Article: RT0456

Biotica Research Today

Vol 2:12 1302/1304

2020

Enhancing Livelihood Security of Small and Marginal Farmers of Tripura through Integrated Farming Systems

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Keywords

Backyard farming, Fish-pig IFS model, Livelihood security, Rice-Pig-Kitchen garden IFS

Article History

Received in 24th December 2020

Received in revised form 27th December 2020

Accepted in final form 28th December 2020

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How to cite this article?

Yadav *et al.*, 2020. Enhancing Livelihood Security of Small and Marginal Farmers of Tripura through Integrated Farming Systems. Biotica Research Today 2(12): 1302-1304.

Abstract

Charkalak is an autonomous district council (ADC) village under Jampuijala sub-division, Sepahijalla district of Tripura. Farmers are mostly depending on agriculture for their livelihood and income. Lands are mostly hilly and along with some valley type land dominated by traditional rice cultivation, and improper management of upland. Thus, the income from agriculture was generally low in the study area. Therefore, to enhance farmers, food and nutritional security, ICAR- Research Complex for NEH Region, Tripura centre demonstrated integrated farming system (IFS) models on various household of Charkalak ADC, Sepahijalla, Tripura under National Mission on Sustaining Himalayan Ecosystem Task force 6-Agriculture. Adoption of Rice-Pig-Kitchen garden IFS model gave net profit to farmers Rs. 94,500.00 from an area of 0.72 ha. Under Fish-pig IFS model, integration of two pig (one male and one female) with fish pond to fertilize the pond (800 m^2) and increases the productivity and income of the system by Rs. 42,320.00 per annum. Thus, study concluded that demonstrated IFS model food, nutritional and livelihood security of small and marginal farmers of Charkalak ADC.

Introduction

Charkalak is an autonomous district council (ADC) village under Jampuijala sub-division, Sepahijalla district of Tripura. Farmers are mostly depending on agriculture for their livelihood and income. Lands are mostly hilly and along with some valley type land dominated by traditional rice cultivation, and improper management of upland (Yadav *et al.,* 2019; Babu *et al.,* 2020). Thus, the income from agriculture was generally low in the study area. To enhance the income and livelihood status of famers, an animal and nutritional kitchen garden component was integrated with rice system. Fish is also integral component in the diet of people in Tripura State. Thus, the fish culture is very popular in study area but fish productivity per unit area was quite low due to improper stocking and management practices. For a balance diet, an adult require of 85 g of fruits and 300 g of vegetables per day as ICMR recommendation At the present level of production of vegetables, per capita consumption is of only 140-160 g of vegetables per day. Balanced nutritional is incomplete without vegetables as these are the major and the only source of nutritional vitamins and minerals required by human body besides being rich source of carbohydrate and protein. Vegetables are the source to increase not only the family income but also nutritive values of foods and its palatability. So production of vegetables in backyards though efficient use of available resources could make household self-sufficient in vegetable production and consumption. Since kitchen gardening is practiced in small area, it facilitates efficient controlling of pests and diseases through the removal

of affected parts and adoptions of indigenous traditional knowledge etc. without use of agro-chemicals (Yadav *et al.,* 2013). Thus, it provides the quality vegetable free from chemicals to the households. Therefore, to enhance farmers, food and nutritional security, ICAR- Research Complex for NEH Region, Tripura centre demonstrated integrated farming system (IFS) models on various household of Charkalak ADC, Sepahijalla, Tripura under National Mission on Sustaining Himalayan Ecosystem Task force 6-Agriculture. The detail impact of some selected IFS models are presented here.

Rice-Pig-Kitchen Garden Based Farming System for Enhancing Farm Income

For efficient utilization of resources and biomass, traditional rice production system was replaced with improved system of rice intensification (SRI) and pig husbandry and nutritional kitchen garden system were integrated with rice farming. Standard practice of SRI was adopted like transplanting single seedling of 10-12 days old at 25 cm × 25 cm spacing. For piggery, first year two piglets were given to each farmers (one male and one female). Kitchen waste and rice bran was used to feed pigs along with some concentrate. Pig excreta along with farm litters and wastes were used in compost making. Kitchen garden was developed surrounding home yard of each farmers. A good quality vegetable seeds for kitchen gardening for year round farming comprising cabbage, cauliflower, amaranthus (green), amaranthus (red), radish, bitter gourd, bottle gourd, dolichos bean, cucumber, okra, maize, cowpea, tomato, chilli, lattuce etc., was provided to farmers. Need based awareness and training program for importance of nutritional kitchen gardening and multitier kitchen gardening, recycling of on-farm waste or biomass through composting or vermin composting preparation etc was arranged for farmers. The holding size was 0.6 ha area under rice, 800 m^2 under pond and 400 m^2 under kitchen garden. This IFS model from an area of 0.72 ha proved an income of Rs. 94,500.00 annually to farmers. This model was demonstrated at household of 5 farmers.

Table 1: Detail cost of production and profit

Rice- Fish- Kitchen garden Intervention	Before intervention	After intervention
Cost of production (Rs.)	15,540.00	56,750.00
Gross return (Rs.)	15,790.00	1,51,250.00
Net return (Rs.)	250.00	94,500.00
B:C ratio	1.02	2.67

Figure 1: Rice-Pig-Kitchen garden IFS model

Fish + Pig Based Farming System for Income Enhancement of Hill Farmers

Scientific composite fish culture with pig integration was demonstrated on 5 farmers' field having pond of 800 m^2 to augment the fish productivity and overall income of farmers. Under scientific fish culture, quality fingerlings like rohu, catla, mrigal etc., for composite fish culture was provided to famers along with requisite awareness cum training program. Fish fingerling was stocked at rate of 10,000/ ha. High quality fingerlings of different fish was stocked as per standard norm like rahu (column feeder-20%), cattla (surface feeder-30%), grass carp (Column feeder-20%), puti (bottom feeder-30%). Two piglets (one male and one female) were integrated with fish pond to fertilize the pond (800 m^2) and increase the productivity and income of the system. This IFS model gave about Rs. 42,320.00 net profit to a farmer.

Table 2: Detail cost of implementation of this model and their profit

Fish - Pig intervention	Before intervention	After intervention
Cost of production (Rs.)	8,330.00	42,680.00
Gross return (Rs.)	15,000.00	85,000.00
Net return (Rs.)	6,670.00	42,320.00
B:C ratio	1.80	1.99

Figure 2: Fish + Pig IFS model

Backyard Farming with Nutritional Kitchen Garden for Enhancing Nutrition and Income of Farmers

There is an ample scope for sustainability of the programme in the selected clusters as farmers are not utilizing the available land in their back yard round the year. Thus, the nutritional kitchen gardens were demonstrated at 16 household farms to make the sufficient production of vegetables and other nutritional crops. Good quality vegetable seeds like cabbage, cauliflower, amaranthus (green & red), radish, bitter gourd, bottle gourd, dolichos bean, cucumber, okra, maize, cowpea, tomato, chilli, lattuce etc., was given to women famers along with awareness cum training for value of nutritional kitchen garden & multitier kitchen garden, utilization of on farm waste or biomass minimization like composting or vermicompost preparation etc. Due to availability of fresh vegetables/ fruits in doorsteps, the vegetable consumption of farmers especially the women and children increased which resulted into better nutrition and health of the people. Nutritional kitchen garden in backyard farming provides an income of Rs. 28,000.00 per year, in addition to supply the quality and nutritious vegetables to farming family. This system was mostly operated by house women.

Figure 3: Nutritional kitchen garden in backyard farming

Table 3: Details of this is presented below

Nutritional kitchen garden Intervention	Before intervention	After intervention
Cost of production (Rs.)	7,000.00	9,000.00
Gross return (Rs.)	17,000.00	37,000.00
Net return (Rs.)	10,000.00	28,000.00
B:C ratio	2.43	4.11

Conclusion

Rice-Pig-Kitchen garden IFS model increased the profit to farmers by Rs. 94,500.00 from an area of 0.72 ha. Famers those have only fish pond, integration of pig with fish pond increase the productivity and income of the system by Rs. 42,320.00 per annum. Thus, study concluded that demonstrated IFS model food, nutritional and livelihood security of small and marginal farmers of Charkalak ADC.

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