

Soil fertility management

- A deliberate and careful management of soil fertility is crucial in organic farming
- Therefore an accurate knowledge of the soil fertility status is extremely important
- An appropriate management strategy must be adopted.
- High soil organic matter levels must be sustained

Tillage and cultivation practices

- The tillage and cultivation practices adopted must be able to maintain and/or improve the physical, chemical and biological conditions of the soil
- It must also maximize the soil biological condition, this is of special consideration under an organic farming system
- The soil chemical and physical conditions are given higher consideration in conventional crop production

Soil physical condition

- In a lay man's language this describes the softness, mellowness and workability of soil
- In technical terms it describes the:
 - Bulk density
 - Water retention
 - Infiltration rate
 - Water holding capacity etc

Benefits of good soil physical condition

- Plant roots can grow through the soil without restriction
- Air, water and nutrient move through the soil with ease
- Rainfall or irrigation water seeps into the soil
- Soil organisms thrive and disperse throughout the soil

Soil chemical condition

- This include the fertility

- Salinity
- Acidity
- Alkalinity of the soil

Benefits of soil in good chemical condition

- A near neutral pH
- Sufficient nutrients
- Nutrients are in available forms
- Availability of nutrient is balanced to promote crop growth and microbial activity
- The soil does not contain toxins or heavy metals in concentrations high enough to inhibit growth of plant and beneficial organisms
- Enough moisture to facilitate nutrient movement to plant root
- Sufficient oxygen for growth of plant and organisms
- Relatively high level of soil organic matter

Soil Biological condition

- Improving chemical and physical condition is important in both organic and conventional agriculture
- Improvement of biological condition is particularly important in organic system
- In lay man's language It is described as:
 - earthy soil, soil crumbliness, greasy soil etc
- Scientists measure it as
 - Microbial biomass (N,P & C)
 - Microbial community (Population & diversity)
 - Rate of organic matter decomposition
 - Microbial respiration
 - Enzyme activities

Benefits of good biological condition

- The plant and animal residues added to the soil are readily broken down to plant available nutrients
- The soil has a good structure

- It is well aggregated and clumps are held together
- Legumes form healthy nodules
- Plant have high resistance to soil-borne diseases

Minimizing soil erosion

- Erosion is the loss of surface soil to forces of wind and water
- Minimizing it is critical
- The top layer of soil has the physical, chemical and biological properties that favor crop production
- Top soil contain organic matter than other soil layers
- Organic producers must use tillage practices that maintain good physical, chemical and biological conditions of soil.
- Such practice should :
- Promote water infiltration
- Minimize compaction
- Minimize soil degradation
- Protect soil from erosion
- Minimally disrupt habitat of beneficial organism
- Return or add plant and animal residue to soil

Practices in organic farming

- Crop rotation and intercropping
- Cover cropping
- Green manuring
- Agroforestry and alley cropping
- Use of organic fertilizer
- Return of crop residues to the soil
- Inoculation of Rhizobium and mycorrhizal fungi
- Use of phosphate rock

Cover cropping

- The crops are planted to protect the soil during the off – season
- The residues are ploughed in to the soil to increase organic matter level
- They are grown to check erosion
- They can serve as green manure if ploughed in when fresh.

Green manures

- This is a type of cover crop
- It is grown for a specific period then plowed into the soil
- It perform function of soil improvement and cover
- It increases the organic matter and other soil parameter
- The root system of some grow deep into the soil and bring nutrients to the top soil

Organic fertilizer- compost

- This is the biological decomposition and stabilization of organic material
- The final product is free of pathogen and plant seeds
- Improves soil physical, chemical and biological conditions
- It has many uses
- Increase plant disease resistance

Benefits of composting

- It is an efficient method of managing farm waste
- Solves problems associated with pests and diseases including weeds
- Avoid losses of nutrients particularly N under semi-anaerobic condition and leaching
- Can also avoid temporary fixation of N and P in residues with high C/N ratio.

Benefits of compost

- Nutrient functions: stores nutrients by absorbing macro and micronutrients into the organic matter, microbial tissues and their waste products and release them slowly.
- Improves soil structure
- Stimulates soil organisms
- Strengthens resistance to pests and diseases
- It is made from renewable resources by farmers themselves

- It ensures longer-term soil fertility

Principles of composting

- Organisms: optimum conditions for microbial activities must be provided
- Materials: all organic materials including plants, dung, refuse, paper etc are suitable. Human excreta and feces from carnivores require separate treatment. Materials with high C/N ratio decompose slowly and should be combined with low C/N ratio, ideally C/N ratio of composting materials should be 30:1
- Water: important for the process to flourish, water should be applied to the layers and at the end. The heap should contain between 50-60 % water.
- Ventilation, steps should be taken to improve ventilation within and around the compost.
- Temperature: A satisfactory temperature is the best indicator of a successful composting and can be maintained by insulating the system.
- pH: wood ash may be applied thinly to each layer of the compost

Indicators of a successful composting

- Rise in temperature
- Reduction in size
- Presence of moisture under the polythene cover

Agroforestry

- This is a collective name for land use systems in which woody perennials are grown in association with crops
- It evolved as a replacement to shifting cultivation
- Non nodulating trees, nodulating trees and actinorhizal trees are used
- The system has many benefits

Benefit of Agro-forestry

- Erosion control
- Additional soil cover
- Improve soil structure
- Increase soil fauna activities
- Help to close up nutrient cycle

- Help to prevent loss of nutrient flush