

11. Organic Farming



Can you recall?

In earlier studies we have understood the importance of organic carbon in soil properties. Most of the soil properties are benefited by soil carbon. Hence, organic farming is most suited for soil health.

11.1 ORGANIC FARMING

11.1.1 Meaning : Organic farming is the crop production system which avoids or largely excludes the use of chemical fertilizers, pesticides (chemicals) and growth regulators. It also depends on crop rotation with leguminous crops, addition of crop residues, animal manures, green manuring, biofertilizers and biopesticides.

Organic farming works in peace and friendship with nature rather than going against nature and thus, organic farming involves the use of distinct methods to achieve the best and sustainable yields of a crop. In this, the good yield of the crop is achieved without harming the health of the people who live and work in those farms and also it does not harm the natural environment. (Eco-system)



Do you know ?

Plants require nutrients for their growth. These essential nutrients are absorbed from soil.

11.1.2 The practices of organic farming also involve the following :

- Good Animal Husbandry Practices
- Careful use of Natural Water Resources
- Good Agricultural Practices.

11.1.3 A Modern Approach to Farming :

Practicing organic farming does not mean that we are going back and using the old and traditional methods, because there are many old techniques of farming which are still used today. Organic farming picks up the best techniques and combines those with the new scientific techniques. Farmers who practice organic farming do not leave their farms totally



Can you tell?

Fertilizers are expensive and their indiscriminate use causes problems to soil health and hazards to human life.

upon nature, instead, they avail the complete knowledge, methods, and material to work with nature. By doing like this, the farmers maintain a balance to grow animals and crops together. Organic farmers do not see every insect as a pest and they don't solve every problem of the farm with the chemical inputs. Many insects are considered as friends of farmers and helps the farming.

Aims of organic farming

The organic farming furnish long-term benefits to the environment because organic farming has the following aims:

- Enhance the long term soil fertility
- Control the diseases and pests without harming the environment
- Make sure that the water is clean and safe
- Avail the resources which the farmers already have, becomes affordable to the farmer to buy the necessary inputs of the farm. Sustainability is must.
- Generate nutritious, chemical free food to human beings and feed for animals and also sell the high-quality produce at the good price.

11.2 PRINCIPLES OF ORGANIC FARMING

11.2.1 Principle of health :

Organic agriculture should sustain and enhance the health of soil, plant, animal, human beings and planet as a whole.

The role of organic agriculture is to sustain and enhance the health of total ecosystem.

11.2.2 Principle of ecology :

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



Fig. 11.1 Principles of organic farming

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

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

11.2.3 Principle of fairness :

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 of the locality.

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 such a way that is socially and ecologically justified and should be held in trust for future generations.

11.2.4 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 along with environment and ecosystem.

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

11.2.5 Types of organic farming :

1. Pure organic farming where the inorganics, both fertilizers and chemical pesticides are completely excluded. It advocates the

use of organic manures and biological pest control methods only.

2. Integrated green revolution organic farming techniques are developed and are combined with the high input technology in order to create integrated system such as INM, IPM and IWM, etc.
3. Integrated farming system (IFS), is the low input organic farming in which dependence is on local resources and ecological processes, recycling of agricultural waste and crop residues.



Observe and Discuss

Observe and discuss :

1. Management of farm resources in such a way that harmonises rather than struggle with natural systems. (insects, microbes, all habitats, etc.)
2. Use of appropriate technologies based on biological system.
3. Achieve and maintain soil fertility for optimum production.
4. Use diversification to achieve optimum production.
5. Aims for optimum nutritional value of chemical free staple food.
6. Decentralize structures for processing, distribution and marketing of organic products.
7. Strive for suitable relationship between those who work and live on the field.
8. Maintain and preserve wild life and their habitat.



Remember this

Organic farming is different from old and traditional farming.

11.3 REQUIREMENTS AND COMPONENTS OF ORGANIC FARMING

11.3.1 Requirements of organic farming :

1. Crop production plan :

The producer seeking certification under the National Standards for Organic Production NSOP, here in after, referred to as 'standards'

shall be required to develop an organic crop production plan. This plan shall include description of the crops in the production cycle (main crop and intercrop) as per the agro climatic situations.

- i. Description of practices and procedures to be performed and maintained.
- ii. List of inputs used in production along with their composition, frequency of usage, application rate and source of commercial availability.
- iii. Source of organic planting material (seed and seedlings).
- iv. Description of the record keeping system implemented to comply with the requirements.

2. Conversion requirements :

- i. The establishment of an organic management system and building of soil fertility.
- ii. A farm may be converted through a clear plan of how to proceed with the conversion.
- iii. The requirements prescribed under these standards shall met during the conversion period.
- iv. The start of the conversion period may be calculated from the date of first inspection of the operator by the Certification Body.

3. Duration of conversion period :

- i. In case of annual and biennial crops, plant products produced can be certified organic when the requirements prescribed under these standards have been met during the conversion period of at least two years (organic management) before sowing (the start of the production cycle).
- ii. In case of perennial plants other than grassland (excluding pastures and meadows), the first harvest may be certified as organic after at least thirty six months of organic management according to the requirements prescribed under these standards.
- iii. The Accredited Certification Bodies shall decide in certain cases, for extension or reduction of conversion period depending

on the past status/use of the land and environmental conditions.

- iv. Organic products in conversion period shall be sold as “produce of organic agriculture in conversion” or of a similar description.

4. Landscape :

- i. Organic farming shall contribute beneficially to the ecosystem. The certification programme shall set standards/procedures for a minimum percentage of the farm area to facilitate biodiversity and nature conservation.
- ii. Areas which are managed organically shall facilitate biodiversity.

5. Choice of crops and varieties :

- i. All seed and plant materials shall be certified organic. Species and varieties cultivated shall be adapted to the soil and climatic conditions and be resistant to pest and diseases.
- ii. When organic seed and plant materials are available, they shall be used.
- iii. When certified organic seed and plant materials are not available conventional seed and plant material which is not treated with chemical shall be used.
- iv. The use of genetically engineered seed, transgenic plants or plant material is prohibited.

6. Diversity in crop production and management plan :

- i. The basis for crop production in organic farming shall take into consideration the structure and fertility of the soil and the surrounding ecosystem, with a view to minimizing nutrient losses.
- ii. Where appropriate, the organic farms shall be required to maintain sufficient diversity in a manner that takes into account pressure from insects, weeds, diseases and other pest, while maintaining or increasing soil condition as regards to, organic matter, fertility, microbial activity and general soil health.
- iii. Soil fertility shall be maintained through the cultivation of legumes or deep rooted

plants and the use of green manures, along with a suitable programme of crop rotation.

7. Nutrient management

- i. Sufficient quantities of biodegradable material of microbial, plant or animal origin produced on the organic farms shall form the basis of the nutrient management programme.
- ii. Nutrient management should minimize nutrient losses. Accumulation of heavy metals (salts) and other pollutants shall be prevented.
- iii. The certification programme shall set procedures which prevent animal runs from becoming over manuring where there is a risk of pollution.
- iv. Mineral fertilizers shall only be used in a supplementary role to carbon based materials. Only those organic or mineral fertilizers that are brought in to the farm (including potting, compost) shall be used when, the circumstances demand
- vi. Permission for use shall only be given when other fertility management practices have been optimized
- vii. Manures containing human excreta (faeces and urine) shall not be permitted to prevent transmission of pest, parasites and infectious agents.
- viii. The certification programme shall lay down restrictions for the use of inputs such as minerals potassium, magnesium, fertilizers, trace elements, manures and fertilizers with a relatively high heavy metal content.

8. Pest, disease and weed management

- i. Organic farming systems ensures that losses from pest, diseases and weeds are minimised. Emphasis is placed on the use of a balanced fertilizer management, use of crops and varieties well-adapted to the environment, fertile soils of high biological activity, adapted rotations, intercropping, green manuring, etc. Growth and development shall take place in a natural manner.

- ii. Weeds, pest and diseases shall be controlled through a number of preventive techniques, mulching, mechanical control and the disturbance of pest development cycles, etc.
- iii. Pest management should be regulated by understanding and disrupting the ecological needs of the pest. The natural enemies of pest and diseases should be protected and encouraged through proper habitat management by hedges, nesting sites, etc. An ecological equilibrium must be created.
- iv. Products used for pest, disease and weed management, prepared at the farm from local plants, animals and microorganisms, may be allowed
- v. Thermic weed control and physical methods for pest, diseases and weed management should be permitted.
- vi. All equipments from conventional farming systems should be properly cleaned and free from residue before being used on organically managed areas.
- vii. The use of synthetic herbicides, fungicides, growth regulators, synthetic dyes, insecticides and other pesticides are prohibited.
- viii. Commercial products used as inputs shall always be evaluated.
- ix. The use of genetically engineered organisms or products is prohibited.

9. Contamination control

- i. All relevant measures may be taken to minimize contamination from outside and within the farm.
- ii. Buffer zones should be maintained to prevent contamination from conventional farms.
- iii. In case of reasonable suspicion of contamination, the certification programme shall take place to determine the level of contamination.

- iv. Polyethylene and polypropylene or other polycarbonates coverings shall be removed from the soil after use and shall not be burnt *in situ*.

10. Soil and water conservation :

- i. Soil and water resources shall be handled in a sustainable manner. Measures to be taken to prevent erosion, salination and improper use of water and the pollution of water.
- ii. Cleaning of land through the means of burning organic matter, should be restricted to the minimum. The cleaning of primary forest is prohibited.
- iii. The certification programme shall require to check the land degradation and pollution of ground and surface water.

11. Collection of non cultivated material of plant origin / forest produce :

- i. The collection of wild plants and parts grown naturally shall be certified as organic provided the collection areas have not received any treatment with products other than those authorized for use in the organic production.
- ii. In case of cultivation when it is carried out in the forest area, the operators shall follow similar procedures.
- iii. Organic collection management should ensure that in case of minor forest produce collection, the State Government Act shall be applicable and should not exceed sustainable yield of the collected species or otherwise threaten the local ecosystem.
- iv. Products can only be certified organic if derived from a designated area for collection.
- V. The collection area shall be at an appropriate distance from conventional farming, pollution and contamination.
- vi. The producer managing the harvesting or gathering of the products shall be clearly identified.

11.3.2 Components of organic farming :



Fig. 11.2 Components of organic farming

A. Organic manures : which include FYM, biogas slurry, compost, straw or other crop residues, biofertilizers, etc.

B. Non chemical weed control measures : All physical, mechanical and biological methods are followed to reduce the weed without the use of herbicides/weedicides.

Biological insects/ pest and disease management. This includes the conservation of natural enemies of pest and pathogens and use of botanical and microbial pesticides.

Non chemical weed control

Weeds are causing great economic loss to the main crop yield. Weeds are having fast reproduction capacity and massive recycling potential. As there are many kind of weeds with varying germination periods and high differing life cycles, weed management requires an integrated approach based on biology and ecology of the species. The major components of integrated weed management (IWM) include:

1. Monitoring weeds.
2. Emphasis on ecological, biological and bio-technological methods.
3. Low cost agronomic strategy.
 - Balanced nutrition use.
 - Higher plant population (high seed rate for dense population)
 - Inter-cropping, relay cropping, mixed cropping, etc.

- Use of competitive cultivars.
- Use of dense vegetative crop

C. Ecological Management :

Ecological management (cultural practices) aims by attacking ecological weak points of weeds during field operations such as ploughing, water management, crop season, crop rotation, intercropping, soil solarization, etc. Ploughing operation helps in reducing the emerging weed seedlings which are buried or exposed to hot sun for drying. Intensive puddling is very effective for weed control in low land rice crop. Water management practices are very effective for weed control especially in low land rice.

Crop rotations which are effective against weeds in pulse crop (soybean) rotation with cereal crops (sorghum, maize).

D. Biological control :

Biological weed control involve the use of insects, pathogens, fish and snails (bio-agents) which appears to be ideal for reducing the inputs of herbicides. In biological control method, it is not possible to eradicate weeds, but weed population can be reduced.

Insects - In Australia, *Lantana camara* was controlled by two beetles viz. *Octotoma scabripennis* and *Uroplata giraldi*.

Prickly-pear weed (*Opuntia*) was controlled in India by *Dactylopius tomentosus*-a scale insect. Alligator weed (*Alternanthera philoxeroides*) which is an aquatic weed was controlled by *Agasicles hygrophylla* (flea beetle).

Fish : Common carp (*Cyprinus carpio*) and chinese carp control aquatic weeds.

Mammals : Manatee or sea cow is very effective in controlling water hyacinth.

Snails : *Marisa sp.* and other fresh water snails feed on submerged weed like coontail and algae.

Fungi : Water hyacinth can be controlled by *Rhizoctinia* blight.

Mites : A spider mite (*Tetranychus sp.*) is found to be useful in controlling prickly pear.

Plants : Cow pea sown in between sorghum rows effectively reduces the growth of weeds.

E. Physical/ mechanical methods

Physical force either manual, animal or mechanical power is used to pull out or kill weeds. The different methods used are:

- a. Hand weeding
- b. Hand hoeing
- c. Digging
- d. Mowing (cutting weeds to the ground level)
- e. Cutting
- f. Dredging and chaining
- g. Burning and flaming
- h. Mulches
- i. Intercultivation

11.4 MERITS OF ORGANIC FARMING

1. Organic farming create optimal conditions in soil for high yields and good quality crops. (improve health of soil)
2. Organic manures supply all the nutrients both macro and micronutrients required by the plants.
3. Soil physical properties like bulk density, hydraulic conductivity, total porosity, etc. are improved. The water holding capacity, permeability, aeration and aggregation of soil are also enhanced with organic matter application which is declining day by day with ignorance.
4. Improves soil chemical properties such as supply and retention of soil nutrients and promote favorable chemical reaction like cation exchange capacity. Particularly the soil organic carbon is increased which is a key nutrient (organic manures have high CEC).
5. Improves biological activities like earthworms, insects, micro-organisms, enzymatic activity and biological nitrogen fixation in the soil.
6. Organically grown crops are believed to provide more healthy and nutritionally

superior (good quality) food for human and animals than those grown with commercial chemical fertilizers.

7. Organic farming helps to prevent environmental degradation and can be used to regenerate degraded areas (maintain ecosystem).
8. It is low cost farming and controls erosion.
9. It reduces human and animal health hazards.
10. It helps in maintaining agricultural production at the sustainable level.
11. It ensures optimum utilization of natural resources.
12. It helps to maintain symbiotic relationship or environmental factors related to soil,

minimizes environmental pollution, degradation of soil, etc.

13. It helps to reduce the crop pest and disease incidence.

14. The cost of production of organic produce is comparatively low.

11.5 DEMERITS OF ORGANIC FARMING

1. Comparatively low production potential
2. Lack of natural resources (limitations)
3. More time is required for stabilization.

Now, there is a need of ‘**Organic Revolution**’ after green revolution through organic farming or IPNS.

The components of Integrated Plant Nutrient Supply (IPNS) are given further:

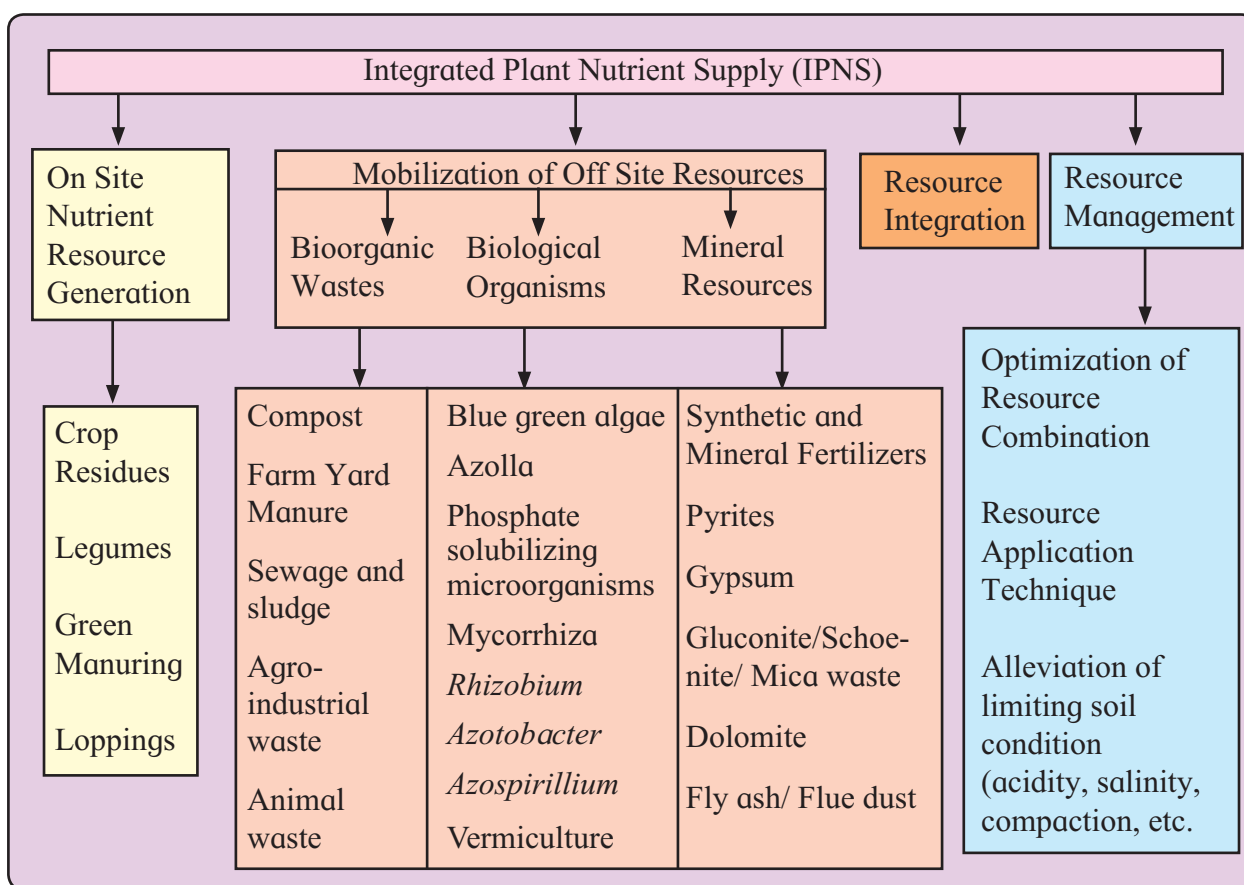


Table 11.3 Components of Integrated Plant Nutrient Supply (IPNS).



Q.1 Answer the following questions.

A. Select the appropriate alternative and complete the following statements.

- Organic farming is the production system which avoid the use of -----
a. pesticides b. organic manures
c. bio-agents d. none of these
- Principles of organic farming are related with of -----
a. health b. fertilizers
c. herbicides d. growth regulators
- Biological weed control involve the use of -----
a. pathogens b. herbicides
c. chemicals d. none of these
- Hand weeding is an example of ----- method of weed control.
a. physical b. biological
c. chemical d. none of these
- The examples of organic manure is -----.
a. compost
b. urea
c. single super phosphate
d. muriate of potash

B. Make the pairs.

'A' Group

- Mulches
- Farm yard manure
- Sea cow

'B' Group

- Chemical weed control
- Physical weed control
- Organic manure
- Biological weed control
- Nitrogenous fertilizer

C. Find the odd one out.

- FYM, compost, sewage, dolomite
- Rhizobium, azzola, azotobactor, gypsum
- Ecology, care, fairness, vermicompost
- Pyrites, gypsum, dolomite, sewage

D. State true or false.

- Organic farming enhance long term soil fertility.
- Organic manures include compost.

- Biological weed control involve use of insects.
- Organically grown crops provide nutritionally superior food.
- The cost of production of organic produce is comparatively high.

Q.2. Answer in brief.

- Define organic farming.
- What is the principle of health?
- What are the conversion requirements of organic farming?
- List out any four physical methods of weed control.
- What are the demerits of organic farming?

Q.3. Answer the following questions.

- What are the objectives of organic farming?
- Describe the types of organic farming.
- What is a crop production plan?

Q.4. Answer the following questions.

- What are the major components of integrated weed management.
- Describe the duration of conversion period in organic farming.
- How does contamination controlled in organic farming?

Q.5 Answer the following questions in detail.

- Describe the principles of organic farming.
- Write in detail about nutrient management in organic farming.

Q.6 Answer the following questions in detail.

- Describe biological weed control in organic farming.
- What are the merits and demerits of organic farming?



Activity

- Visit any agricultural farm and take observations of organic as well as chemical inputs used.
- Obtain information regarding beneficial as well as harmful effects of the inputs used.