

## Integrated farming system- A model land use plan for sustainable development

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Out of 105 million operational holdings, 80 million holdings are smaller than one hectare in India (Sharma, 2011) and 85 per cent of the farming population is marginal land holding size family farms (Food and Agriculture Organization (FAO STAT, 2013). Under the circumstances of shrinking land holding size, it is necessary to integrate enterprises such as dairy, fishery, poultry, duckery, apiary, along with field and horticultural crops etc. so as to make farming a more profitable and dependable options for the farmers (Behera *et al.*, 2004). Integration of enterprises not only helpful in ensuring food, nutrition and livelihood security but also ensures social, economic and environmental sustainability. Future of agriculture and rural poverty alleviation depends on how we ensure food, nutrition and livelihood security through sustainable and integrated family farming, which is resilient to uncertainties of open markets and climatic variability. There is an urgent need for sustainable agricultural practices for the development of smallholder farms to ensure food and nutritional security as well as economic advancement. IFS approach focuses on a few selected interdependent, interrelated and interlinking enterprises of crops, animals and other related subsidiary professions. Thus, it is helpful in enhancing productivity, profitability and nutritional security of the farmer and various enterprises involved sustains the soil productivity through recycling of organic sources (Yogeesh *et al.*, 2016). Under such situations, Integrated farming system could provide best possible solution to the rising demand for food production, income stability and improvement of nutritional status of the small and marginal farmers within the socio-economic and bio-physical resources base of the area and hence, it could be considered a model land use plan for sustainable development of the locality in general and farming community *per se*.

**Basic aim and objective of the IFS :** The basic aim of IFS is to derive a set of resource development and

utilization practices, which lead to substantial and sustained increase in agricultural production (Kumar and Jain, 2005). The primary objective of the IFS is to maintain production of food and other goods and services that contribute to food security and income generation to the rural poor. Besides, it is important for achieving environmental and ecosystem services and ensures agricultural sustainability. It is considered as an alternative to commercial farming systems because it helps in preventing resource degradation and stabilization of farm income of the marginal land holders (Lightfoot and Minnick, 1991).

**Integrated farming system approach :** Integrated farming system approach not only fulfills the household needs but also ensures nutritional security for both human as well as animals being. It also generates employment and earning to the rural masses specially the marginal and small farm holders, which in turn ensures a better livelihood opportunity. This approach not only increases income and employment opportunity but also protect the environment through recycling of the crop and animal wastes at farm itself.

**Need of integrated farming systems :**

*Protection and conservation of natural resources :* Green revolution era witnessed a very high consumption of off-farm resources (Chemical fertilizers, pesticides, herbicides etc.) to raise the productivity of crops, which led to food contamination, ground water pollution and soil degradation problems. Such problems can be addressed by adopting IFS strategy due to its natural potential of recycling and reuse of farm and animal waste, which in turn less or no reliance on the off-farm resources and conservation of natural as well as financial resources of the country.

*Protection from environment and climate change:* Integrated farming system could mitigate the adverse effect of climate change and environment to a greater extent because it ensures sustainable agricultural

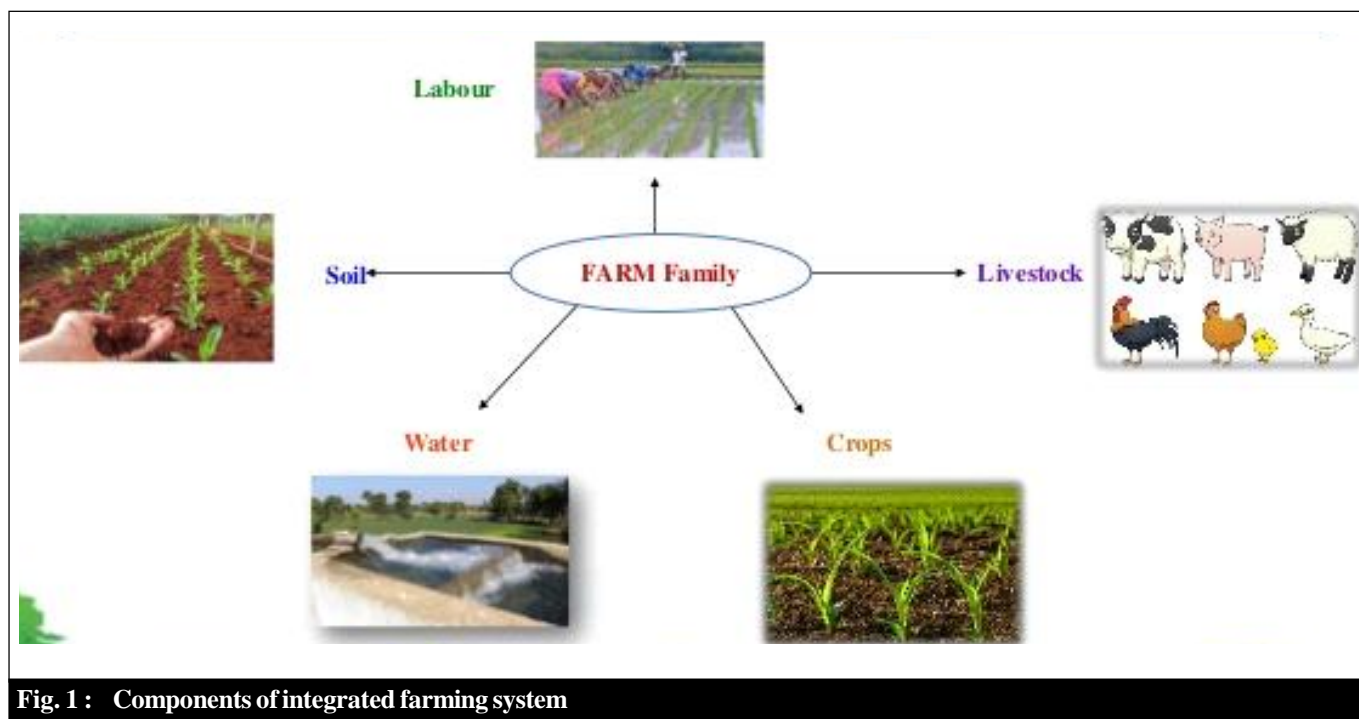


Fig. 1 : Components of integrated farming system

production, conservation and utilization of natural resources effectively and efficiently, scientific rearing of livestock, optimum land use for meeting the demands of food, fibre, fuel and fodder requirements under the existing and changing socio-economic conditions.

**Protection and conservation of biodiversity :** IFS rely on multiple enterprises viz., crops, livestock, horticulture, fishery etc. to meet the food and fodder demands of human as well as animal being. Due to reliance on various production systems for meeting the food and fodder requirements it does not over exploit the genetic biodiversity of a particular component besides; it provides every chance to flourish different components simultaneously and/ or sequentially.

**Food and nutritional security :** IFS ensures a balanced supply of food, fodder and other consumable products for the farming family round the year as it integrates various enterprises simultaneously, which in turn yield different component in sufficient quantity and proportions so as to meet the food and nutritional requirement (food grain, milk, egg, meat etc.).

**Restoration of soil fertility :** IFS ensure effective utilization of farm and animal wastes by recycling them on farm, which is used as organic source, which in turn improves the soil physico-chemical and biological properties. Therefore, it ensures sustain the soil health and environment for crop growth.

**Provision for sustainable rural livelihood security :** IFS ensure regular income and employment for the farming families from various enterprises. Therefore, it is considered as a means to provide sustainable rural livelihood under different socio-economic constraints due to its inherent potential to secure an economically viable, ecologically sound and socially acceptable living for the rural farmers and unemployed youths. Its income and employment generation potential across the country has been reported by the researchers. Radhamani (2001) reported that integrated farming system with crop+ goat under rainfed vertisols was found effective in generating an additional employment of 314 man days/year.

**Benefits of IFS :** It ensures social and ecological security under limited resource base of the farmers by integration of different components of IFS.

- It ensures round the year income and employment generation - It was reported from various researches that the magnitude of income ranges from INR. 55000 (Ramrao *et al.*, 2005) to INR. 80000 (Dasgupta *et al.*, 2014). Behera and Mahapatra (1999) reported more than 450 man-days ha<sup>-1</sup> year<sup>-1</sup> in a pond-based system. Similarly, Jayanthi *et al.* (2000); Ramrao *et al.* (2005) and Solaippan *et al.* (2007) reported that mixed integrated systems generate 575, 950 and 343 man-days ha<sup>-1</sup> year<sup>-1</sup>, respectively.

- It ensures food security by integrating different

components viz., crops, livestock, fishery, poultry and duckery. Besides it also ensures a proper balanced nutrition and food security of the farming family.

– Saving of farm resources -IFS use on-farm resources as fertilizers and manures and hence, save lot of financial resources of the farm family, which in turn reduces the cost of cultivation and thereby add to the farmers' income.

– Integrated farming system and carbon storage - IFS has a tremendous potential of storing Carbon in the eco-system since – (a) tree is considered as an important component of the system, (b) livestock are raised and organic manures are used extensively in farming that enhances soil carbon storage, (c) external input like fertilizers are minimized hence, indirectly saving fossil fuel, and (d) little amount of fossil fuel is used in farming.

– Integrated farming system and biodiversity - IFS encourage the maintenance of biodiversity in the agro-ecosystem by growing more number of crops/varieties (often by employing mixed and intercropping), by raising more number and breed of ruminants and non-ruminants in the farm, by maintaining several tree species, shrubs and herbs in the homestead and farm (to meet several household and farm-related needs), by encouraging the integrated management of pest and by enhancing soil microbial biodiversity by incorporating more organic matter into it.

#### Constraints in adoption of integrated farming systems :

Labour shortages during peak period of multiple enterprises,

- Availability of improved breeds of livestock,
- Timely availability of fish seed and fish feed,
- Credit support from financial institutions
- Information about improved technologies
- Awareness about Government schemes on various inputs and

– Effective extension services for technology transfer upto farmers field level

**Conclusion :** Integrated farming systems is important for the marginal and small farmers under the changing scenario of global climate. In this context, better understanding of the nature and extent of the interactions among various enterprises and natural resources is essential for the economic benefits as well as livelihood security. IFS is capable of producing diverse social, economic and environmental benefits besides, ensuring food security, employment opportunity.

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