

AGRI MAGAZINE

(International E-Magazine for Agricultural Articles) Volume: 02, Issue: 05 (May, 2025) Available online at http://www.agrimagazine.in [©]Agri Magazine, ISSN: 3048-8656

Rainfed Integrated Farming System: Under Shadow of Dry Area ^{*}Gajendra KumarVerma¹ and Arun Meghwal² ¹M.Sc. Scholar (LPM), S.K.N. Agriculture University, Jobner, Jaipur, Rajasthan-303329, India ²M.Sc. Scholar (Agronomy), Sardarkrushinagar Dantiwada Agricultural University, Sknagar, Dantiwada, Gujarat-385506, India ^{*}Corresponding Author's email: <u>ver.gajendra@gmail.com</u>

R ainfed agriculture accounts for 68% of India's cultivated land and provides food for 40% of the human and 60% of the animal populations. It generates 44.5 percent of India's food requirements, and so has played and will continue to play a key part in the country's food security. However, abnormal monsoon rainfall behaviour, eroded and degraded soils with numerous nutrient and water deficits, a diminishing ground water table, and a poor farmer resource base are the primary restraints for low and unstable yields in rainfed areas. Increasing agricultural production to fulfil the food needs of our country's millions offers a significant challenge. As a result, the situation necessitates measures to increase output in both time and space. This might be accomplished through the development of appropriate agricultural and farming methods in rainfed agriculture.

Rainfed regions have been split into five key production systems in order to critically analyse crop and area specific issues and potentials, namely, Nutritious Cereals, oilseeds, Rainfed rice, Pulses, Cotton, and Soybean based systems. Rainfed farmers are often modest subsistence landowners that combine agricultural and animal production. Farming systems are the planned cultivation of crops, fruit and forest trees, fish, poultry, sericulture, mushrooms, and other animals on a specific area of land with the goals of improving the environment overall, boosting productivity and profitability, and upgrading the base of natural resources.

The idea behind switching from a cropping system to a farming system is to:

(i) Lessen reliance on chemicals by recycling organic leftovers in situ, including agricultural waste produced on the property.

(ii) Lowering cultivation costs by improving input utilisation efficiency.

(iii) Making efficient use of one component's wastes or bye-products to benefit another component or components.

(iv) Improving the biodiversity and quality of the soil and water;

(v) Increasing water productivity.

(vi) Ensuring nutritional security by reducing chemical residues in the soil, plants, animals, and human food chain.

(vii) Ensuring environmental security by reducing the amount of greenhouse gases released into the atmosphere from the soil.

For small landholders, farming systems offer a wide range of livelihood collecting opportunities, improved risk management techniques, and year-round income and employment. Through reciprocal integration, it entails using the primary and secondary output of one system as the foundational input of another.

Components of Rainfed Integrated Farming System:

1. Diversified cropping: Crop diversification means growing a variety of different crops on a piece of land. It helps reduce the risk of crop failures due to pests, diseases or adverse weather. The common crops of the arid region are: pearl millet, greengram, moth bean, cluster bean and sesame. High value- low volume commodities like medicinal, dye yielding crops etc. could also provide much needed buoyancy in arid farming. This includes *Cassia angustifolia, Aloe vera, and Plantago ovata.*

2. Livestock production: Dairy farming is one of the economically viable enterprises in rainfed ecosystem that could provide constant income throughout the year to farmers when combined with cropping. Increased fodder production as an intercrop with cereals, relay and alley cropping, forage production on bunds and improved grass productivity quantification and distribution determine the effective growing season all contribute to increasing livestock productivity in rainfed agriculture. Legumes in degraded lands, the construction of fodder banks in areas with surplus fodder available, artificial insemination using semen-approved bulls, the castration of low-grade animals, and the adoption of preventive measures like vaccination and de-worming through health camps were all beneficial ways to increase yield by 15–25%.

3. Sheep rearing: Sheep rearing is the raising and breeding of domestic sheep. It can be raised in a range of temperate climates, including arid zones near the equator. Sheep with its multi-facet utility for wool, meat, milk, skins and manure, form an important component of rural economy particularly in the arid, semi-arid and mountainous areas of the country. Even with the poor grazing facilities and with minimum managerial resources sheep and goats can return high profits to rainfed farmers. Chokla, marwari, bhakarwal, merino etc. are the most important breeds of sheep.

4. Goat rearing: Goat is one of the important common livestock enterprises followed by small and marginal farm families and landless labourers in drought prone, hilly and desert areas. It needs less capital when compared to dairying, and the animals can be raised in small farms as well. This enterprise provides employment opportunities round the year for the farm household as well as for the unemployed and under employed rural population. The most important breeds of goat are jamunapari, barbari, beetal, sirohi, saanen etc.

5. Poultry farming: Poultry farming is the form of animal husbandry which raises domesticated birds such as chickens, ducks, and turkeys to produce meat or eggs for food. It is emerging as an important livestock activity in farming system for enhancing economic stability, nutrition and providing regular employment and cash flow. Cereals (Maize, barley, oats, wheat, pearl, millet, sorghum, rice-broken); cakes/meal (Oil cakes, maize-meal, fish meal, meat meal, blood meal); minerals/salt (Limestone, oyster shell, salt, manganese) are some of the popular feed materials used for creating chicken ration in India. The most important breeds of poultry are white leghorn, kadaknath, plymouthrock, aseel etc.

6. Horticulture: In rainfed condition, horticulture is more profitable than other crops because of less water availability and it requires less care, providing continuous income after few years. Ber, Guava, Citrus, Pomegranate, Fig can be planted in rainfed conditions. Dried leaves can be used in FYM, fuel purposes, branches can be used as fencing purposes. It gives balanced nutrition to the farm family.

7. Agro-forestry: Agroforestry is important component in IFS. It gives cash to farm families and also provide fuel. Sal, Segun, Eucalyptus and Mehagini *etc.* are suitable for rainfed areas. Rainfall is the primary governing factor for evolution of different agroforestry systems in the region. *Prosopis cineraria* based agroforestry is the most popular and widespread system covering about 60% area of arid zone.

8. In-situ moisture conservation: In-situ moisture conservation decides the survival of crops in arid zone. Studies on preparatory tillage suggested that one sub-surface cultivation (disking) once in three years followed by harrowing and planking is required for good crop stand and higher yields of crops. Soil amendments like pond sediments, vermiculite, FYM, etc. were found very promising in improving moisture retention capacity of the soil. Use of

mulches has been reported to favorably modify the hydrothermal regimes of soil and suppress weeds in arid regions.

Importance of Rainfed Integrated Farming Systems:

Water Conservation: Rainfed systems rely on natural rainfall for water supply. By integrating various crops, livestock, and aquaculture, farmers can optimize water use and reduce the risk of water scarcity. This promotes efficient water management and conservation.

Diversification of Income Sources: Integrating different agricultural activities within a single farming system provides farmers with multiple sources of income. This diversification helps in reducing economic risks associated with the dependence on a single crop or livestock species. It enhances resilience against market fluctuations and adverse weather conditions.

Soil Health Improvement: Rainfed integrated farming systems often involve the cultivation of a variety of crops, which can contribute to the improvement of soil health. Crop rotation and intercropping practices help in preventing soil degradation, erosion, and nutrient depletion. The integration of legumes in the system also enhances nitrogen fixation, enriching the soil fertility.

Biodiversity Conservation: Integrating crops, livestock, and aquaculture in a farming system promotes biodiversity. This biodiversity can have positive effects on ecosystem services, such as pollination, pest control, and nutrient cycling. It helps create a more resilient and sustainable agricultural ecosystem.

Climate Change Adaptation: Rainfed farming systems are particularly important in the context of climate change. These systems are often more adaptable to changing weather patterns and can help farmers cope with unpredictable rainfall, droughts, or floods. Diversification and integration can serve as risk-mitigation strategies.

Livestock Integration: Integrating livestock into rainfed farming systems allows for efficient nutrient cycling. Livestock can graze on crop residues, providing natural fertilizer through manure. This integration helps in maintaining the nutrient balance in the soil and contributes to sustainable agricultural practices.

Local Resource Utilization: Rainfed integrated farming systems are well-suited for utilizing locally available resources. Farmers can make use of indigenous crops and livestock breeds that are adapted to the local agro-ecological conditions, reducing the dependency on external inputs.

Social and Economic Benefits: RIFS can have positive social and economic impacts by generating employment opportunities, improving food security, and fostering community development. The diversified nature of these systems often leads to improved rural livelihoods.

Reduced Environmental Impact: Compared to monoculture systems, rainfed integrated farming systems tend to have a lower environmental impact. They promote sustainable farming practices, reduce the need for synthetic inputs, and minimize the risk of pest and disease outbreaks.