Biotica Research Today Vol 4:5 2022

295/297

Integrated Farming System: A Way towards Climate Resilience

Mandakranta Chakraborty[1*], Supriya Debnath[2] and Gaytri Hetta[1]

[1]College of Agriculture, CSK HPKV, Palampur, Himachal Pradesh (176 062), India

[2]College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh (482 004), India

Open Access

Corresponding Author

Mandakranta Chakraborty

e-mail: chakrabortymandakranta@gmail.com

Keywords

Agro-ecosystem, Recycling, Risk minimization, Sustainable

Article History

Received on: 01st May 2022

Revised on: 06th May 2022

Accepted on: 07th May 2022

E-mail: *bioticapublications@gmail.com*

How to cite this article?

Chakraborty *et al*., 2022. Integrated Farming System: A Way towards Climate Resilience. Biotica Research Today 4(5):295-297.

Abstract

Vertical expansion through integration of appropriate farming components is the only way out for economic and sustainable crop production. IFS may be defined as linking together of two or more normally separate enterprises into a whole farming system. NATP broadly delineated the agro-ecosystem of India into 5 zones: rainfed, irrigated, coastal, arid and hill and mountain, farming system models are established based on agro-ecological situations, socio-economic settings, *etc*. The resource-saving practices involved in IFS are profitable and sustainable besides minimizing the negativities and risks associated with intensive cropping. Thus, IFS should be popularised among farmers.

Introduction

The average sizes of landholdings have declined from 2.28 ha in 1970-71 to 1.08 ha (2021). With the growing population and shrinking resources, horizontal expansion of cropping area is no more feasible, vertical expansion through integrating appropriate farming components is essential for economic and sustainable crop production. Integrated Farming System (IFS) is an integrative whole farm approach and effective in solving the problems of small and marginal farmers through boosting employment and income by integrating various farm enterprises and recycling crop residues.

Concept of IFS

IFS may be defined as linking together of two or more normally separate enterprises which then become subsystems of a whole farming system. Two major features of IFS are: (1) waste or by-product utilization in which the wastes or by-products of one subsystem become an input to a second subsystem; and (2) improved space utilization in which the two subsystems essentially occupy part or all of the space required for an individual subsystem (Behera and France, 2016). An ideal IFS would satisfy five basic conditions: (1) economic feasibility; (2) nutritional security; (3) environmental sustainability; (4) energy self-sufficiency; and (5) climatic adaptability (Behera *et al.,* 2015).

Goals of Integrated Farming System

The four primary goals of IFS are:

1. Maximization of the yield of all components to provide steady and stable income.

2. Rejuvenation of the system's productivity and achieve agro-ecological equilibrium.

3. Avoid the build-up of insect-pests, diseases and weed populations through natural cropping system management and keep them at a low level of intensity.

4. Reducing the use of chemicals to provide chemical-free healthy produce and environment to the society (Manjunatha *et al*., 2014).

IFS based of Agro-Ecosystems of India

According to National Agricultural Technology Project (NATP), India has been broadly delineated into 5 agro-ecosystems: rain-fed, irrigated, coastal, arid, and hill and mountain. The farming system in one agro-ecosystem differs from another depending upon agro-ecological situations, socio-economic settings, *etc*. Thus, suitable IFS for different agro-ecosystems are mentioned below in table 1.

Advantages of IFS

• *Productivity*: IFS increases economic yield per unit area per unit time by virtue of intensification of crop and allied enterprises.

• *Sustai nability*: Organic supplementation through effective utilization of by-products of linked components, sustain the potential of the production base for much longer periods.

• *Balanced food*: Components of a varied nature are linked to produce different varieties of products and produce, which serve to provide a balanced diet for the farm family.

• *Resource recycling*: Effective recycling of waste materials and by-products lowers reliance on outside inputs stabilizing production.

• *Income year round*: IFS provides a flow of money for the farmers throughout the year by way of the sale of a variety of farm produce (*e.g.*, milk, egg, mushroom, vegetables, fruits, food grains).

• *Risk minimization*: Diversification of crops and enterprises helps in risk minimization and offers resilience to climate change.

Table 1: Suitable IFS models under different Agro-ecosystems of India

Agro-ecosystem	Suitable Integrated farming systems
Rainfed Agro-Ecosystem	1. Dryland cropping (Sorghum/ Pearl Millet + Cowpea) + Sheep/ Goat + Trees/ grass fodder (*Lucaena + Cenchrus/ Acacia Senegal/ Prosopis cineraris*). 2. Rainfed cropping (Sorghum + pulses) + Sheep/ Goat + Dryland horticulture (ber, custard apple, vegetables).
Irrigated Agro-Ecosystem	1. Cropping (Cotton-Sorghum-finger millet) + Cattle + Mushroom cultivation. 2. Improved cropping (rice-rice-cotton/ rice-rice-maize) + Poultry + Fish 3. Rice + Fish + Vermicomposting + Vegetable farming
Coastal Agro-Ecosystem	1. Cropping (Rice-Rice-Maize/ Rice-Rice-Groundnut) + Fish (silver carp/ rohu/ mrigal/ grass carp) + Poultry + Mushroom Cultivation. 2. Rice + Fish + Poultry – Cowpea
Arid Agro-Ecosystem	1. Diversified cropping (pearl millet + greengram + clusterbean) + Tree/ grass (*Prosopis cineraria, Cenchrus ciliaris*) + Sheep/ Goat. 2. Agri-horticulture (Ber + Pearl millet/ Cluster bean) + Boundary plantation (*Acacia senegal, Hardwickia binata*) + Cattle (Tharparkar). 3. Silvi-pasture (*Hardwickia binata/ Ailanthus excels*) + Horti-pasture (*Ziziphus rotundifolia/ Ziziphus mauritiana + Cenchrus ciliaris*) + Goat/ Sheep.
Hill and mountain Agro-Ecosystem	1. Poultry + Crop (Rice/ Maize + Soybean/ Mustard) + Fish + Duck + Horticulture. 2. Crop (Maize/ Wheat/ Rice+ Vegetables) + Fish + Poultry + MPTs (*Dalbergia sissoo, Melia azedarach, Eucalyptus hybrid, Eulaliopsis binata*). 3. Crop (Cereals + Oilseed/ Pulses) + Fish + Goat + Bamboo + MPTs (*Acacias, Leucacena leucocephala*).

Conclusion

The resource-saving practices involved in IFS are profitable and sustainable besides minimizing the negativities and risks associated with intensive cropping. It improves environmental conditions and reduces reliance on external inputs and conserves resources. Farmers are able to uplift productivity through optimal resource utilization and waste matter recycling. Thus, popularisation of IFS should be promoted and any help needed for its successful adoption should be extended to farmers.

Future Thrust

• Development of low cost, location specific, viable and socially acceptable IFS models for varied landholding sizes are required.

• Module development on the basis of farmer's need through on-farm testing is necessary by substituting lower profitable components with higher ones, depending upon choice of the farmers and availability of market.

• Inclusion of high value crop according to different agro-

ecosystem can help in the sustainability and profitability of the IFS modules.

• There is necessity to evaluate soil nutrient dynamics, carbon sequestration and organic resource recycling with different systems over the long run.

• Drafting policy for its promotion and awareness at large scale with small financial aids through loans or subsidy.

References

Behera, U.K., Babu, A., Kaechele, H., France, J., 2015. Energy self-sufficient sustainable integrated farming systems for livelihood security under a changing climate scenario in an Indian context: a case study approach. *CAB Reviews* 10(19), 11.

Behera, U.K, France, J., 2016. Integrated Farming Systems and the Livelihood Security of Small and Marginal Farmers in India and Other Developing Countries. *Advances in Agronomy* 138, 235-282.

Manjunatha, S.B., Shivmurthy, D., Sunil, A.S., Nagaraj, M.V., Basavesha K.N., 2014. Integrated Farming System - An Holistic Approach: A Review. Research and Reviews: *Journal of Agriculture and Allied Sciences* 3(4), 30-38.