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INTEGRATED FARMING SYSTEM AND MANAGEMENT (IFS&M): AN APPROACH FOR SUSTAINABLE AGRICULTURAL PRODUCTION IN MANIPUR STATE OF INDIA

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I. GREEN REVOLUTION TECHNOLOGIES IN MANIPUR STATE OF INDIA-THE IMPACT

The overall production and productivity, particularly of rice, has undoubtedly increased in Manipur through Green Revolution. Over the last two and half decades, high input chemical technologies which are also commonly known as Green Revolution Technologies reached the irrigated fields of Manipur as it is evident from the increased area under high yielding varieties of paddy (Singh, 1985). During 1990-91, about 38.16 per cent (60,070 ha) of the total paddy area i.e. 1,570,410 ha of the state was under high yielding varieties of paddy with an irrigated area of about 36.34 per cent (57,210 ha) from all sources of irrigation (Singh, 1992). The record increase in rice production and productivity in the State by 108.09 per cent and 77.19 per cent respectively achieved during the year 1985-86 over 1970-71 as the base year (Singh, l.c.) was the result of the adoption of Green Revolution Technologies.

Following the introduction of high yielding crop varieties coupled with high input chemical agriculture, much emphasis has been given to the enhancement of productivity, particularly in the irrigated low land areas of Manipur Valley, without taking care for its sustainability. As a result, valley farmers experienced plateauing out yield of rice with the increased input supply. Another emerging problem of the State is the gradual reduction of rice productivity from 2020kg/ha in 1985-86 to 1742kg/ha in 1990-91 in spite of the increased fertilizer use from 9,000 tons in 1985-86 to 14,630 tons in 1990-91 (Singh, l.c.). These observations have revealed a declining trend of nutrient use efficiency, multiple nutrient imbalance, adverse changes in physico-chemical properties of soil, etc. The pest and disease complexes have also shown a changing trend due to the changed microclimates and continuous use of pesticides and fungicides in the irrigated lowland area of Manipur Valley (Anon., 1992).

II. SUSTAINABLE AGRICULTURE-A VIEW WITH SPECIAL REFERENCE TO MANIPUR STATE OF INDIA

The term 'sustainability' denotes the characteristic state of being maintained indefinitely and the 'sustainable use of ecological assets' refers to the use of environmental factors without impairing its capacity for regeneration. By definition, therefore, 'sustainable agriculture' is that form of farming which produces sufficient food to meet the needs of present demand without eroding the ecological assets of productivity for future generations.

As soon as one think of sustainable agricultural production in the present context of Manipur, two agricultural aspects emerge; first, the hill agriculture and secondly, the valley agriculture. The hill agriculture is characterized by two types of cultivation practices-Jhoom and Terrace. Under Jhoom cultivation i.e. shifting cultivation with slash and burn practices, crops are grown under rainfed conditions in low to moderate hill

slopes of varying elevations with an average Jhoom cycle of 5 to 10 years while under terrace cultivation, crops are grown in the permanent terrace fields, generally located at the foot hills of lower slope, either as rainfed or irrigated crops. The valley agriculture is of permanent nature under different categories of fields viz., rainfed upland, rainfed lowland, irrigated lowland and low lying/deep water areas.

The community land ownership prevailing in the hill districts vis-à-vis the individual land ownership in those of the valley is another feature which needs due consideration. Approaches for sustainable agricultural production and productivity under these circumstances, therefore, should be made after looking carefully into the socio-economic and cultural environment of the people.

III. INTEGRATED FARMING SYSTEM AND MANAGEMENT (IFS&M): A TWO WAY APPROACH TOWARDS SUSTAINABILITY

As the average holding size of most of the farmers of Manipur ranges from 1 to 2 hectares or below, minimizing risk is often more important than maximizing profit. The high input improved agricultural technologies, even when considered as technically sound, are not adopted uniformly by the farmers operating under widely varying agro-climatic, socio-economic and cultural environments because of their high risk factor. In short, farmers generally seek for those technologies which increase their income while keeping the risk within a reasonable bound under their control and management.

Nevertheless, demographic and socio-economic compulsions in the State make it imperative to produce more and more income and livelihood opportunities from less and less land with the available resources. Ecological compulsions further indicate that such a high production should come from technologies that are environmentally sustainable. These necessities call for the two-way-approach, one for enhancing income generation for better livelihood opportunities to the farming families and the other for environmentally sustainable agricultural production, which is proposed in the name of 'Integrated Farming System and Management (IFS&M)' in the present article.

IV. INTEGRATED FARMING SYSTEM - WHAT DOES IT MEAN ?

Integrated Farming System, as a concept, takes into account the components of soil, water, crops, livestock, fish, labor, capital and other resources with the farm family at the center managing agricultural and other related activities. The farm family, as a client, functions within the limitations of its capability and resources for location specific integrated farming systems like crop-livestock, crop-fish, agro-forestry and other forms of farming systems viz., mushroom farming, floriculture, sericulture, etc. with crops that can help to provide additional channels of household income and employment opportunities.

The core characteristics of the Integrated Farming System are as follows:

- a. It is holistic and the whole farm is viewed as a system encompassing and interacting sub-systems. No potential enterprise is considered in isolation.
- b. It acknowledges location specificity and recognizes the location specific nature of agricultural production problems and income generation models.
- c. It identifies specific client group and emphasis is made on the identification of specific client group of farmers with common socio-economic and cultural background.
- d. It is multidisciplinary and lays greater emphasis on multidisciplinary approaches.

- e. It is gender sensitive and acknowledges the gender differentiated roles of farm family in production and income generating processes.
- f. It focuses on sustainability and seeks to harness the strength of the existing farming systems and to ensure that the productivity gains are environmentally acceptable.

V. INTEGRATED MANAGEMENT OF PRODUCTION FACTOR - AN ECOFRIENDLY APPROACH

It is possible to keep the production environment sustainable, ecofriendly and cost effective through integrated management practices of each production factor.

a. Integrated Nutrient Management (INM): Long term fertility trials have revealed the importance of conjunctive use of organic manures with inorganic sources for sustaining the biological productivity of the soil. China has successfully sustained and enhanced the productivity level of wheat-rice system for over one hundred years by meeting over 50 % of the nitrogen requirement through organic sources (Paroda, 1995).

The components of integrated nutrient management system i.e. organic manures, biofertilizers and inorganic fertilizers shall have to be introduced for sustainable soil productivity in the State.

Farmers can work out a manurial schedule for various crops based on the soil test results of the field and further improvements may be monitored by maintaining a soil health card (Swaminathan, 1995). When raised crops with organic manures and biofertilizers supplemented with inorganic fertilizers, if necessary, the crops keep good health and show a remarkable degree of tolerance to pests, diseases and drought (Venkataramani, 1995).

b. Integrated Pest Management (IPM): IPM is an economically justified and sustainable system of crop protection that leads to maximum productivity with the least possible adverse impact on the total environment.

In crop production technology, IPM is a schedule of practices which start from field selection till harvest of a crop. The major components in this approach are to advocate cultural, mechanical, biological and chemical methods of insect pests, diseases, weeds and vertebrate pests control to bring down the pest population below Economic Threshold Level (ETL). Use of resistant varieties, pesticides of botanical origin and pest specific bio-control agents have been found quite effective in a number of crops (Paroda, l.c.).

VI. INTEGRATED FARMING SYSTEM AND MANAGEMENT - EXPERIENCES

Very few experiences have been gathered so far on the implementation of the concept and strategies of IFS&M for sustainable agricultural production and for channeling income generation of the farming families in the N. E. H. Region of India. Some of the major projects that incorporate IFS&M strategies into their programs are discussed thereunder:

The watershed management project implemented by the ICAR Research Complex for N. E. H. Region of India for stabilizing the ecology and for improving the economic status of tribal farmers has concentrated on the development of suitable soil and water conservation technologies based on the concept of IFS&M. Integrated farming such as Agro-Horti-Silvicultural systems and management of production factors with locally available resources were recommended as an alternative to Jhoom cultivation (Borthakur, 1985).

The National Watershed Development Project which is under active implementation in Manipur hills is based on the concept of IFS&M strategies as one of the possible alternatives to Jhoom cultivation. Curiously Jhooming as such can neither be stopped nor be allowed to continue. It should rather stop by itself only when Jhoomias are engaged through out the year in one or other employment and income generating enterprises for enhanced family income and better livelihood opportunities. Since the IFS&M is an approach to create such farming enterprises, success of achieving the desired goal is anticipated.

Paddy-cum-Fish farming in the low lying areas of Manipur Valley is another successful story of IFS&M strategies in the State.

The future of food and livelihood security in the State of Manipur will depend on how much attention is paid to the development and dissemination of environmentally sound, economically viable and socially equitable IFS&M concepts and strategies.

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