

**FACULTY OF AGRICULTURE SCIENCES AND
ALLIED INDUSTRIES**

INTEGRATED FARMING SYSTEM

History:

All over the world, during the last four decades, grain yields went up at spectacular rates during the green revolution and individual levels of production in animals followed similar trend. Ensuring food security for the fast growing global population is a mammoth challenge for the present agricultural production system. Shrinking average farm size in India and financial constraints for higher investment in agriculture due to 80 per cent farm families belonging to small and marginal farmer categories further heighten the challenge. For securing food and nutrition security for sizable population, productivity enhancement may provide a vital solution. This involves adoption of scientific agronomic practices and technologies which promise an augmentation of the productive capacity of traditional agricultural system. Agronomic practices such as the liberal use of inorganic pesticides and fertilizers during the twentieth century enhanced productivity significantly but undesirable environmental degradation accompanied by increased operational costs in agriculture raised concerns about economic feasibility and sustainability. Unsustainable farming leads to environmental pollution and threatens the livelihood of millions of small farm holders. Strengthening agricultural production systems for greater sustainability and higher economic returns is a vital process for increasing income and food and nutrition security in developing countries.

Therefore, integrated farming system (IFS) is a multidisciplinary whole farm approach and appears effective in solving the problems of small and marginal farmers. The approach aims at increasing income and employment from small-holding by integrating various farm enterprises and recycling crop residues and by products within the farm itself. Farmers need to be assured of regular income for living at least above poverty line. Progress in production or steady growth in output is necessary to face the challenges posed by present economic, political and technological environment. In this context, farming system approach is one of the important solutions to face this particular situation as in this approach different enterprises can be carefully undertaken and the location specific system are developed based on available resources which will result in sustainable development.

Objectives:

Sustainability is the objective utilization of inputs without impairing the quality of environment with which it interacts. Therefore, it is clear that farming system is a process in which sustainability of production is the objective.

The overall objective is to evolve technically feasible and economically viable farming system models by integrating cropping with allied enterprises for irrigated, rainfed, hilly and coastal areas with a view to generate income and employment from the farm.

Integrated Farming as a farming system where high quality food, feed, fibre and renewable energy are produced by using resources such as soil, water, air and nature as well as regulating factors to farm sustainably and with as little polluting inputs as possible.

At present, the farmers concentrate mainly on crop production which is subjected to a high degree of uncertainty in income and employment to the farmers. In this contest, it is imperative to evolve suitable strategy for augmenting the income of a farm.

Integration of various agricultural enterprises *viz.*, cropping, animal husbandry, fishery, forestry *etc.* have great potentialities in the agricultural economy. These enterprises not only supplement the income of the farmers but also help in increasing the family labour employment.

1. The integrated farming system approach introduces a change in the farming techniques for maximum production in the cropping pattern and takes care of optimal utilization of resources.
2. The farm wastes are better recycled for productive purposes in the integrated system.
3. A judicious mix of agricultural enterprises like dairy, poultry, piggery, fishery, sericulture *etc.* suited to the given agro-climatic conditions and socio-economic status of the farmers would bring prosperity in the farming.

The growth rate of agriculture in the recent past is very slow in spite of the rapid economic growth in India. According to the Economic Survey of India, 2008, the growth rate of food grain production decelerated to 1.2% during 1990-2007, lower than the population growth of 1.9%. It is projected that in our country population will touch 1370 million by 2030 and to 1600 million by 2050. To meet the demand, we have to produce 289 and 349 MT of food grains during the respective periods. The current scenario in the country indicates that area under cultivation may further dwindle and more than 20% of current cultivable area will be converted for non-agricultural purposes by 2030.

The operational farm holding in India is declining and over 85 million out of 105 million are below the size of 1 ha. Due to ever increasing population and decline in per capita availability of land in the country, practically there is no scope for horizontal expansion of land for agriculture. Only vertical expansion is possible by integrating farming components requiring lesser space and time and ensuring reasonable returns to farm families. The Integrated farming system (IFS) therefore assumes greater importance for sound management of farm resources to enhance the farm productivity and reduce the environmental degradation, improve the quality of life of resource poor farmers and maintain sustainability. In order to sustain a positive growth rate in agriculture, a holistic approach is the need of the hour.

Integrated farming system approach is not only a reliable way of obtaining fairly high productivity with considerable scope for resource recycling, but also concept of ecological soundness leading to sustainable agriculture. With increasing energy crisis due to shrinking of non-renewable fossil-fuel based sources, the fertilizer nutrient cost has increased steeply and with gradual withdrawal of fertilizer subsidy. It is expected to have further hike in the cost of fertilizers. This will leave the farmers with no option but to fully explore the potential alternate sources of plant nutrients at least for the partial substitution of the fertilizer nutrients for individual crops and in the cropping systems.

During XII plan period the ICAR-Project Directorate for Farming Systems Research (ICAR-PDFSR) officially renamed as Indian Institute of Farming Systems Research (IIFSR) and it established with focus on farming systems research after re-naming the Project Directorate for Cropping Systems Research (PDCSR) which became operational during 2009.

Objectives of integrated farming system:

1. Maximization of yield of all component enterprises to provide steady and stable income at higher levels.
2. Rejuvenation/amelioration of system's productivity and achieve agro-ecological equilibrium.
3. Control the buildup of insect-pests, diseases and weed population through natural cropping system management and keep them at low level of intensity.
4. Reducing the use of chemical fertilizers and other harmful agro-chemicals and pesticides to provide pollution free, healthy produce and environment to the society at large.

Characteristics

Each individual farm has its own specific characteristics, which arise from variations in resource endowments and family circumstances. The household, its resources and the resource flows and interactions at this individual farm level are together referred to as a farm system. A farming system is defined as a population of individual farm system that has broadly similar development strategies and interventions would be appropriate.

Classification of the farming system has been based on a number of key factors, including:

1. The available natural resources base.
2. The dominant pattern of farm activities and household livelihoods, including relationship to markets.
3. The intensity of production activities.

These criteria have been applied to each of the six main regions of the developing world. The exercise resulted in the identification of 72 farming systems with an average agricultural population of about 40 M inhabitants (FAO). Based on these criteria 8 broad categories of farming systems have been distinguished:

1. Irrigation farming system, embracing a broad range of food and cash crop production.
2. Wetland rice-based farming system, dependent upon seasonal rains supplemented by irrigation.
3. Rainfed farming system in humid areas characterized by specific dominant crops or mixed crop livestock system.
4. Rainfed farming system in steep and highland areas, which are often, mixed crop-livestock system.
5. Rainfed farming system in dry or cold low potential areas, with mixed crop-livestock and pastoral system merging into system with very low current productivity or potential because of extreme aridity or cold.
6. Dualistic (mixed large commercial and small holders) farming system, across a variety of ecologies and with diverse production pattern.
7. Coastal artisanal fishing system, which often incorporate mixed farming elements.
8. Urban-based farming system, typically focused on horticultural and livestock production.

List of the components/enterprises in integrated farming system

Agriculture	Mushroom cultivation	Seed Production	Sheep/goat rearing
Horticulture	Sericulture	Vermiculture	Piggery
Forestry	Azolla farming	Pigeon rearing	Rabbitory
Dairy	Kitchen gardening	Apiary	Value addition
Fish farming	Fodder production	Poultry	

Elements of integrated farming system

Watershed	Farm ponds	Bio-pesticides & Bio-fertilizers
Plant products as pesticides	Bio-gas	Solar energy
Compost making	Green manuring	Rain water harvesting

Advantages of Integrated farming system

1. It improves space utilization and increase productivity per unit area.
2. It provides diversified products.
3. Improves soil fertility and soil physical structure from appropriate crop rotation and using cover crop and organic compost.
4. Reduce weeds, insect pests and diseases from appropriate crop rotation.
5. Utilization of crop residues and livestock wastes.
6. Less reliance to outside inputs – fertilizers, agrochemicals, feeds, energy, *etc.*
7. Higher net returns to land and labour resources of the farming family.
8. Regular stable income through the products like egg, milk, mushroom, vegetables, honey and silkworm cocoons from the linked activities in integrated farming.
9. Reduced production cost of components through input recycling from the byproducts of allied enterprises.
10. Integration of allied activities will result in the availability of nutritious food enriched with protein, carbohydrate, fat, minerals and vitamins.