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Plantation crops-based farming system is remunerative

The integrated farming system (IFS) is a judicious mix of one or more enterprises along with cropping having complimentary effect through effective recycling of wastes and crop residues and encompasses additional source of income to the farmers. The IFS activity depends on inter-dependent, inter-related and inter-linking production systems, based on crops, animals and related subsidiary professions. It improves species diversity, helps in soil building, preserving and improving ecological condition essential to achieve sustainability. It also enhances soil-nutrient cycling and prevents proliferation of pests. In all the ecosystems, IFS approach with location-specific models offers gainful employment and is highly profitable and sustainable. In this regard, the wide interspace between plantation crops can be efficiently used to grow variety of crops and to sustain the farmer's income and reduce the risk of crop failure and market fluctuations. Along with IFS, the soil and water conservation, integrated nutrient management, agroforestry, increase in nutrient-use efficiency processing and value addition are need of the hour.

UTILIZATION of inputs without impairing the quality of environment is the main objective in the farming system approach. 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, rained, hilly and coastal areas with a view to generate employment and income from the farm. The integration of farm enterprises depends on the following factors:

- Soil and climatic features of the selected area
- Availability of the resources, land, labour and capital
- Present level of utilization of resources
- Economics of proposed integrated farming system
- Managerial skill of farmer.

NEED OF INTEGRATED FARMING SYSTEMS

Deteriorating Resource Base

During post-green revolution period, the attempt to solve food problem and attain self-sufficiency in food production through excess use of agrochemicals, inevitable dependence on irrigation and high cropping intensity has led to contamination of food with harmful chemicals, pollution of groundwater, degradation of soil quality and damage to agriculturally beneficial microorganisms. In many regions, both surface and groundwater are already becoming unfit for human and animal consumption due to high concentration of pesticide residues.

Climate Change

The increasing green-house gases resulted in global warming. The Intergovernmental Panel for Climate Change (IPCC) projections on temperature predicts an increase of 1.8-4.0°C by the end of this century. Temperature and sea level changes will affect agriculture through their direct and indirect effects on

Arecanut + banana + coconut system

Arecanut + banana + coconut system

crops, soils, livestock, fisheries and pests. The brunt of environmental changes is expected to be very high in India due to greater dependence on agriculture, limited natural resources, alarming increase in human and livestock population, changing pattern in land use and socio-economic factors that pose a great threat in meeting the food, fibre, fuel and fodder requirement.

Narrowed Biodiversity

The narrowing of genetic biodiversity occurs as traditional crop varieties and local animal breeds are being replaced by modern ones. These new varieties/ breeds are certainly better matched to modern intensive agriculture, but rarely any consideration is given to preserving the bio-diversity of an agricultural ecosystem. In addition, the increased farming density tends to erode the biodiversity of flora and fauna in the agricultural ecosystems.

Multiplicity of Integrated Farming Systems

Very often, almost all Indian farmers, in pursuit of supplementing their needs of food, fodder, fuel, fibre and finance resort to adopt integrated farming systems, majority of them revolving around the crops + livestock components. Livelihood of small and marginal farmers, comprising more than 80% of total farmers, depends mainly on crops and livestock, which is often affected by weather aberrations.

Homestead-based Farming System

Homestead-farming system is an age-old production system. The traditional homestead-farming system in the coastal ecosystem with its highly diverse crop and animal components has been a low-input sustainable system evolved with nature, socio-economic, ecological and cultural aspects of the people. Homestead farming is the most common in IFS and may be defined as an operational unit which is adjacent or surrounds the farmer's home with a wide array of crops/trees with or without livestock and other subsidiary income-generating activities for subsistence and for marketable surpluses. The major constraints in homestead farming are its complex entity which varies according to the taste of the farmer. It is a form of low-input management subsistence model and since the situations within a small area differs considerably, models for different resource base is essential for homestead-based IFS. Homesteads are thus a unit of polyculture of perennials, annuals and livestock for the nearly full exploitation of solar energy. It fulfills the strategies of agroforestry

Arecanut + banana + coconut

and is a rich source of biodiversity. A close scrutiny of features of homestead farming system of Kerala reveals that the system has several attributes of globally important agricultural heritage system.

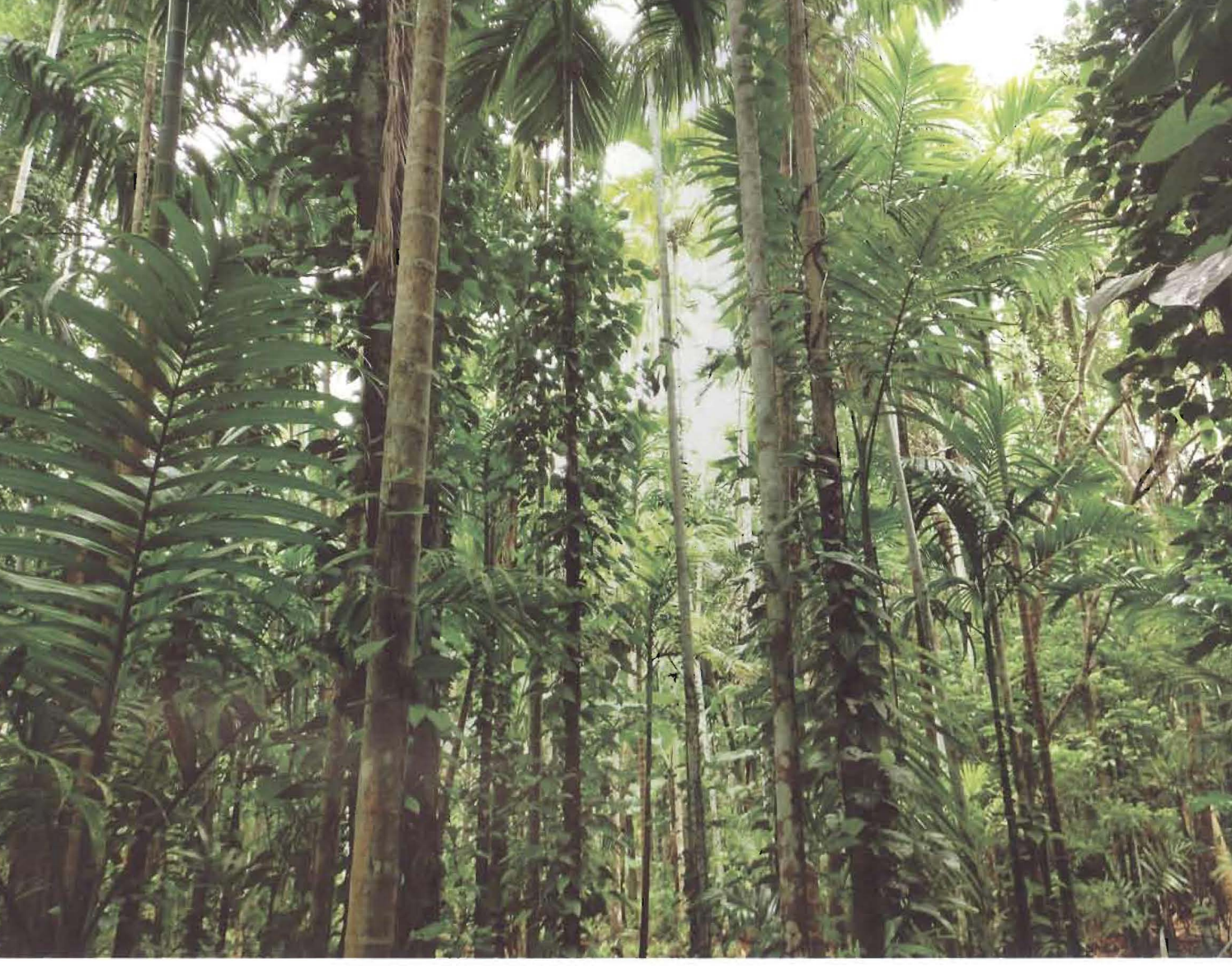
Coconut-based Integrated Farming Systems

The coconut-based IFS studies conducted at the CPCRI, Kasaragod and Kayamkulam, revealed that the grass–legume fodder from coconut garden in the ratio of 3:1 (30 to 40 kg) could support 4 milch cows/ha. The total output from 1.04 ha IFS model in 1994-95 was 19,125 nuts, 9,275 litre milk, 526 kg poultry, 50 Japanese quail bird and 400 kg fish. The economic analysis revealed that the total variable cost for the system was ₹15,9939. The gross and net returns/annum from the system was ₹207,169 and ₹66,678 respectively. The IFS with small farmers (0.2 ha and less) developed through linear programming, comprising 43 enterprises and with a cropping intensity of 161, provides a cost: benefit ratio of 1:2.5. A field investigation was carried out during 1998-2001 to identify a suitable forage grass with legume combination for intercropping in coconut in Goa with dairy integration. The result indicated that growing sole coconut achieved a net return of ₹6,225/ha. However, the net returns from a high yielding forage grass (PBN-16) with legume (Centrosema) intercropped in coconut was found to be ₹19,350/ha. The mean net returns from two milch cows was worked out to ₹17,710/year with a total net returns of ₹32,335/year from coconut-forage-dairy system. Thus, by growing forage in wider spacing of coconut with dairy integration would sustain the production and profitability of small and marginal farmers in the west coast of India.

Arecanut-based Integrated Farming System

An eight-year experiment studied the sustainability, profitability, interdependencies and ecosystem services of crop–livestock integration in an arecanut plantation (ABMS) in humid tropics of India during 2007–2014.The result highlights that carbon stocks were significantly higher in arecanut + fodder system (210–

Arecanut + Black pepper + Banana system



Arecanut + black pepper system

228 tonnes/ha) than arecanut sole and fodder sole. The contribution of livestock to total outflows was high (82-87%) and organic waste recycling potential of arecanut + dairy unit was 13.7 tonnes/ha and dairy unit alone contributed to 87% of the manure production. Total nutrient supply from arecanut based mixed cropping system after recycling to the system was estimated at 218 kg N, 51.8 kg P and 33 kg K that can meet N and P demand of 1.7 and 2.2 ha of arecanut, respectively.

Another study in Ramanagara district of Karnataka reported an arecanut yield of 10 tonnes, with a net profit of ₹1,60,000; vegetables' input cost is ₹38,000 and net profit is ₹2,07,000; for planting 1200 rose plants, cost is ₹30,000 and net profit is ₹1,80,000; cost incurred for growing 1500 marigold plants is ₹8,000 and the net profit is ₹47,000; flock of 16 sheep costs costs ₹60,000 and net profit is ₹68,000 and lastly vermicompost of 1-1.5 tonnes would give a net profit of ₹1700 with input cost being ₹500. This model shows a total earning of ₹6,63,700. This study shows that the interspace between arecanut rows can be used profitably by growing rose, marigold and vegetables with a successful integration with sheep.

Cashew-based Integrated Farming System

A model of area 0.8 ha comprising of enterprises – plantation crops: [cashew (variety Bhaskara) + pineapple (Variety Giant Kew)], coconut + pineapple+ papaya+noni, arecanut + banana), piggery, poultry, vermicompost unit, compost unit was evaluated for upland situations of Goa. The total cost of cultivation (inclusive of the farm labour employed) of the system was around ₹1.26 lakhs, whereas the net profit was ₹0.92. This net return was significantly higher based to the sole cashew crop cultivation. The highest contribution to net profit was from the cashewnut-pineapple (39%) system as both the components started yielding. The contribution of the piggery component to the net profit was 22%.

Sustainable Integrated Farming System

The concept of sustainability in agriculture depends upon the integration of three main factors, viz. environmental health, economic profitability and social and economic equity. On any farm, four natural ecosystem processes, energy flow, water cycle, mineral cycles and ecosystem dynamics are at work. These four ecosystem processes function

Arecanut+Banana+ Black pepper intercroppong system

Coconut + Pineapple System

together, complimenting each other. Sustainable agriculture require a system approach. System implies a set of inter-related practices organized into a functional entity. Farming system therefore designate a set of agricultural activities organized while preserving land productivity and environmental quality and maintaining a desired level of biological diversity and ecological stability. Sustainable agriculture in farming with efficient use of natural resources for increased productivity and production would result in improved farm income, maintenance of ecological balance, easy accessibility to food and social benefits and improved quality of life for farming communities. An agro-ecological approach is an appropriate method to understand the success of sustainable farming systems, and to identify ways to improve the productivity, profitability and resource use efficiency.

The horticultural crops as an enterprise in the integrated farming system triggers the profitability of particular farming system. The selection of horticultural component for the integrated farming systems should be based on location, soil and climate suitability, market demand, family requirement, available farm resources, etc. Besides yield and income, it also addresses partially the nutritional security and the issue of unemployment and has a potential to produce round the year income.

For further interaction, please write to:
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