

Farmer's Guide on Bio-Organic Inputs from Plants, Fish & Animal Liquid Extracts



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Introduction

The insurmountable rising cost of inorganic fertilizers is inevitably uncontrollable in the coming production years. Looking into this perspective the farmers has to look for an alternative measures to sustain his farming business profitability.

On December 27, 2005 Her Excellency President Gloria Macapagal-Arroyo signed Executive Order 481 on the Promotion and Development of Organic Agriculture in the Philippines. Then, Former Agriculture Secretary Domingo F. Panganiban signed Administrative Order No. 9 series of 2006 or the Implementing Rules and Regulations (IRR) of EO 481.

With these development the Department of Agriculture has come up with programs and projects in support to EO 481. Thus, the Agricultural Training Institute in Region 8 made this material on bio-organic inputs in response to the program.

This material discusses steps on the preparation, the materials needed, the applications and benefits of the different bio-organic inputs. It is hope that this material will provide the needed know-how on bio-organic inputs that would eventually help farmers improve their farming.

The Bio-Organic Inputs

This material discusses the following organic inputs:

1. Indigenous Microorganism (IMO)
2. Fermented Plant Juice (FPJ)
3. Fermented Fruit Juice (FFJ)
4. Fermented Amino Acid (FAA)
5. Oriental Herbal Nutrients (OHN)
6. Calcium Phosphate (Ca Phos)
7. Lactic Acid Bacteria Serum (LABS)
8. Natural Insect Attractant (NIA)

B. Procedure

1. Mix the sugar, water and vinegar in a basin or any available container that could accommodate the mixture.

C. Application

1. Cut out holes or vents (2 square inches) on two opposite sides of the plastic bottles.
2. Transfer a minimal amount of the mixture into bottles and make sure that the contents do not spill out of the vents.
3. Using a piece of rope or tie-wire, hang bottles from fruit trees or vineyards. For low-lying crops, pour solution in coconut shells or any bowl-like container and strategically place near plants.
4. Hang 100 bottles of NIA with a distance of 10 x 10 meters for a hectare farm lot planted with rice, corn, bananas, fruits, high value vegetables, etc.

References

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3. TOT documents on Organic-based Agriculture
4. Handout, Application Manual on Crop Production using EM Technology, EM Research Phils., Inc., Madrigal Business Park, Alabang, Muntinlupa City
5. Organic Fertilizers and Soil Amendments: Importance and Role of Organic Fertilizers and Soil Amendments
6. Advocacy documents of DA-ATI 8, LSU, Visca, Baybay, Leyte

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float and leaving a yellow liquid (serum) which contain the lactic acid bacteria. Dispose the coagulated carbohydrate, protein and fat. Add them to compost pile or feed them to your animals.

9. The pure lactic acid bacteria serum can be stored in the refrigerator. Or simply add equal amount of crude sugar (*kinugay*) or molasses and dilute with 1/3 water. Crude sugar or molasses will keep the lactic acid bacteria alive at room temperature at 1:1 ratio serving as food for the bacteria to keep alive.

C. Application

1. To use, dilute this pure culture with 20 parts water or 1:20 ratio as basic lactic acid bacteria concoction.
Use: 2-4 tbsp/gal of water (clean water) spray or add to water and feeds of animals
For bigger animals: use 2-4 tbsp of diluted lactic acid bacteria serum without diluting it further with water.
2. Use as spray to plant leaves to fortify phyllosphere microbes. Spray to soil and compost to build-up good microorganism colony.

D. Benefits

1. Promotes intestine movement
2. Regulates the balance of the intestinal bacteria
3. Prevents growth of harmful or pathogenic bacteria
4. Improves immune system
5. Contains anti-aging properties and/or antioxidants

VIII. Natural Insect Attractant (NIA)

A. Materials

1. 3 liter clean water
2. 1 liter coconut vinegar
3. 1 kilo muscovado sugar
4. Empty mineral water bottles

I. Indigenous Microorganism (IMO)

A. Materials

1. Clay pot/Bamboo trough
2. Manila paper (unprinted)
3. Basin
4. Cooked rice
5. Muscovado sugar (generic or crude sugar)
6. Clean water (no chlorine or other chemicals)

B. Procedure

1. Collecting IMO
 - a. Place cooked rice into pot or bamboo trough. Let it cool first before placing into the trough.
 - b. Cover container with fine wire screen to avoid rat disturbances and tie up using any tying material.
 - c. Place container face down or slant position in an area where decomposed crops such as corn, rice straw, etc. or in banana/bamboo plantation areas. Cover container with any material to protect from rain.
 - d. Collect container after 5-7 days when presence of molds can be seen.
2. Culture and production
 - a. Transfer the molded rice with collected microbes into a basin. For every kilo of cooked rice add 1 kilo of muscovado sugar and 1 liter clean water (no chlorine). Mix well.
 - b. Transfer the mixture into an old pail or clay jar. Cover with unprinted Manila paper and tie up using any tying materials. Fill the pail up to 75% only, leaving 25% air space.
 - c. Place the container in a cool place away from the heat of the sun.
 - d. Leave pail or jar for 7 days then collect by straining the liquid extract, leaving the substrate to the compost area.
3. Harvesting
 - a. Prepare plastic containers (mineral water bottle, softdrinks bottle, etc.)

- b. Harvest microorganisms by straining the fermented liquid (extracts) using mosquito net or any straining materials through a funnel poured into the plastic containers.
- c. Store the basic and pure IMO in the containers. IMO is now ready to use.

4. Application

- a. The use of IMO as foliar fertilizer
 - Mix 2 tablespoons of IMO per liter of clean water when directly sprayed to plants. Use clean sprayer (the sprayer must be new and not used previously with chemicals, otherwise clean thoroughly the sprayer before using).
 - Spray the IMO mixture into the leaves of the plants or the soil early in the morning at 4:00-6:00 AM or in the afternoon at about 5:00 PM until sunset (when micro-organisms are very active).
 - In rice fields, spread immediately newly threshed rice straws, to avoid burning, and spray the whole area with IMO at least 2 times before land preparation or plowing, at 8 tbsp/liter for this purpose.
 - Spray IMO immediately after leveling with the same dosage.
 - Use IMO every 7-10 days on newly planted seedlings until maturity for rice, corn, vegetables and fruit trees at the rate of 2 tablespoons per liter.
 - If you find white materials in the soil it is an indication of the proliferation and good production of micro-organisms in the soil.
- b. The use of IMO in quick composting

Materials:

- ½ bag tiki-tiki (very fine rice bran)
- ½ bag ash
- 5 bags chicken dung
- 1 ton (1,000 kg) rice straw (about 50sacks)

Preparing BOKASHI Mixture

- Ratio 1:4 (3 liters IMO, 12 liters clean water)

- Fruits, Vegetables and Bananas: from bearing stage up to a week before harvesting

D. Benefits

1. Can induce flowering among plants
2. Promotes higher yield
3. Induce longer shelf life of fruits
4. Give added resistance to plants against pests and harmful insects

VII. Lactic Acid Bacteria Serum (LABS)

Lactic acid bacteria can be collected in the air

A. Materials

1. Rice wash
2. Fresh milk (skimmed or powdered milk can be used)
3. Used or old pail or plastic container
4. Manila paper (unprinted)
5. Muscovado sugar (crude or generic sugar)

B. Procedure

1. Pour rice wash (solution generated when you wash the rice with water) into a container.
2. Allow 50-75% air space in the container.
3. Cover container loosely (not vacuum tight, allowing air to move into the container). Put container in a cool area with no direct sunlight.
4. Allow rice wash to ferment for 5-7 days at a temperature of 20-25 degrees centigrade.
5. The rice bran will be separated and float like a thin film on the liquid smelling sour.
6. Strain the liquid with a cheese cloth or wheat flour bag cloth. Put liquid in a bigger container.
7. Pour ten parts milk (the original liquid has already been infected with different types of microorganisms including *Lactobacilli*. Saturation of milk will eliminate the other microorganisms and pure *Lactobacilli* will remain.)
8. Ferment in 5-7 days. Carbohydrates, protein and fat will

D. Benefits

1. Serve as insecticide and fungicide at the same time.
2. Provide more vigor and vitality to the plant.
3. Use to treat skin diseases of hogs and other animals.
4. Use as energy drink for humans.

VI. Calcium Phosphate (Ca Phos)

A. Materials

1. Any of the following: pork, fish and beef bones, eggshells and kuhol and/or any shells
2. Clay pot or cross-cut bamboo trough
3. Manila paper (unprinted)
4. Plastic straw (for tying)
5. Coconut vinegar
6. Griller

B. Procedure

1. Broil bones. Roast eggshells until they turned into ashes
2. Pulverize bones. Transfer in a container pulverized bones or shells and add equal volume of vinegar.
3. Transfer the mixture into a bamboo trough or clay jar, cover with Manila paper and tie up with plastic straw.
4. For bones: Allow to sit for one month or until bones soften or dissolve completely. For eggshells: Allow to sit for 2 weeks (14 days) or until dissolved completely.
5. Harvest, strain the preparation and bottle after a month or until when bones are completely dissolved.

C. Application

1. Dilute the juice extracted in 20 parts water.
2. Spray mixture into leaves or soil, preferably at both ends of the day (4:00-6:00 AM or 4:00 PM until sunset) when microorganisms are most active. Apply every 7 days to the following crops:
 - Rice: from booting stage up to a week before harvesting
 - Corn: 45 to 90 days of tenure

- Put IMO in a large used basin. Add 12 liters clean water and mix.
- Add tiki-tiki until 60% moist. The 60% moisture is determined when you strongly squeeze the BOKASHI, just enough water will come out between your fingers. BOKASHI is now ready for application.

Steps in Compost Making using IMO

- Uniformly cut rice straws at least 2 inches long and dip in a basin with clean water for 5 minutes.
- Arrange the first layer of straw bed that measures 2m x 6m x 4 inches thickness. Sprinkle water in bed with chopped rice straw or any bio-degradable materials and press into its desired thickness. Spread BOKASHI uniformly then spread uniformly 1 bag chicken dung. Place at least 1 inch thick rice hull ash evenly spread on top of the dung.
- Repeat the same procedure up to desired height based on farmer's convenience.
- Wet the topmost layer of straw and spread ash about 1 inch thick again.
- Cover the compost bed with plastic to generate heat and to protect the compost pile from the rain. Put on top some coconut fronds to stabilize and give weight to the plastic cover in order to be in place.
- After 2 weeks, in 1 week interval thereafter, slice the end of the bed and place at the side having the same layout and dimension. Invert and mix thoroughly the material and spread within the layout by using a spading fork. Cover again with the plastic material and coco fronds after all are transferred and properly mixed.
- Harvest the compost after one month. If the field is not yet ready for application, air-dry the compost under a shed. When dried, place the compost in bags and store.

C. Benefits of IMO

For plants and soil

1. Good soil conditioner
2. Restores plant vitality

3. Reduces plant stress on seedlings
4. Collects nitrogen from the atmosphere, thus promotes faster plant growth
5. Controls pests and diseases
6. Serves as foliar fertilizer spray to cutflowers and ornamentals
7. Reduces growth of weeds and grasses seeds

For Animals: Poultry, Piggery and Livestock

1. Arrests foul odors and minimizes flies proliferation in poultry and piggery houses.
2. Improves digestion of feeds and helps better nutrient assimilation when the good bacteria create enzymatic reaction by converting nutrients into minerals (mineralization) and other vitamins needed for animal growth.
3. Serves as probiotics to prevent diseases, pathogens and epidemic development in poultry and livestock thereby reducing the use of biologics and antibiotics to animals.
4. Additive for drinking water of poultry, livestock and pets. Improves appetite and feed conversion ratio (FCR) of chickens resulting to no left over feeds on the feeder.
5. Eliminate foul odor of slaughtered hog's internal organs when regularly used as mixture in feeds and drinking water.
6. Improves water quality and serves as water conditioner when added in fish aquarium, fish ponds and lagoons.
7. Has anti-fungal and anti-septic property on dogs and pets. Very effective remedy for scabies (*kagid*), otitis media (*bo-og*) and other skin ailments of pets.
8. Removes odor from animal wastes and urine if added on feeds or drinking water.

On Household Use and Environmental Quality Improvement

1. Used as sanitary spray to eliminate foul odor in toilets, drainage canals, slaughter houses, septic tanks, garbage, markets, etc.
2. Improves sanitation and produces a pleasant sanitary environment.

3. Crosscut bamboo or clay jar or glass jar
4. Plastic straw (for tying)
5. Muscovado sugar
6. Coconut vinegar, Beer or Gin

B. Procedure

1. Finely chop half-a-kilo each of ginger, bulb onion and garlic.
2. Transfer chopped spices into a bamboo through or clay/ glass jar and pour 2 liters coconut vinegar . Mix well and cover with a clean Manila paper and tie with plastic straw.
3. Preserve for a duration of 12 hours then remove cover and add 1 kilo of muscovado sugar. Replace cover.
4. Place container in a cool place away from direct sunlight.
5. After 4 to 5 days of fermentation add gin.
6. Replace cover, return to storing place and retrieve after 7 to 10 days. Strain liquid from container and place in plastic bottles.
7. OHN is now ready to use.
8. You can extract liquid 5 times from this preparation. Add beer or vinegar into container and ferment using the same procedure.

C. Uses and Application

1. Add 2 tablespoons of OHN to every liter of water. Spray mixture into leaves or soil, at both ends of the day (4:00-6:00 AM or 4:00 PM) when microorganisms are most active to the following crops:
 - Rice, corn, Vegetables, Fruits and Bananas – from planting up to bearing stage. (Apply twice weekly upon indications of insects infestation and aphids.)
2. Used as natural anti-biotic for plants and animals. Garlic has high level of sulfur which is a good fungicide.
3. Used on chicks, chickens and sick animals.
4. Sprayed to plant leaves to fortify phyllosphere microbes.
5. Treatment for fungal problems of plants: downy mildew, powdery mildew. (See application on number 1)
6. Used as herbal tincture which is highly medicinal and highly nutritious.
7. On humans: a) used as a remedy for rheumatism; and b) a treatment for coughs, fever and flu.

3 liters natural water

2. Put into a pail and leave a 25% air space.
3. Cover with Manila paper and tie securely fastened with plastic straw.
4. Put in a cool undisturbed place. Leave for 14 days.
5. Harvest FAA liquid extracts using a mosquito net to strain.
6. Store in plastic bottles. FAA is now ready to use.

C. Application

1. For foliar spray to orchids, ornamentals, vegetables, cereals and fruit trees.
2. Use 2 tablespoons FAA per liter of clean water. Use new sprayer, otherwise clean the sprayer thoroughly before using.
3. Spray the leaves of plants or the soil.
4. Spray every 7 days on newly planted seedlings until fruiting stage. Spray early in the morning at 4:00am–6:00am or in the afternoon at 5:00pm until sunset when organisms are most active.
5. Spray on the following:
 - **On rice:** 7 days after transplanting up to panicle initiation stage
 - **On corn:** 7 days after sowing and every 10 days thereafter until milking stage
 - **On fruit trees:** every 10 days to maintain vigor

D. Benefits

1. A good source of nitrogen
2. Serves as “growth hormone” for plant growth and development
3. Used as foliar spray
4. Food of microorganisms

V. Oriental Herbal Nutrients (OHN) / Herb Medicine Nutrient (HMN)

A. Materials

1. Ginger, garlic and bulb onions
2. Manila paper (unprinted)

II. Fermented Plant Juice (FPJ)

A. Materials

1. Use any of the following plants: *Trichanthera* leaves; *kangkong*; banana trunk; *camote* shoots; carabao grass; hagonoy (*Chromolaena odorata* – used for crops only); *alugbati*; etc.
2. Old or used pail
3. Manila paper (unprinted)
4. Plastic straw (for tying)
5. Muscovado sugar (crude sugar)
6. Clean water (no chlorine)

B. Procedure

1. Gather plants before sunrise (when plant’s energy is at its peak and microorganism is available)
2. Chop and/or shred the plants into small pieces
3. Mix properly the following at a ratio of 1:1:1
 - 3 kilos chopped/shredded plant parts
 - 3 kilos muscovado sugar (crude sugar or *kinugay*)
 - 3 liter clean water
4. Transfer the mixture into a pail. Leave 25% air space.
5. Cover with manila paper and tie securely.
6. Leave the pail in an undisturbed cool place for 7-14 days away from sunlight.
7. Harvest by straining the liquid extracts with a mosquito net or any strainer using a funnel poured into a bottle.
8. Store in plastic bottles.

C. Application

1. Mix 2 tablespoons of FPJ per liter of clean water.
2. Spray on the leaves of plants or on the soil using a clean sprayer.
3. Spray early in the morning at 4:00am–6:00 am or in the afternoon at 5:00pm until sunset when the microorganism are very active.
4. Use on the following:
 - **On rice:** 7 days after transplanting up to booting stage
 - **On corn:** 7 days after plant germination until flowering stage

- **On vegetables:** every 10 days after planting until harvesting
- **On bananas:** 10 days after planting up to blossoming stage
- **On fruit trees:** every 10 days to maintain plant vigor

D. Benefits of FPJ

1. Helps maintain vigor in plants and resistance against pests.
2. Can be used for livestock bedding sprays (pig pens and poultry houses) to produce more colony of microorganism
3. Can also promote resistance against illnesses for human

III. Fermented Fruit Juice (FFJ)

A. Materials

1. Any of the following fruits: mango; papaya; marang; jackfruit; or banana (but not pineapple); etc.
2. Old or used pail
3. Muscovado sugar (crude sugar or *kinugay*)
4. Manila paper (unprinted)
5. Plastic straw for tying
6. Clean water (no chlorine or other chemical compound)

B. Procedure

1. Collect fruits before sunrise (when fruits energy is at its peak)
2. Cut or chop the fruit finely
3. Mix properly the following at the ratio of 1:1:1
 - 3 kilos chopped fruits
 - 3 kilos muscovado sugar
 - 3 liters natural water
4. Put in a pail and leave 25% air space.
5. Leave container undisturbed in a cool place for 7-14 days.
6. Harvest FFJ liquid extract by straining with a mosquito net. The substrate shall be composted
7. Store FFJ in a plastic bottle. FFJ is now ready to use.

C. Application

1. Mix 2 tablespoons of FPJ per liter of clean water.
2. Spray on the leaves of plants or on the soil using a clean sprayer.
3. Spray early in the morning at 4:00am–6:00am and in the afternoon at 5:00pm until sunset when the microorganisms are most active.
4. Spray on the following:
 - **On rice:** from panicle initiation until a week before harvesting
 - **On corn:** as soon as tassels appear until a week before harvesting
 - **On banana:** as soon as blossoming starts until a week before harvesting

D. Benefits

1. A good source of potassium which can speed up plant's absorption and results to sweeter tasting fruits.
2. Helps maintain vigor in plants and resistance against pests.
3. Adds to soil fertility and the advent of good colonies of microorganisms.

IV. Fermented (Fish) Amino Acid (FAA)

A. Materials

1. Chopped fish or fish trash such as gills, entrails, golden snail (shell removed) or meat scrap and rejects
2. Old or used pail
3. Manila paper (unprinted)
4. Muscovado sugar
5. Plastic straw
6. Clean water (no chlorine or other chemical compound)

B. Procedure

1. Mix properly the following ingredients at a ratio of 1:1:1
 - 3 kilos chopped fish, snail or meat scraps and rejects
 - 3 kilos muscovado sugar