

3

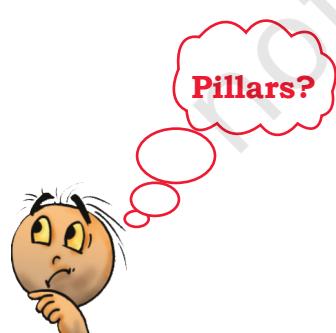
Pillars of Organic Farming



May be we can make the soil chemical free even after a long time of conventional practices.



Fig. 3.1 Children at the office of Utkrisht Krishi Cooperative Society



The field visit and conversation with farmer Himmat Singh and farmer Gopichand provided many insights to Paheli and Boojho about different types of farming practices. After comparing the conventional and organic farming practices, Paheli and Boojho wanted to spread the awareness about the advantages of organic farming to the community for a sustainable living. They wanted to know more about organic farming so that they could follow those practices in the school where they were allotted small piece of land

and big earthen pots for growing vegetables and flowers. They were happy that the produce will be organic. They wanted to know more about how a farmer adhering to conventional practices can switch over to organic farming practices. They went to the office of *Utkrisht Krishi Cooperative Society* of their area — a society formed by all the organic growers of that area. The aim of the society was to strictly follow the organic farming practices so that only organic produce would reach the consumers. Thus, all children went to meet the Chief of

the Cooperative Society, Maina Devi to know more about the organic farming practices.

Maina Devi discussed the factors which help in the sustainability of organic farming. She called these components ‘the pillars of organic farming’.

Organic farming prospers on the following core pillars, absence of even one may cause this farming method to crumble.

1. Organic standards
2. Technology packages
3. Certification and Regulatory mechanism
4. Market network

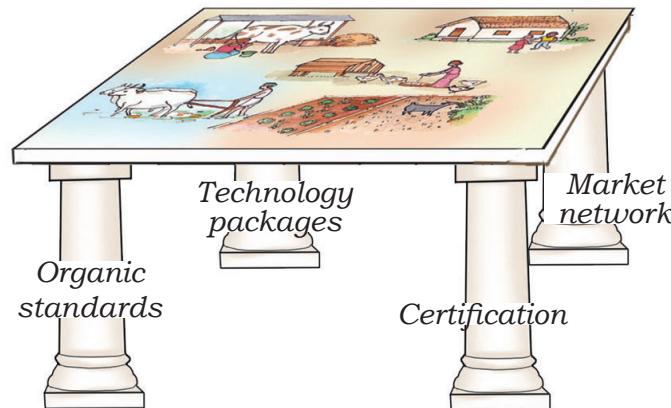
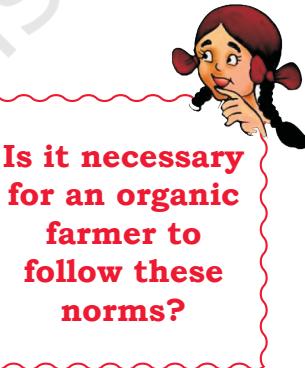


Fig. 3.2 Pillars of organic farming

3.1 ORGANIC STANDARDS AND NORMS

Organic produce needs to be safe and have high nutritional quality. All farming operations on an organic farm must interact with each other in an effective manner. All natural systems and cycles, involving micro-organisms, soil flora and fauna, plants and animals would have interdependence.

The **organic standards** and norms ensure authenticity of organic products and practices. Regulations for packaging and labelling need to be followed for certification. It is a quality control mechanism for operation of the organic farming and its products.



**Is it necessary
for an organic
farmer to
follow these
norms?**

Conversion Requirements

The time between the start of organic management and certification of crops and/or animal husbandry is known as the conversion period. It is also known as transition period. The whole farm, including livestock, should be converted according to the National Standards for Organic Farming Practices provided by NPOP over a period of three years, in general.

For fulfillment of the principles of organic farming there are legal aspects that ensure safety of food, health and environment. Some important national standards for organic production practices provided by National Programme on Organic Production (NPOP), Government of India and the certification procedure are discussed here.

- A clear separation between organic and conventional production — a buffer zone or a natural barrier — should be maintained.
- A sufficient conversion or transition period (more than three years) be provided to convert conventional production to organic production.
- All the standard requirements for organic production must be applied on the relevant aspects from the beginning of the conversion period.
- Switching back and forth between organic and conventional farming is not allowed.
- All seeds and plant material used in the farming practices must be certified as organic.
- The use of the Genetically Modified (GM) crop varieties or animal breeds for food production in the farm is not allowed.
- Organic farming must maintain and improve the soil structure, organic matter, fertility and biodiversity.
- Only biodegradable organic products of plants, animals and microbial origin, may be used.
- Use of manure or fertilisers with relatively high heavy metal content and other unwanted substances, e.g., basic slag, rock phosphate and sewage sludge, human excreta, etc., may be restricted.
- Interrelated natural processes and mechanism for controlling pests, diseases and weeds should be followed extensively.
- Sustainable use of soil and water resources must be ensured.



How much time does it take to convert a conventional farm into an organic farm?

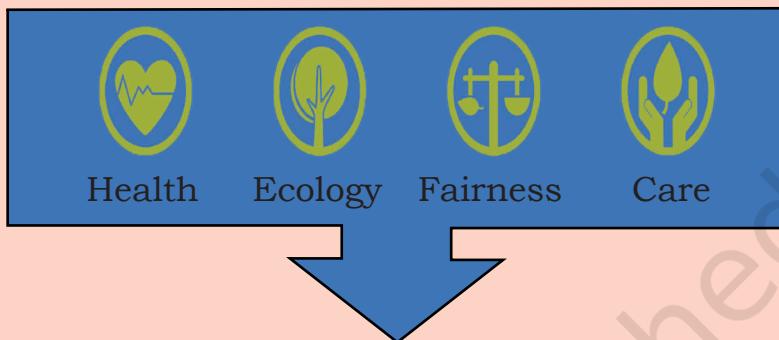
- Farming operations may be encouraged not to use any synthetic feed rations in animal husbandry. Livestock should be fed 100 per cent organically grown feed of good quality.
- Crop diversity and indigenous animal breeding within the farming could be followed.
- Organic farming practices need to contribute beneficially to the ecosystem and create a harmonious balance between crop production and animal husbandry.
- Cultivation of terrestrial crops may be integrated with the soil-based system only.
- Only biological and physical processes that use only additives, processing aids, etc., in organic products' processing, should be used.
- It requires strictly avoiding contamination of chemicals in each step of production and processing of organic material.
- It must use only organic ingredients in organic processing.
- It is important to ensure that while packaging and storage and transportation, containers do not contaminate the organic product they contain.
- Use of socially just and ecologically responsible farming operations towards an entire production, processing and distribution chain, must be ensured.

3.2 TECHNOLOGY PACKAGES

The ‘technology package’ includes a bunch of guidelines and practices that are adopted for growing crops organically at a farm. These are based on national organic standards and norms. The technology packages for growing organic crops are still evolving in different parts of the country. Here, we will discuss some of the key practices adopted to grow crops at an organic farm.

Principles of Organic Farming by IFOAM

To promote organic farming in the world, the International Federation of Organic Agriculture Movements (IFOAM) was set up in 1972 in France. Presently, the headquarters of IFOAM is in Germany. Its aim is to bring all the countries to work together for an organic world. It has laid down four principles of organic farming.



Principle of Health

This principle points out that the health of individuals and communities cannot be separated from the health of ecosystems—healthy soils produce healthy crops that foster the health of animals and people.

Principle of Ecology

Organic agriculture should be based on ecological systems and cycles, and help sustain them. It states that production is to be based on ecological processes, and recycling.

Principle of Fairness

This principle emphasises that those involved in organic agriculture should ensure fairness at all levels and to all parties—farmers, workers, processors, distributors, traders and consumers. Organic agriculture should provide everyone involved in it a good quality of life, food for all and reduction of poverty.

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.

Source: Luttkholt, L.W.M. 2007. Principles of Organic Agriculture as Formulated by the International Federation of Organic Agriculture Movements. *NJAS*, Vol. 54, No. 4, pp. 347–60. Available at:

[http://www.ifoam.bio/en/principles-organic-agriculture/principle health](http://www.ifoam.bio/en/principles-organic-agriculture/principle-health)

Seeds and Plant Material

Organic seeds, plants or plant parts/materials such as tubers, rhizomes, germinated plants, etc., of *desi* (indigenous) varieties should be used for growing crop plants. When certified organic seeds and plant materials are not available, chemically untreated conventional materials may also be used. The use of genetically engineered seeds, transgenic plants or plant materials is not allowed. Under organic farming, we do not use any genetically modified crop variety.

Rearing of Indigenous Animal Breeds

We are all aware that India has huge variety of indigenous animal breeds. These animal breeds are well adapted to Indian agricultural conditions just like indigenous crop varieties. Their dung and other waste materials can be used as manure for crops and for enriching the soil.



Fig. 3.4 Cow dung

Activity 3.1

Visit a cow shed in your area. Talk to the cattle farmer and find out the names of *desi* breeds of cow and buffalo.

Mixed Farming

When more than one farming practices are allowed together in one piece of land, it is called mixed farming. Organic farming encourages growing of crops and rearing of animals on the same piece of farmland. This helps in efficient resource management too. As we know, the animal waste can be recycled for growing crops and waste plant-parts such as husk, is fed to animals. Thus, a holistic system is established at the farm.

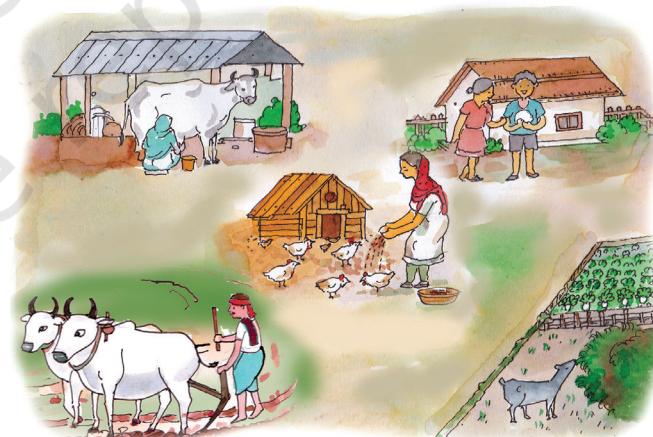


Fig. 3.5 Mixed farming

Traditional mixed farming of the rice–fish–millet by a Tribe of Arunachal Pradesh

A tribal community named ‘Apatanis’ living in Ziro valley in the Lower Subansiri district of Arunachal Pradesh can surely be considered as a role model for Organic Farming, not only in India but all over the world. The Apatanis are dependent on agriculture for their livelihood. The popular traditional organic mixed farming practices of paddy-cum-fish culture are their indigenous agronomic practices. Apatanis develop strong bunds around their paddy fields and grow millets on the bunds. This way the system utilises the available limited agricultural paddy field judiciously to produce rice–fish–millet simultaneously and this is considered as one of the best utilisation of land in the world of agricultural practices. The paddy fields are enriched with the traditional manure such as animal excreta like *Paro pai* (poultry dropping), *Alyi ekha* (pig excreta), *Sii ekha* (cow dung) and plant wastes like *Piina* (rice husk), *Poi* (local beer) and *Muyu* (ashes from household burnt). Moreover, after harvesting of paddy, the crop residue is also recycled by burning of the stump, straws and natural decomposition of weeds as well as remaining stump and straws. Thus, the paddy fields are free from agro-chemicals such as weedicides and pesticides. The Apatanis farmers through the indigenous practices of rice–fish–millet culture not only conserve biological diversity but also manage sustainable utilisation of the available resources in agriculture and get triple benefits.

Source: Rai, S.C. 2005. Apatani Paddy-cum-fish cultivation: An indigenous hill farming system of North East India. *Indian Journal of Traditional Knowledge*. Vol. 4(1), pp. 65-71.



Fig. 3.5 Intercropping

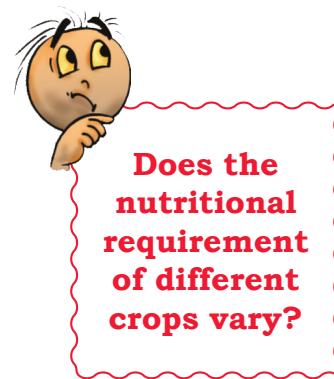
Intercropping

Intercropping is the practice of growing two or more crops in close proximity in the same field. The crops may be sown and harvested at the same time or they may be sown and harvested at different times. Intercrops can be a combination of two or more species, including both annuals and perennials or a mixture. It improves crop production and environmental quality under organic production. Intercropping increases

biodiversity, which facilitates better biological control of pests and reduced soil erosion, resulting in reduced pest and disease incidence. Thus, intercropping is a very important practice for successful crop production under organic farming.

Activity 3.2

Visit an organic farm and observe how many crops are grown on a piece of land and how they are useful to each other. Record your observations in a notebook.



Crop Rotation

Different crops are grown season after season in the same field. This practice to alter the crops grown in the same field year after year is called crop rotation. Crop rotation helps to improve soil by changing flora, fauna, crop residue and rooting patterns. A range of crops encourage more diverse and healthy soil microbial community. Similarly, the microbial community is supported by rotating crops with a high carbon to nitrogen ratio (such as corn) with low carbon to nitrogen ratio crops (such as soybeans), thus crop rotation maintains nutrients in the soil. Introduction of both grain and fodder legumes in crop rotation and application of all available organic sources of manure, including animal waste and compost, increase the yield.

Activity 3.3

- Make a survey of various fields. Note the crops grown in those fields after every three months.
- Find out which crop is grown and alternated after which crop by farmers. This data will provide a pattern of crop rotation popular among farmers of a particular region.
- Make a report of crop rotation process and share with the peers.

Use of Organic Manure

The farm soil may be considered as a live platform where we grow plants. It harbours diversified living organisms including flora and fauna along with sensual microbes. These living organisms make the soil live which in turn provides nourishment to the crops. Therefore, favourable farming practices may be adopted keeping in view the maintenance



Fig. 3.6 Compost (organic manure)



Fig. 3.7 Dhaincha (*Sesbania aculeata*)—
an important common green manuring crop



Fig. 3.8 Sannhemp (*Crotalaria juncea*)—
a common green manuring crop in India

of farm for the survival and sustainable living for all. Under organic farming, the soil is kept healthy so that the plants get necessary nutrients. Organic manure or organic inputs are used to increase the soil fertility. Compost, vermicompost, green manuring, bio-fertilisers, natural oil cakes, etc., are used as organic manure to maintain the soil fertility, which may last longer. Use of organic manure increases soil biodiversity as it acts as a source of food for living organisms in the soil. Organic farming also avoids eutrophication of waterbodies caused by the oversupply of highly soluble chemical fertilisers, manure and slurry, as organic farms depend highly on the use of organic manure.



Maa told me
to pluck neem
leaves for use
in storing
grains for
protection
from insects.

Biological Insect-pest and Disease Management

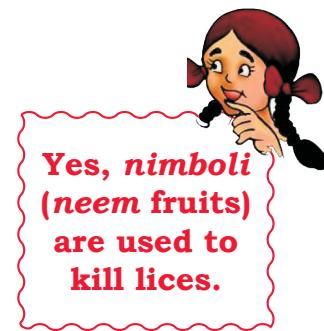
Bio-pesticides are an important component of organic farming. They build a robust system of managing the insect-pests by other parasites and predators in the ecosystem. Unlike conventional farming where chemical pesticides kill all insects, bio-pesticides do not kill the insects but drive them away from the crop field. Thus, the population of predators and parasites remains maintained which in turn, naturally manages the population of harmful insects. This way over a period, a permanent system of biological pest management is established on the farm. Similarly, the diseases are also managed and controlled in an organic farm.

Products prepared at the farm from local plants, animals and micro-organisms are used for pest, disease and weed management. Certain extracts from seeds and other plant parts can be used as pesticides. For example, *neem* seed extract can be used to control some insect-pests of crops.

All equipment from conventional farming systems need to be properly cleaned and free from residues before being used on organically managed areas.

On-farm Resource Management

Under organic farming, on-farm available resources are managed and recycled. For example, the agro-wastes, such as crop plants residues, leaves and animal dung can be converted into compost using earthworms. This is known as vermicomposting. Thus, under organic farming, a permanent on-farm resource management system can be established.



**Yes, nimboli
(neem fruits)
are used to
kill lices.**



Fig. 3.9 Vermicompost

3.3 CERTIFICATION AND REGULATORY MECHANISM

Organic certification is a certification process that ensures that the food and other agricultural products are organic. It generally involves the inspection of farming practices, processing, packaging, shipping, etc., of organic products according to a set of standards. These include avoidance of synthetic chemical inputs (e.g., fertiliser, pesticides, antibiotics, food additives, synthetic preservatives, colours, etc.), irradiation, and the use of sewage sludge; avoidance of genetically modified seeds; use of farmland that has been free from prohibited chemical inputs at least for a fixed number of years (often, three or more); for livestock, it is important to adhere to specific requirements for feed, housing and breeding; keeping detailed written production and sales records; maintaining strict physical separation of organic products from non-certified products; undergoing periodic site inspections, etc.

Organic certification assures quality of food and produce, prevents fraud and promotes business.



**Does the
certification
process
include
thorough
inspection?**



**Why is
certification
necessary?**



Are the organic certified products costly?

3.4 MARKETING NETWORK

The emerging demand for organic products is both a constraint as well as an opportunity for farmers, suppliers and traders of agricultural products.

The attributes of organic products most likely to influence consumers are:

1. health (i.e., minimal artificial chemical residues in the product and high nutritional value)
2. environment (i.e., environment-friendly production and processing)
3. taste
4. animal welfare
5. minimal processing
6. novelty
7. fashion



Fig. 3.10 Organic products available at a shop

Conversely, the attributes most likely to limit consumption of organic products are:

1. high price
2. limited availability
3. skepticism about the credibility of product claims
4. poor appearance
5. non-awareness of organic
6. contentment with existing products

Promoting Input Market for Organic Farming

The Government of India is promoting the production and use of bio-fertilisers to make them popular. The government has initiated a project, 'National Project

on Development and Use of Biofertilisers', for this purpose. The main objectives of this project are—

- Production and distribution of Bio-fertilisers (BFs).
- Developing standards for different BF s and quality control.
- Releasing of grants for setting up bio-fertiliser units.
- Training and publicity.

Activity 3.4

Make a project for spreading awareness about the organic farming processes, organic products and their health benefits, keeping in mind the following points:

- The farming techniques.
- Availability of organic food.
- Benefits for maintaining environment.
- How to recognise an organic product?
- Scope of marketing of organic products.
- Examples of processed organic products.

The report can then be discussed in the class.

Challenges in Marketing of Organic Inputs

Though there are positive signs for organic farming in India, but it is not growing at a fast enough pace to enhance its market value. Major problems that hinder the growth of the marketing of organic inputs in India are—

- Some climatic regions and soil conditions are not suitable for organic production.
- Use of bio-fertilisers and bio-pesticides is considered as less yielding than the use of chemical enhancers.
- Some bio-fertilisers have limited shelf-life — about 4–6 months.
- A long span (about three years) is required for a conventional farm to become an organic farm.
- The benefits perceived by small and marginal farmers, in particular, tend to be limited as they always need higher yield and income. As a result, they are hesitant to switch over to organic agricultural practices.

- More efforts are required for orientation of all involved in agriculture, to spread awareness of organic agriculture inputs, practices, etc.
- Changing the cropping and cultivation patterns is slow and a time-consuming process. High levels of illiteracy and large number of small and marginal farmers result in unwillingness to accept the change easily.
- Subsidies on chemical fertilisers and pesticides slow down the growth of organic agriculture.

Activity 3.5

Organise an organic input and practices awareness campaign in various localities.

Organic Produce Market

The market for organic products is expanding continuously, but at a slow pace in India. Do you find organic products at departmental stores and food *bazaars* near your area? Some farmers sell their organic products directly to the consumers. But still, most of the marketing of organic products is not well organised. Before going into the details of marketing of organic products, we need to try and gauge the perception of people about organic products. Why do some people want to buy organic products and others do not?

There are certain limitations in the expansion of organic markets. These are—

- Lack of information about organic market is the biggest drawback in the Indian agriculture scenario. Marketing network, specifically for organic products, has not yet been developed both in the domestic and export markets.
- Consistency in quality of Indian food industry has always been a constraint for growth. Contamination in food products is a setback in capturing the available market, especially the international market.

- The certification process for organic farming is very lengthy and complex.
- High transaction costs for getting farm produce certified as organic product is also unaffordable for small farmers.
- Cost of the end products is higher than the cost of products from conventional farming.
- Lack of proper infrastructure in terms of roads from remote villages, cold storage facilities and slow transportation infrastructure affect the cost, quality and reach of producers.
- Indian organic agriculture is very fragmented and there are no organisations for managing the entire value chain of organic products.

Strategies for Efficient Marketing of Organic Products

All over the world, standards are developed to monitor and control organic trade. The choice of the most appropriate organic certification standard depends mainly on the final market of the organic product. The products must be certified based on the standards required by the importing countries in order to label and market them as 'organic'.

In order to promote organic products in the market, the following issues need to be addressed—

- *Pricing:* Keeping the price reasonably low and affordable would remove the barrier in sales of organic food products.
- *Visibility:* Introduction of organic foods in the markets has increased their visibility. The appearance and packaging of products may be improved.
- *Labelling:* National and international certified organic labels may increase the trust of consumers in the authenticity of organic claims.
- *Availability:* The supply and quality of organic products must be consistent enough to ensure that buyers are not tempted to substitute them with conventional products.

The organic farming has been growing with rising demand and consumer awareness. There is a need to promote organic products from health and sustainability point of view. Support for inspection and certification and market-oriented services are necessary to provide equal opportunities to the growers.

Cardamom Plantation

Large cardamom is cultivated in almost all parts of Sikkim, especially West Sikkim. Entrepreneurs from different parts of the world visit to see the organic cardamom plantations. Heegaon, in West Sikkim, has the most suited climate and is a vibrant cardamom cluster. Almost all the farmers are cardamom growers, with an area of around 450 hectare. They have beautiful cardamom nurseries. Nursery raising has been adopted as a profession and large cardamom cultivators from within the state as well as from outside the state demand materials in advance during winters. Nursery owners supply planting material to Nagaland, Bhutan and DRDA (District Rural Development Agency).

Laxmi Bista is one of the most enterprising cardamom growers of the area. He is a young and educated progressive farmer and is a guiding force for his peers. In 2016, his income generation was about ₹26 lakhs per season through sales with more than seven lakhs of it being from the DRDA, Nagaland.

Source: Revolution in Horticulture: Sikkim's 22 Years of Achievement, published by Horticulture and Cash Crop Development Department, Government of Sikkim, August 2016.



Fig. 3.11 Fields of cardamom



Fig. 3.12 Farmers harvesting cardamom in the field

Improved *desi* variety of Brinjal crop developed by traditional methods

A progressive farmer of Dhuma Kurda village of district Dhamtari in Chhattisgarh, Leela Ram Sahoo, has conserved good quality *desi* variety of brinjal, growing by a traditional method of mass selection year after year. He has been able to maintain the purity of the variety. The variety of brinjal is known for its fruit quality and also it is resistant to major pests and diseases. He devotes his full time to farm experiments and he hopes that one day his variety would be known in all parts of the country.

Mass selection is a traditional method of crop improvement, in which large number of plants of similar phenotype are selected and their seeds are harvested and sown again. Same practice is followed year after year for an improved variety of the crop.

Source: Personal interview with the farmer in the Festival of Innovation — India and Entrepreneurship 2018 organised by National Innovation Foundation at Rashtrapati Bhawan.



Fig. 3.13 Leela Ram Sahoo with his developed traditional variety of brinjal

GLOSSARY

Crop rotation—It is a planned sequence of growing different crops in the same field. It is opposite of continuous cropping, which is growing the same crop in the same field year after year.

Eutrophication—When a waterbody becomes over enriched with minerals and nutrients which induce excessive growth of plants and algae and results in oxygen depletion in the waterbody.

Irradiation—Exposure to radiation for partial or complete sterilisation; the application of radiation such as X-rays or gamma rays for therapeutic purpose or for sterilisation.

Natural predators—These beneficial anthropods (insects) prey on other insects and spider mites that are critical for *natural* biological control. Lady beetles are natural enemies of aphids and other sap feeders. A single lady beetle may eat as many as 5,000 aphids in its lifetime.

Organic agriculture—A system of farm design and management to create an ecosystem, which can achieve sustainable productivity without the use of

artificial external inputs such as chemicals, fertilisers and pesticides.

Phenotype—Set of observable characteristics of an individual resulting from the interaction of its genes with the environment.

Processed products—Processing of a product includes a series of chemical or mechanical operations in order to preserve its originality for long time or to increase the shelf-life.

Slurry—A semi-liquid mixture, typically of fine particles of manure.

Soil fertility—This refers to the ability of the soil to supply essential nutrients and water in adequate amounts for plant growth.

WHAT HAVE WE LEARNT?

1. Organic farming prospers on four pillars—standards and norms, technology packages, certification and market network.
2. Organic standards and norms ensure safety of food, health and environment.
3. Technology packages include natural input and nature-friendly processes to follow in organic farming.
4. Certification ensures safety of food products.
5. The emerging demand for organic products is both a constraint as well as an opportunity.

Exercises

1. Answer the following questions.

- i. What are the four pillars of organic farming? Write a brief note on each of them.
- ii. What are the requirements for a successful conversion of a conventional farm to an organic farm?
- iii. Explain in brief the four principles of organic farming given by IFOAM.
- iv. What is the difference between intercropping and crop rotation? How do these practices strengthen organic agriculture?

- v. How different is the pest and disease management under organic farming *vis-à-vis* conventional farming?
- vi. What do you understand by organic certifications? What are their benefits?
- vii. Discuss the limitations and challenges in the expansion of organic markets in India. What strategies could be adopted to promote organic products?

2. Read the statements and indicate 'True' or 'False'.

- i. Crop rotation means growing the same crop in the same field year after year.
- ii. Intercropping is the practice of growing two or more crops in close proximity in the same field.
- iii. Organic farming can lead to eutrophication of waterbodies.
- iv. Corn is a low carbon to nitrogen ratio crop.
- v. Exotic varieties of crops and animals are used in organic farming.

3. Activities

- i. Find out what technology packages have been followed in the farm of your school.
- ii. Trace the marketing networks for any organic product.
- iii. Make composting in your kitchen garden using earthen (terracotta) pots. Segregate the biodegradable kitchen waste. Start adding the kitchen waste to the composter 'Pot A'. When it is filled three-fourth, start adding in 'Pot B' and so on. Find out how much time it takes in composting. Use the compost in your kitchen garden and observe the growth and health of the plants. Record your specific observations and share with your peers and teachers in school.

