

Sustainable livelihood development of farmers in Manipur through participatory technology application

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Location and selection of area

The participatory technology application in the form of FFP was initiated on 17th February 2017 at the two selected villages, viz. Yairipok Top Chingtha and Yairipok Yambem of Keirao Bitra block, Imphal East district of Manipur. Due to its topography and special features, this region needs special focus, attention and location-based suitable technologies. The selected farmers are partners of the research, extension and production process. The indigenous Technical Knowledge (ITKs) available with the farmers has hardly been utilized in a scientific way to derive suitable options for the better production along with the scientist.

Number of farm families

A total of 600 farm families (300

farm families each) were involved in the two selected villages.

OBJECTIVES

- To assess and integrate economically viable and socially compatible technological options for profitable cropping systems and integrated farming systems.
- To develop suitable technological modules for farm families for income enhancement and livelihood security.
- To design suitable networks, linkages, and convergence models for improving the overall access of farm households to information, technology, input and market linkages.
- To analyze the impact of the interventions under the project and suggest a strategy for refinement and for replication.

INTERVENTIONS

Crop based module

Popularization and quality seed production of improved Rice/Paddy Var. CAUR-1

Rationale of the intervention: This intervention was carried out for

the medium and large farmers who were practicing rice cultivation with local cultivars following indigenous practices. Farmers were experiencing less productivity and income due to the lack of scientific way of cultivation. Under FFP, CAU, Imphal improved rice variety CAUR-1 (Tamphaphou) was introduced and cultivated following the scientific method of cultivation (SRI).

Outcome: Shri Singh could earn an additional income of ₹ 50,040 following the technological intervention under the FFP Programme over their earlier indigenous practices.

Popularization and standardization of production technologies of Black aromatic rice i.e Chakhao Amubi and Chakhao Poireiton.

Rationale of the intervention: Indigenous Black rice of Manipur possesses tall and low productivity, and cultivation is practised without proper management. Since time immemorial, the farmers' in the state grows black aromatic rice in small pockets without proper production practices and use only in specific ritual functions. However, in recent



Shri Sanabam Jogendra Kumar Singh, 56 years, of Yairipok Yambem, Imphal East, Manipur is one of the beneficiaries under Farmer FIRST Programme of CAU, Imphal cultivated improved CAU released rice variety CAUR-1 in 1 ha area during 2017-18, 2018-19 and 2019-20.

Table 1. Year wise income from cultivation of improved rice variety CAUR-1

Impact	Variety (Introduction of improved rice variety)	Year	Income (₹) per ha	Activities of intervention
Before FFP	Local (Akhan Phou)	2017-18	85,000	Broadcasting
After FFP	CAUR-1	2018-19	135,040	Quality seed production following SRI method
	CAUR-1 and RC Maniphou-13	2019-20	Affected by drought	Quality seed production following SRI method

years, it is becoming popular because of its high medicinal properties, top rated quality rice, and increasing demands from hotels and metropolitan cities. Then another farmer, Shri Khumanthem Ibomcha Singh of Yairipok Yambem (2nd Selected Village) was also convinced to grow this aromatic rice following scientific method of cultivation (SRI) in 1 ha area during 2017–18 and 2018–19, respectively.

Outcome: SRI method of cultivation with proper management practice like proper spacing (20 cm ×



Shri Khumanthem Ibomcha Singh cultivated Black aromatic rice in 1 ha area

20 cm, 1 seedling per hill) and application of NPK @ 30:30:30 kg/ha gave yield increment of 55.1% (IP = 2812 kg/ha and FP-1813 kg/ha) over farmers practice and good quality of seeds were produced which fetched more income. Thus, a total net profit of ₹ 168,720 was made subsequently with an additional income of ₹ 37,740 (₹ 168,720–130,980) from the scientific cultivation of Black aromatic rice over farmers' practice.

Horticulture based module

Introduction of Makhana var. Swarna Vaidehi from Patna under Manipur's condition and comparative studies with local genotype.

Rationale of the intervention: Makhana, Thanjing in local dialect, can be considered as one of the popular aquatic food crops of

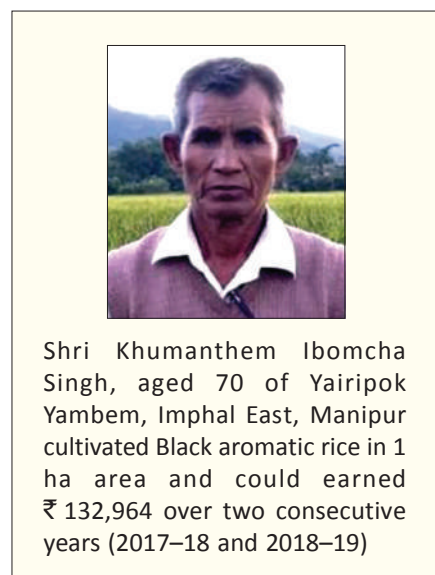
Manipur and is one of the feasible ways of generation of income in marshy lands. However, its cultivation is restricted with the farmers own idea/knowledge without specific package of practices and are also not aware about the improved varieties. However, the Farmer FIRST project of the Central Agricultural University, Imphal, attracted farmers of the region towards the scientific cultivation of Makhana using improved variety, Swarna Veidehi from Patna, Bihar and cultivated by 3 farm families in an area of 0.25 ha each (1 sangam) per farm family.

Outcome: Farmers can easily earn an additional income of ₹ 54,720 (within 6–7 months) from an area of 0.25 ha by cultivating improved variety of Makhana var. Swarna Vaidehi (₹ 1,44,000) over local genotype (₹ 89,280) in a year. Hence, it can be recommended for larger scale cultivation in Manipur condition.

The Farmer FIRST Programme, CAU, Imphal also procured another new Gorgon nut Variety Sabour Makhana-1 from Sabour, Bihar during 2019–20 and it is ready for large scale cultivation.

Introduction of quality planting materials of U-morok (King chilli)

Rationale of the intervention: King Chilli (*U-Morok*) is a crop



Shri Khumanthem Ibomcha Singh, aged 70 of Yairipok Yambem, Imphal East, Manipur cultivated Black aromatic rice in 1 ha area and could earned ₹ 132,964 over two consecutive years (2017–18 and 2018–19)

Table 2. Year wise income generation

Impact	Variety	Year	Income (₹) per ha	Activities of intervention
Before FFP	Black aromatic rice	2017–18	130,980	Transplanting at 25 days old seedling 2 to 3 seedlings/hill (no proper spacing and nutrient management)
After FFP	Black aromatic rice	2018–19	168,720	SRI method, Fertilizer dose (40:30:30 kg/ha) Spacing (20 cm × 20 cm)
	Black aromatic rice	2019–20	Affected by drought	SRI method, Fertilizer dose (40:30:30 kg/ha) Spacing (20 cm × 20 cm)

Table 3. Comparative income generated from Swarna Vaidehi and local cultivars

	Local genotype	Swarna Vaidehi
Area	0.25 ha	0.25 ha
Spacing (ft)	10 × 10	10 × 10
Number of plants	240	240
Number of fruits per plant	31	40
Total yield (fruits)	7,440	9,600
Price per fruit (₹)	12	15 (Because of big fruit size)
Gross return (₹)	89,280	1,44,000
Cost of cultivation (₹)	31,500	31,500
Net profit (₹)	57,780	1,12,500
Benefit cost ratio	1.8 : 1	3.5 : 1



Shri Khaidem Gouramani Singh, aged 67 of Yairipok Top Chingtha, Imphal East, Manipur cultivated Gorgon nut (Makhana) Variety Swarna Vaidehi and local cultivars. He is the recipient of First Prize on poster presentation during the 6th Farmers Science Congress, CAU, Imphal held at College of Horticulture and Forestry, Pasighat during 11-13 November 2019.

which has been cultivated in Manipur since time immemorial. In recent years, this crop has gained importance because of its high content of capsaicin (3–5%) as compared to any other Indian chilli.

But one of the challenges faced by the farmers is crop loss due to the viral infection. Thus, virus free seedlings cultivation by providing quality planting materials has been intervened under the FFP, CAU Imphal.

Outcome: Shri Ayekpam Suranjoy Singh under his IFS model of farming, cultivated (0.125 ha) in the periphery of farm pond during summer (April to October) 2018–19 and could get 1363 kg of fresh fruits at 3 times pickings at an interval of one month. The average fruits per plant were 50. After selling the fresh fruits at an average of ₹ 175 per kg he could earned a net profit of ₹ 238,525 within 6–7 months.



Shri Ayekpam Suranjoy Singh, aged 40 years of Yairipok Top Chingtha, Imphal East, Manipur is one of the successful farmer cultivating Giant Chilli in an area of 0.125 ha.



Makhana var. Swarna Vaidehi

Livestock based module

Popularization of scientific rearing of poultry under backyard farming

Rationale of the intervention: Livestock farming is one of the common ways of income generation for most of the landless and small farmers in many villages of Manipur for living. Farmers were continuously rearing poultry with local indigenous breeds without scientific knowledge. Since, increase in population during the last few decades, production from these local indigenous breeds is very difficult to manage and to earn more income for living. Due to all these facts, FFP introduced ‘Giriraja and Girirani’ improved breeds during the year 2017–18 with 3,200 poultry birds and 3,000 Srinidhi breed during the year 2018–19 covering a total of 260 farm families.

Outcome: After the intervention, Shri Shagolsem Shyamcha Singh earned a net income of ₹ 200,740 (by selling eggs, birds for meat and chicks etc.) from 70 (Giriraja and Girirani breed) poultry birds within one and half year duration. Then Shri Singh started rearing 50 birds of new breed (Srinidhi) during 2019–20 and earned ₹ 3500 from sale of eggs. Shri

Singh earned a sum of Rs 204,240 under FFP during three consecutive years.

Integrated farming system based module

Horti-Fishery-Livestock integrated farming for income generation

Rationale of the intervention: Generally under the IFS model, farmers considered only fishery and livestock components and as such peripheral farm pond areas remained unused. Also fishery and livestock were carried out without proper scientific knowledge. Therefore, expected profit/income could not be achieved against the expenditure. With the initiation of FFP of CAU, Imphal, interventions namely introduction of nutritional vegetable and fruits garden on the peripheral banks of the farm pond; inclusion of fruit plants like cucurbitaceous crops and pulses etc. on the peripheral banks of the farm pond; and



Shri Shagolsem Shyamcha Singh, aged 45 years of Yairipok Top Chingtha, Imphal East, Manipur started rearing poultry (Giriraja, Girirani and Srinidhi breed) under Farmer FIRST Programme since 2017.



King chilli (U-marok) cultivation by Shri Ayekpam Suranjoy Singh in 0.125 ha



Giriraja and Girirani breed
(Shri Shagolsem Shyamcha Singh)

introduction of composite fish farming.

Outcome: After the intervention, the income of the farmer increased by ₹ 57,000 (₹ 247,000-1, 90,000) during 2018-19 and ₹ 89,000 (₹ 279,000-1, 90,000) during 2019-20 respectively.

Agri-Horti-Fishery-Livestock integrated farming for income generation

Rationale of the intervention: Cultivation of improved varieties of cereals, oilseeds and pulses were initiated with the project.

Component before FFP: Horticultural crops (Some indigenous vegetables and fruits)

Up-scaling after FFP: Introduction of improved crops varieties

Crops: CAUR-1, RC-Maniphou-13 in paddy, Aman var. of pea, NRCHB-101, TS-38 of rapeseed/mustard, Sweet corn var. Golden Cob F1

Fruits: Sapana var. of papaya.

Poultry: Srinidhi and Vanaraja of poultry

Fishery: Composite fish rearing.

Now, the technology is



Shri Yumnam Ingo Singh, aged 45 years of Yairipok Yambem village, Imphal East district, Manipur practiced Integrated Farming System before. After the implementation of FFP, CAU, Imphal, he started doing Horti-Fishery-Livestock integrated farming since 2017-18.

disseminated to his neighbouring fellow farmers.

Outcome: After the intervention, the income of the farmer increased by ₹ 104,000 (₹ 284,000-1,80,000) during the year 2018-19 and ₹ 107,000 (₹ 287,000-180,000) during 2019-20.

Enterprise based module

Preparation of nutritious food from locally available resources for good health as well as for enhancement of income.

Rationale of the intervention: There were two women Self Help Groups which were formed after attending training programme on different value addition and post harvesting of foods rendered by Farmer FIRST Programme, CAU, Imphal. From these two groups we selected the Self Help Group of

Yairipok Top Chingtha for their amazing consistent performance.

Outcome: Main activities included preparation of pickles, popcorn, papad, roasted/fry groundnuts, chick pea, soy products, black aromatic rice powder (health



Shri Heikrujam Premjit Singh, aged 28 of Yairipok Top Chingtha, one of the youngest beneficiary under FFP, CAU, Imphal started Agri-Horti-Fishery-Livestock integrated farming since 2018-19.

Table 4. Year wise income from IFS model

Impact	Year	Total Income (₹)	Component
Before FFP	2017-18	190,000	Banana (700 hills) Giant chilli (500 plants) Vegetables
After FFP	2018-19	247,000	Banana (700 hills) Giant chilli (400 plants) Vegetables Papaya (25 plants) Fish
After FFP	2019-20	279,000	Banana (700 hills) Giant chilli (500 plants) Vegetables Papaya (25 plants) Poultry (Srinidhi) (40 birds) Fish



Before intervention



After intervention

Horti-Fishery-Livestock integrated farming

Table 5. Year wise income from IFS model

Impact	Year	Total Income (₹)	Component
Before FFP	2017-18	180,000	Banana (700 hills) Giant chilli (500 plants) Vegetables
After FFP	2018-19	284,000	Banana (700 hills) Giant chilli (400 plants) Vegetables Rice (CAUR-1, RC Maniphou-13) Mustard (NRCHB-101) Papaya (25 plants) Fish
After FFP	2019-20	287,000	Banana (700 hills) Giant chilli (500 plants) Vegetables Papaya (25 plants) Poultry (Srinidhi) (40 birds) Fish Rice (CAUR-1, RC Maniphou-13) Mustard (NRCHB-101)



Miss Khaidem Papki Devi, aged 23 of Yairipok Top Chingtha, Imphal East, Manipur is the leader of Yairipok Top Chingtha Women's Self Help Group member of 12 women.

drink) etc. from locally available materials.

Impact: A women entrepreneur can earn ₹500–800/day by spending ₹200–300 as material cost. Therefore, net profit from the above activities by a women per day = ₹500–200 = ₹300 (minimum ₹9,000 per month). However, it can earn up to ₹16,000 (depending on market chain).

Establishment of Custom Hiring Centre under Farmer FIRST Programme, CAU, Imphal

Rationale of the intervention: Most of the small and marginal farmers could not be able to own farm machineries or any other equipment which leads to many problems in their farming and generating income. Unemployed female youths and farm women have less interest to carry out different

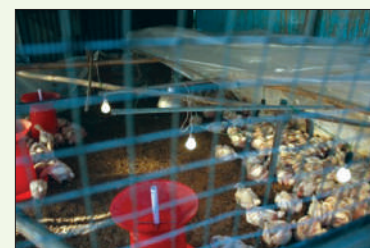
post-harvesting and food processing due to lack of infrastructure. For this, the FFP have established office cum Custom Hiring Centre in 2017 and rendered different types of equipment's and farm machineries.

Table 6. Farm machineries and equipments procured by the FFP, CAU, Imphal for the CHC maintained at Top Chingtha, Yairpok, Imphal East, Manipur

Item	Quantity (nos.)
Power tiller with steel wheel	1
Power tiller trolley	1
Pineapple harvester	2
Makhana harvester	2
Pineapple cutting/ quatering tools	6
Low cost fermenter for soybean	4
Hand pineapple peeling machine	20
Mini rice mill (3 H.P.)	2
Plough	1
Water pump	2
Water sprinkler set	2

The Custom Hiring Centre is run by the FFP farmers themselves by appointing the office bearers. Through this, farmers can hire power tiller, water pump etc for use at their field by paying some amount fixed by the farmers themselves. Earlier, they hired and used from other source in which they spent more hiring cost. Now, farmers are using farm machineries and other equipment on less hiring charges.

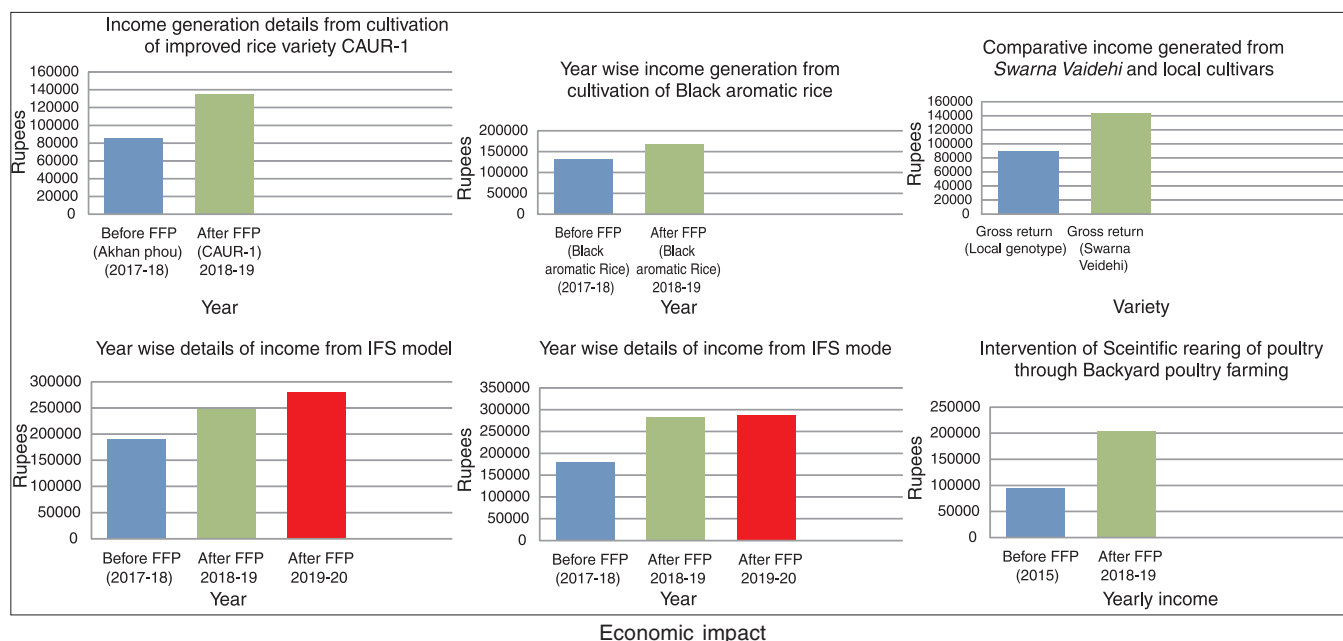
Outcome: Bank account in the name of Custom Hiring Centre, CAU, Imphal have already been opened and till now they could save about ₹13,000 after spending all the expenses which can be utilised for the benefit of the farmers, they can now buy more necessary office items.



Shri. H. Premjit Singh of Yairipok Top Chingtha village, a FFP, CAU, Imphal beneficiary owned a second hand diesel auto after implementation of FFP for expansion of his work. He is using the auto for transportation of his farm products/produce to nearby villages or markets. He further also started rearing of poultry (Broiler) in 2019–20. Now he can keep his fellow friend as an assistant to look after the IFS model which helps in employment generation to the other farmer.



Agri-Horti-Fishery-Livestock integrated farming



TRAINING

CAU, Imphal imparted 19 training programmes on different aspects to the beneficiaries particularly on skill development aspects under. The most important training programme consisted of Farmer FIRST programme.

- Scientific cultivation of rice, vegetables and other crops.
- Scientific care and management of poultry, pigs and new born piglets.
- Scientific fish rearing.
- Value addition and post harvesting technology on locally available fruits and vegetables.

Resource persons from various discipline gave lecture to the participant farmers on scientific rearing of fish, piggery and poultry. Training programme on Entrepreneurship and Skill Development through Food processing among the Rural Women Farm workers and Unemployed Female Youth.

IMPACT

Social impact

The positive impact of FFP includes strong influence among the fellow farmers of the same village and their neighbouring village as well. Shri Meihoubam Modhu Singh of Yairipok Yambem village has started his own farm with scientific



Training programme to the beneficiaries of the Farmer FIRST Programme, CAU, Imphal on skill development

cultivation of crops, mushroom cultivation, vermicomposting, use of improved varieties of crops, fruits, vegetables etc.

LESSONS LEARNT

- Moisture stress during crop growing period leads to lesser yield.
- Poultry breed (Giriraja and Girirani) has bigger size and more weight compare to Srinidhi breed. Considering the egg laying Srinidhi has more performance than Giriraja and Girirani. Hence, in farmers' situation, Srinidhi breed is good for eggs production only and Giriraja and Girirani is suitable for both egg production as well as meat production.
- Unavailability of inputs in time.
- IFS –Problem of marketing and need of value addition.
- If the Custom Hiring Centre is

able to sustain, percentage of employment and livelihood of the farmers will increase.

- Need of Skill development training on post-harvest, value addition and waste management (Pineapple wine preparation, local cow milk nutritional value, locally available fruits and vegetables).

WAY FORWARD

- Makhana popping machine will be a new intervention for farmers through Custom Hiring Centre to produce popped Makhana as an extra income.
- Rain water harvesting structures to serve the problems of moisture stress condition.
- E-marketing of Manipur Black aromatic rice which is one of the most demanded and high rated crop.
- Establishment of regulated market at district level will also help the farmers in getting their Minimum Support Price (MSP)
- Need of carpet expansion of villages under FFP.
- Agro-Eco tourism (PPP mode)
- Incubator cum hatchery machine through Custom Hiring Centre to reduce the cost of production.
- Main emphasis may be given to the farm women and youths for the promotion of value addition and post-harvest technology.

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