Asia-Pacific
Economic Cooperation

Organic Agricultural Manual

What is Organic Agriculture?

APEC Agricultural and Technical Cooperation Working Group October 2008

ATC 11/2008A

Organic Agricultural Manual

APEC#209-AT-03.1 © 2009 APEC Secretariat
Produced for
APEC Secretariat
35 Heng Mui Keng Terrace Singapore 119616
tel. (65) 67756012 Fax: (65) 67756013
Email: info@apec.org Website: www.apec.org

Published by

ATCWG Focal Point of Viet Nam
Ministry of Agriculture and Rural Development

ATCWG Focal Point of Viet Nam
International Cooperation Department
Ministry of Agriculture and Rural Development
Tel: (84-4) 8437674
Fax: (84-4) 7330752
Email: dunght.htqt@mard.gov.vn; hhanh.htqt@mard.gov.vn
2 Ngoc Ha - Ha Noi - Viet Nam

What is Principles of Organic Agriculture?

According to IFOAM, the Organic Agriculture is based on:

The principle of health

Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

The principle of ecology

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

The principle of fairness

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

The principle of care

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

What is Organic Agriculture?

Organic agriculture is a form of agriculture that relies on:

- Crop rotation
- Green manure, compost
- Biological pest control
- Mechanical cultivation to maintain soil, productivity and control pests.

Excluded use of:

- The use of synthetic fertilizers and synthetic pesticides,
- Plant growth regulators,
- Livestock feed additives, and
- Genetically modified organisms

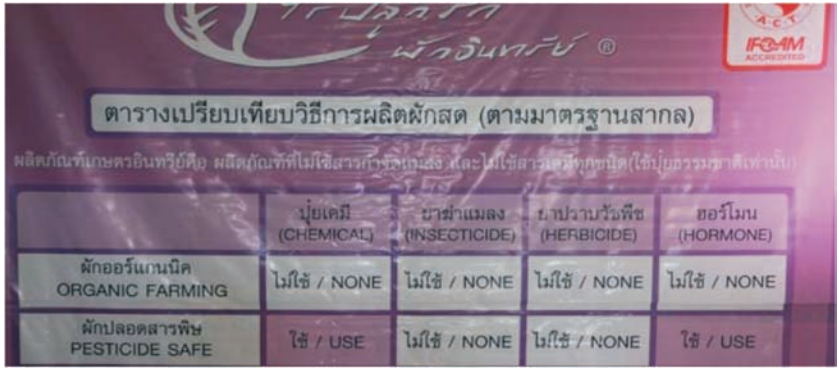
An Organic farm in Thai Land certified by IFOAM

How long does it take in transitional period to convert from conventional farming to Organic farming?

The transition period is range from two to three years to fully convert to organic farming regulating in international or national organic standards.

Where you can start?

- Crops rotation and intercropping to reduce pests and diseases and enhance the effectiveness of antagonist living agents.
- Reduce pesticides used and replace by biological agents.
- Reduce herbicides used and replace by hand weeding or biological control by using traditional extract kills the weeds through stop photosynthesis.
- Reduce chemical fertilizers used by using composting, green manures, or microbial-fertilizers and others biological methods to improve soil fertility.



When you can certify organic farming?

- After two year to three years transition period (depend on the organic standards regulation).
- Fully certified organic products by organic certification bodies when your production system fully used of biological of weeds, pests and diseases control agents, organic fertilizers and green manures to improve soil fertility.

Who respond for organic certification?

- Government certification bodies.
- Private certification body recognize by international.
- or by using PGS system as case for domestic market.

What types of organic certify?

- Individual farm certification
- Group farmer's certification.

How much does the certification costs?

- Depend on your farm size and scheme of your production system.
- Group certification will be the best choice for farmer in developing APEC economies.

Two types of organic Agriculture

Market oriented organic farming

Subsistent oriented organic farming

What is Organic farming system?

The crop production system excluded the use of:

- Chemical fertilizer or artificial fertilizer.
- Chemical herbicides and chemical pesticides, which remain in soil and contaminate the water sources, residue in plants or animals.

In contrast to negative effects and to maintain and improve soil fertility, the organic crop production systems are used:

- Crops rotation.
- Legumes plant.
- Green manures (Azolla and other).
- Composted animal manure and crop waste.
- Used recycle and renewable material.
- Minimize soil tillage, right soil cultivation and right time.
- Mulching or intercropping to protect soil surface.

Soil mulching

Inter-cropping with legumes

What are the benefits of Organic farming?

- Protect the soil from erosion and run off.
- Remain soil fertile and improve soil texture.
- Control pests and diseases while protecting human health and wildlife.
- Reduced water contamination by agro-chemical.
- Promoted biodiversity.
- Reduced carbon emission.
- Using resources available in farm and backyard, so farmer use less money for farm inputs.

Organic farming system helps to protect environment and provides nutritious foods for human and feed for animals. Organic products have higher quality and to sell with higher prices.

Mulching in early stage

Inter-cropping with legumes to improve soil nutrient

Why should you change to Organic farming?

Because of Inorganic farming or intensive farming has cause several problems such as:

- ❖ Soil exhausted and soil erosion.
- ❖ More inputs need year by year to maintain productivities.
- ❖ Pests and diseases resistance, so higher dosage spray to be danger for human and food safety.
- ❖ Polluted water sources such as ground water, lakes and rivers by Agro-chemical and run-off soil.

Soil being wash-off

Pesticide spray

Drought

Disposal of bottles

Does Organic farming use backward methods?

Organic farming does not only used traditional methods or backward methods.

Organic farming use the best practices from the traditional farming methods and improves them using modern scientific knowledge.

Organic farming does not mean the farmers leave their farms to nature. Here, they use the knowledge, techniques and renewable material to harmonize the whole production process with nature.

How about the yield in Organic farming?

Organic farming has lower yield compare to intensive farming but it does not cause the yield loss over the years and has higher yield compare to less intensive inorganic farming.

Organic farmer can reduce risk of lower yield by promoting biodiversity by provide natural capital (input e. g, chemical fertilizers and pesticides) and recreation.

To become successful organic farmer, you should not see every insect as a pest, every plant out of place as a weed and the solution to all problems with chemical treatment.

An organic farmer must create the balance between nature and farming, where together Plants and Animal can grow and thrive.

How about the Soil system in organic farming?

The soil is living system; biological research on soil and soil organisms has proven beneficial to the system of organic farming. Varieties of Bacteria and fungi break down chemicals, plant matter and animal waste into productive soil nutrients. Many soil creatures rely on plant to survive and in return help the plant to grow well. Feeding the soil with manure or compost mean feeding the whole variety of life in the soil which return the nutrient for plant and healthier soil and more arable soil system.

Organic soil matter is related to soil quality and yield, manure or compost added has increase soil life and is able to produce healthier crops and more arable soil for future crops as long as organic management continues.

The organic farmer must cultivate the soil at the right time and in the right way to providing the best living conditions for all the soil micro-organisms and healthier plant.

Organic soil is soft and porous and is the best medium for plant roots grow deeper to take nutrient and water. Organic soil has higher water holding capacity and drainage.

How about crop nutrition?

In intensive farming

- Chemical fertilizer support plants to grow fast but the plant is soft and not able to withstand unfavorable conditions, pest and diseases.
- Chemical fertilizers do not support the soil life or soil micro-organisms.
- Chemical fertilizers do not improve soil texture and often the soil getting compact and reduce the water holding capacity, soil porous and drainage.
- The leaching of nutrient in intensive farming such as nitrates are harmful to aquatic animals, excess of nutrient groundwater in river or lakes can cause algal blooms, eutrophication and subsequent dead zones.

How about crop nutrition?

In organic farming

- Mostly, organic farmers use available resources from farm and seldom work with input resources out side the farm.
- Nutrients are recycles by composting crop residues and animal manures.
- Optimize use of natural processes such as nitrogen fixation by legumes plants and azolla in paddy field.

It is important to remember that using to much animal manure or nutrient rich organic matter and using it at wrong time, it could be as harmful as using of too much artificial or chemical fertilizer.

Azolla in paddy field

Rice bran, cow dung, ash and clay

Legumes in tea garden

Composting

What is Crop rotation systems use in organic farming?

All organic farming systems are based on the use of crop rotation systems.

Crop rotation is practice of planting a succession of crops in a field over periods and in certain rotations, plants like legumes (peas or beans) are grown to restore soil fertility or increase soil mineral and soil organic matter.

Crop rotation helps improve and maintain soil fertility, eradicate weeds, reduce the built of insects and plant diseases, mitigate risk of weather changes and increase net profits.

Types of crop rotation:

- Shifting cultivation
- Grass or bush fallows
- Rotation with legumes crops

What kind of plants can be used green manure?

Green manure is plants or crops, which are grown to benefit the soil, to recycle plant nutrients and adding soil organic matter.

They have specific characteristics like nitrogen fixation or release nutrient to soil, but not always. They can grow with crops or used as cover crops to reduce nutrient being washed out of the crops.

Plants or plant materials for green manure can also be taken from plants and trees grown on the farm or elsewhere and can be put into the soil or used to mulch the crops.

Green manure helps to:

- Build up and recycle plant nutrients and soil organic matter.
- Improve soil texture.
- Improve the water holding capacity of soil.
- Control soil erosion.

Fallows with Legumes and use as green manure

Grass as green manure

Organic farming - protects natural life?

It is importance to help a wide variety of useful plants and animals live in the farm or garden. This may form an ecological Niche where plants or animals have its place and their numbers are kept down by each others. In nature, Plants or animal rarely suffer from serious pests or disease problems.

This does not mean that nature can be allowed to take over the farm, with crops struggling to survive.

Farmers should learn to recognize insects and other animals that are natural enemies of pests. These should be helped and protected by giving them favorable conditions like food and shelter to develop.

Insect parasite

Spider feed on aphis and larvae

Food and shelter for natural enemies of pests in vegetable field

Food and shelter for natural enemies of pests in orchard

Organic farming helps to reserve water resources?

In arid or semi-arid lands the effectively use of water for cropping is a part of organic growing as any other the technique.

As other farm resources, organic farming systems should try to use water available in the local, do not using water more than it is replaced naturally.

There are many ways to use water carefully as;

- The use of terracing, careful irrigation and rain water basins or catchments.
- Improve water holing capacity of the soil by adding organic matter to the soil.
- Mulches help to hold the water in the soil by stopping evaporation of the soil surface or reduce heat on the top soil.

Mulching to reduce water loss

Terrace to keep water in paddy field

Organic farming increases genetic diversity?

In a single crop there can be differences between the plants; some may be tall, some may be short and some may be able to resist to certain diseases. This is variety in the traditional crops grown by farmers where the seeds have been harvested and used locally.

Crops which have been bred by modern breeding techniques tend to be very similar and have the same characteristic. If one plant is infected to disease, they will be all the same. Although some varieties develop to resist to pests and diseases it is dangerous to rely too much on any one of them.

In organic farming systems, a wide variety or genetic diversity between the plants within a single crop is importance. This helps crop to resist to pests and diseases and acts as insurance against crop failure in unfavorable weather condition such drought or flood.

The mixture of different crops or different varieties of one crop is also so useful in Organic farming. This can be provided food or shelter for other micro-organisms or animal against pests and diseases.

Organic farm should:

- Use as many local crop varieties as possible
- Grow more than one modern crop varieties
- Grow mixture of crops in the same field

Which crops or varieties should be used?

Every crop or crop varieties has its own characteristics such as water and nutrient demands, crop density and etc. The growth of crops is very much depended on;

- Soil type
- Climate
- Altitude
- The kinds and amount of nutrients
- The amount of water needed.

Crops will gave high yield, resistant to pests and diseases if they grown under best conditions. Therefore, the organic farmer should grown crops or varieties which are adapted with the local conditions.

Shan tuyet tea in Ha giang, Viet Nam

Organic Rice in Tra Vinh, Viet Nam

How to control pests and diseases in organic farming?

Use of control agents;

- Organic farming not uses chemical pesticides which dissolve, residue in the crops and early leaching to soil and water.
- The organic farming uses antagonist organisms so called "Biological control agents" from nature or produce industrially.
- To control pests and diseases the safest natural pesticides or biological agents should be used, event there is an alternative of other natural control agents.

The best used is to check with the national or international organic standards to see which ones are allowed and recommended.

Extract from plants

Biological pesticides

How to control pests and diseases in organic farming?

Healthy crops suffer less damage from pests and diseases, therefore growing healthy crops are ones of the first targets of organic farmer.

To choose the crops or varieties, which natural resistance to pests and diseases and if possible, the local varieties are the best choice.

The pests and diseases incident are very much depend on when, how and where crops are grown, so the organic farmer should;

- Plant their crop at a certain time to avoid the time when a pests or disease usually appearance.
- Intercropping or mixing of different crops to take advance of repellant effect to pests, such as garlic.
- Use attractant crops to attract pest and use physical control.
- Use light trap or pick from the crop.
- Useful animals to control pests.

Sticky trap

Light trap

How to control pests and diseases in organic farming?

By carefully planning and using combination available techniques can to reduce pets and diseases damage.

If the pests and diseases are still problems. Than natural products can be used to control them. This is consisting of biological pesticides and other biological control agents.

Insect parasites

Aphis feeder

Phacelia – habitat for parasites

Bacteria and fungus

How to control weeds?

On organic farm, weeds can control by following methods:

- Hand weeding or using mechanical weeders.
- Intercropping with legumes.
- Crop rotation.
- Mulching on the crop bed or top of the soil.
- Close planting.
- Hoeing.
- Flame weeding.

Weeding by hand in paddy field

Mulching seed beds

Close planting

Raising poultries

Keynote on organic farming

On an organic farm, each technique would not usually be used on its own. The farmer would use the whole range of organic techniques at the same time to allow all methods or techniques to work together for the maximum benefit.

For example the use of green manure and careful cultivation together provide better control of weeds than if they are apply separately.

Duck to control pests and weeds

Alyssum –habitat for aphis feeders

Crops diversify

Cover with legumes

What are requirements in organic animal husbandry?

In organic animal husbandry;

- The animal welfare is considered very important
- The housing conditions must satisfy physiological and behavior needs, ample access to feeds and fresh water and proper density.
- Free-range should have shelter to protect animals from rain, wind and sunlight.
- The animal feed should be 100% from organic sources or grown organically
- The breeds should be chosen to adapt with local needs, the local conditions and resources

Organic chicken

Organic pork

Organic goose

Organic beef

Who to manage the animal diseases?

To manage the animal diseases in organic breeding systems;

- Rely on prevention by providing good animal feeds and good animal husbandry practices.
- Take care of animal health by reducing the animal stress.
- Provide the shelter and optimizing hygienic conditions to avoid diseases incident and spreading.
- Do vaccinations but limited.

To manage the diseases;

- Consider animal health is principles for diseases prevention methods.
- Encouraging use the natural methods, or substances from nature for rescues.
- Not allow to use chemical drugs or animal drugs and hormone for diseases prevention.

Shelter for poultries

Parking for milk cows

Shelters;

- Available of sun light, density of animal in stocks.
- Animal must approached to natural grass field for grassing and movements. The grass field should divide into parts for shifting animal from part to part and avoiding the diseases or parasites incident.

Breeding;

- The system must be based on the characteristic of animal species, formulate the best conditions for natural fertility without human interpretation.
- Allows artificial fertilization but not allows using growth hormones and chemical drugs.
- Prohibition of cruelty to animals such as tail docking, castration, marking and dehorning.

Transportation and slaughter:

- Reduce the stress during transportation keep quiet, no hurt and no pain and ensure the best conditions for survive of animal to slaughter house.
- Slaughter by minimizing stress and pain

What are requirements in organic fishery?

Lakes and fish-pond;

- Bank or dam should isolate and to avoid negative effect on surrounding environment.
- Manage to avoid the movement of fish or shrimp from pond to pond.
- Provide shelter or cave to hide and movement of fish.
- The deep of lake or fish-pond at least 1,5 to 2 meters.
- Not allow to supply oxygen continuity.

Fish and shrimp varieties;

- The input must derive from organic fish farm.
- Where possible different species can rare together.
- The best is to use local shrimp or fish species.
- Control the density to avoid feeding exceeds cause of water pollution.

Harvesting organic fish

Feeding fish pond

Disease management;

- Disease preventions are the principle and to ensure the healthy of fish and shrimp by optimizing use of water surface, feeding and management practices.
- When fish or shrimp suffer from disease the natural disease control is recommended.
- Not allow to use chemical or antibiotic to treat or prevent of disease incident.

Use of organic matter;

- The organic material can use to increase the organic component of lake and fish-pond, but they must derive from organic plant or organic animal production process.
- Not allows using inorganic material.
- Farmers are encouraged to combine organic farming with organic animal husbandry and organic fishery.

Feeds;

- All the feeds for shrimp or fish must be produced organically.
- Not allow to put any kind of antibiotic or chemical to increase productivities.

International organic standards

To have farmers follow these principles, the International Federation of Organic Agriculture Movements (IFOAM) has decided on a range of techniques and rules, wherever they are need and the limits have also been setting up.

Organic standards are very important as they ensure to the people that the foods, which they grown or buy is safe and healthy and grown organically and in a way which protects the land and the environment.

IFOAM have produced a set of international organic standards, this has been built up by people from many countries and to help everyone to know what organic farming is and how it was practiced.

International standards are also used to help many countries to set up their own organic standards, which take into account the different farming systems. Government authority beside develop organic standards has also certify for organic products by using a symbol. This symbol then allows farmers to sell their products as organic certified.