**FARMING SYSTEMS**

Farming system is a complex inter-related matrix of soil, plants, animal implements, power, labor, capital and other inputs controlled in part by farm families and influenced by varying degrees of political, economic, institutional and social forces that operate at many levels.

In other words, it is defined as unique and reasonably stable arrangement of farm enterprises that the household manages according to its physical, biological, economic and socio-cultural environment in accordance with the household’s goals, preferences and resources.

Conceptually it refers to a set of elements or components that are interrelated which interact among themselves. At the center of the interaction is the farmer exercising control and choice regarding the type and result of interaction.

It is a resource management strategy to achieve economic and sustained production to meet diverse requirement of farm household while preserving resource base and maintaining a high level of environmental quality.

For example, it represents integration of farm enterprises such as cropping systems, animal husbandry, fisheries, forestry, sericulture, poultry etc. for optimal utilization of resources bringing prosperity to the farmer. The farm products other than the economic products, for which the crops are grown, can be better utilized for productive purposes in the farming systems approach.

◆ **Farming systems concept**

In farming system, the farm is viewed in a holistic manner. Farming enterprises include crops, dairying, poultry, fishery, sericulture, and piggery, apiary tree crops etc. a combination of one or more enterprises with cropping when carefully chosen, planned and executed, gives greater dividends than a single enterprise, especially for small and marginal farmers. Farm as a unit is to be considered and planned for effective integration of the enterprises to be combined with crop production activity, such that the end-products and wastes of one enterprise are utilized
effectively as inputs in other enterprise. For example the wastes of dairying viz., dung, urine, refuse etc. are used in preparation of FYM or compost which serves as an input in cropping system. Likewise the straw obtained from crops (maize, rice, sorghum etc.) is used as a fodder for dairy cattle.

Further, in sericulture the leaves of mulberry crop is used as a feeding material for silkworms, grain from maize crop are used as a feed in poultry etc.

Sustainability is the objective of the farming system where production process is optimized through efficient utilization of inputs without infringing on the quality of environment with which it interacts on one hand and attempt to meet the national goals on the other. The concept has an undefined time dimension. The magnitude of time dimension depends upon ones objectives, being shorter for economic gains and longer for concerns pertaining to environment, soil productivity and land degradation.

◆ **Principles of farming system**
  o Minimization of risk
  o Recycling of wastes and residues
  o Integration of two or more enterprises
  o Optimum utilization of all resources
  o Maximum productivity and profitability
  o Ecological balance
  o Generation of employment potential
  o Increased input use efficiency
  o Use of end products from one enterprise as input in other enterprise

◆ **Characteristics of farming system**
  o Farmer oriented & holistic approach
  o Effective farmers participation
  o Unique problem solving system
  o Dynamic system
Gender sensitive
- Responsible to society
- Environmental sustainability
- Location specificity of technology
- Diversified farming enterprises to avoid risks due to environmental constraints
- Provides feedback from farmers

◆ Objectives of farming system

Productivity - Farming system provides an opportunity to increase economic yield per unit area per unit time by virtue of intensification of crop and allied enterprises. Time concept by crop intensification and space concept by building up of vertical dimension through crops and allied enterprises.

Profitability - The system as a whole provides an opportunity to make use of produce/waste material of one enterprise as an input in another enterprise at low/no cost. Thus by reducing the cost of production the profitability and benefit cost ratio works out to be high.

Potentiality – Soil health, a key factor for sustainability is getting deteriorated and polluted due to faulty agricultural management practices viz., excessive use of inorganic fertilizers, pesticides, herbicides, high intensity irrigation etc. In farming system, organic supplementation through effective use of manures and waste recycling is done, thus providing an opportunity to sustain potentiality of Production base for much longer time.

Balanced food - In farming system, diverse enterprises are involved and they produce different sources of nutrition namely proteins, carbohydrates, fats & minerals etc. form the same unit land, which helps in solving the malnutrition problem prevalent among the marginal and sub-marginal farming households.

Environmental safety - The very nature of farming system is to make use or conserve the byproduct/waste product of one component as input in another component and use of bio-control measures for pest & disease control. These eco-friendly practices bring down the
application of huge quantities of fertilizers, pesticides and herbicides, which pollute the soil water and environment to an alarming level. Whereas IFS will greatly reduce environmental pollution.

**Income/cash flow round the year**- Unlike conventional single enterprise crop activity where the income is expected only at the time of disposal of economic produce after several months depending upon the duration of the crop, the IFS enables cash flow round the year by way of sale of products from different enterprises viz., eggs from poultry, milk from dairy, fish from fisheries, silkworm cocoons from sericulture, honey from apiculture etc. This not only enhances the purchasing power of the farmer but also provides an opportunity to invest in improved technologies for enhanced production.

**Saving energy**- Availability of fossil fuel has been declining at a rapid rate leading to a situation wherein the whole world may suffer for want of fossil fuel by 2030 AD. In farming system, effective recycling of organic wastes to generate energy from biogas plants can mitigate to certain extent this energy crisis.

**Meeting fodder crises**- In IFS every inch of land area is effectively utilized. Alley cropping or growing fodder legume along the border or water courses, intensification of cropping including fodder legumes in cropping systems helps to produce the required fodder and greatly relieve the problem of non-availability of fodder to livestock component of the Farming system.

**Employment generation**- Various farm enterprises viz., crop +livestock or any other allied enterprise in the farming system would increase labour requirement significantly and would help solve the problem of under employment. An IFS provides enough scope to employ family labour round the year.

**Scope for establishment of agro- industries**- When once the produce from different components in IFS is increased to a commercial level there will be surplus for value addition in the region leading to the establishment of agro-industries.

**Enhancement in input use efficiency** – An IFS provides good scope for resource utilization in different components leading to greater input use efficiency and benefit-cost ratio.
Organic farming “is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic agriculture systems rely upon crop rotations, crop residues, animal manure, legumes, green manure, off-farm organic wastes, mechanical cultivation, mineral bearing rocks, and aspects of biological pest control to maintain soil productivity, till, to supply plant nutrients, and to control insects, weeds, and other pests”.

The concept of the soil as a living system which must be “fed” in a way that does not restrict the activities of beneficial organisms necessary for recycling nutrients and producing humus is central to this definition.
“Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including bio-diversity, biological cycles and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using wherever possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system”
ORGANIC FARMING IN THE WORLD:

(Source: World of Organic Agriculture & FiBL Outlook, ICARE knowledge Report)
Principles of organic farming

1. To produce food of high nutritional quality in sufficient quantity
2. To interact in a constructive and life enhancing way with all natural systems and cycles
3. To encourage biological cycles within the farming system, involving micro-organisms, soil flora and fauna, plants and animals and careful mechanical intervention
4. To maintain and increase long-term fertility of soils
5. To promote the healthy use and proper care of water, water resources and all life therein
6. To help in the conservation of soil and water
7. To use, as far as is possible, renewable resources in locally organized agricultural systems
8. To work, as far as possible, within a closed system with regard to organic matter and nutrient elements
9. To work, as far as possible, with materials and substances which can be reused or recycled, either on the farm or elsewhere
10. To give all livestock conditions of life which allow them to perform the basic aspects of their innate behavior
11. To maintain all forms of pollution that may result from agricultural practices
12. To maintain the genetic diversity of the production system and its surroundings including the protection of wild life habitats
13. To allow everyone involved in organic production and processing a quality of life confirming to the UN Human Rights Charter, to cover their basic needs and obtain an adequate return and satisfaction from their work, including a safe working environment
14. To consider the wider social and ecological impact of the farming system
15. To produce non-food products from renewable resources, which are fully degradable
16. Weed, disease and pest control relaying primarily on crop rotation, natural predators, diversity, organic maturing, resistant varieties, and limited (preferably minimal) thermal, biological and chemical intervention
17. To create harmonious balance between crop production and animal husbandry
18. To encourage organic agriculture associations to function along democratic lines and the principle of division of powers

19. To progress towards an entire production, processing and distribution chain which is both socially just and ecologically responsible

◆ Relevance of organic farming

Interest in organic agricultural methods is growing, especially in areas where the present modern farming system has unleashed many agro-ecological and environmental problems both on and off the farm, which threaten food security. The following are some examples:
a) Degradation of soil quality (structured & fertility)

b) Pollution of soil, water and food with pesticides and nitrates

c) Health effects on farmers, farm workers, farm families, rural communities (apart from concerns about the non-intended effects of pesticides on human beings in general, sound use of pesticides requires a technical knowledge which is often lacking in developing countries)

d) Resistance of pests to pesticides

e) Dependence on off-farm agricultural inputs which can increase poor farmers’ dependence on credit facilities (to purchase synthetic fertilizers, pesticides and seed), which may result in decreased local food security and self-reliance

Further consumer awareness of the environmental costs of agriculture is increasing. The awareness of environmental quality and health is often promoted by environmental groups, especially in developed countries. The resulting demand for organic products creates the opportunity to sell organic products at premium prices, enabling organic farmers to continue, and often expand. Some governments have begun to recognize the possibility that it may be cheaper to support organic agriculture than to rectify problems associated with certain resource-destruction production practices. For this reason, several governments have introduced subsidies for organic agriculture. For example, in Indonesia where, after a period of subsidies on pesticides, the use of this input was prohibited while efforts were put in IPM programmes. In China, pesticide problems in products both on the domestic and export market has resulted in government involvement in certification organizations for “green food”, including also a small amount of organic produce. Both these policies facilitate a shift towards organic agriculture
**Components of organic farming**

Thus, organic agriculture is comparatively free from the complex problems identified with modern agriculture. It is basically a farming system, devoid of chemical inputs, in which the biological potential of the soil and the underground water resources are conserved and protected from the natural and human induced degradation or depletion by adopting suitable cropping models including agroforestry and methods of organic replenishment, besides natural and biological means of pest and disease management, by which both the soil life and beneficial interactions are also stimulated and sustained so that the system achieves self-regulation and stability as well as capacity to produce agricultural outputs at levels which are profitable, enduring over time and consistent with the carrying capacity of the managed agro-ecosystem.
Crop production and health in organic farming systems is attained through a combination of structural factors and tactical management components to ensure products of sufficient quality and quantity for human and livestock consumption.

1. Diverse crop rotations
2. Soil fertility management
3. Weed control
4. Natural pest and disease control
5. Integrated nutrient management
   - Bulky organic manures
   - Recycling of organic wastes
   - Bio-fertilizers
   - Green manuring