



# Natural Farming Technologies used in **ORGANIC AGRICULTURE**



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# UNDERSTANDING SUSTAINABLE AGRICULTURE & NATURAL FARMING

## Sustainable Agriculture

- one of the alternative models of agriculture

**CONCEPT:** maintain plant and animal production at a rate that will not prove harmful or create conditions that cause damage in the long-term

**EMPHASIS:** self-sufficiency for sustainability

*Any kind of agriculture that offers long-term sustainability to farmers can be categorized to sustainable agriculture.*

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## Natural Farming

- this is sustainable agriculture

**CONCEPT:**

- considers the ecosystem and environment with no tillage, non-use of chemical fertilizers and herbicides; and uses ground cover crops and mulches
- utilizes available natural resources to avoid causing pollution or harm the farmers' and consumers' health while still able to deliver good quality and quantity yield

**EMPHASIS:**

- Improvement of soil condition, bringing it back to natural fertility levels and creating an ecology which can support its fertility
- produce food with its natural taste and without toxins
- provide a production process throughout which both producers and consumers are kept safe
- provide and maintain a sustainable system in balance with nature



# WHAT IS ORGANIC AGRICULTURE?

a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity;

emphasizes on the use of management practices over the use of off-farm inputs; and utilizes cultural, biological, and mechanical methods as opposed to synthetic materials, and

combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

The diversity of crops and cropping systems on organic farms should sustain and promote diversity that is suited to local agro-ecosystem.

Crop diversification systems which include crop rotation, intercropping, alley cropping, relay cropping, and multi-storey cropping may be used.

*(PNS-BAFS-07-2016)*

# FOUR PRINCIPLES OF ORGANIC AGRICULTURE



## 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.

These principles are the roots from which organic agriculture grows and develops. They express the contribution that organic agriculture can make to the world, and a vision to improve all agriculture in a global context. They also guide in the development of positions, programs, and standards.

*(International Federation of Organic Agriculture Movements - Organics International)*



The background of the page is decorated with large, flowing, wavy shapes in various shades of green, ranging from a deep forest green to a bright lime green. These shapes create a sense of movement and organic growth.

# *Preparation of soil amendments*

# MINIMUM REQUIREMENTS IN PREPARING SOIL AMENDMENTS

## A. Specifications for solid organic fertilizer and compost/soil conditioner

Properties	Organic Fertilizer	Compost/Soil Conditioner
Total N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O	5-10%	2.5-<5%
C:N	10:1 - 20:1	10:1 - 20:1
Organic Matter	≥ 20%	≥ 20%
Actual Moisture Content	10-35% *	10-35%
Color	brown to black	brown to black
Consistency	friable	friable
Odor	no foul odor	no foul odor

\*For pelletized fertilizer, moisture content should be ≤10%.

## B. Specifications for liquid organic fertilizer

Properties	Organic Fertilizer
Total N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O	5-10%

## C. Minimum requirements for organic plant supplements

Main ingredient	Total N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O	Other requirements
Animal Origin (bone meal, blood meal)	5-10%	Products that contain high concentrations of nitrogen should also include P <sub>2</sub> O <sub>5</sub> and K <sub>2</sub> O.  All claims for contents of macro and micronutrients, microorganisms, and plant growth hormones should be verifiable.  Heavy metal content should be within allowable levels as stated in the Table 5.4 of the PNS.
Fish Amino Acid (FAA), Fish Emulsion (FE)	0.5-<5%	
Plant-based (Fermented Plant Juice, Fermented Fruit Juice)	0.5-<5%	
Seweed extracts	0.5-<5%	
Vermi-tea, compost tea	0.5-<5%	
Humic and humic acids	0.5-<5%	
Wood vinegar	0.5-<2.5%	
Biochar	0.5-<2.5%	

Source: PNS-BAFS-07-2016



# SOLID SOIL AMENDMENTS

## A. Basic Composting

Compost is a nutrient soil-like material produced by the biological decomposition of organic materials such as vegetable debris with the help of microorganisms and other decomposing agents.

It is naturally-occurring and known as the most complete fertilizer.

### Natural Composting

This is done by turning a raw poly-biodegradable wastes to compost with earthworms as the main agents of decomposition.

Vinegar flies can also be part of the decomposition process as they nibble at fruit peelings on top of the compost.

Fungus, bacteria or microbes also help and can be a substitute to the main agents to ensure a continuous process of decomposition.

### Making a compost pile:

1. Select a dry, shady spot near a water source for your compost pile. Start the compost by removing the vegetation in the area.
2. Gather all materials for compost. If freshly cut grass is used, no need to add water. For rice straw and other dried materials, soak it overnight with clean water.
3. Place a layer of plant materials about 20-30 cm thick. Sprinkle a layer of ash or lime, if available.
4. Add a thin layer of top soil to cover surface of the plant materials. Repeat this layering process until a pile of about 1.5 meters is built.
5. Cover the pile with dried materials or rice straw. After three days, depending on the plant materials used, the compost pile will heat up and the size of the heap begins to shrink.
6. Compost is ready to use if the original materials can no longer be recognized and the pile has sweet woody smell.





## *Some benefits of composting:*

- enriches soil which helps retain moisture and suppress plant diseases and pests
- reduces the need for chemical fertilizers
- encourages the production of beneficial bacteria and fungi that break down organic matter to create humus, a rich nutrient-filled material
- reduces methane emissions from landfills and lowers your carbon footprint (amount of greenhouse gasses emitted by our actions)
- promotes cleanliness and help solve garbage problem
- environment-friendly
- improve soil fertility
- saves water
- boost soil tilth (suitability for planting and growing crops)

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### **NOTE:**

Properly composted materials are stored well. These are biologically stable, no unpleasant odors, and easier to handle compared to raw organic wastes.

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## B. Vermicomposting

The process that relies on earthworms and microorganisms to help stabilize active organic materials and convert them into valuable soil amendments and a source of plant nutrients.

Vermicompost is the product of the decomposition process.

### Steps:

- 1. Site selection.** Consider the following in selecting your site: proximity to source of materials; availability of water; flood-free; and overall accessibility.
- 2. Design and construction of vermi beds.** Ideal measurements of vermi beds is 5m x 2m x 0.2 m but size and height may vary depending on the area available. Hollow blocks, woods, or stones can be used as wallings. Provide the beds with protection against rain and direct sunlight.






- 3. Bedding and coarse material preparation.** Sawdust, rice husk, coffee husk, shredded paper or sacks may be used as bedding materials. Chop the organic materials such as crop residues, sawdust, grass/weeds, leaves of leguminous trees, and banana trunks among others.

Add animal manure preferably from cow, horse, rabbit, sheep, or goat. Kitchen waste could also be included except fats and oil, meat, chlorinated water, citrus peeling and the like.

Add a little amount of soil or sand to enable the worms to digest their food.

- 4. Releasing worms.** Release 1 kg of earthworms per square meter. Release them in the bed by handling a handful material rich in worm cluster. Avoid individual handling of worms. Reproduction rate is 2 folds after 30 days.



STEPS IN VERMICOSTING	
<b>1 SITE SELECTION</b> Consider the Following: *Proximity to source of materials *Availability of water *Flood free *Accessibility	
<b>2 DESIGN AND CONSTRUCT OF VERMI BEDS</b> *Ideal measurement: 5m x 2m x 0.2m (size and height varies depending on the area available) *Hollow blocks, wood, or stones, can be used as wallings. *Provide protection against rain and direct sunlight.	
<b>3 PREPARATION OF BEDDING AND COARSE MATERIALS</b> *Sawdust, rice husk, coffee husk, shredded paper or sacks maybe used as bedding materials. *Finally chop organic materials such as crop residues, sawdust, grass/weeds, leaves of leguminous trees, banana trunk, etc., then place it over the beddings. Add animal manure preferably from cow, horse, rabbit, sheep, or goat. Kitchen waste could also be in	



**5. Care and maintenance.** Water the bed when necessary but keep it from being too wet. Cover the bedding with plastic sheet or banana leaves. Practice proper feeding of organic matter to the worms for its easier reproduction/multiplication and to prevent it from migrating to other areas.

**6. Harvesting and processing.** Vermicompost can be harvested at 30-40 days after stocking with the appearance of black granules on top of the mound. Harvest on time to avoid loss due to build up waste and migration. Using a screen, sift the vermicast or separate the worms manually. Air dry your compost.



**7. Packaging, Marketing, and Cost of Production.** Vermicompost may be packed, labelled, and sold as medium at a reasonable price. Farmers in Aklan sell it at Php350-400 pesos per sack.



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### **Advantages of vermicomposting:**

- Combats environmental stress – earthworms consume huge quantities of decomposed litter, manure and other organic matter deposited in the soil
- Earthworms help reduce soil compaction, improve permeability – thus providing channels for root growth, water infiltration, and gas exchange
- Earthworms play an important role in the food chain (earthworms are detective for soil pollution)
- Reduces the use of chemical fertilizer

# LIQUID SOIL AMENDMENTS

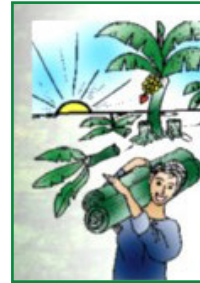
## A. *Fermented Plant Juice (FPJ)*

### Importance:

- enhances photosynthesis (greener leaves)
- food for indigenous microorganisms
- enhances plant growth

### Procedure:

1. Collect any green colored and fast growing leaves before sunrise to preserve its energy. Fresh, juicy, and succulent leaves are the best.



2. Chop 2 kgs of plants and mix 1 kg of molasses in a basin. Place in a clay jar or container. Put a rock on top of the jar and wait until 3/4 of the contents settle in the bottom. After 5 hours, remove the rock and cover the jar with manila paper. Tie with a string.



Put the jar/plastic container in a cool and shaded place for 7 days to complete its fermentation.

3. The fermentend plants will yield 2 1/2 liters of juice if the banana trunk is used. Filter to separate sludge.

**NOTE:** If there are undissolved sugar at the bottom, it means that the fermentation did not take place. Extend for another day and add water to reactivate.



### How to use the concoction:

- Mix 2 tablespoon of FPJ to 10 liters of water.
- Apply directly to the leaves of the plants when the sun is not hot. Apply before sunrise or two hours before sunset.
- FPJ material can be used as animal feed or compost. The juice must have a pleasant smell and sweet, strong taste. Keep for about one year.

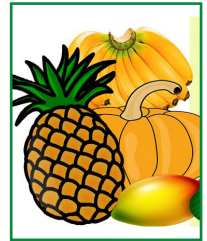
## B. Fermented Fruit Juice (FFJ)

### Importance:

- increases plant nutrition through leaves and roots with potassium factor
- sweetens the fruit and speeds harvesting
- serves as plant hormone
- helps in the digestion of animal and plant nutrients
- resist plant diseases and protects plants from insects

### Procedure:

1. Prepare 1 kg fruits and 1 kg brown sugar or molasses (Ratio is 1:1). Suggested fruits are banana, pineapple, papaya, mango, jack fruit, star fruit, guava, pumpkin etc. Citrus are not recommended.
2. Put 1 kg sweet fruit inside the clay jar/container and add 1 kg of brown sugar/molasses. It is best prepared in the evening to avoid interference from insects.



3. Cover the jar with a clean sheet of paper and tie with a string. Label the jar indicating the date it was prepared. Keep in a cool and shaded place. Ferment for 7 days.



**NOTE:** Keep the bottle lid loose for 2 weeks from the time of bottling to allow the escape of gas to avoid sticky explosion.

4. This will make approximately 1 and 1/2 liters of juice. Drain the liquid and place in plastic bottles. Always leave about 1/3 of the bottle empty so the IMO can breathe. The FFJ should have a pleasant smell with sweet and tangy taste.



### How to use the concoction:

- **For plants:** Mix 2 tbsp of FFJ to 10 liters of water. Apply directly to the leaves of the plants when the sun is not out. Add to the IMO and FPJ mixture. Spray to the soil and leaves of fruit-bearing trees or during the vegetative and reproductive stages.
- **For animals:** Mix 2 tbsp of the juice to 1 liter of water.



# C. Fish Amino Acids (FAA)

## Importance:

- it is a good source of nitrogen
- contains abundant amount of nutrients for plant growth and development

## Procedure:

1. Weigh the fish and its parts (head, bone, intestine, gill) as well as the golden apple snail (smashed), if available. Add muscovado sugar or molasses at 1:1 ratio. If bad odor occurs during the fermenting process, add more sugar.
2. Put the materials in a clay or UV resistant plastic container. Fill the container up to 2/3 full leaving spaces for air circulation inside. Cover the mouth of the container with paper or thin cloth to allow air flow. Keep the container in a cool dark place.
3. Liquid will form after 2-3 days. After 7-10 days, oil will be visible on the top surface. Apply 2-3 handfuls of IMO2 to dissolve the fat floating on the surface.
4. The fermentation is completed after 21 days and is ready to use. It will soon have a sour smell with no smell of rotting flesh.
5. Strain the liquid off the solids to be stored and used as a foliar spray. The left over residue can be mixed back into a new batch for further fermentation or used as a compost fertilizer.
6. For storage, it should be kept in an air tight container and then it can be kept for 1 year.



## How to use the concoction:

- Spray on plants/soil when diluted with water 1,000 times (20 ml of liquid:20 liters of water)
- Spray on compost pile to stimulate microbial activity when diluted with water 1,000 times

## D. Lactic Acid Bacteria Serum (labs)

### Importance:

- LABS thrive and feed on the ammonia released in the decomposition that is normally associated with the foul odor
- converts waste into organic matter and basic materials
- improves the growth rate of plants and improves digestion in animals
- prevent disease development, epidemics, and foul odors

### Procedure:

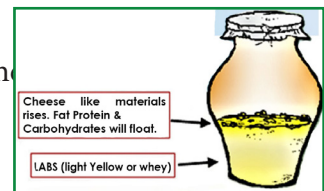
1. Put the first rice wash, about 7 inches in depth, in a large container for good aeration of the liquid.

2. Cover the container with a clean sheet of paper. Put container in a shaded area for 7 days.

3. The content will develop a sour smell after 7 days. It will also form three layers: floating compound (rice bran), clear layer (LAS), and starch. Extract only the clear layer using siphon.

4. For Secondary Culture: Mix one clear liquid (LAS) to 10 parts of fresh milk. Put rice bran evenly on top of the milk to keep it anaerobic. Do not stir.

5. After 5-7 days, the carbohydrates, protein, and fats will float leaving a yellow liquid (serum) or whey which contains lactic acid bacteria. Extract only the yellow liquid and add crude sugar for preservation having the same amount with the LAS. Keep in a cool dry place since the process takes place in an even temperature. Keep the solution out of direct sunlight.



### How to use the concoction:

- Mix 2 tbsp of LABS to 1 liter of water.
- Cheese filtrate can be used as fertilizer with IMO 5.



# E. Fermented Liquid Calcium

(Other term: Water soluble calcium)

## Importance:

- one of the nutrient important for use in organic farming systems, and can be produced by recycling waster produce from either communities or agriculture
- strengthen flower buds and fruit stems
- increase fruit sugar content

Two ways to extract fermented liquid calcium:

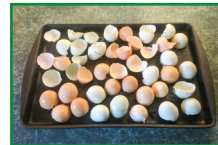
### A. Extraction by wood vinegar

1. Collect materials containing organic calcium which can be egg shell, snail shell, or any type of sea shell, etc.
2. Wash, clean, and dry the materials. Smash them into smaller similar pieces.
3. Add liquid wood vinegar and the ratio of 2 liters of liquid to 1 liter volume of shells (2:1).
4. Leave to ferment for 9 days in a glass jar. Cover jar with paper to allow for air flow and to keep insects out.
5. Strain off the liquid then store in a plastic bottle with an airtight lids and keep in a cool place.



### B. Extraction by fermented rice water

1. Collect materials containing organic calcium such as egg shells, etc.
2. Wash, clean, and dry the shells. Smash them into smaller similar pieces.
3. Place inside a container and then add fermented rice water just enough to cover the materials. There will be a reaction with bubbles coming up. Wait until there are no more bubbles, and add a little bit more of the fermented rice water.
4. Leave to ferment for 7 -10 days. Strain and store the water soluble calcium in plastic bottles with airtight lids and place in a cool dry place.



bubble reaction





## ***F. Fermented Liquid Calcium Phosphate*** ***(Other term: Water soluble calcium phosphate)***

### **Importance:**

- helps with the germination by increasing seedling vigor and resistance to insect attack.
- contains both calcium and phosphorus at the same time which is needed by the plants.
- stimulate flower buds and fruit; help the fruit have a strong stem.
- promotes plant growth and health and resistance to insects.

### **Procedure:**

1. Collect animal bones from cows, pigs, etc. or even bones left over from making soup are suitable.
2. Chop the bones into similar size so that they are easy to be boiled or roasted.



3. Boil or roast the bones to get rid of fat or any meat left on the bone. This is to get rid of nitrogen and any unwanted bacteria and disease. Do not use an overly hot fire because bones will turn into char.




4. Measure the appropriate volume of bones in a container, set aside some, then add 10 parts of fermented brown rice water to 1 part of bones. There will be a bubble reaction. Wait until the bubbles disappear, then add a small amount of bones. If there are no more bubbles, it has reached proper saturation. If there are more bubbles, add more liquid.



5. Leave to ferment for 7-10 days. Strain and then it is ready for use.

### **How to use the concoction:**

- Dilute with water 1:500-1000 and spray on leaves before and after the plant goes through changes in its growth stage.
- Dilute it with water 1:1000 and mix with any of the other types of organic bio-liquids.
- It can be mixed with livestock feed during the pregnancy or breeding stage.

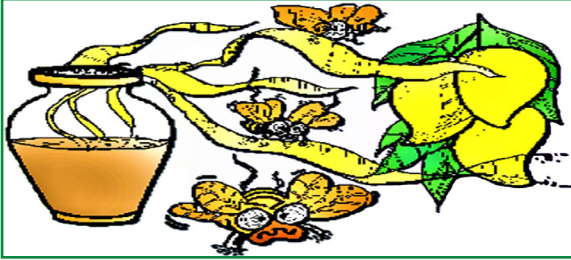
The background features a white central area with decorative green wavy borders at the top and bottom. The top border consists of two overlapping wavy bands, one in a darker green and one in a lighter, lime green. The bottom border also consists of two overlapping wavy bands in the same color scheme.

*Preparation  
of botanical  
pest control  
formulations*

# NATURAL ATTRACTANT FOR FLYING INSECTS AND BUTTERFLIES

## Importance:

- eliminates flying insects



**DID YOU KNOW?**

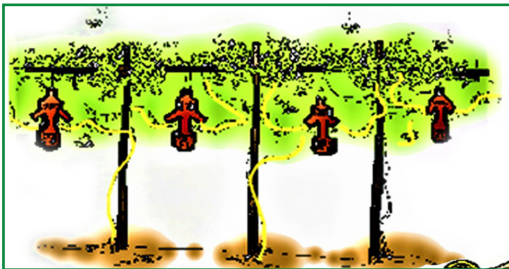
*Insects are alcoholic!*

## Procedure:

1. Boil 1 gallon of coconut vinegar or coconut wine (*tuba*). Add 1/2 kg of crude sugar before boiling. Let it cool then add 1/3 liter of FPJ concentrate.



2. Put some of the mixture in containers and hang on fruit-bearing trees, vegetable trellises, and/or place near vegetable plots. It is also excellent for household use. It can be placed near open spout, open garbage bin, or a place with visible presence of insects.



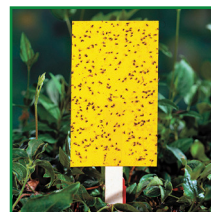
vegetables trellises



vegetables plots

## NOTE:

- You can also use yellow traps for flying insects. Insects are attracted to yellow color.



water trap



# ORIENTAL HERBAL NUTRIENT (OHN)

## Importance:

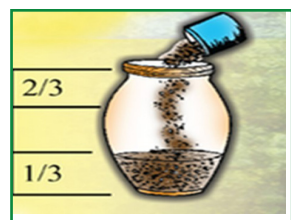
- repels insects and diseases
- cures diseases caused by bacteria and viruses
- strengthens plant's seeds, stems, and roots

## Procedure:

1. Prepare herbs such as garlic, ginger, neem, derris root, and lemon grass. Pound or grind into a paste. If the herbs are dry, soak it in water overnight before using).



2. Divide container into three parts. Mix the herbs and muscovado sugar together preferably by hand and put inside the jar. Cover and seal. Ferment for 7 days.



3. Add 10 liters of gin/liquor after 7 days. Cover and seal. After 10 days, gradually pour the liquid from one container to another without disturbing it. The first extraction is good for animals while the second one is good for plants. Just add gin/liquor of the same amount that was taken from the extraction.



4. You may add fresh or dry chili, neem fruit, curry fruit, or marigold for stronger potency and repeat the same process for the third time. Continue to ferment for 10 days.



neem fruit




marigold

## How to use the concoction:

- Mix 2 tbsp of OHN to 1 liter of water.
- Add the mixture to IMO and FPJ mixture then spray it on the leaves and soil every week.



The background features several thick, wavy, overlapping bands of green in various shades, ranging from a vibrant lime green to a deep forest green. These bands curve across the page, creating a sense of movement and organic growth.

*Plant production  
in natural  
farming systems*



## A. SEED AND SEEDLING TREATMENT



Using good seeds is among the factors that contribute to successful farming. Having such seeds also entails proper selection to ensure the quality of the seeds.

Natural farming techniques nourish the seeds to be strong, with high viability, and increased tolerance to poor conditions.

**Seed selection:** Select seeds from plants that are the strongest and most tolerant to environmental changes, rather than just the high yielding ones.

**Seed treatment:** Soak the seeds in a treatment to help the future plant develop good root systems and have thick, well shaped leaves.

### Preparing the treatment:

1. Mix FPJ, fermented brown rice water, and liquid herb hormone or OHN at a ratio of 1:1:1, with each one having been diluted with water 500 times.
2. Soak the seeds of similar characteristics. Soaking time varies depending on the size and types of seeds.

- **Fast germinating seeds (cabbage, legumes)** - soak for 2 hours
- **Slower germinating seeds (cucumber, melon, squash)** - soak for 4 hours
- **Slow germinating seeds (rice, barley, tomatoes)** - soak for 7 hours
- *Tubers namely potatoes, ginger, garlic, and taro should be soaked only for half an hour.*

**Rice seedlings** - spray with the same treatment before and after transplanting.



### Good to know:

For seeds bought in the market, soak them in warm water to get rid of chemicals and to help them to germinate better. This is because most seeds in the market are coated with chemicals in order to protect them against insects and diseases. The chemicals makes the seeds weaker and lowers viability.

## B. SOIL IMPROVEMENT

Soil is improved naturally to be suitable for plant growth by not using any chemicals. Natural farming also does not encourage unnecessary mechanical plowing because it can damage the soil structure in the long term.

Plowing the soil mechanically can be prevented if the small scale farmers are able to take good care of the soil and create a good habitat for the soil living organisms.



### 1. Mulching

Mulching is one way to create good environment for soil organisms. It is done by covering the soil with mulch materials in order to preserve moisture, prevent weed growth, and improve the condition of the soil.

**a. Use of dry materials.** use of dead plant materials like rice straw, corn cobs, cut weeds and leaves, etc. to be placed in the soil surface. These materials which are normally dry needs to be watered to become softer. The soil organisms can break down the materials easily when moist and soft.

The moist materials helps the soil to stay wet and maintain a constant temperature which enables the microorganisms and earthworms to multiply rapidly. In return, they make the soil soft and 'loose' by their activity of 'plowing' the soil.

It is a good practice to cover the garden beds with rice straw and leaf mulches after harvest to prevent weed growth.

**b. Use of cover crops.** cover crops are grown as living mulches to cover the soil between harvesting and mulching.

**c. Use of plastic sheets.** This is also used, however, it is not recommended. It can cause temperature to rise quickly and the roots will lack oxygen from being highly active. Aerobic microorganisms die which can cause in increasing the density of the soil that is in contact with the plastic sheet.

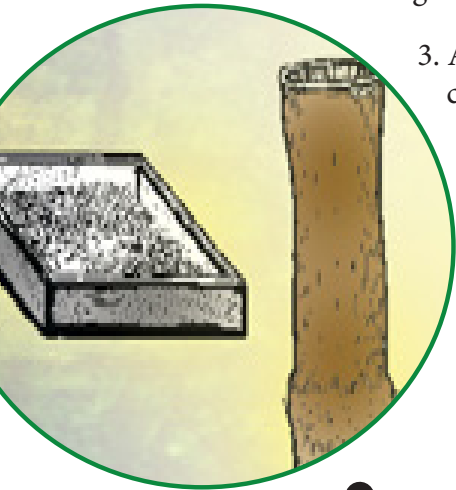


## 2. Indigenous Microorganisms

The use of IMO to improve soil is cheap, safe, and effective, especially as the farmers can make them from their own available resources.

### **IMO for rice production:**

1. Select a healthy banana sucker in which the main vertical leaf has grown to around 1 meter long. Dig out the sucker with root attached, slice into thin sections and then pound thoroughly.
2. Weigh and place 30 kgs of the ground up material in a 200-liter container. Add 10 kgs of sugar and IMO2 agent. Mix well and leave to ferment for 7 days.
3. After 7 days, drain the liquid off to be used as a soil conditioner and to decompose stubble.



### **Decomposing rice stubble:**

Dilute 1 liter of fermented banana sucker liquid with 100 liters of water. Pour on at a ratio of 12.5 liters per acre (0.404686 hectares) into the flooded field 10 cm deep. This will help speed up decomposition when left for 10-15 days. There is no need after to plow the stubble in as it has rotted away.

The formula can be used again 15 days after the seedlings are planted and applied at a rate of 1,250 liters per acre.

## 3. Treatments

Treatments or solutions are different types of fermented bio liquids mixed together to make formulas. These contain different levels of nutrients and are best when left sitting for 3-5 hours before use to increase microbial activity.

### **They are sprayed on plants:**

- before or after sowing seeds
- during the growing stage
- before harvest





## C. FORMULAS FOR PROMOTING PLANT GROWTH

- **Fermented Plant Juice** - contains beneficial microorganisms for soil and nutrients for plants that promote stem and leaf growth. Promotes the first stage of plant growth.
- **Fermented Fruit Juice** - contains nutrients and plant hormones. Promotes plant growth during the changing over stage (between growth and reproduction stages). Promotes flowering and fruiting.
- **Fermented liquid calcium** - promotes fruiting which results in strong fruit stems and sweetness in fruit.
- **Fermented liquid potassium** - helps with quality control such as weight and sweetness in fruit. Transfers starch and sugar to the growing plant parts. Slows down leaf drop and increases grain volume and quality.
- **Fermented liquid calcium phosphate** - stimulates flowering and fruiting. Increases the ability of the flower and fruit to stay attached to the tree. Increases plant health to resist insects.
- **Liquid natural mineral** - used to add more nutrients to the plants.
- **Liquid herb hormone (or OHN)** - contains important substances that helps plants to grow normally. Helps plants to resist insects and diseases.
- **Fermented liquid phosphorus** - contains high amounts of phosphorus from sesame plants. Promotes flower buds, increase sugar levels, and help carbohydrates in plants.
- **Fermented liquid animal protein** - contains minerals and high protein. Good for nourishing leaves and roots in leafy vegetables as it increases the number of leaves.
- **Fermented liquid magnesium** - important for chlorophyll and photosynthesis, thus, helping the plants to stay green.
- **Fermented liquid boron** - helps with plant growth and effects flowering, fruiting, and grain forming.



## D. FORMULA PREPARATION



### Seed and seedling formula



1. Mix the following solutions together at 1 part each:
  - fermented plant juice (dilute with water 500 times)
  - fermented brown rice water (dilute with water 500 times)
  - liquid herb hormone/OHN (dilute with water 1000 times)
  - fermented liquid from fish (dilute with water 1000 times) is added when the seedlings are small and weak
  - fermented liquid calcium (dilute with water 1000 times) needs to be added when seedlings grow abnormally and are weak
2. Soak seeds and seedlings in the solution according to seed types following recommended soaking time.



### Soil improving formula



1. Mix one portion of each solution together. Make sure the dilutions are strictly followed to avoid damage from the concentrations being too high:
  - fermented plant juice (dilute with water 1000 times)
  - fermented brown rice water (dilute with water 500 times)
  - liquid herb hormone/OHN (dilute with water 1000 times)
  - fermented liquid from fish (dilute with water 1000 times)
  - fermented liquid calcium phosphate (dilute with water 1000 times)
  - fermented liquid from lactic acid (dilute with water 1000 times)
  - sea water (dilute with water 30 times)
  - solution form of IMOs (dilute with water 500 times)
2. Spray on soil.





## Stems and leaf formula at growing stage



1. Mix one portion of each solution as follow:

- fermented plant juice (dilute with water 500 times)
- fermented brown rice water (dilute with water 500 times)
- liquid herb hormone/OHN (dilute with water 1000 times)
- fermented liquid from fish (dilute with water 1000 times)
- fermented liquid calcium phosphorus (dilute with water 1000 times)

2. Spray on plants during its leaf and stem development stage. To prevent fruiting plants from having too many leaves, add in the mixture the fermented plant juice made from young fruit (dilute with water 500 times) and fermented liquid lactic acid.



## Change over stage formula



The change over stage refers to the transition stage between the finishing of stem and leaf growth and the starting of flowering and fruiting stage. During the change over stage, plants need different nutrients from other growth stages. They are in need of high phosphorus.

1. Mix one portion of each solution as follow:

- fermented plant juice from tips or young fruit (dilute with water 500 times)
- fermented brown rice water (dilute with water 500 times)
- liquid herb hormone/OHN (dilute with water 1000 times)
- fermented liquid from fish (dilute with water 1000 times) - it is added if the plants are not in good condition
- fermented liquid calcium phosphate (dilute with water 1000 times)

2. Spray on plants during change over stage.

# Flower and Fruit Stimulating formula

1. Mix one portion of each solution as follow:

- fermented plant juice (dilute with water 500 times)
- fermented brown rice water (dilute with water 500 times)
- liquid herb hormone/OHN (dilute with water 1000 times)
- fermented liquid from fish (dilute with water 1000 times) - it is added if the plants are not in good condition
- fermented liquid calcium (dilute with water 1000 times)
- sea water (dilute with water 30 times)



2. Spray on plants during the flowering and fruiting stage. The plants need more calcium during this stage.

## Fruit Ripening Formula

1. This formula is used to promote fruit ripening. Mix one portion of each solution as follow:

- liquid herb hormone/OHN (dilute with water 1000 times)
- sea water (dilute with water 30 times)
- fermented liquid calcium (dilute with water 1000 times)

2. Spray on plants during the fruit ripening stage. Be careful not to use fermented brown rice water on plants because it will decrease sugar levels and it can even give the fruit a sour taste.





## Splitting fruit preventing formula



1. The first rain after a long dry period often causes the fruit to split. Mix one portion of each solution as follow:

- liquid herb hormone/OHN (dilute with water 1000 times)
- fermented brown rice water (dilute with water 500 times)
- fermented plant juice (dilute with water 500 times)
- sea water (dilute with water 30 times)
- fermented liquid lactic acid (dilute with water 500 times)

2. Spray on plants to prevent fruit splitting.

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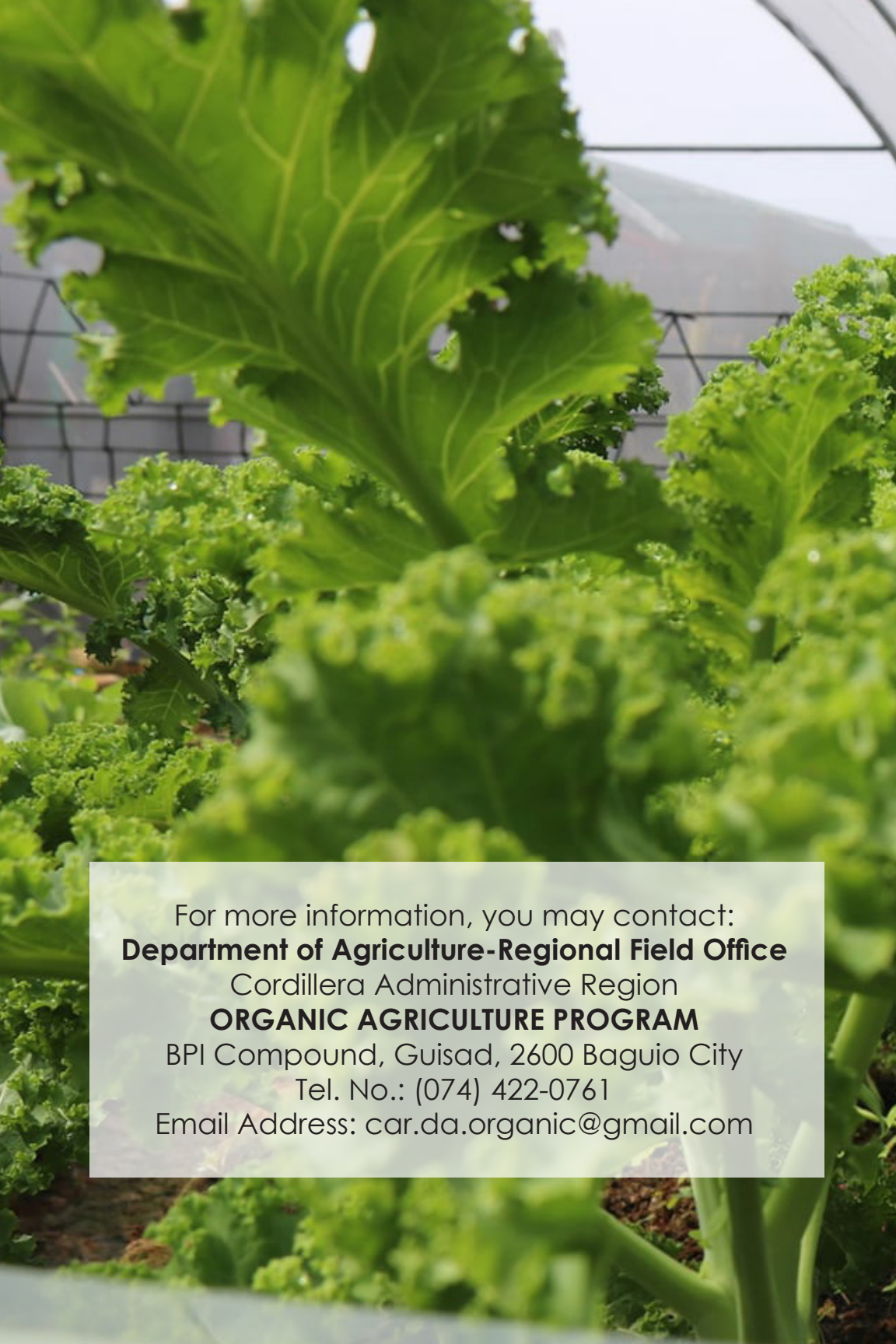
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*\*Photos and illustrations used were lifted from the internet*



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