Organic farming

organic farming

Organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection.

Organic farming

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Need

Increase in population make compulsion to stabilize agricultural production, but to, increase it further, in sustainable manner.

Natural balance needs to be maintained at all cost for existence of life and property.

Agrochemicals which are produced from fossil fuel and are not renewable and are diminishing in availability.

It may also cost heavily on our foreign exchange in future.

Green manure

- Green undecomposed material used as manure is called green manure.
- It is obtained in two ways: by growing green manure crops or by collecting green leaf (along with twigs) from plants grown in wastelands, field bunds and forest.
- Green manuring is growing in the field plants usually belonging to leguminous family and incorporating into the soil after sufficient growth.
- The plants that are grown for green manure known as green manure crops. The most important green manure crops are sunnhemp, dhaincha, *pillipesara,*clusterbeans and *Sesbania rostrata*.

Green Manure Crops

Crotalaria juncea

Sesbania rostrata

Cow pea

Cluster bean

Sesbania aculeata

Biomass production and N accumulation of green manure crops

Crop	Age (Days)	Dry matter (t/ha)	N accumulated
Sesbania aculeata	60	23.2	133
Sunnhemp	60	30.6	134
Cow pea	60	23.2	74
Pillipesara	60	25.0	102
Cluster bean	50	3.2	91
Sesbania rostrata	50	5.0	96

Nutrient content of green manure crops

Plant	Scientific name	Nutrient content (%) on air dry basis		
		N	P2O5	K
Sunhemp	*Crotalaria juncea*	2.30	0.50	1.80
Dhaincha	*Sesbania aculeata*	3.50	0.60	1.20
Sesbania	*Sesbania speciosa*	2.71	0.53	2.21

- *Sesbania rostrata* is a stem nodulating green manure crop which is a native of West Africa. As it is a short-day plant and sensitive to photoperiod, the length of vegetative period is short when sown in August or September.
- A mutant (TSR-l) developed by Bhabha Atomic Research Centre, Bombay is insensitive to photoperiod, tolerant to salinity and waterlogged condition. Growth and nitrogen fixation is higher with TSR-l compared to the existing strains

Advantages

- Improves soil structure
- Increases water holding capacity and
- Decreases soil loss by erosion

- Application of green leaves and twigs of trees, shrubs and herbs collected from elsewhere is known as green leaf manuring. Forest tree leaves are the main sources for green leaf manure. Plants growing in wastelands, field bunds etc., are another source of green leaf manure. The important plant species useful for green leaf manure are neem, mahua, wild indigo, Glyricidia, Karanji *(Pongamia glabra)* calotropis, avise*(Sesbania grandiflora)*, subabul and other shrubs

Green Leaf Manure Crops


Cassia fistula


Leucaena leucocephala


Sesbania grandiflora


Calotropis gigantea


Gliricida sepium


Pongamia globra


Delonix regia


Peltophorum ferrrugenum


Azadiracta indica

Nutrient content of green leaf manure

Plant	Scientific name	Nutrient content (%) on air dry basis		
		N	P2O5	K
Gliricidia	*Gliricidia sepium*	2.76	0.28	4.60
Pongania	*Pongamia glabra*	3.31	0.44	2.39
Neem	*Azadirachta indica*	2.83	0.28	0.35
Gulmohur	*Delonix regia*	2.76	0.46	0.50
Peltophorum	*Peltophorum ferrugenum*	2.63	0.37	0.50
Weeds				
Parthenium	*Parthenium hysterophorus*	2.68	0.68	1.45
Water hyacinth	*Eichhornia crassipes*	3.01	0.90	0.15
Trianthema	*Trianthema portulacastrum*	2.64	0.43	1.30
Ipomoea	*Ipomoea*	2.01	0.33	0.40
Calotrophis	*Calotropis gigantea*	2.06	0.54	0.31
Cassia	*Cassia fistula*	1.60	0.24	1.20

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Key characteristics

Protecting the long term fertility of soils by maintaining organic matter levels, encouraging soil biological activity and careful mechanical intervention.

Providing crop nutrients indirectly using relatively insoluble nutrient sources which are made available to the plant by the action of soil micro-organisms.

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Key characteristics

Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials including crop residues and livestock manures

Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties and limited (preferably minimal) thermal, biological and chemical intervention.

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Key characteristics

The extensive management of livestock, paying full regard to their evolutionary adaptations, behavioral needs and animal welfare issues with respect to nutrition, housing, health, breeding and rearing.

Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.

ORGANIC FARMING PRINCIPLE

Health

Care

Principles of Organic Farming

Ecology

Fairness

organic farming

Four principles

1. Principle of health

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

Healthy soils produce healthy crops that foster the health of animals and people.

Health is the wholeness and integrity of living systems.

The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings.

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2. Principle of ecology

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

This principle roots organic agriculture within living ecological systems.

It states that production is to be based on ecological processes, and recycling

Nourishment and well-being are achieved through the ecology of the specific production environment.

Organic management must be adapted to local conditions, ecology, culture and scale.

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Principle of ecology

Inputs should be reduced by reuse, recycling and efficient management of materials and energy in order to maintain and improve environmental quality and conserve resources

Organic agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity.

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3. Principle of fairness

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

This principle emphasizes that those involved in organic agriculture should conduct human relationships in a manner that ensures fairness at all levels and to all parties - farmers, workers, processors, distributors, traders and consumers

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Principle of fairness

It aims to produce a sufficient supply of good quality food and other products.

Natural and environmental resources that are used for production and consumption should be managed in a way that is socially and ecologically just and should be held in trust for future generations

Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.

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4. 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.

Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions.

This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture.

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Basic Steps of Organic Farming

Organic farming approach involves following five principles:

1. Conversion of land from conventional management to organic management
2. Management of the entire surrounding system to ensure biodiversity and sustainability of the system
3. Crop production with the use of alternative sources of nutrients such as crop rotation, residue management, organic manures and biological inputs.
4. Management of weeds and pests by better management practices, physical and cultural means and by biological control system
5. Maintenance of live stock in tandem with organic concept and make them an integral part of the entire system

1. Composting
2. Vermicomposting
3. Applicability
4. Advantages and disadvantages

Why composting?

- about 70 % of municipal waste is normally organic
- organic waste can cause problems of smell, leachate, gas, and stray animals in landfills
- recycling at source is most economic and environment friendly method of waste management
- simple methods available
- compost is valuable resource for farmers
- composting at source keeps inorganic waste clean and makes it easier for recycling

1. Composting

Concept

- process of decomposition of organic waste by micro-organism
- natural process (be made faster and more effective by mixing various types of waste and adjusting moisture, temperature and aeration)
- contains NPK and other plant nutrients including micro-organisms

steps of composting:

- prepaeration (converting waste into raw material)
- production of compost
- marketing

Preparation

1. Composting

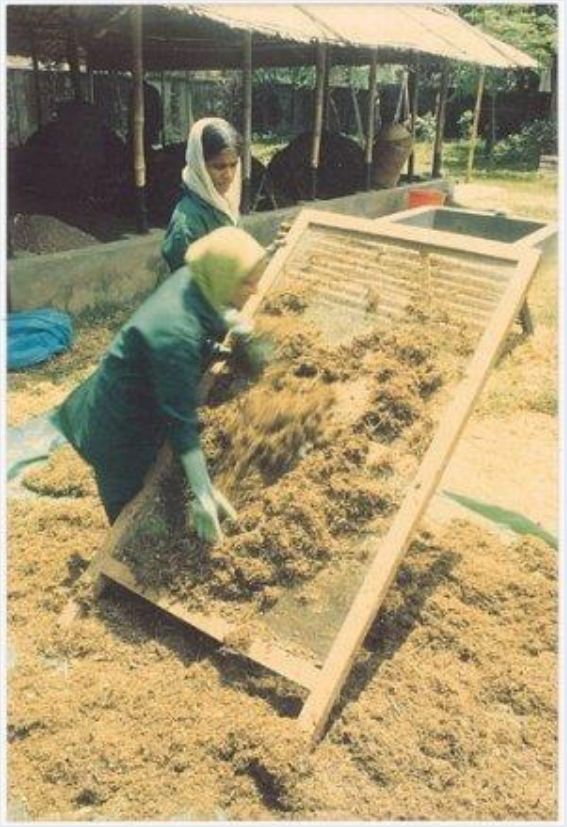
- waste collection
- sorting into organic and inorganic
- reduce size if necessary
- adjust moisture content
- starters/additives
- adjust C:N ratio

Compost preparation

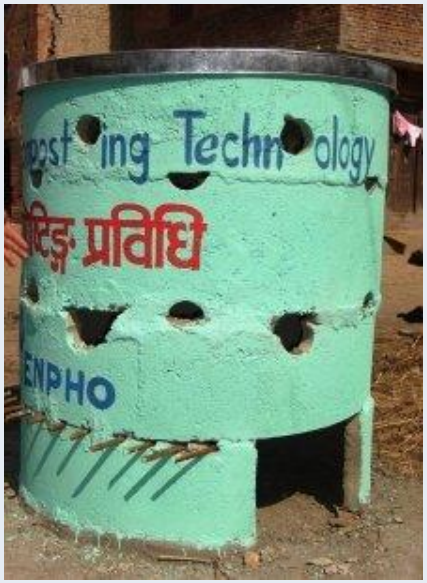
- place prepared waste in piles, windrows, chamber or bins
- turn the compost regularly or arrange other ways to aerate the waste
- regularly monitor temperature & moisture

Finishing & Marketing

- screening & packaging
- marketing strategy
  - product
    - quality
    - packaging
  - price
    - main distributor
    - Consumer
  - place
    - distribution network
  - promotion
    - mass communication
    - interpersonal communication

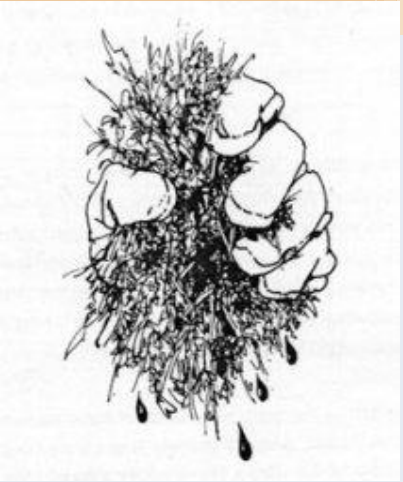


Home composting options

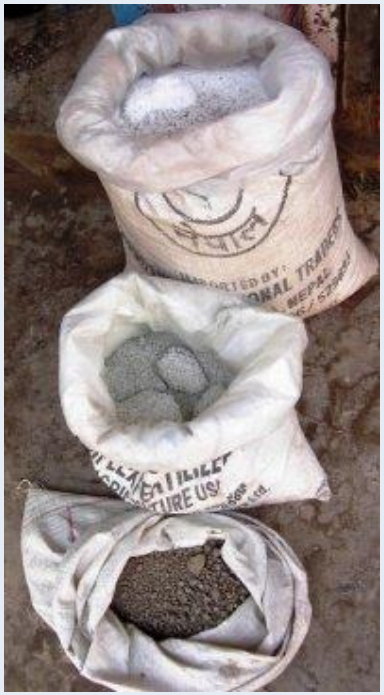


Composting at community & municipal level

Important points to remember



- separate waste at source. Glass in the waste can result in injuries
- ensure proper C/N-ratio & chop waste in small pieces
- ensure proper amount of water and air to avoid smell
- prepare and implement proper marketing strategy (most compost projects fail because of poor marketing)
- regularly monitor composting process



Vermicomposting

- ***Definition***

- Vermicomposting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better product.

- Vermicomposting is a method of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost.

Concept

Vermicomposting

The Worms do the Work for you!

WHY?

Turners

Like Tiny Plows, worms work throughout the material

Aerators

Worms add Oxygen for all the beneficial micro-organisms.

Mixers

Worms move all kinds of organisms and nutrients throughout the compost pile adding many small aggregates.

Screeners

Worms eat the bedding materials and the feed and turn it into a rich soil product.

Pathogen Controllers

Worms inges and render useless, the "bad guys".

Accelerators

Worms can eat 1/2 to all their weight per day.
A 5'x8' large scale Flow-through system
can process 100 lbs of food scraps per day
and will produce 78-80 lbs of castings per day.

How to do at home

- prepare vessel or bin
- add 2 inches (5 cm) of bedding materials
- add worms
- cut waste into small pieces and put in the bin
- keep bin covered with a moist cloth
- put bin away from direct sunlight
- regularly check moisture
- harvest vermicompost every 3 to 4 months
- store harvested compost for 2-3 weeks and then remove the young worms

Types of vermicomposting

Amount of production and composting structures.

- Small-scale vermicomposting:

personal requirement (5-10 tonnes of vermicompost annually).

- large-scale vermicomposting:

commercial scale (50 – 100 tonnes annually)

Methods of vermicomposting

- *Bed method :*

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

Bed Vermicomposting

Pit Method

Phase 1	:	**Processing involving collection of wastes, shredding, mechanical separation of the metal, glass and ceramics and storage of organic wastes.**
Phase 2	:	Pre digestion of organic waste for twenty days by heaping the material along with cattle dung slurry. This process partially digests the material and fit for earthworm consumption. Cattle dung and biogas slurry may be used after drying. Wet dung should not be used for vermicompost production.
Phase 3	:	Preparation of earthworm bed. A concrete base is required to put the waste for vermicompost preparation. Loose soil will allow the worms to go into soil and also while watering, all the dissolvable nutrients go into the soil along with water.
Phase 4	:	Collection of earthworm after vermicompost collection. Sieving the composted material to separate fully composted material. The partially composted material will be again put into vermicompost bed.
Phase 5	:	Storing the vermicompost in proper place to maintain moisture and allow the beneficial microorganisms to grow.

Steps followed for vermicompost preparation

- Vermicomposting unit should be in a cool, moist and shady site .
- Cowdung and chopped dried leafy materials are mixed in the proportion of 3: 1
- kept for partial decomposition for 15 – 20 days.
- A layer of 15-20cm of chopped dried leaves/grasses should be kept as bedding material at the bottom of the bed.
- Beds of partially decomposed material of size 6x2x2 feet should be made
- Each bed should contain 1.5-2.0q of raw material and the number of beds can be increased as per raw material availability and requirement.

- Red earthworm (1500-2000) should be released on the upper layer of bed.
- Water should be sprinkled with can immediately after the release of worms.
- Beds shouldbe kept moist by sprinkling of water (daily) and b y covering with gunny bags/polythene
- Bed should be turned once after 30 days for maintaining aeration and for proper decomposition.
- Compost gets ready in 45-50 days.
- The finished product is ¾ of the raw materials

Red earthworm is preferred because of its high multiplication rate and thereby converts the organic matter into vermicompost within 45-50 days.

Since it is a surface feeder it converts organic materials into vermicompost from top.

Harvesting

- When raw material is completely decomposed it appears black and granular.
- Watering should be stopped as compost gets ready.
- The compost should be kept over a heap of partially decomposed cow dung so that earthworms could migrate to cow dung from compost.
- After two days compost can be separated and sieved for

Preventive measures

- The floor of the unit should be compact to prevent earthworms' migration into the soil.
- 15-20 days old cow dung should be used to avoid excess heat.
- The organic wastes should be free from plastics, chemicals, pesticides and metals etc.
- Aeration should be maintained for proper growth and multiplication of earthworms.
- Optimum moisture level (30-40 %) should be maintained 18-25°C temperature should be maintained for proper

Advantages of vermicompost

- Vermicompost is rich in all essential plant nutrients.
- Provides excellent effect on overall plant growth, encourages the growth of new shoots / leaves and improves the quality and shelf life of the produce.
- Vermicompost is free flowing, easy to apply, handle and store and does not have bad odour.
- It improves soil structure, texture, aeration, and water holding capacity and prevents soil erosion.
- Vermicompost is rich in beneficial micro flora such as a fixers, P- solubilizers, cellulose decomposing micro-flora etc in addition to improve soil environment.
- Vermicompost contains earthworm cocoons and increases the population and activity of earthworm in the soil.
- It neutralizes the soil protection.
- It prevents nutrient losses and increases the use efficiency of chemical fertilizers.
- Vermicompost is free from pathogens, toxic elements, weed seeds etc.
- Vermicompost minimizes the incidence of pest and diseases.
- It enhances the decomposition of organic matter in soil.
- It contains valuable vitamins, enzymes and hormones like auxins, gibberellins

Composting

Advantages:

- recycling at source
- economic and environment friendly waste management
- simple methods available
- compost is valuable resource for gardeners/farmers

Disadvantages:

- waste segregation required

Vermicomposting

Advantages:

- see above
- selling of worms

Disadvantages:

- maintain proper environmental conditions for worms