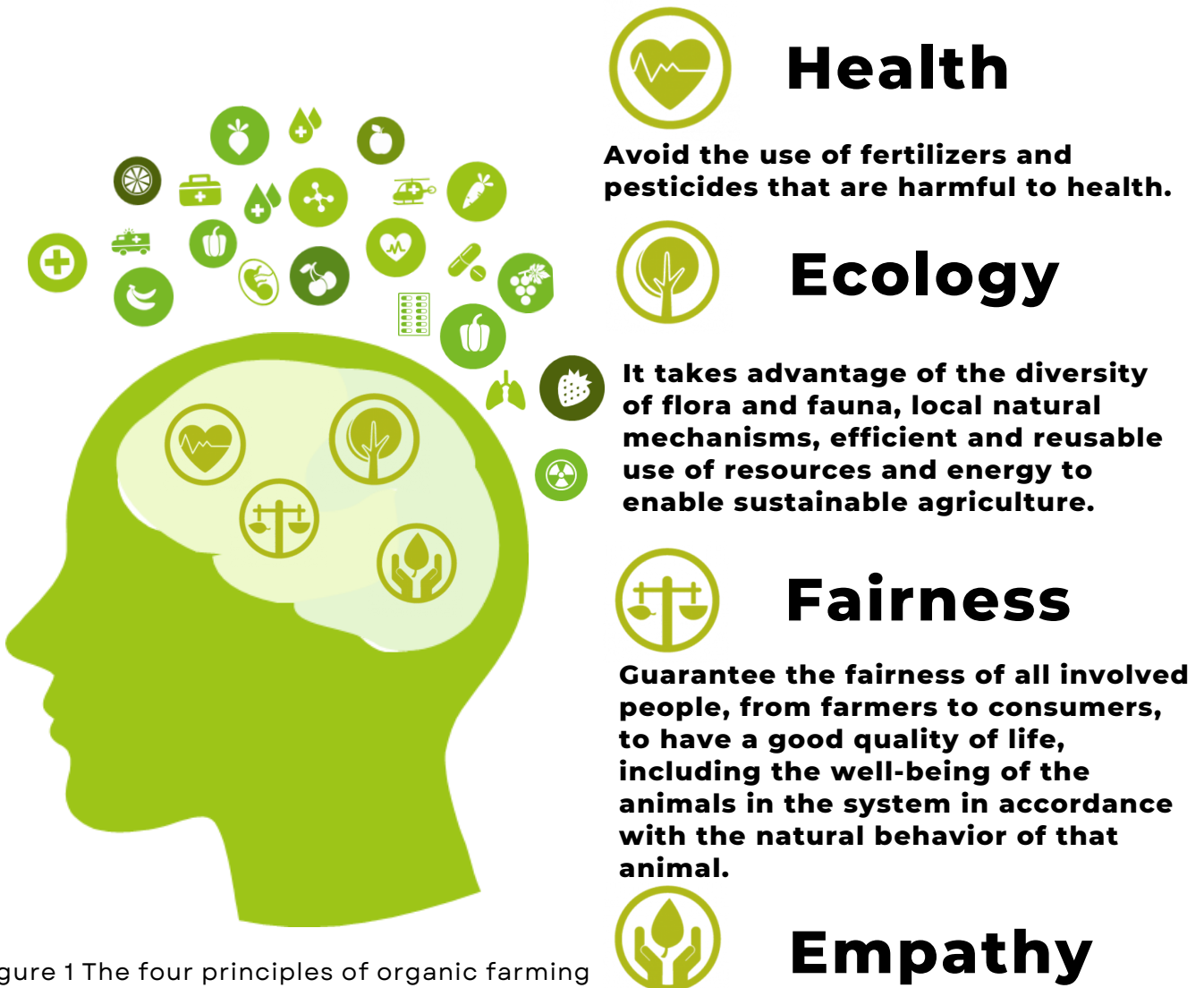
# What is Organic Agriculture?

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."



## 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.**

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

# Where are you planting and selling?

**For sell in foreign  
retsonal markets**



[HTTPS://WWW.MARKETWATCH.COM/STORY/IS-ORGANIC-FOOD-REALLY-HEALTHIER-2016-12-01](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](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**, does not require certification standards.
2. Production for **sale in the local market** may not require certification standards or require Community Participatory Certification (PGS)
3. Production for **sale in the domestic market** may require Thai organic agriculture standards (TAS 9000 - 2021).
4. Production for **sale in foreign market** must meet the standards set by the destination country.

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 sale of organic produce and products.

Coverage

- 1) Crop production: crop cultivation, mushroom cultivation, natural produce harvesting, seed production and propagation parts.
- 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

### Voluntary standards of the private sector



### Fair Trade Standards



### Standards of Agricultural Product



Figure 5 shows an example of a voluntary standard emblem.



# Which country is good to export to?

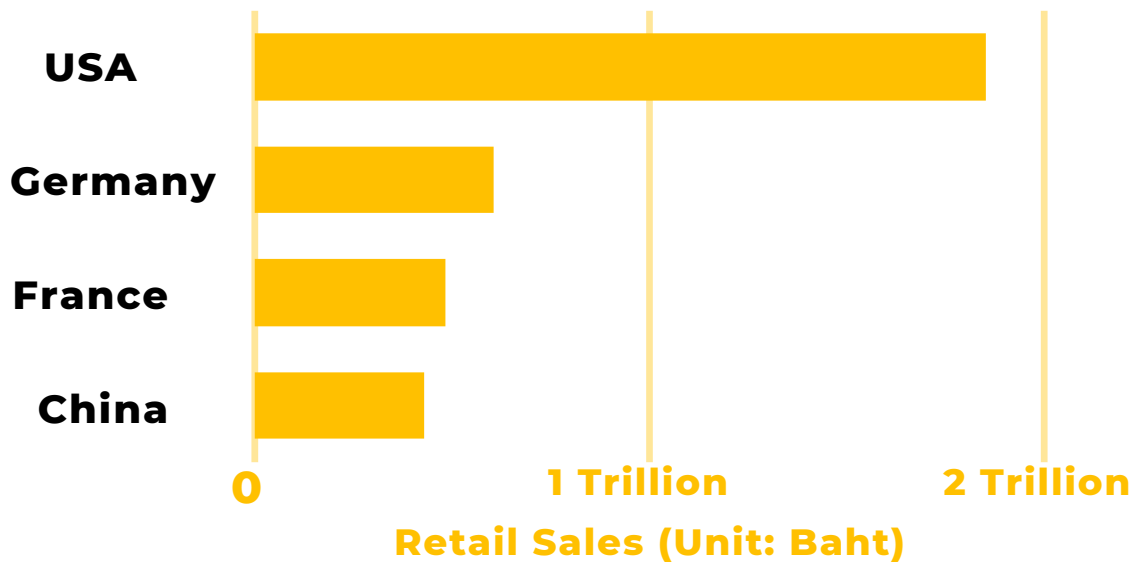


Figure 6 Shows the market value of organic products in the 4 countries with the highest value in the world in 2021.  
Source: FiBL survey 2023

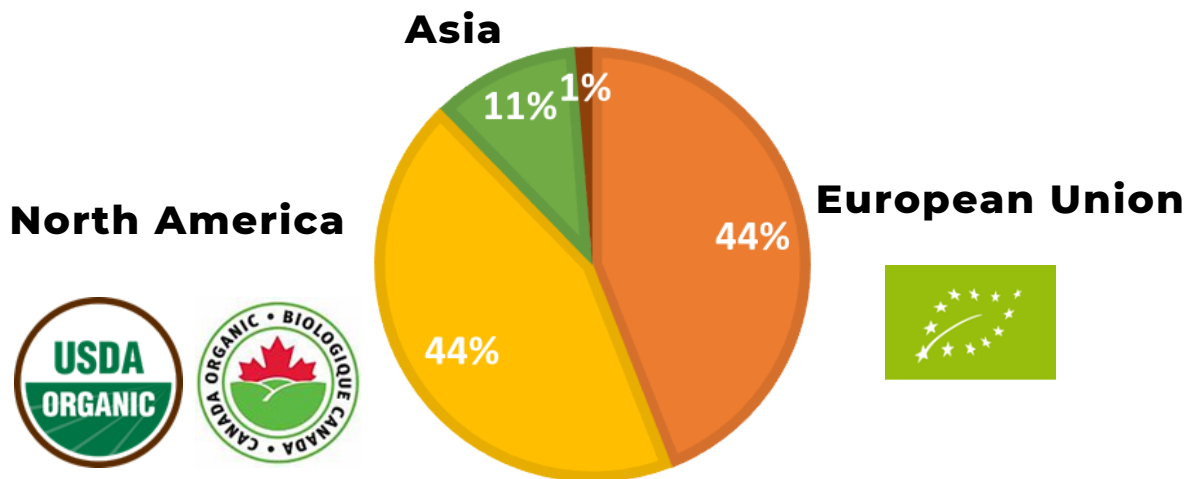


Figure 7 Shows the market value of organic products by continents in 2021 and the certification mark.  
Source: FiBL survey 2023

## 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

### Farm-level production

Single Farm



Farms under a company



Group of Farmer



### Exporting produce from the farm

Middleman



Product Collector



Initial Packaging

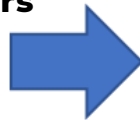


### Processing

Processing (Factory)



OEM Factory Subcontractors



### Export and Distribution

Bulk exporter



Importer



Exporter of Finished product



Distributor



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

# Applying for Certification

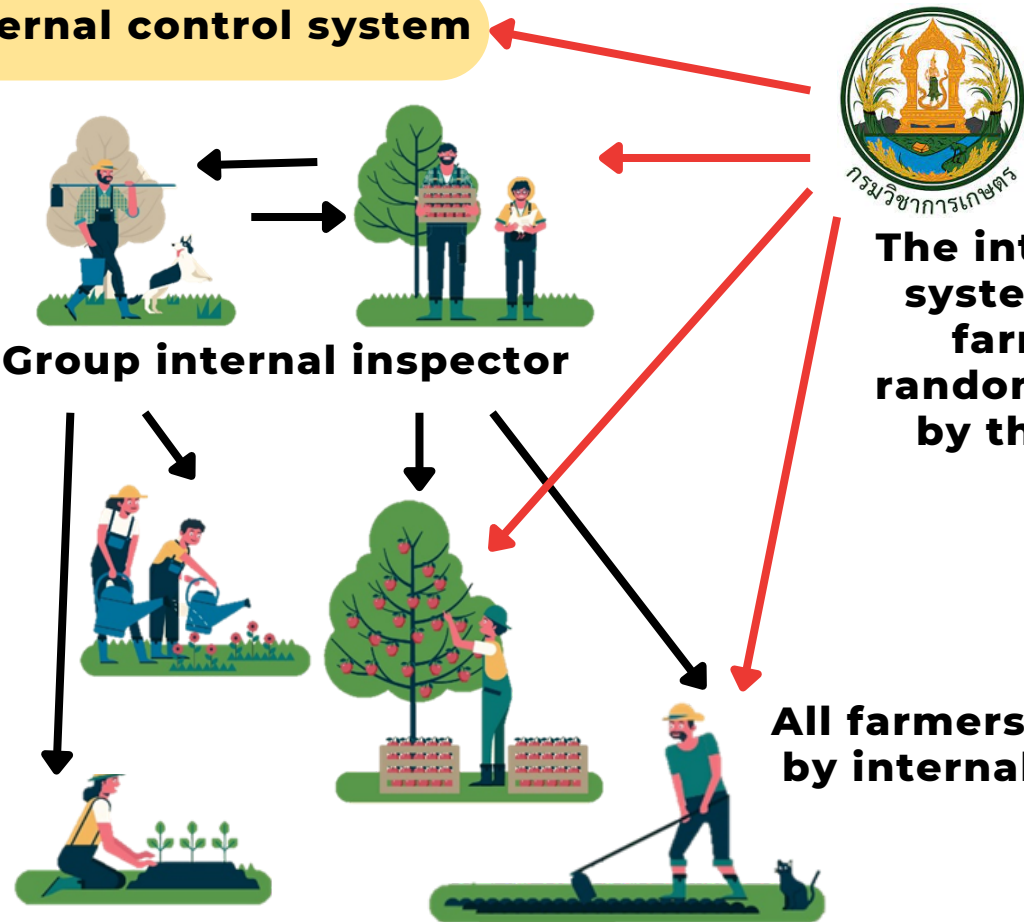
## Single Certification



**Farmers are directly inspected by the inspector.**

## Group Certification

**Internal control system**



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

**All farmers are inspected by internal inspectors**

[HTTPS://WWW.UIDOWNLOAD.COM/TH/VECTOR-DHRXE/DOWNLOAD](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 divers variety of crops.
- 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 plot  
=> 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?

14

## 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**



# Basic rule on organic mangosteen production for organic standards

**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 rule on organic mangosteen production for organic standards

## 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 over a 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 rule on organic mangosteen production for organic standards

17

## 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

### 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>

## 3 Sustainable and environmentally friendly production

- It is forbidden to burn garden waste or leave rubbish in the garden.
- do not destroy protected forest areas
- There is a cover crop\* between the planting rows.
- There are a variety of plants\* in the garden according to their uses, for example:

Medicinal plants used to make fermented water to control insects, food plants and others

\*Conditions of seedling and seed requirements must also be complied with.

# Basic rule on organic mangosteen production for organic standards

## 4 seedlings and seeds

### Mangosteen seedlings and other plants that are planted in the area.

- Use self-produced seedlings or from gardens that have been certified according to organic standards.
- Do not use propagators that come with potting soil.

### Other plants that are planted in the area

- Use seeds from organic sources certified by organic standards. If you can't find it, there must be evidence to confirm. Try to search but can't find the source of organic seeds of that plant.
- Do not mix chemicals
- Do not use genetically modified seed

### 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.

# Basic rule on organic mangosteen production for organic standards

## 5 Avoid contamination

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

### Practice guidelines

- Plant other plants that grow faster and taller than the mangosteen tree as a buffer.
- Distance from the source of contamination by roads or open space.
- Use the outermost row of mangosteen trees as a buffer line, **but the produce must be clearly separated, labeled and recorded.**
- Talking with neighboring plots to find solutions together

## 6 Parallel production

### Plot of **Organic mangosteen** 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 mangosteem** with other plots that grow **non-organic manogosteen.**

- 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.

# Basic rule on organic mangosteen production for organic standards

## 7 Conversion period



**A conversion period of mangosteen**

18 month before harvest



36 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 rule on organic mangosteen production for organic standards

## 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
<ul style="list-style-type: none"> <li>○ <u>Activities in Each Farm</u></li> <li>○ <u>Activities in sub-plots</u></li> <li>○ <u>Activities of Each Plant</u></li> <li>○ <u>Daily Activities</u></li> <li>○ <u>Others .....</u></li> </ul> <p>Pictures</p>	<ul style="list-style-type: none"> <li>○ <u>Seeds</u></li> <li>○ <u>Compost/Fermented water</u></li> <li>○ <u>Soil amendments</u></li> <li>○ <u>Biological substance</u></li> <li>○ <u>Others .....</u></li> </ul> <p>Receipt</p>	<ul style="list-style-type: none"> <li>○ <u>Each crop must have it</u></li> <li>○ <u>Specify the plot and day</u></li> <li>○ <u>Sent for packaging/processing</u></li> <li>○ <u>Sales record</u></li> <li>○ <u>Others .....</u></li> </ul> <p>Sales Document</p>

## 10 Cooperate in internal and external audits.

# Organic mangosteen production calendar

The production of organic mangosteen for good and standardized yield requires year-round care.

It is divided into 4 steps together.

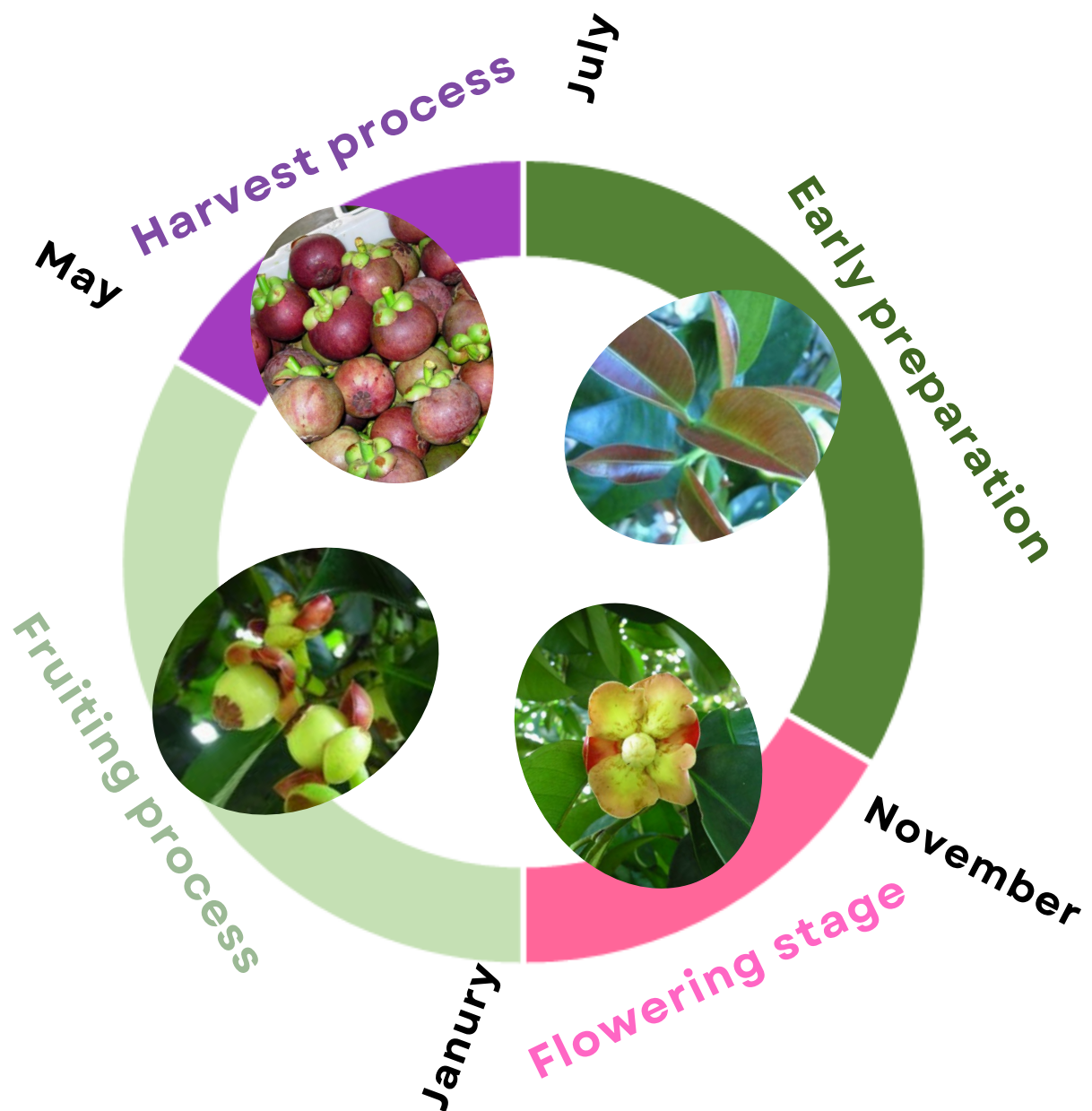


Figure 10 shows the organic mangosteen production calendar.

# Organic mangosteen production calendar

**July**    **The process of preparing the plants to be ready for flowering**

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

After harvest

1. Add manure or compost that has undergone a complete composting process. The rate is about 20-60 kg/plant, depending on the canopy size of the tree and soil fertility. **The soil should be analyzed once a year.**
2. Foliar spraying with animal or plant bio-fermented water or animal or plant extracts at the rate of 1 liter / 1,000 liters of water.
3. Pour bio-fermented water from animals or plants or extracts from animals or plant through the soil or give way to the water system at the rate of 3 liters / 1,000 liters

**Weed**

After harvest

1. Mow the grass 2-4 times a year as needed.
  - Should be cut before flowering and before harvest.
  - Grass should not be mowed in the rainy season to preserve soil structure.
  - The grass should not be mowed to maintain the balance of the ecosystem in the garden.
2. Planting medicinal plants in the mangosteen garden such as turmeric, cha-plu, citronella

# Organic mangosteen production calendar

## July

The process of preparing the plants to be ready for flowering

### Pruning to control the canopy size

#### After harvest

1. Trim once a year to allow light into the canopy.
2. Cut off the shoots that exceed the height needed not more than 1 meter per year, cut 2-3 overlapping branches per year or as appropriate, and cut off the outer branches in the canopy shape that exceeded what is needed by about 50 centimeters.
3. Cut branches to allow light to enter from both east and west.



Cut off the shoots that are too high



Leave the top apex as shade.



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



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

Figure 11 Shows pruning to control the size of the canopy.

# Organic mangosteen production calendar

## August – September

**The process of preparing the plants to be ready for flowering**

**Manage the fertilizer to induce young leaf breaking.**

After harvest

1. Spray animal or plant bio-fermented water or animal or plant extracts at the rate of 1 liter / 1,000 liters of water foliar way.
2. Pour bio-fermented water from animals or plants or extracts from animals or plant through the soil or give way to the water system at the rate of 3 liters / 1,000 liters of water

**Manage fertilizers to promote fertility.**

11 – 12 weeks after harvest

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

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

Choose to practice or combine different methods.

### **Thrips**

**Mechanism:** Spray water using a mini sprinkler to increase humidity to repel thrips.

**Natural enemies** such as white-winged elephant beetles, striped turtle beetles, long-legged flies and spider.

**Extracts from plants** such as neem, dead worms, Siam weed, sweet flag, Turmeric, Citronella, Marigold, Phakakong, Galangal, Cucumber, Dipli, etc.

**Biological products** such as Beauveria fungi and metarisium fungi

# Organic mangosteen production calendar

## August – September

### The process of preparing the plants to be ready for flowering

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

#### **Worms that feed on young leaves**

**Mechanism:** Destroy the worms that hide in the soil, grass clippings and weeds under the roots during the day.

**Natural enemies** such as red ants, assassin bugs, long stink bugs, wasp parasite, *Bracon hebetor* and *Pteromalus puparum* L.

**Extracts from plants** such as neem, dead worms, Siam weed, sweet flag, Turmeric, Citronella, Marigold, Phakakong, Galangal, Cucumber, Dipli, etc.

**Biological products** such as Beauveria and Bt (*Bacillus thuringiensis*)

#### **Young leafworm**

**Natural enemies** such as wasp parasite

**Biological product** Such as Beauveria and Bt (*Bacillus thuringiensis*)

#### **Red mites**

Use the same pesticide prevention methods as **thrips**.

**Natural extracts** Sprayed with sulfur

#### **White mites**

**Natural extracts** Sprayed with sulfur

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

**Mechanism:** Prune the branches to be airy.

**Extracts from plants** such as Siam weed, sweet flag, Turmeric,

**Biological product** such as Trichoderma and BS (*Bacillus subtilis*)



# Organic mangosteen production calendar

## August – September

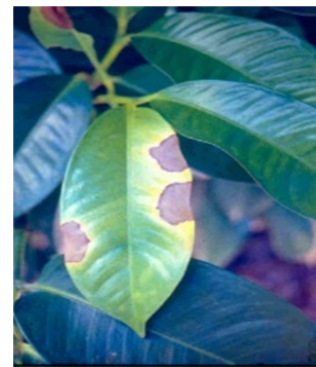
### The process of preparing the plants to be ready for flowering



Thrips



Young leaves are destroyed by thrips.



Leaf spot disease



Worms feed on young leaves.



Leaf shoots are destroyed by leaf-eating worms



Young leaves are destroyed by leafworms.

Figure 12 Shows plant pests and diseases and the appearance of mangosteen leaves when they break young leaves.

### Recommendations for spraying pesticide

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

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

# Organic mangosteen production calendar

## October

**The process of preparing the plants to be ready for flowering**

**Manage fertilizer to enhance the fertility of the tree.**

14 – 16 weeks after harvest

1. Spray egg hormone fermented water and/or fermented water from shrimp shells, crabs, shellfish.
2. Pour the fermented water from yellow fruits through the water system at the rate of 3 liters/1,000 liters<sup>2</sup> – 3 times before flowering.



Figure 13 Shows shoots over 9 weeks old ready for flowering.

# Organic mangosteen production calendar

## November

### Managed steps to induce flowering

#### Before flowering

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

#### Notice

Mangosteen must be allowed to pass until the stalk between the last apex of the shoot shows obvious signs of wilting and the last pair of leaves of the shoot begin to show signs of falling leaves, therefore giving water for the first time. If there are no such symptoms, the water will not be given.

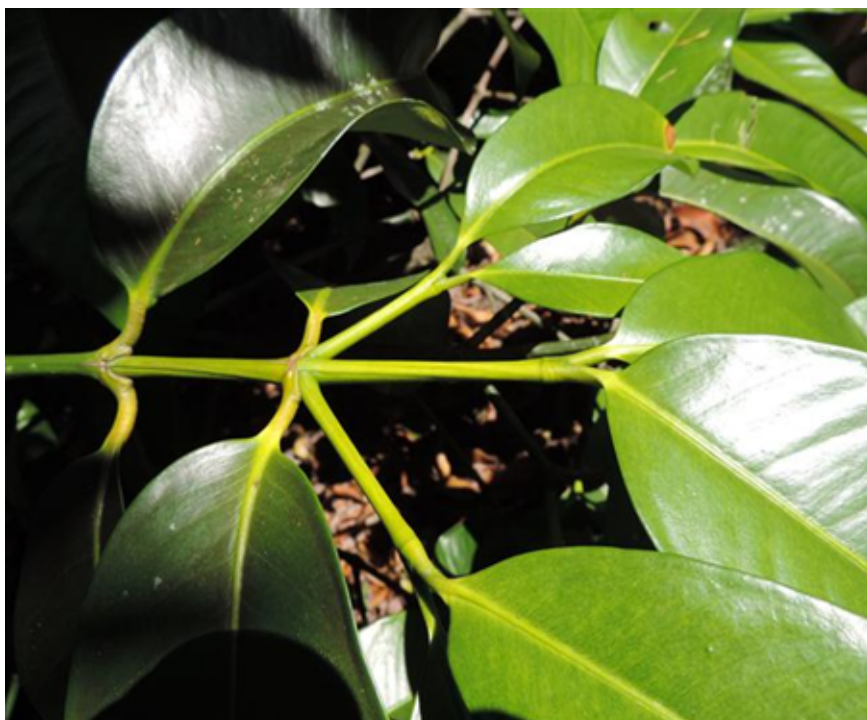


Figure 14 Shows the stem between the joints of the mangosteen branch. That shows signs of wilting



# Organic mangosteen production calendar

## DECEMBER

**Steps to control the amount of flowers per plant appropriately**

### Manage **water** to control flowering

When mangosteen begins to flowers

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

Survey for **pests** that destroy **flowers**.

Choose to practice or combine different methods as follows.

#### **Thrips**

**Mechanism:** Spray water using a mini sprinkler to increase humidity to repel thrips.

**Natural enemies** such as white-winged beetles, black-legged beetles, long-legged flies and spiders.

**Extracts from plants** such as neem, dead worm, Siam weed, sweet flag, Turmeric Citronella, Marigold, Phakakong, Galangal, Cucumber, Dipli, etc.

**Biological products** such as Beauveria fungi and metarisium fungi



Figure 15 Shows the condition of the mangosteen flower.

# Organic mangosteen production calendar

## JANUARY

Management procedures to promote fruit development and increase quality yields.

### Examine insect pests, destroy the effect.

Choose to practice or combine different methods as follows.

#### Thrips

**Mechanism:** Spray water using a mini sprinkler to increase humidity to repel thrips.

**Natural enemies** such as white-winged beetles, black-legged beetles, long-legged flies and spiders.

**Extracts from plants** such as neem, dead worm, Siam weed, sweet flag, Turmeric Citronella, Marigold, Phakakong, Galangal, Cucumber, Dipli, etc.

**Biological products** such as Beauveria fungi and metarisium fungi

#### White mites

**Natural extracts** Sprayed with sulfur



Complete mangosteen flowers and fruits



Mangosteen fruit destroyed by thrips

Figure 16 Shows the condition of the flowers and fruits of mangosteen and the condition of the mangosteen fruit destroyed by thrips.

# Organic mangosteen production calendar

## February

### Procedures for promoting fruit development and increasing yield

#### Fertilization

Fruit age about 4 weeks after flowering

1. Add manure or compost at the rate of about 20 - 60 kg/tree.
2. Spray bio-fermented water or extracts from animals or plants at the rate of 1 liter/1,000 liters of water.
3. Pour bio-fermented water extracts from animals or plants from the soil or through the water system at the rate of 3 liters / 1,000 liters of water.

#### Examine insect pests, destroy the effect

##### Thrips and white mites

\*\*\* Treat it like January \*\*\*

#### Appropriate amount of fruit per plant

After flowering

Provide water to control the amount of fruit per tree to cause fruit drop, remaining about 35 - 50% of the total amount.



# Organic mangosteen production calendar

## March - April

### Procedures for promoting fruit development and increasing yield

#### Fertilization

After flowering

1. Spray bio-fermented water or extracts from animals or plants through the leaves at the rate of 1 liter/1,000 liters of water.
2. Pour bio-fermented water or animal or plant extracts into the soil or through the water system at the rate of 3 liters / 1,000 liters of water.

#### Manage water to promote fruit development.

The fruit is about 10-13 weeks after flowering.

Give water 200 - 600 liters/tree, giving every other day.



Figure 17 Shows the condition of the mangosteen fruit in April.

# Organic mangosteen production calendar

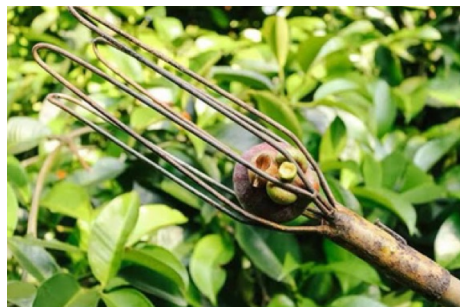
## May-June

### The process of preventing crop damage

#### Prevent crop damage **during** harvest

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

- Harvest using tools that prevent the mangosteen fruit from dropping or being hit hard.
- Be careful not to break the terminals or bruise the calyx.
- Choose to collect only ripe fruits in the pedigree stage (stage 1 - 3)



ที่มา: <https://kasetgo.com/t/topic/712394/4>

Figure 18 Shows the equipment for picking mangosteen and the degree of color of mangosteen fruit when it reaches maturity.

# Organic mangosteen production calendar

## May-June

### The process of preventing crop damage

#### Prevent crop damage **during** harvest

- Keep it in the shade
- Cleaning effect
- Quality sorting before selling



Figure 19 Shows the yield of mangosteen after harvest.

# 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?

38

## 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?

39

## 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.

ข้าวสารออร์แกนิก



# Organic food processing and food hygiene standards

Principles for handling organic food processing should include either **Good Hygienic Practices (GHP)** or **Good Manufacturing Practices (GMP)** to 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.