

**Rohini College of Engineering & Technology**

**AI 3017 INTEGRATED FARMING SYSTEM**

**UNIT 1.2**



**Rohini College of Engineering & Technology**

## **Types of Farming System:**

Integrated Farming Systems (IFS) can vary widely depending on the specific combinations of agricultural enterprises and practices integrated within a farming system. Here are several types of integrated farming systems commonly practiced around the world:

### **1. Crop-Livestock Integration:**

- **Crop Rotation:** Alternating different crops in sequence to optimize soil health and nutrient management.
- **Mixed Farming:** Integrating crops with livestock (e.g., cattle, sheep, goats) on the same farm to utilize crop residues as animal feed and manure for crops.

### **2. Agroforestry Systems:**

- **Silvopastoral Systems:** Integrating trees or shrubs with pasture or livestock production, providing shade, fodder, and timber.
- **Agro-Silvopastoral Systems:** Combining crops, livestock, and trees in a mutually beneficial arrangement, enhancing biodiversity and soil fertility.

### **3. Aquaculture Integration:**

- **Aquaponics:** Integrating fish or shrimp farming with hydroponic crop production, where fish waste provides nutrients for plants and plants purify water for fish.
- **Integrated Fish-Farming:** Combining fish ponds with crop farming, where pond water is used for irrigation and fish waste serves as fertilizer.

### **4. Mixed Farming Systems:**

- **Diversified Farming:** Introducing multiple crops and livestock species on the same farm to improve farm resilience and productivity.
- **Integrated Dairy Farming:** Combining dairy farming with crop production, where animal manure fertilizes crops and crop residues feed livestock.

### **5. Horticulture Integration:**

- **Agro-Horticulture Systems:** Integrating horticultural crops (fruits, vegetables) with other farming enterprises to diversify income sources and maximize land use efficiency.
- **Floriculture Integration:** Combining flower cultivation with other farming activities to cater to local markets or export industries.

### **6. Urban and Peri-urban Farming:**

## Rohini College of Engineering & Technology

- **Rooftop Gardening:** Utilizing rooftop spaces for vegetable cultivation, often in conjunction with rainwater harvesting and composting.
  - **Community Gardens:** Integrating multiple small-scale gardens within urban areas, fostering community engagement and local food production.
7. **Integrated Pest Management (IPM):**
- **Biological Control:** Introducing natural predators or parasites to control pest populations in crops, reducing reliance on chemical pesticides.
  - **Crop Rotation and Companion Planting:** Planting diverse crops together to deter pests and diseases naturally.
8. **Energy Farming:**
- **Bioenergy Systems:** Integrating energy crops (e.g., biomass, biofuels) with traditional farming practices to produce renewable energy while maintaining agricultural productivity.
9. **Integrated Nutrient Management:**
- **Organic Farming:** Utilizing organic materials (compost, green manure) and practices (crop rotation, cover cropping) to maintain soil fertility and minimize reliance on synthetic fertilizers.
10. **Livelihood and Agroecosystem Integration:**
- **Integrated Livelihood Systems:** Combining diverse agricultural and non-agricultural activities (e.g., beekeeping, handicrafts) to enhance income and food security in rural communities.
11. **Pastoral-Farming Integration:**
- **Agro-Pastoral Systems:** Integrating crop production with extensive livestock grazing, where livestock provide manure for crops and crop residues feed livestock during periods of scarcity.
12. **Agro-forestry Systems:**
- **Taungya System:** A traditional system where crops are grown during the initial years under the canopy of fast-growing trees, providing shade and shelter, followed by timber production from the trees.

## Rohini College of Engineering & Technology

- **Homegardens:** Small-scale agroforestry systems around homesteads where diverse crops, fruit trees, and sometimes livestock are integrated, providing multiple products and enhancing food security.

### 13. Integrated Vermicomposting:

- Integrating vermiculture (worm farming) with organic waste management and crop production. Worms convert organic waste into nutrient-rich vermicompost, which improves soil fertility and enhances crop yields.

### 14. Integrated Agri-Aquaculture Systems:

- **Rice-Fish Culture:** Introducing fish species into rice paddies during the wet season, where fish feed on pests and weeds, while their waste fertilizes the rice crop.
- **Integrated Multi-Trophic Aquaculture (IMTA):** Cultivating multiple species (e.g., fish, shrimp, seaweed) in a single ecosystem, where each species contributes to nutrient cycling and ecosystem balance.

### 15. Integrated Livestock-Waste Management:

- **Biogas Systems:** Using anaerobic digestion to convert livestock manure into biogas for cooking and heating, while the digestate serves as organic fertilizer for crops.
- **Integrated Livestock-Poultry Systems:** Integrating poultry farming with livestock to utilize poultry manure for composting or as feed supplement for livestock.

### 16. Integrated Pest and Disease Management:

- **Trap Cropping:** Planting specific crops to attract pests away from main crops, reducing the need for chemical pesticides.
- **Crop Diversification:** Growing a mix of crops that have different pest susceptibilities, reducing pest pressure on individual crops.

### 17. Integrated Agricultural-Water Management:

- **Rainfed Agriculture:** Integrating crop production with rainwater harvesting techniques, such as contour farming and bunding, to conserve soil moisture and reduce erosion.

## Rohini College of Engineering & Technology

- **Integrated Irrigation Systems:** Combining efficient irrigation methods (drip, sprinkler) with soil moisture monitoring and crop water requirements, optimizing water use efficiency.

### 18. **Integrated Seed-Fertilizer Systems:**

- **Seed-Bed Preparation:** Integrating seed treatment with organic fertilizers or bio-fertilizers to enhance seed germination and early plant growth.
- **Seedling Nurseries:** Growing seedlings in nutrient-rich media or organic composts before transplanting into the main field, ensuring strong early growth and establishment.

### 19. **Integrated Livelihood and Conservation Systems:**

- **Community-based Conservation Agriculture:** Integrating sustainable agriculture practices with biodiversity conservation efforts, preserving natural habitats while promoting agricultural productivity.
- **Indigenous Integrated Farming Systems:** Traditional farming systems practiced by indigenous communities, combining ancestral knowledge with modern techniques to sustainably manage natural resources and enhance livelihoods.

### 20. **Integrated Agricultural Value Chains:**

- **Farm-to-Table Systems:** Integrating production, processing, and marketing of agricultural products within a local or regional value chain, ensuring traceability and quality control.
- **Contract Farming:** Integrating farmers into supply chains through contractual agreements with processors or exporters, providing market access and stable incomes.

### 21. **Agroforestry Systems:**

- **Silvopastoral Systems:** Integrates trees or shrubs with livestock grazing. Trees provide shade, fodder, and timber, while livestock contribute to nutrient cycling and soil fertility.

## Rohini College of Engineering & Technology

- **Agro-Silvopastoral Systems:** Combines crops, livestock, and trees in a mutually beneficial arrangement. For example, planting fodder trees in pastures or alley cropping with nitrogen-fixing trees like Acacia.
- **Homegardens:** Small-scale agroforestry systems around homesteads, typically including a mix of fruit trees, vegetables, herbs, and sometimes small livestock. Homegardens enhance food security and provide a variety of products for household consumption and sale.

### 22. Aquaculture Integration:

- **Rice-Fish Culture:** In this system, fish are introduced into rice paddies during the wet season. The fish feed on pests and weeds, while their waste fertilizes the rice crop. This integrated approach reduces the need for chemical pesticides and synthetic fertilizers.
- **Integrated Multi-Trophic Aquaculture (IMTA):** This system involves cultivating multiple species in the same ecosystem, where each species plays a complementary role. For instance, combining fish with seaweed or shellfish cultivation to utilize waste nutrients and improve overall ecosystem productivity.

### 23. Agro-Pastoral Systems:

- **Agro-Pastoral Systems:** Integrates crop production with extensive livestock grazing. This system is prevalent in areas where traditional pastoralism is practiced, combining livestock rearing with rainfed crop cultivation during the agricultural season.
- **Taungya System:** A traditional system where farmers grow crops under the shade of fast-growing trees during the initial years. Once the trees mature, they are harvested for timber or other products, allowing for sustainable land use and diversified income streams.

### 24. Integrated Livestock-Waste Management:

- **Biogas Systems:** Uses anaerobic digestion to convert livestock manure into biogas for cooking and heating purposes. The digestate, a byproduct of biogas production, is rich in nutrients and can be used as organic fertilizer for crops, thus closing the nutrient cycle on the farm.

- **Integrated Livestock-Poultry Systems:** Integrates poultry farming with livestock production. For instance, poultry can be raised in rotational systems on pasture, where their scratching behavior helps in weed control and fertilization, benefiting subsequent crops or pastures.

**25. Integrated Pest and Disease Management:**

- **Trap Cropping:** Involves planting specific crops that attract pests away from the main crops, reducing pest pressure and minimizing the need for chemical pesticides. For example, planting marigolds to attract nematodes away from vegetable crops.
- **Crop Diversification:** In this approach, farmers grow a mix of crops with different growth habits, pest susceptibilities, and nutritional requirements. Crop diversification helps in pest management and reduces disease incidence, improving overall farm resilience.

**26. Integrated Agricultural-Water Management:**

- **Rainfed Agriculture:** Integrates crop production with rainwater harvesting techniques, such as contour farming and water-harvesting structures. These practices help conserve soil moisture and reduce erosion in rainfed agriculture systems.
- **Integrated Irrigation Systems:** Combines efficient irrigation methods (e.g., drip irrigation, sprinkler irrigation) with soil moisture monitoring and crop water requirements. This integration optimizes water use efficiency and ensures crops receive adequate irrigation without wastage.

**27. Integrated Seed-Fertilizer Systems:**

- **Seed-Bed Preparation:** Includes practices like seed priming or treating seeds with bio-fertilizers before planting. These techniques enhance seed germination, early plant growth, and nutrient uptake.
- **Seedling Nurseries:** Involves raising seedlings in nutrient-rich media or organic composts before transplanting into the main field. This approach ensures strong early growth and establishment of seedlings, leading to better crop performance.

**28. Integrated Livelihood and Conservation Systems:**

## **Rohini College of Engineering & Technology**

- **Community-based Conservation Agriculture:** Integrates sustainable agriculture practices with biodiversity conservation efforts. Farmers use methods like minimum tillage, cover cropping, and agroforestry to maintain soil health and biodiversity while improving crop yields.
- **Indigenous Integrated Farming Systems:** Reflects traditional farming practices of indigenous communities, integrating diverse crops, livestock, and natural resources management. These systems often incorporate traditional knowledge and cultural practices to sustainably manage landscapes and enhance livelihoods.