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INVESTING IN OUR PLANET

Growing Green

Master the Art of Preparing Organic Farm Inputs





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Overview :

The Green-Ag Project in Similipal Landscape, Odisha aims to promote biodiversity, climate change, and sustainable land management in the agricultural sector. It aims to secure ecosystem services, provide incentives for communities, and ensure the long-term sustainability of agriculture. The project intends to cover 34,200 hectares of farms in the Similipal Landscape, promoting organic farming and agrobiodiversity conservation. While promoting eco-friendly agriculture is one of the important aspects of the project, there is a need to ensure the production and availability of eco-friendly agricultural inputs at the farmer's level. The farmers in the landscape understand and value the importance of the use of natural inputs for better production and improved land fertility. However, they lack the knowledge of producing their own input materials from the natural resources available on their fields. Therefore, enhancing the skilling of these farmers becomes essential for a change towards positive agro-environmental practices.

For this purpose, this brochure is designed to help and provide handholding support to the farmers for enhancing their skills in the production of natural inputs to practice organic farming. The brochure outlines the processes of producing various farm inputs particularly organic manures in the field such as Jeevamruta, Panchagavya, Ghana Jeevamruta and Vermicompost, and pesticides such as Bijamruta, Neemasta, Brahmasta, Agneyasta and Handikhata. These all inputs are eco-friendly and act as an alternative to chemical fertilizers and pesticides. The production processes detailed in the

brochure promote the use of locally available natural raw materials, like cow dung, crop residues and green manure crops.

Objective

The brochure aims to enhance the skills of the farmers on the production of eco-friendly organic manures and pesticides from locally available natural raw material and sensitize the farmers on the adoption of environmentally friendly practices.

What are organic inputs ?

Organic manures are well-decomposed materials usually from animal or plant origin and are free from chemicals, harmful organisms and weed seeds and natural pesticides are eco-friendly, effective in controlling pests, promoting sustainable agriculture, healthier produce, and mitigating pesticide-resistant species, while reducing reliance on synthetic chemicals.

Why organic inputs ?

Organic manure has several benefits over chemical fertilizers. It is prepared with locally available natural ingredients which are safer, and more sustainable. It also helps to improve soil structure, water-holding capacity, and nutrient availability. Organic manures also promote microbial diversity of soil and help to enhance the soil carbon. Natural pesticides are environmentally safe, targeted pest control, sustainable farming, reduced health risks, and minimal residue in crops for agriculture.

Preparing various farm inputs particularly organic manures in the field such as Jeevamruta, Panchagavya, Ghana Jeevamruta and Vermicompost, and pesticides such as Bijamruta, Neemasta, Brahmasta, Agneyasta and Handikhata in the priority villages of the Similipal Landscape in Mayurbhanj District under the Green-Ag project holds significant importance for several reasons.

- **Foster Sustainable Farming Practices** : The project promotes sustainable farming practices, including organic farm inputs, supporting biodiversity conservation, climate change mitigation, and long-term agricultural system sustainability.
- **Enhance Soil Health and Nutrient Management** : Organic farm inputs improves soil health, fertility, and water-holding capacity, enhancing soil fertility and ensuring sustainable agricultural productivity in priority villages of Similipal Landscape.
- **Reduced Chemical Dependency** : Organic farm inputs reduces synthetic fertilizers and pesticide dependency, promoting eco-friendly practices and minimizing harmful chemicals in agricultural systems, aligning with Green-Ag's eco-friendly objectives.
- **Cost-Effective Farming** : Organic farm inputs production in priority villages of Similipal Landscape is cost-effective, using locally available resources like crop residues, animal waste, and plant materials, reducing input costs. It enables them to depend less on cost-intensive chemical inputs.
- **Biodiversity Conservation** : Organic farm inputs conserves biodiversity in Similipal Landscape by promoting beneficial micro-organisms and improving better soil health for regenerating agriculture, aligning with Green-Ag project objectives.
- **Biological Pest Control** : Beneficial insects, nematodes, and microbial agents used to manage pests and diseases, keeping the ecosystem in balance without the use of synthetic pesticides.

Types of organic manures

- **Animal Manure:** It is a decomposed mixture of dung and urine of farm animals along with litter and leftover material from roughages or fodder fed to the cattle and other animals (goat, pig, poultry, etc.). It's also known as farmyard manure.

- **Compost:** Compost is made by decomposing organic matter such as food waste, yard waste and leaves. It is rich in nutrients, organic matter, and beneficial microorganisms, which help to improve soil health and plant growth.
- **Green Manure:** Green manure is made by growing specific crops, such as legumes, and then tilling them into the soil before they reach maturity. Green manure is rich in nitrogen, and it also helps to improve soil structure and water-holding capacity.
- **Crop Residue:** Crop residue is made up of leftover plant material after a crop has been harvested. It is rich in organic matter and nutrients and it can be left on the field to decompose naturally or used as a mulch or compost.
- **Biogas Slurry:** Biogas slurry is a byproduct of the anaerobic digestion of organic waste, such as animal manure or food waste. It is rich in nutrients and organic matter, and it can be used as a fertilizer for crops.
- **Worm Castings/ Vermicompost:** Worm castings/ Vermicompost are the waste produced by earthworms when they consume organic matter such as kitchen and vegetative waste. They are rich in nutrients and beneficial microorganisms, and they can be used as a soil amendment or fertilizer.
- **Jeevamruta:** Jeevamruta is a bio stimulant containing beneficial microbes, improves soil structure, fertility, and plant growth. It is cost-effective, easy to prepare, and supports soil pH, aeration, and beneficial bacteria. One gram of Jeevamruta contains more than 700 million microorganisms, which make the nutrients available for the plants.
- **Panchagavya:** Panchagavya, an organic liquid made from cow dung, urine, milk, curd, and ghee, promotes plant growth and immunity, improving soil fertility, nutrient availability, and biological activity, offering a cost-effective, environmentally friendly alternative to synthetic fertilizers.

- **Ghana Jeevamruta:** Ghana Jeevamruta is an organic manure made from cow dung, urine, and jaggery, and is used to enrich soil and provide essential nutrients for plant growth, promoting the use of organic fertilizers.

Types of Organic Pesticides

- **Bijamruta :** Bijamruta is a seed treating formula which protects the seeds from harmful fungus, bacteria and pathogens. It protects the crops from soil borne diseases. Bijamruta has hormones and alkaloids, which enhance the germination, neutralize the anti-germinating chemicals in the embryo, give the protection power to the seedlings. This will help the farmers for treatment of their seeds in a natural ways at the time of sowing.
- **Neemastra :** Neemastra is a natural insecticide / pesticide mixture prepared from the Neem (*Azadirachta indica*) tree leaves to control the nymph-sucking insects and mealybugs. Being plant origin, it is bio-degradable and does not leave harsh residues behind.
- **Brahmastra :** Brahmastra is a natural insecticide used in crop protection, derived from leaves with specific alkaloids. It enhances plant disease resistance, provides nutrients, and controls insects. It's compatible with various agricultural products, promoting sustainable agriculture and mitigating climate change.
- **Agneyastra :** Agneyastra is a natural pesticide used in agriculture to control insect pests, prepared using traditional Indian methods. It provides greenery and nutrition for plants, part of low-cost natural farming practices for plant protection.
- **Handikhata :** Handikhata is an organic formulation made from cow dung, urine, jaggery and leaves use to control various types of pest and diseases.

Overall, the above organic farm inputs play a crucial role in Green-Ag projects by improving soil health, promoting sustainable farming practices, reducing reliance on synthetic inputs, and producing healthy and high-quality crops. They contribute to the sustainability and environmental friendliness of agricultural systems.

How to use organic manure ?

Organic manure can be applied to crops in several ways, including broadcasting, banding, and side-dressing. It is important to apply the right amount of organic manure to avoid over-fertilization, which can lead to crop damage and an imbalance in the nutrient balance ratio of the soil.



Process of Preparation of Organic Manures

(Source - Odisha Millet Mission)

Jeevamruta

Ingredients: (per acre)

- Large drum - which can hold more than 200 liters of water.
- Fresh cow dung - 10 kg
- Cow urine - 5 to 10 litres
- Jaggery - 2 kg
- Flour of pulses - 2 kg
- Termite mound or soil from the root zone of banyan tree - 1 kg



Preparation: (per acre)

Take 200 liters of water in a drum and add all the ingredients to it. Then close the face of the drum and place it in shade. Mix the mixture daily in the morning and evening with a stick. Do this for 7 days, which will increase the number of micro-organisms in the dung. Cow urine will increase the fertility and total mixture will get converted into Jeevamruta.

Method of application

- The mixture filtered after 9 to 12 day can be applied to soil, which will activate the micro-organisms that in turn will provide nutrient to the crop plant.
- During irrigation mix the 1 litre of Jeevamruta with 10 litres of water and apply in the form of a foliar spray with the sprayer.
- Spray when the soil is moist at the base of fruit or flower plant.

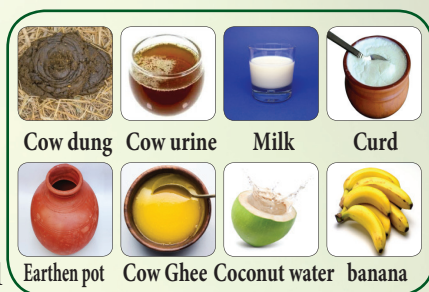
Caution

- Crush the jaggery and soak with water before adding it to the mixture.
- Add pulse flour with water in another bowl and mix well then should be added to the solution mixture.
- If these two materials are mixed directly in the solution, then there will be no proper mixing.

Panchagavya

Ingredients:

- Cow dung slurry - 500 ml
- Cow urine - 300 ml
- Milk - 200 ml
- Curd - 700 ml
- Earthen pot - 01
- Dasi Cow Ghee - 100 ml
- Tender Coconut water - 300 ml
- Ripened banana - 02 number



Preparation:

- Cow dung slurry to be kept in a wide-mouth earthen pot. Then mix cow urine, curd and milk and stir for 10 minutes.
- Mix paste of ripened banana properly and add water of two tender coconuts.
- The mouth of the container to be cover properly and be kept for 10 days.
- The mixture should be stirred in every morning.

Application:

- Add 1 litre of the filtered mixture in 20 litres of water and apply as foliar spray.
- It controls the diseases of leaf and grain and also helps in better flowering and fruiting.

Ghana Jeevamruta

Ingredients

- Cow dung (7days old) - 100kg
- Molasses or Gur - 2kg
- Gram powder - 2kg
- Soil from field or below the tree - one handful
- Cow urine - as per required

Preparation

- Mixed cow dung, molasses, gram powder and soil together.
- Add slowly cow urine till it become harder.
- Spread it under a dry place.

Application

- Make powder of the dried Ghana Jeevamruta and mixed 10kg into 100kg FYM and apply on the last plough.
- You can apply 4ql/acre only Ghana Jeevamruta as basal dose.



Cow dung



Molasses
or Gur



Cow urine



Gram Powder



Soil from Field

Vermicompost

Methods of vermicomposting

Vermicomposting is done by various methods, among them bed, pit and tank methods are more common.

Bed method: Composting is done on the pucca / kuchha floor by making the bed (6x2x2 feet size) of the organic mixture. This method is easy to maintain and practice.

Pit method: Composting is done in the cemented pits of size 5x5x3 feet. The unit is covered with thatch grass or any other locally available materials. This method is not preferred due to poor aeration, water logging at the bottom, and more cost of production.

Materials for preparation of vermicompost: Any types of biodegradable wastes-Crop residue, Weed biomass, Vegetable waste, Leaf litter, Waste from agro-industries, Biodegradable portion of urban and rural wastes and Earth worm.

Procedure

1. To prepare compost, either a plastic or a concrete tank can be used. The size of the tank depends upon the availability of raw materials.
2. Collect the biomass and place it under the sun for about 8-12 days. Now chop it to small pieces using the cutter for easy decomposition.
3. Prepare cow dung slurry and sprinkle it on the heap for quick decomposition.
4. Add a layer (2 - 3 inch) of soil or sand at the bottom of the tank.
5. Now prepare fine bedding by adding partially decomposed cow dung, dried leaves and other biodegradable wastes collected from fields and kitchen. Distribute them evenly on the sand layer.
6. Continue adding both the chopped bio-waste and partially decomposed cow dung layer-wise into the tank up to a depth of 0.5-1.0 ft.

7. After adding all the bio-wastes, release the earthworm species @ 500 worms per m³ of bed space over the mixture and cover the compost mixture with dry straw or gunny bags.
8. Sprinkle water on a regular basis to maintain the moisture content of the compost.
9. Cover the tank with a thatch roof to prevent the entry of ants, lizards, mice, snakes, etc. and protect the compost from rainwater and direct sunshine.
10. Have a frequent check to avoid the compost from overheating.

Application:

Apply vermicompost as basal dose 0.5 tonnes /acre during last ploughing of the field. During tillering stage apply 0.1 tonnes vermi compost as tillering dose when moisture in the soil.



Process of Preparation of Organic Pesticides

(Source - Odisha Millet Mission)

BIJAMRUTA

Ingredients

- Fresh cow dung - 5 Kg
(Preferably within 7 days
dropped cow dung)
- Cow urine- preferably from
Desi cow Approx. - 5 litres
- Water - 20 litres
- One hand full of soil from the
surface or from the termite hill
- Lime - 50gm



Cow Durg



Termite Hill



Water



Cow Urine



Lime

Preparation

- Take 20 litres of water. Then take 5 kgs of country-cow dung in a cloth and bind it with a small rope to make a bundle. Hang this bundle of cow dung in 20 litres of water for a night (12 hours).
- Then take 1 litre water and add 50 gms of lime in it, letting it stabilize for a night.
- Then next morning, squeeze this bundle of cow dung in that water continuously, so that all the essence of cow dung will accumulate in that water.
- Then add a handful of soil in that water solution and blend it well.
- Then add 5 litre deshi (country) cow urine in that solution & add the lime water and stir it well.
- Now Bijamruta is ready to treat the seeds.

Application

- Spray the prepared quantity of mixture to 100 kg of seeds and keep it for drying in a shaded place.

NEEMA STRA

Ingredients

- Plastic drum - 150 litre capacity
- Cow urine - 5 litres
- Cow dung - 5kg
- Neem leaves - 5kg
- Stick - 01
- Filter cloth - 1 piece



Preparation

Take a 150 litre capacity plastic drum and add 100 litre water to it. Add 5-litre cow urine and 5kg of cow dung and stir with the stick for 10-15 minutes. Then add 5kg green neem leaves paste in it and again stir continuously for 10-15 minutes. Cover the drum tightly and keep it for 24 hours in a shaded place.

Application

- Filter the solution with a thin filter cloth
- Apply the solution with a sprayer in 10 day intervals
- This Neemastra will control all types of sap feeder pests and mealy bug pests in the crops
- It can be used in vegetable crops, fruits & plantation crops and floriculture

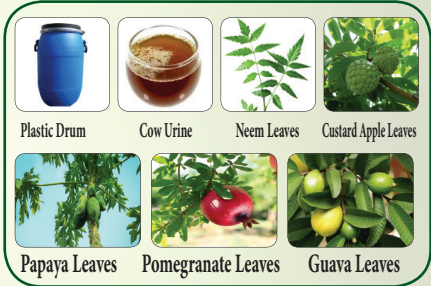
You can keep the solution for 6 months and use.



BRAHMASTRA

Ingredients

- Plastic drum - 50 litre capacity
- Cow urine - 10 litres
- Neem leaves - 3 kg
- Custard apple leaves - 2kg
- Papaya leaves - 2kg
- Pomegranate leaves - 2kg
- Guava leaves - 2kg



Preparation

Take a plastic drum. Add 10 litres of cow urine to it. Crush 3kg neem leaves, make a paste and add. Then crush and make a paste from 2kg each of Custard apple leaves, Pomegranate leaves, Papaya leaves and Guava leaves and add. Then stir the solution for 10-15 minutes with a stick. The solution should be boiled 30 minutes for five times at 1-hour intervals. Cool the solution and filter with the help of filter cloth to another pot. Cover the drum of the filtered solution for 24 hours.

Application

- Mix 1-litre Brahmastra with 50-litre water and apply during the evening at 15 days interval.
- This Brahmastra will control the boring pest, sap feeder, and hairy caterpillar.
- It can be used in vegetable crops, fruits & plantation crops and floriculture.
- You can keep the solution for 6 months and use.

AGNEYASTRA

Ingredients

- Plastic drum - 50litres capacity
- Cow urine - 10 litres
- Tobacco leaves - 1kg
- Neem leaves - 5kg.
- Green chilli - 500gram
- Garlic - 500gram
- Stick - 01
- Filter cloth - one piece



Preparation

Take a plastic drum. Add 10 litre of cow urine to it. Crush and make a paste of 1kg of tobacco leaves and add to it. Then crush 500gm green chilli and 500gm garlic and add into the solution. Stir for 10 minutes. Then add 5 kg of neem paste in it and again stir for 10 to 15 minutes. The solution should be boiled for 30 minutes for five times at 1-hour intervals. Cool the solution and filter with the help of a filter cloth to another pot. Cover the drum of the filtered solution for 24 hours.

Application

- Mix 1 litre of Agneyastra with 50 litre of water and apply during the evening at 15 days interval.
- It will control stem borer, fruit borer, pod borer, leaf folder, gall midge, green grasshopper, etc.
- It can be used in vegetable crops, fruits & plantation crops and floriculture.
- You can keep the solution for 6 months and use.

Note :

- Use 2 days old Cow dung and one-week old Cow urine for any bio-pesticide preparation.
- Always use the sprayer with a wider nozzle during spraying.
- Always apply the bio-pesticide during the evening.
- Never use very tender leaves or older leaves in the preparation.

Handikhata (Liquid Pot Manure)

Ingredients

- Earthen pot - 5 to 7 litres capacity
- Cow dung - 1 Kg
- Cow urine - 5 litres
- Jaggery - 50 gm
- Leaves of ARAKHA (*Calotropis procera*), NEEM (*Azadirachta indica*), KARANJ (*Pongamia pinnata*) : 1kg each

Preparation

Cut small pieces of all the leaves and thoroughly mix them with all the ingredients in an earthen pot for at least one hour. The pot is covered by a polythene cover and is kept airtight for 10 days. At every two days interval, the mixture is stirred with a stick.

Applications

- After 10 days the mixture is filtered by a thin cloth and applied to the crop by diluting upto 40 times with water.
- Unfiltered Handikhata may also be applied directly to the water channel.



Earthen pot



Cow Dung



Cow Urine



Arakha

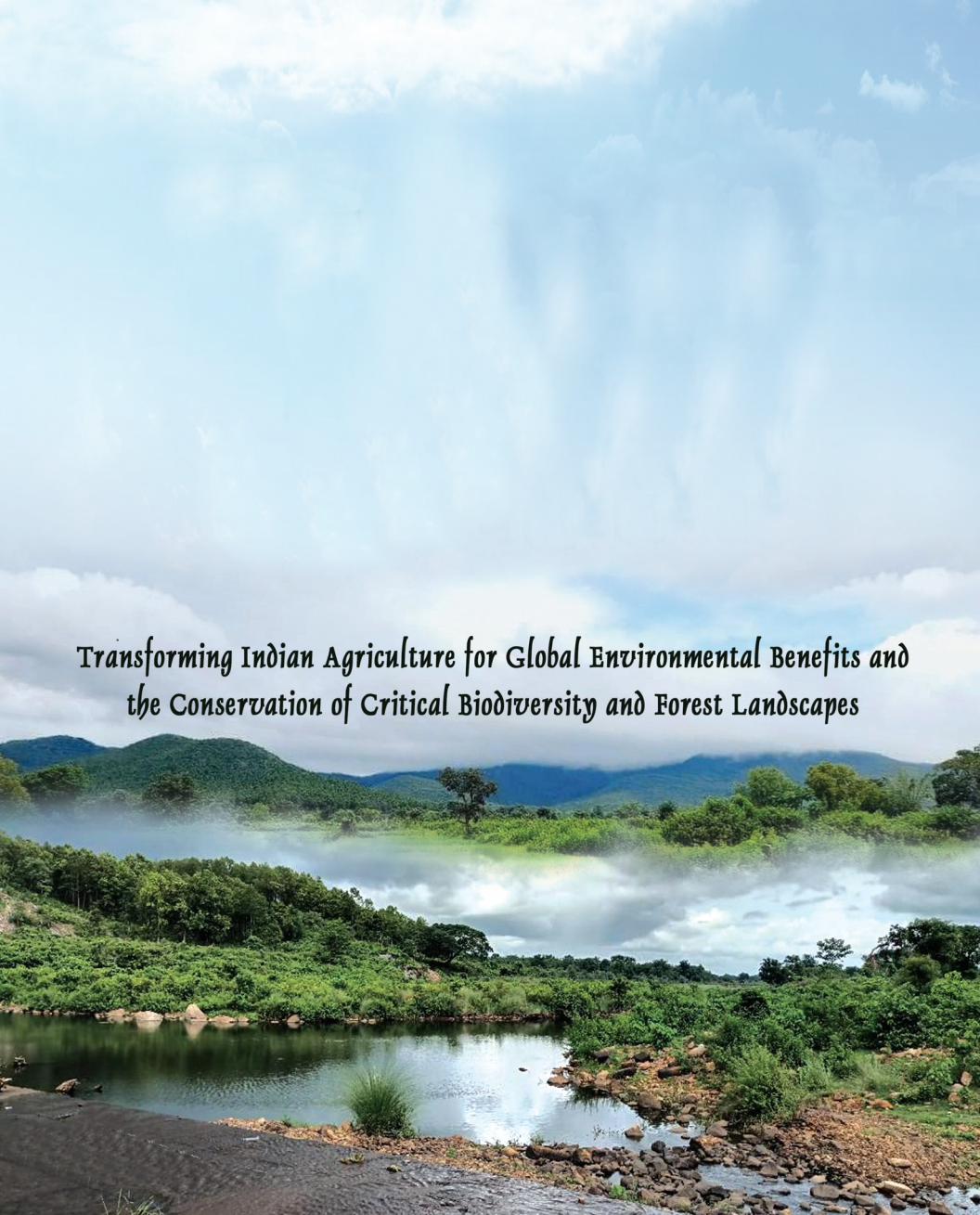


Neem



Karanj





*Transforming Indian Agriculture for Global Environmental Benefits and
the Conservation of Critical Biodiversity and Forest Landscapes*

For Information

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