FARMER-CENTRIC APPROACH FOR SUSTAINABLE RURAL LIVELIHOOD THROUGH FARMER FIRST PROGRAMME

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PREFACE

The Farmer FIRST Programme (FFP) was launched by ICAR during 2016-17 with an aim to involve farmers for technology development/refinement based on their need utilizing their own Farm, Innovations and Resources incorporating the latest development of Science and Technology (FIRST). In the past, the wisdom available with the farmers was not channelized appropriately to derive the suitable options for different production systems. This necessitates a new approach for project development with the strong partnership of the farmers for developing location specific, demand driven and farmer friendly technological options.

This ICAR sponsored project is being under implementation at two centers one- "Livelihood improvement of Hill Farmers through Sustainable Farming Systems in North Eastern Hill Region" at ICAR Research Complex for NEH Region, Umiam and the other- "Sustainable Livelihood Development of Farmers in Manipur through Participatory Technology Application" at Central Agricultural University, Imphal. Since its launching, different modules such as crop, horticulture, livestock and fish, enterprise, NRM, integrated farming system, etc. were taken up by the implementing centers of the project for the benefit of small and marginal farmers in their respective states.

This document has been prepared by compiling the achievements attained by the FFP Centres: ICAR Research Complex for NEH Region Umiam and CAU, Imphal for the benefit of various stakeholders including farmers of the region. I hope this publication would be of great help for the farmers and other stakeholders for field application of the successful technologies in their farming institutions.

I would like to express my sincere thanks and gratitude to Dr. U.S. Gautam, DDG (AE), Dr. R.R. Burman, ADG (AE) and Dr. R.K. Singh, ADG (AE), ICAR, New Delhi for their constant encouragement, guidance and support in executing the project.

Place: Umiam, Meghalaya
Date: March 2024

A.K. Mohanty
Director

1 Chapter

Background and guidelines

1.1 Introduction

The Farmer FIRST project, conceptualized and executed by ICAR, aims to engage active farmers in identifying and prioritizing research problems, as well as conducting experiments in their own fields using available resources. This approach centers on the Farmer's Farm, Innovations, Resources, Science, and Technology, often referred to as "FIRST." In the Indian context, Farmer FIRST embodies the notions of "enriching knowledge" and "integrating technology." Enriching knowledge highlights the importance of mutual learning between the research system and farmers, considering the existing farm environment, perceptions, and interactions with surrounding sub-systems. Technology integration emphasizes the need for scientific research outputs to be adapted and customized to fit the conditions on farmers' fields for successful adoption and acceptance. The Farmer FIRST program aims to strengthen the interaction between farmers and scientists for technology development and application, emphasizing innovation, technology, feedback, involvement of multiple stakeholders, diverse realities, various methodological approaches, and interventions related to vulnerability and livelihoods.

1.2 Why Farmer FIRST Programme?

The past efforts brought lot of success in terms of raising production and productivity and addressing issues of the farmers and the technology was considered as a vital factor in the production system and farmer as a recipient of the technology outputs. The knowledge and innovations of the farmers were not valued much, and their presence was relegated at most as a participant but not as a partner in the experimentations. The wisdom available with the farmers was also not channelized so much to derive suitable options for different production systems. The participation of multiple stakeholders was also not taken up in perspective for technology development, integration, and adoption. Now the situation has changed drastically in terms of increased number of smallholders, growing proposition of women-led agriculture, need for higher return per unit area and addressing the changing socio-economic environment, etc. This necessitates new approach for project development involving

innovation and technology development with the strong partnership of the farmers for developing location specific, demand driven and farmer friendly technological options.

1.3 Applying Farmer FIRST approach

Farmers tend to face problems related to production and natural resource management, but they might not have found out solutions to overcome them. In such situations, Farmer FIRST is an opportunity for the researchers, extension professionals and farmers to work together and find appropriate ways through assessing different solutions. During the production process, farmers often evolve new ideas to improve their cultivation and natural resource management activities. This creates a space for researchers, extensionists and farmers to design and organize new experiments. Farmer FIRST can be applied not only at household level but also at village and community level as community experimentation.

Usually, the experiments are managed at the individual farmer's level who are involved in the project or who are selected by the village as the representatives to con- duct experiments. In addition, there are some cases where experiments focus to solve problems of the whole village. Farmer FIRST is a concept in which the farmers participate in the research process with scientists. Research questions are found out together with selected farmers or the whole village and villagers' participation in monitoring experiments with scientists. The aim is to find out new ways of doing and bringing in synergy of the stakeholders. The experiments need to be adapted to specific conditions of a farming system and to have the participation of farmers as well as scientists. Especially they must acknowledge local wisdom as a vital element for the development of useful innovations. The role of extensionists is to ensure implementation.

Farmer FIRST will create linkages between farmers-researchers and extensionists to support farmers to conduct appropriate experiments selected by them. It will help researchers and extensionists understand and know real needs of villages. In this process, priority does not come from researchers or extensionists but from the end users of results of research and technology development.

1.4 Aims and Objectives of FFP

'Farmer FIRST programme' aims at enhancing farmer-scientist interface for technology development and application. It will be achieved with focus on innovations, technology, feedback, multiple stakeholder's participation, multiple realities, multi method approaches, vulnerability, and livelihood interventions. The specific objectives are:

1. To enhance farmer-scientist interface, enrich knowledge and facilitate continued feedback.
2. To identify and integrate economically viable and socially compatible technological options as adoptable models for different agroecological situations.
3. To develop modules for farm women to address drudgery reduction, income enhancement and livelihood security.
4. To study performance of technologies and perception of the farmers about agriculture as a profession in the rural setting.
5. To build network of linkage or organizations around the farm households for improving access to information, technology, inputs, and market.
6. To institutionalize Farmer FIRST process.

2 Chapter

Achievements

2.1 Module wise achievements under FFP during 2022-23

Farmer FIRST Programme (FFP) has been in implementation by two institutes under ATARI Zone VII namely CAU, Imphal and ICAR RC for NEH, Meghalaya, since 2016. The programme was implemented in 12 Villages namely Maopungdong village in Senapati district and Sangshak Khullen Village in Ukhrul District under CAU Imphal and ten villages in the Ri Bhoi district under ICAR RC for NEH Region namely Borgang, Sarikhusi Lalumpam, Purangang, Umtham, Borkhatsari, Nalapara, Nangagang, Mawphrew, and Mawtnum during 2022-23**.** During the year 2022-23, 1241 farmers have been scientifically trained and benefitted from various modules under Farmer FIRST Programme as part of the activities of the programme.

2.1.1 Crop based module

CAU Imphal initiated scientific Sweet Corn (Golden Cob F1) cultivation in Manipur's Ukhrul and Senapati districts, while ICAR RC in Umiam led the initiative for double cropping in fallow rice fields. These collaborative efforts aimed at enhancing agricultural productivity and generating increased income and job prospects for local farmers. This joint endeavour resulted in the successful execution of 5 demonstrations, benefiting a total of 180 beneficiaries from the local farming communities.

2.1.2 Horticulture based module

To boost potato cultivation, the Kurfi Joyti variety was introduced in the adopted villages with a cultivation area of 0.25 hectares in Maopungdong and an additional 0.25 hectares in Shangshak Khullen, Ukhrul district. In addition to potatoes, fruit crops like lemon and pineapple were also introduced as alternative income sources. These efforts led to the successful execution of four demonstrations, benefiting a total of 47 farmers through these interventions.

2.1.3 Livestock based module

Through the interventions 20 Yorkshire breed piglets and 1590 improved breed poultry was distributed to 91 farmers, aiming to boost income generation through pig farming and poultry production.

2.1.4 Enterprise based module

As part of Enterprise based module CGI sheets were distributed to set up a mushroom spawn production unit in the adopted village. Moreover, mushroom spawn was distributed to boost farmers' income. In addition, trial at a poultry hatchery was conducted using 200 fertile eggs, utilizing an automatic egg incubator situated at the custom hiring centre in the adopted village. Under this enterprise-based module, 7 demonstrations were organized benefited a total of 18 beneficiaries.

2.1.5 NRM based module

In the NRM Based module, 5 demonstrations were conducted, benefiting 34 farmers. Jalkunds a cost-effective hilltop micro rainwater harvesting structures were constructed for rainwater collection and storage. These structures serve various purposes during dry seasons, including essential irrigation during critical crop growth stages, washing produce like ginger and turmeric, supporting animal husbandry and livestock, and meeting domestic water needs. Furthermore, azolla, a floating fern recognized for its value as a bio-fertilizer in wetland paddy fields, was introduced and recommended for use as fish feed due to its nutritional richness and cost effectiveness. To promote vermicomposting, vermicompost beds were distributed.

2.1.6 Fishery based module

Under Fishery Based module 3 Demos were conducted benefitted 30 beneficiaries. FFP Centre at ICAR RC Umiam distributed 1500 fingerlings of Rohu, Gania, and Guchi breeds to 10 farmers in the Marngar Cluster, promoting fishery as an alternative income source. Meanwhile 4500 fingerlings of Rohu, Mirgal, Grass carp, and silver carp were distributed to 20 farmers by CAU Imphal. A fishery training program was also conducted with the aim of encouraging farmers to adopt fishery as an alternate source of livelihood for doubling their income.

2.1.7 IFS based module

Three demonstrations were conducted with the participation of 3 beneficiaries to showcase the development of Integrated Farming Systems in the project sites. Integrated farming systems offer the opportunity to increase economic yield per unit area and time through the intensification of crop and allied enterprises. The Integrated Farming System was established at the adopted villages with the aim of enhancing the annual income of local farmers.

2.1.8 Farm mechanization based module

The beneficiaries received a set of farm mechanization tools and equipment, including Tulu pumps designed for irrigation to eliminate the manual water transport effort in hilly areas, Knapsack sprayers equipped with precision spray gun for precise application of chemicals, insecticides, and pesticides on individual plants. In addition, farmers also received 2 dewatering pumps with accompanying pipes, 2 grass cutters, 20 knapsack sprayers, and various essential farm implements such as 20 garden hoes, 20 shovels, 20 hand cultivators, and 20 sickles which will benefit around 514 farmers through custom hiring centres.

2.1.9 Extension activities

Under extension activities A total no. of 17 trainings/demonstration/ programmes had been conducted during the year with 973 total numbers of participants.

Table 1: Achievement wise during the year 2022-23

Module Wise	CAU, Imphal		ICAR RC Complex, Umiam		Total	
	No. of Demos	No. of Beneficiaries	No. of Demos	No. of Beneficiaries	No. of Demos	No. of Beneficiaries
Crop based module	2	20	3	160	**5**	**180**
Horticulture based module	2	20	2	27	**4**	**47**
Livestock based module	2	40	3	51	**5**	**91**
Enterprise based module	4	9	3	9	**7**	**18**
NRM based module	2	20	3	14	**5**	**34**
Fishery based module	2	20	1	10	**3**	**30**
IFS based module	2	2	1	1	**3**	**3**
Extension Activities	7	575	10	398	**17**	**973**
Farm Mechanization	2	500	2	14	**4**	**514**
TOTAL	**25**	**1206**	**28**	**684**	**53**	**1890**

3 Chapter

Central Agricultural University, CAU, Imphal

3.3 Enhancing Farmer –Scientist Interface

a. University Advisory Committee (UAC) & Site Plan Implementation Group (SPIG) Meeting

The 4th and 5th University Advisory Committee (UAC) and Site Plan Implementation Group (SPIG) Meetings was held on July 28, 2022, at the Directorate of Extension Education, CAU, Imphal, by the Farmer FIRST Programme. Dr. Anupam Mishra, the Hon'ble Vice Chancellor of CAU, Imphal, presided over the meeting. Attendees included the Director of Extension Education, the Director of Instruction, the Dean of the College of Agriculture, Iroisemba, the Dean of the College of Food Technology, the Professor and Scientist of COA, CAU, Imphal, representatives from the Government of Manipur's Agriculture, Horticulture, Agriculture, Horticulture & Vet. & AH departments, Co-PIs, FFP, CAU, Imphal, Project Staffs, Pradhans and Farmers of Yairipok Top Chningtha and Yairipok Yambem villages. During the programme farm implements like Sickle, Shovel, Garden hoe, Hand Cultivator were also distributed to the farmers. A total of 35 farmers from these two villages attended the meeting.

4th & 5th UAC & SPIG Meeting of FFP, CAU, Imphal held at DEE, CAU, Imphal on 28th July 2022

b. Launching of Farmer FIRST Programme cum Farmer- Scientist Interface

The Farmer FIRST Programme, CAU, Imphal, was launched at two new project sites, namely Shangshak Khullen village in Ukhrul district on August 30, 2022, attended by 180 farmers and Maopungdong village in Senapati district of Manipur on November 7, 2022, attended by 80 farmers. As part of the program, Scientist-Farmer Interaction programs were conducted with the participating farmers. Dr. Anupam Mishra, Hon'ble Vice Chancellor of CAU, Imphal, distributed various agricultural and allied inputs such as seeds, mushroom spawn, poultry chicks, and manual sprayers to the farmers. Additionally, he installed an Egg Incubator cum Hatchery (500 eggs capacity), Mini Rice Mill, *etc*., in the Custom Hiring Centre.

Shangshak Khullen, Ukhrul district

Maopungdong, Senapati district

c. Farmers training programme

i) Farmer FIRST Programme, CAU, Imphal organised One day Farmers Training cum Input distribution programme at Maopungdong village, Senapati district on 13th October 2022. 35 farmers participated during the programme. Inputs like Seeds, Mushroom Spawn and Poultry Chicks (CSB breed) were distributed during the programme.

Farmer Training Programme at Maopungdong village

ii) On March10,2023, a one-day farmers training programme on "scientific livestock and fish farming" was held at Shangshak Khullen village in the Ukhrul district of Manipur. The farmers in presence heard lectures on the scientific rearing of pig, poultry, and fish farming from Dr. H. Chaoba Singh, former director of the Department of Vet. and AH Services, Govt. of Manipur and OSD (Accounts), CAU, Imphal, and Th. Nilachandra Singh, consultant (Fisheries), NEC Model Farm, CAU, Imphal. Approximately thirty-five farmers took part in the programme.

Training programme on "Scientific Livestock and Fish Farming"

3.2 Awareness, demonstration, and input distribution programme

a) Under the Farmer FIRST Programme, the Directorate of Extension Education, CAU, Imphal, conducted a one-day awareness and input distribution programme on February 20, 2023, in Maopungdong village, Senapati district, Manipur. Dr. Anupam Mishra, the Hon'ble Vice Chancellor of CAU, Imphal, and Dr. S. LorhoPfoze, the Hon'ble MP Lok Sabha (Outer Manipur), presided over the programme. The honourable MP and honourable vice chancellor of CAU, Imphal, handed over an egg incubator/hatchery with a 500-egg capacity, a mini rice mill, a power generator, a 15-liter manual sprayer, garden tools, seeds, and other items through the Custom Hiring Centre to improve the lives of the villagers' farmers. Approximately 85 farmers took part in the programme.

b) On March 10, 2023, at Shanghak Khullen village, Ukhrul district, Manipur, The Directorate of Extension Education, CAU, Imphal held a one-day awareness and demonstration workshop on "Utilization of Drone in Agricultural Field" as part of the Farmer FIRST programme. Application of nano urea in a 2-acre crop field as a demonstration is part of the programme. 125 farms took part in the initiative.

One day awareness cum demonstration programme on "Utilization of Drone in Agricultural Field

Application of Nano Urea in cabbage field

3.3 Technology assemblage, application, and feedback

3.3.1 Crop based module

a) Cultivation of maize -sweet corn (Var. *Golden Cob F1*) for higher profitability

The Farmer FIRST Programme, CAU, Imphal, was conducting Crop-based module activities. During 2022–2023, four beneficiaries were involved in the cultivation of maize with sweet corn (var. Golden Cob F1) on a 0.5 ha total area in two villages: Maopungdong village in Senapati district and Shangshak Khullen village in Ukhrul district.

It was found that by cultivating sweet corn with Golden Cob F1, farmers may make a profit of Rs. 50,000/-from a 0.5-hectare area in 3–4 months with a B:C ratio of 2.

Intervention	:	*Variety introduction of Sweet Corn (Golden Cob F1)*
Technology details	:	Scientific Sweet corn cultivation.
Yield (q)	:	70 q/0.5 ha.
Net return from 0. 5 ha. within 80-90 days	:	50,000/-
Total Cost	:	Rs. 50,000/-
Gross return	:	1,00,000/- @ Rs. 100/10 cobs
B:C Ratio	:	2:1

3.3.2 Livestock based module

a) Scientific backyard poultry farming

The Farmer FIRST Programme, CAU, Imphal have provided 1000 *nos*. of Poultry chicks (CSB breed) covering 30 nos. of farmers of both the villages *i.e*. Maopungdong village, Senapati and Shangshak Khullen village, Ukhrul district. CSB poultry breed is a dual-purpose bird which is a crossed of Broiler female and Kuroiler male.

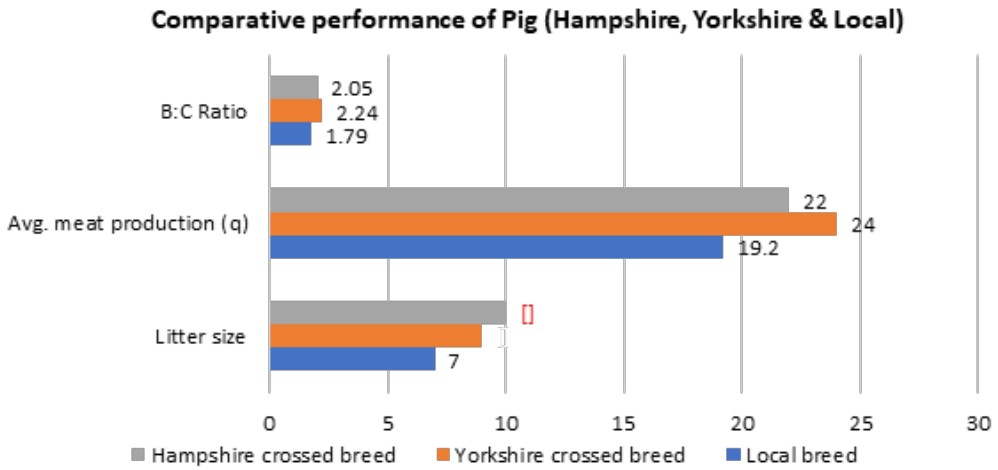
Intervention	:	Backyard Poultry farming with CSB improved breed.
CSB breed	:	Dual propose crossed of Broiler female and Kuroiler male.
Yield	:	99 kg (Meat) by selling of 30 nos. cock & Spent hen & 2200 eggs in one year
Avg. weight	:	3.3 kg
Gross income	:	Rs. 46,750/- annually
Net Income	:	Rs. 33,250/- annually
B:C Ratio	:	3.4:1

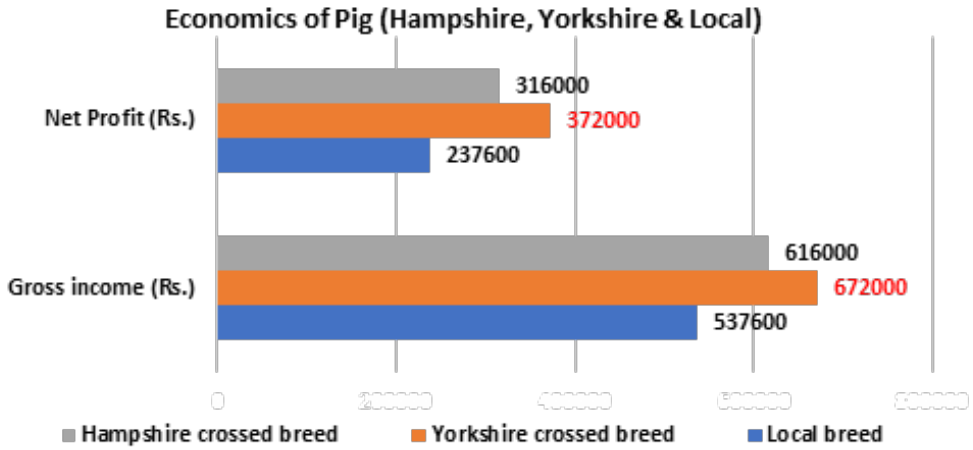
b) Scientific rearing of pig

In February 2023, five piggery units were established by the Farmer FIRST Programme, CAU, Imphal. The programme provided 20 piglets of the Large White Yorkshire and Local breed, covering 10 farmers from each of the two villages- Maopungdong in Senapati and Shangshak Khullen in Ukhrul district.

Table 2. Comparison of different pig breed

Parameter	Local breed	Large white Yorkshire	Large black Hampshire
Avg. male adult body weight (kg)	160	220	230
Avg. female adult body weight (kg)	130	200	210
Avg. No. of litters	6-8	8-10	10-11
Avg. meat production (q)	19.2 q	24 q	22 q
Cost (in one year)	300000	300000	300000
Avg. gross income	5,37,600	6,72,000	6,16,000
Avg. Net Profit	2,37,600	3,72,000	3,16,000
B:C Ratio	1.79:1	2.24:1	2.05:1





Local breed

Large White Yorkshire

Large Black Hampshire

3.3.3 IFS and Fish based module

FFP, CAU, Imphal has also initiated One IFS unit (Agri-Horti-Livestock-Fishery) at at Shangshak Khullen village, Ukhrul Sistrict, with the distribution inputs such as Rice, potato, sweet corn, CSB poultry breeds, Yorkshire and Local breeds of pigs and Fish fingerlings (Grass carp, Common carp, Tilapia) with an area of 1.25 ha during 2022-23.

3.3.4 Enterprise based module

The FFP, CAU, Imphal constructed 2 nos. of Low-Cost Mushroom house (20ft x 15ft x 9ft) at Maopungdong village, Senapati district and Shangshak Khullen village, Ukhrul district, Manipur during the year 2022-23.

3.3.5 NRM based module

a) Vermicompost

The FFP, CAU, Imphal constructed two vermicomposting units (10ft x 3ft x 3ft) at Maopungdong village, Senapati district and Shangshak Khullen village, Ukhrul

district, Manipur, during the year 2022-23. The Scientific Vermicomposting is to be conducted under this structure covering 5 *nos.* of farmers.

Shangshak Khullen village, Ukhrul

Maopungdong village, Senapati

b) Protected technology

The FFP, CAU, Imphal constructed two Low-cost Polyhouse (20ft x 15ft x 9ft) at Maopungdong village, Senapati district and Shangshak Khullen village, Ukhrul district, Manipur, during the year 2022-23. The Scientific Vermicomposting is to be conducted under this structure covering 10 nos. of farmers.

Maopungdong village, Senapati

Shangshak Khullen village, Ukhrul

3.3.6 Farm mechanization based module

a) Custom Hiring Centre

Two Custom Hiring Centers (CHC) have been established as part of FFP initiative. These centers aim to serve two villages, namely Maopungdong village in Senapati and Shangshak Khullen village in Ukhrul. The primary focus is on providing essential services and resources to the local community.

The impact of these efforts is reflected in the direct benefits to 22 beneficiaries. Through these CHCs, the objective is to enhance agricultural practices, promote community development, and contribute to the overall well-being of the residents in these two villages. The establishment of these centers underscores the commitment to fostering sustainable agricultural practices and supporting the livelihoods of the local population.

The following equipment and facilities have been installed and maintained as part of agricultural development initiative.

- Two Egg Incubator cum Hatchery units with a capacity of 500 eggs each.
- Two Power Generators.
- Two Mini Rice Mills with a power capacity of 3 HP.
- Various other tools and equipment such as Garden hoe (20 nos.), Shovel (20 nos.), Sickle (20 nos.), Hand cultivator (20 nos.) & Manual Sprayer (15L) (20 nos.) are available at the Custom Hiring Centre for community use.

During the period from August 2022 to March 2023, the initiative has generated a revenue of Rs. 3800. This financial achievement reflects the positive impact and sustainability of the efforts in promoting agricultural practices and supporting the local community.

3.4 Content mobilization

Particular	Number
WhatsApp group created	4 groups
Publication (Research Article, Folders, Leaflets, Bulletins, Booklets, *etc*.)	23 nos.
Success stories published	54 nos.
Innovative Farmers' Award, 2021 received during the 46th Foundation of ICAR-NAARM, Hyderabad on "Agri-Hort-Livestock-Fishery IFS"	1 farmer (Shri. H. Premjit Meitei)
Received First Prize in Poster Presentation on "Scientific Makhana Cultivation" during 6th Farmers Science Congress, CAU, Imphal held at College of Horticulture & Forestry, Pasighat during 11-13 Nov. 2019.	1 farmer (Shri. Kh. Gouramani Singh)

3.5 Partnership building

Sl. No.	Name of the Organisation	Purpose of convergence/ partnership development	Nature of convergence (Planning/ exposure visit/ training/etc)
1.	ICAR For NEH Region, Lamphelpat, Imphal	Transfer of new scientific Technologies, utilization of scientists, staffs, village leaders, etc.	Training, identifying area specific scientific technologies, Farmer Interface interaction, Identifying sites for with the help of village chairman
2.	Department of Agriculture, Govt. of Manipur		
3.	Department of Veterinary Sciences and AH, Govt. of Manipur		
4.	KVK, Ukhrul, Manipur		
5.	KVK, Imphal East, Andro, Manipur		

6.	District Agriculture Officer, Senapati, Dept. of Agri., Govt. of Manipur		
7.	District Horticulture Officer, Senapati, Dept. Of Horti., Govt. of Manipur		
8.	District Veterinary Officer, Senapati, Dept. of Vety. & AH Services, Govt. of Manipur		
9.	District Fishery Officer, Senapati, Dept. of Fishery, Govt. of Manipur		
10.	District Agriculture Officer, Ukhrul, Dept. of Agri., Govt. of Manipur		
11.	District Horticulture Officer, Ukhrul, Dept. Of Horti., Govt. of Manipur		
12.	District Veterinary Officer, Ukhrul, Dept. of Vety. & AH Services, Govt. of Manipur		
13.	District Fishery Officer, Ukhrul, Dept. of Fishery, Govt. of Manipur		
14.	Maopungdong Village Authority, Senapati, Manipur		
15.	Jhumia Farmers Society (JAFAS) ShangshakKhullen, Ukhrul		

4 Chapter

ICAR, RC, Umiam, Meghalaya

4.1 Enhancing Farmer –Scientist Interface

4.1.1 Programmes

a) Farmer field school on agri-preneurship development

The ICAR RC for NEH Region in Umiam, as part of the Farmer FIRST Programme, organized a three month long "Farmer Field School on Agri-preneurship Development" from May 25th to July 1st, 2022, in Purangang village, Marngar, Ri Bhoi District. The Farmer Field School (FFS) is informal; group based educational initiative covering a wide range of topics, providing farmers with hands-on learning experiences in the field. Unlike traditional top-down "technology transfer" approaches, FFS encourages farmers to seek expert assistance only when they encounter problems they cannot resolve on their own. Emphasizing the core principle of FFP, which views farmers as experts with a basic understanding of agro-ecological systems and decision-making processes, selected farmers shared their experiences and various techniques employed in their own agricultural and animal husbandry practices, which are critical for long-term soil, pest, and crop management. Over the course of three months, weekly meetings were held, featuring different experts from the institute who discussed topics related to the cultivation of high-value horticultural crops, mushroom cultivation, fisheries, piggery, poultry, and goat farming with the participants. Following each session, field visits were conducted to observe real time issues and challenges under field conditions, promoting the development of researchable topics through a participatory approach. The months long program has helped identify priority problems that were addressed prior to each session. The program intentionally targeted 20 farmers, including young aspiring entrepreneurs and female farmers from ten adopted villages within the Marngar cluster in the Ri Bhoi district. This was done to foster knowledge sharing and group collaboration, considering the similarity in agro-ecological systems across the villages. Additionally, as a form of support, summer vegetable seeds were distributed to encourage multiple cropping practices among the farmers.

Farmer Field School Programme at Marngar cluster, Ri-Bhoi District, Meghalaya

b) Input distribution programme at Purangang village

An Input Distribution programme was organized by ICAR Research Complex for NEH Region, Umiam, Meghalaya under Farmer Firsts Programme on 6th September 2022. Approximately 1500 nos. of Rohu, Gania and Guchi breeds were distributed to 10 nos. of farmers from Marngar Cluster. The programme was conducted by the Division of Technology Assessment and Capacity Building, ICAR Research Complex for NEH Region, Umiam, Meghalaya with the objective of educating the farmers about adopting

fishery as an alternate source of livelihood for doubling their income. Further, a trial on poultry hatchery was also conducted on this day as 200 nos. of fertile eggs were disturbed to the already established custom hiring center at Purangang village. The programme was coordinated by Dr. N. Uttam Singh (Senior Scientist & PI), Shri. Kamni P. Biam (Scientist & Co-PI), Dr. Anjoo Yumnam (Scientist) and Iaidonlang Syiemlieh (Project Assistant).

Distribution of fingerlings at Purangang village

c) Input distribution programme at Marngar cluster

An Input Distribution programme was organized by ICAR Research Complex for NEH Region, Umiam, Meghalaya under Farmer FIRST project on 29th September 2022. A total of 140 nos. of poultry birds was distributed to 7 nos. of farmers from Marngar Cluster. Division of Technology Assessment and Capacity Building, ICAR Research Complex for NEH Region, Umiam, Meghalaya conducted the programme with the objective of educating the farmers about adopting poultry farming as an alternate source of livelihood for doubling their income. A trial on poultry hatchery was conducted on 6th September 2022 with 200 nos. of fertile eggs in the automatic egg incubator established in the custom hiring center at Purangang village. After 21-

30 days in incubation, 70 percent hatching rate was observed, as 140 nos. of chicks hatched successfully out of 200 nos. of eggs. The newly hatched birds were distributed to 7 nos. of farmers on 29th September 2022. The programme was coordinated by Dr. N. Uttam Singh (Senior Scientist & PI), Shri. Kamni P. Biam (Scientist & Co-PI), Dr. Anjoo Yumnam (Scientist) and Iaidonlang Syiemlieh (Project Assistant).





Input Distribution Programme at Marngar Cluster

d) Awareness programme on Jalkund at Mawphrew village, Meghalaya

Awareness programme organized by ICAR Research Complex for NE Region, Umiam, Meghalaya under Farmer Firsts programmet on 18th November 2022. A total of 13 nos. of farmers from Mawphrew village attended the Awareness programme on Jalkund. The main objective of the programme was to educate and to convey simple, clear, and presentable message about Jalkund which include all the steps required for Jalkund construction, *i.e.* site selection, requirements, steps in constructing jalkund and most importantly the utilization of water harvested. An interactive session and discussion were held on Jalkund construction and its uses. The programme was coordinated by Dr. N. Uttam Singh (Senior Scientist & PI), Iaidonlang Syiemlieh (Project Assistant), Wanbiang Dkhar (Project Assistant) and Lutmonhaki Dkhar (Senior Research Fellow).

Awareness programme on Jalkund in Mawphrew village

e) Workshop on livelihood improvement for farmers through advanced agricultural technology

A one-day farmer's scientist interaction programme cum workshop was jointly organized by Division of Technology Assessment and Capacity Building (DTAC), ICAR-RC for NEH region, Umiam and Seva Bharati Meghalaya at Marngar cluster, Ri Bhoi District on 31st March 2023, under the Farmers' FIRST Programme. The programme was graced by Honourable Shri Bhagaiah Ji, All India Committee Member, Rastriya Swayamsevak Sangh, Shri Ulhas Kulkarni, Organization Secretary of Northeast, Rastriya Swayamsevak Sangh, Shri Mani Mawapat General Secretary Khasi-Jaintia, Rastriya Swayamsevak Sangh Shri. Rajesh Ji (Seva Pramukh RSS), Shri. Praveen Ji from (Seva Bharati Shillong) and Prof. Dwipendra Thakuria Dean Collage of Agriculture Kyrdemkulai. The ICAR (RC) for NEH, Umiam, was represented by the Director Dr. V.K Mishra, Dr. Aniruddha Roy, Senior Scientist & I/c Head of the Division of Technology Assessment and Capacity Building, Dr. N. Uttam Singh, Senior scientist & PI of Farmer's First Programme, Dr. Anjoo Yumnam (Scientist & Co-PI), Dr. H. Rymbai (Scientist & Co-PI), Mr. Chikkathimme Gowda H.R (Scientist & Co-PI), Dr. Tasvina R. Borah (Scientist &Co-PI), Mr Swaroop Sharma CTO, Ms. Nirmali Borthakur, ACTO, Ms Lutmonhaki Dkhar (SRF), Mr. Wanbiang Dkhar, Mr. Hameki Shylla and other staffs of the institute. The programme started with a welcome speech by Dr. Aniruddha Roy, welcoming the delegates, he also briefed about the one-day workshop to the farmers present. Dr. N. Uttam Singh, Senior scientist & PI of Farmer's First Project, in his speech highlighted the main objective of the project and also the various activities that were undertaken in the Marngar cluster of Villages. Dr V. K. Mishra Director ICAR Felicitating the depilatories, expressed that the farmers are satisfied with the input of the project as it has helped them to win several awards at the national level. However, he requested the farmers that agriculture is a constant effort and they should not only rely on the inputs given to them by ICAR from time to time but it is high time that they should come to a stage where they should become independent with the technological and modern scientific inputs. Chief Guest on the occasion Shri Bhagaiah Ji, initially got the direct feedback from the farmers about the benefits of the project, and other difficulties they were facing. He advised the farmers to give respect to nature in totality as it is nature that gives the three main things – light, water and land. He requested the farmers to give maximum importance to land and soil fertility, for which he said FYM is the most important component which can come from cows only. He requested the farmers to go for dairy farming which will benefit them in totality. He also requested ICAR to look into the areas of transportation and better marketing, as requested by the farmers. The main objective of the workshop was to have a farmers scientist interaction wherein the farmers can highlight their issues / problems related to farming. Approximately 200








Workshop cum inputs distribution in Nongagang village

numbers of farmers from different clusters attended the programme which included a few progressive farmers. The progressive farmers shared their success stories along with certain constraints that they were facing with regard to cultivation practices, packaging, lack of market etc. In this regard they received favourable response and feedback from different scientist who have specialization in different field and they were brief about increasing their production, productivity, market supply and management of different agricultural and horticultural crops including live stocks. The farmers were satisfied with the responses they received. Furthermore, an input distribution programme was also organised to provide few inputs like Vegetable seeds, Bio-pesticides, poultry chicks (300 nos.), poultry feeders (20 Packets.), Vermi-composed beds (5 nos.), Knapsack sprayers (5 nos.) etc. to the farmers to boost up their farming practices. The farmers also set up a few stalls where they displayed the products of few agri-entrepreneurs, namely Mr. Midot Binong who took up spices as his main products, Mr. Gumbir Syiem who adopted fish farming, Marngar Handicrafts groups also displayed specialized bamboo ornaments & jewellery. A vote of thanks was given by Mr. Swaroop Sharma, CTO, Division of technology assessment and capacity building. Later in the evening Shri Bhagaiah Ji, also had an interactive session with the Technical and Scientific staff of the Institute. In the session he wanted to know from the scientist the areas of difficulty in terms of research and advancement. He advised the scientist community to make best use of the biodiversity of the region

4.1.2 Demonstrations

a) Technological demonstration *cum* input distribution at Purangang village

As part of the Farmer Field School conducted by ICAR Research Complex for NEH Region, Umiam under the project Farmer FIRST, a technological demonstration on using of banana pseudostem waste as shading materials was conducted on the 10th June 2022 at Purangang village, Marngar, Ri-Bhoi District, Meghalaya. The programme was conducted for popularization and adaptation of shading at transplanting time using banana pseudostem in vegetable crops. Aspects on time of transplanting, orientation, size and inclination of pseudostem were demonstrated in detail. An interactive session and discussion were held on the beneficial effects of banana pseudostem on the newly transplanted seedling of vegetable crops. Issues raised by farmers on scientific cultivation of lemon, Khasi mandarin and nursery production were also discussed. A total of 18 farmers from different parts of Marngar areas had participated in the programme. Inputs including Jhalkund (01 no.) and vegetable seeds (cucumber, var. Malini – 200 g; tomato, var. KSP-1154, Rocky – 200 g; Bottle gour, var. BSS-333 Pratik, 200 g; chilli, var. Jwala – 200 g; brinjal, var. Devansh – 150 g; bitter gourd, var. Prachi – 200 g) were distributed to the beneficiaries. Feedback also revealed that farmers required hands-on training on propagation of fruit crops. The programme was

coordinated by Dr. H. Rymbai (Scientist & Co-PI), Dr. N. Uttam Singh (Senior Scientist & PI), Dr. K. Biam (Scientist & Co-PI), Lapynbiang Kharrymmai (Project Assistant) and Iaidonlang Syiemlieh (Project Assistant).

Technological demonstration cum input distribution at Purangang

b) Demonstration cum Input Distribution on 'Scientific cultivation of lemon *(Citrus limon)* and pineaaple *(Ananas comosus)*

A demonstration cum input distribution programme was organized by the ICAR Research Complex for NEH Region, Umiam, Meghalaya under the Farmer FIRST Programme on 11th October 2022 at Mawtnum village, Ri-Bhoi District, Meghalaya. The programme was conducted to address farmer's issues with cultivation of fruit crops, and also as an alternative source of income generations. Lemon and pineapple are among the most potential horticultural crops in the adopted cluster villages including Marngar areas, Mawphrew and Mawtnum. A lecture on scientific cultivation of these crops was delivered by Dr. H. Rymbai Scientist (Horticulture - Fruit Science) followed by a field demonstration on layout and planting of these fruit crops. A total of 500 cuttings Assam lemon and 500 suckers of pineapple were distributed to 10 beneficiaries of adopted villages. In the interaction session, issues on Khasi mandarin and other fruits

were also discussed. The programme was coordinated by Dr. H. Rymbai (Scientist & Co-PI), Dr. N. Uttam Singh (Senior Scientist & PI) and Iaidonlang Syiemlieh (Project Assistant).

Demonstration cum inputs distribution in Mawtnum village

c) Hands-on demonstration on the promotion of double cropping through scientific cultivation of rabi crops

A demonstration cum input distribution programme was organized by the ICAR Research Complex for NEH Region, Umiam, Meghalaya, under the Farmer FIRST project on the 11th November 2022 at Borgang village, Ri-Bhoi District, Meghalaya. A series of surveys and interactions with farmers in the adopted villages indicated the need for intervention for the adoption of double cropping through scientific vegetable cultivation in rice fallow to generate additional employment and income for farmers. Dr. H. Rymbai delivered a lecture on the scientific cultivation of vegetable crops suitable for adoption in the post-harvesting of paddy. A hands-on demonstration on the raising and management of nurseries was also conducted in the field. Inputs such as seeds (25.4 kg); bitter gourd (100 g), bottle gourd (275 g), brinjal (80 g), capsicum (160 g), cauliflower (80 g), chilli (80 g), coriander (10 kg), cucumber (200 g), peas (12 kg), radish (2.2 kg), tomato (150 g) were distributed to interested beneficiaries. A

total of 64 farmers from different villages, including Lalumpam, Nongagang, Borgang, Borkhatsari, Mawphrew, Purangang, and Nalapara, participated in the program. The programme was coordinated by Dr. H. Rymbai (Scientist & Co-PI), Dr. N. Uttam Singh (Senior scientist & PI) and Iaidonlang Syiemlieh (Project Assistant) Wanbiang Dkhar (Project Assistant).

Training cum seeds distribution in Borgang village

4.1.3 Trainings

a) Training cum input distribution on nursery management of cole crops

A training cum input distribution programme on "Nursery management of Cole Crops and Other Vegetable Crops" was organised by the ICAR Research Complex for NEH Region, Umiam, Meghalaya, under the Farmer FIRST project on November 22, 2022, at Borgang village, Ri-Bhoi District, Meghalaya. In the post-harvest of paddy, generally, the land remains fallow. In view of these, a training was organised with the goal of imparting scientific knowledge on nursery raising and cultural management practises in cole crops and other winter season vegetables. Furthermore, such activities, if adopted, may generate employment and additional income for the farmers during the off-season. A lecture was delivered on various aspects of nursery management and cultural management of cole crops and other winter vegetable crops.

A total of 50 farmers attended the programme from different villages in the Marngar cluster area, including Borkhatsari, Lalumpam, Nalapara, Umtham, Joigang, Nalapara, Mawtnum, and Borgang. About 10.8 kg of vegetable seeds, including broccoli (400 g), cabbage (100 g), cauliflower (100 g), green peas (10 kg), tomato (50 g), cucumber (70 g), and lettuce (100 g), were distributed to the interested beneficiaries (Figure 1). A field monitoring of fruit orchards was carried out to assess the performance of fruit trees in the project's adopted villages (Figure 2). The programme was coordinated by Dr. H. Rymbai (Scientist & Co-PI), Dr. N. Uttam Singh (Senior scientist & PI) and Lutmonhaki Dkhar (Senior Research Fellow), Iaidonlang Syiemlieh (Project Assistant) and Wanbiang Dkhar (Project Assistant), ICAR Research Complex for NEH Region, Umiam, Meghalaya.

Training cum Input distribution on Nursery management of Cole crops

b) Livelihood empowerment in Marngar cluster, Meghalaya through scientific pig cum fish farming

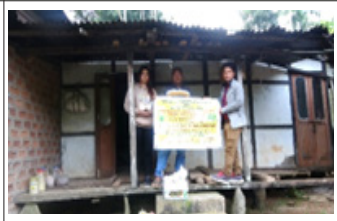
A Three Days Training Programme on "Livelihood empowerment in Marngar cluster, Meghalaya through scientific pig cum fish farming" was organized by Division of Technology Assessment and Capacity Building in collaboration with Department of Animal and Fisheries Sciences at ICAR Research Complex for NEH Region, Umiam, Meghalaya under the Farmers FIRST Programme (FFP) from 22nd-24th March, 2023.The prime objective of this capacity building programme was to enhance the knowledge on scientific pig cum fish farming and educate the participants for the betterment of their livelihoods. A total of 28 interested farmers from adopted villages under Marngar Village Cluster participated in the training programme. Mr. Chikkathimme Gowda H.R., Scientist (Agril. Economics), Division of Technology Assessment and Capacity Building (DTAC) and Co-PI of the project welcomed all participants and gave a brief introduction about the training. The Inaugural Session was graced by the Chief Guest Dr. Aniruddha Roy, Head of Division of Technology Assessment and Capacity Building and Dr. N. Uttam

Three days training programme

Singh, Senior Scientist (DTAC) & PI of FFP, Mr. Kamni P. Biam, Scientist (DTAC) & Co-PI, and Dr. Pampi Paul, Scientist (DTAC) &Co-PI, Dr. Anjoo Yumnam, Scientist (DTAC) & Co-PI and Wanbiang Dkhar (Project assistant) were present. After the inaugural session, the first technical session was conducted by Dr. Chandan Debnath, Scientist, DAFS. The session started with a brief interaction among the farmers and the scientist followed by theoretical classes. The participants were educating about scientific fish farming, feed management, pond management process and treatment of different fish diseases. The farmers were also boost to do large scale farming in order to cope

up with the fish requirement within the state. After the completion of the theoretical classes, the farmers were taken to a field exposure visit were Mr. Pynhun Ryntathiang (Technical Assistant) Fish farm complex, brief them about pH requirement, feed requirement, pond size requirement and breeding techniques of different varieties of fishes. On the Second day, the farmers were exposed to a one day symposium as a part of celebration of world water day organized by ICAR-NEH region, Umiam in the presence of our honorable chief guest Dr. V. K Mishra, Director of ICAR- NEH Region. The farmers got a chance to learn about the importance of water in day to day life style, also the main objective of this exposure was to sensitize the farmers about the judicious usage of water because without which, it is impossible to practice agriculture. On the third day, the theoretical class about scientific pig farming was covered up by Dr. C. Gonmei, SRF (DAFS). The farmers were brief about the growing opportunities of pig farming, especially in the Northeastern hills region as pork is in high demand. They were also being educate on the farming processed, management practices, low-cost pen construction, feed requirement, treatment of different pig diseases, breeding techniques and also the importance of Artificial insemination were brief to them. In the valedictory session, feedback was taken from the farmers and certificates were distributed to participants followed by a vote of thanks.

Table 3. Details of visits of project team and other scientists to project site

Date of visit	Purpose & details of visit	Persons accompanied	Villages covered	Photo
23.12.2022	Training cum input distribution (Mushroom spawn-Florida) and Field monitoring.	Lutmonhaki Dkhar, Wanbiang Dkhar.	Borgang	 

25.12.2022	Existing Jalkund inspection cum awareness programme on benefits through installation of jalkund.	Lutmonhaki Dkhar, Wanbiang Dkhar.		 
18.01.2023	Site inspection for installation or construction of new Jalkund.	Mr. Chikkathimme Gowda (Scientist&Co-PI), Lutmonhaki Dkhar, Wanbiang Dkhar,	Mawphrew	 
27.01.2023	Field Monitor cum inspection of site for installation of Jalkund.	Lutmonhaki Dkhar, Wanbiang Dkhar.		 

1.02.2023	Distribution of Vermibeds and Monitoring programme.	Dr. N Uttam Singh(Sr. Scientist&PI), Mr. Kamni Biam (Scientist&Co-PI), Lutmonhaki Dkhar, Wanbiang Dkhar.	Borgang, Nalapara.	 
21.02.2023	Inputs distribution programme (of Knapsack back pack Sprayers and vermi-bed).	Lutmonhaki Dkhar, Wanbiang Dkhar.	Umtham, Borgang, Lalumpam, Nalapara.	 
28/03/2023	Installation of Jalkunds	Wanbiang Dkhar	Umtham, Borgang, Borkhatsari.	
28/03/2023	Input distribution (CGI Sheets for construction of Mushroom Production unit)	Wanbiang Dkhar	Mawphrew	

4.2 Technology Assemblage, Application and Feedback

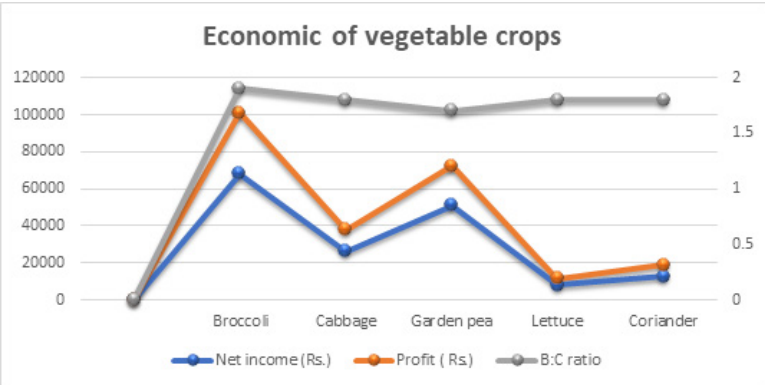
4.2.1 Crop based modules

a) Promotion of second cropping through dissemination of improved technologies (Raised and Sunken Bed) in rice fallow

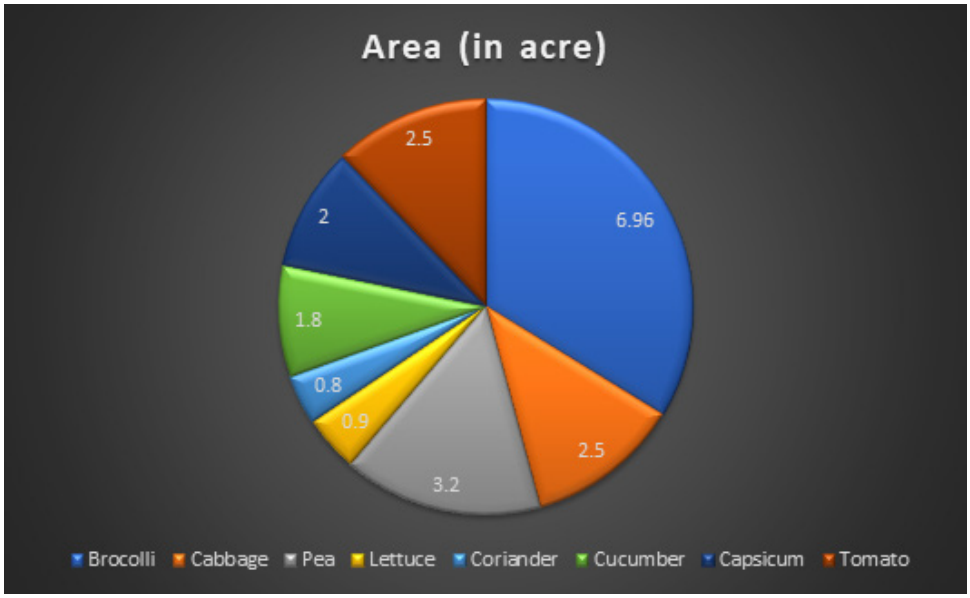
For proper utilization of rice fallow land after *Kharif* rice harvest, seeds of vegetable crops such as broccoli, French bean, tomato, etc. were distributed to 121 beneficiaries from the adopted villages in the month of June and November 2022. Out of 121 numbers of beneficiaries a total of 42 nos. of farmers from the adopted villages have cultivated vegetables such as broccoli, cabbage, and garden pea. The maximum net income was obtained in broccoli (68,200), followed by peas (51,000) and other vegetable crops. The benefit cost ratio was also highest in broccoli (1.9) and followed by peas (1.8) as indicated in the table below:

Table 4: The economics of the vegetable's cultivation

Crop	Variety	Yield (kg)	Rate/kg (Rs.)	Net income (Rs.)	Expenditure (Rs.)	Profit (Rs.)	B:C ratio
Broccoli	F_1 Hybrid destiny	1,705	40	68,200	35,500	32,700	1.9
Cabbage	Swara	1050	20-25	26,250	14,500	11,750	1.8
Garden pea	Bioseed Pea 10	1,100	40-50	51,000	29,500	21,500	1.7
Lettuce	Grand rapid	200	40	8,000	4,350	3,650	1.8
Coriander	Ruchi	320	40	12,800	6,800	6,000	1.8



Economic of vegetable crops



Area under different vegetable crops

Lettuce cultivation

Brocolli cultivation


Garden Pea cultivation


Cabbage cultivation


Coriander cultivation

b) Rabi maize cultivation

Under the Crop based module, Rabi maize production in paddy fallow was introduced for the second time in the adopted villages of the project. The beneficiaries were sensitized about Rabi maize cultivation and efficient utilization of rice fallow areas. Twenty three numbers of beneficiaries were distributed with maize seeds (variety RCM1-76 and DA-61A) in the month of November, 2021 and were instructed to grow on trial basis. The data on production and yield are presented in the table below:

Table 5: The economics of Rabi maize cultivation

Crop	Variety	No. of cob	Yield (kg)	Rate/cob (Rs.)	Net income (Rs.)	Expenditure (Rs.)	Profit (Rs.)	B:C ratio
Rabi maize	DA-61A	3215	678.06	10.00	32,150	15,100	17,050	1.7
	RCM1-76	5472	1154.27	10.00	54,720	28,500	26,220	1.8




Rabi maize cultivation

4.2.2 Horticulture based module

a) Establishment of orchard of fruit, spices and plantation crops

On the 11th October 2022 fruit crops distribution programme was conducted at Mawtnum village, Ri Bhoi District, Meghalaya. The status of the saplings of fruit and plantation crops are mentioned in the table below:

Table 6: Status of Plantation and fruit crops distributed under the project

Crops	Quantity	Status/ stage
Assam lemon	500 plants	Growth state
Pine apple	500 plants	Vegetative state

Assam Lemon

Pineapple

4.2.3 Livestock based module

a) Backyard poultry farming

Improved breeds (Vanaraja/Kruoiler) of backyard poultry chicks (1290 nos.) were distributed to 32 nos. of beneficiaries on the 20th April 2022 and 29th September 2022. Live bird (2.5-3.5 kg) were sold @ Rs. 250-380 per kg live body weight and earn about Rs.625.00-Rs.1330.00 from each bird after rearing for about 8-10 months. The table below shows the income obtained from rearing backyard poultry.

Table 7: Income from backyard poultry farming

Birds sold (nos.)	Body weight (Av.)	Rate/kg live weight (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C ratio
245	2.5 kg	250-380	2,39,100.00	1,40,000.00	99,100.00	1.7


Backyard poultry rearing

b) Backyard pig farming

Improved breeds of pigs (Hampshire cross bred) (33nos.) were distributed among the farmers (33 nos.) on 22.03.2022. The details of the income generated below are shown in the table below.

Table 8: Income generated from pig farming

Piglets sold (nos.)	Rate/ piglets (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C ratio
31	5000	1,55,000.00	90,000.00	65,000.00	1.7

4.2.4 Enterprise based module

a) Development of Pig Breeding Cluster in village

Three farmers, Sh. Mrinal Sohkhwai (Borkhatsari village) and Sh. Jiten Sohkhwai (Nalapara village) and Shmt. Nebha Syiem are rearing pigs (Hampshire cross) for breeding purpose. Farmers earned a total income of Rs. 5,44,000.00 (B:C ratio:1.65) by selling 75 nos. of piglets and 6 nos. of adult pigs. The following table shows the economic from pig breeding unit.

Table 9: Successful pig breeding cluster in adopted villages

Name & village	Pigs/Piglets (nos.)	Total Income (Rs.)	Cost of Production (Rs.)	Net profit (Rs.)	B:C ratio
Mrinal Sohkhwai	Piglets: 47 Sown & Boar: 3	3,19,000.00	2,10,000.00	1,18,000.00	1.5
Jiten Sohkhwai	Piglets: 12 Sown & Boar: 3	1,45,000.00	42,500.00	37,500.00	1.8
Nebha Syiem	Piglets: 16	80,000.00	85,000.00	60,000.00	1.7
		5,44,000.00	3,28,500.00	2,15,500.00	1.65

Pig breeding unit at Borkhatsari, Nalapara and Purangang/Joigang villages

b) 1000 eggs capacity poultry hatchery unit

The 1000 eggs capacity incubator allows for precise temperature setting and easy LED display for temperature, hatching day, egg rotation time and humidity features unique and user-friendly designs which ensure efficient egg setting and hatching operations. It also features a viewing panel for inspection without the need to open the incubator.

Features and specifications

- Adapted for hatching medium eggs of various capacities such as 1000 chicken eggs as well as quail eggs, duck eggs, pheasant eggs, goose eggs, etc.
- A cabin made of an insulated plate in a metal finish which offers a wide range of optimal and proven brood performance for all species.
- An electronic high-quality analog thermostat with decimal accuracy allows easy and accurate temperature setting.
- The machine is ventilated and a special device allows the ventilation to be regulated. The adequate exchange of air with the resulting emission of carbon dioxide takes place through the corresponding ventilation openings.
- Utilizes multi-function and microcomputer-based technology for accuracy.
- High hatching rate with automatic humidity control (0.1% Rh) and is built to give almost zero noise.
- Equipped with standard automatic egg handling and corresponding baskets.
- The temperature is read using a precision thermometer and the hygrometer with water reservoir allows precise reading of the moisture in the incubator. The removable cover for both gauges gives strength and allows for easy cleaning.
- A viewing window attached to the door allows a good view of the incubator. Internal lighting allows you to control hatching without opening the door.
- Egg incubators help simulate avian incubation by regulating factors such as temperature, humidity, and turning the eggs when necessary, which mimics the role of the hen in its natural state. Incubators also eliminate external threats that could possibly harm eggs. They provide perfect conditions for the eggs
- Developed system successfully hatched out chicks from eggs.

A trial on poultry hatchery was conducted on the 6th September 2022 with 200 nos. of fertile eggs in the automatic egg incubator established in the custom hiring centre at Purangang village. After 21-30 days in incubation, 70 percent hatching rate was observed, as 140 nos. of chicks hatched successfully out of 200 nos. of eggs. The newly hatched birds were distributed to 7 nos. farmers.

Installation of 1000 eggs capacity Poultry Hatchery unit cum trial at CHC, Purangang village.

c) Oyster mushroom cultivation

Oyster mushroom spawn of 20 packets was distributed to 1 nos. of beneficiary Sh. Rolling Sohkhwai from Borgang village which is one of the adopted village. A total yield of 66 kg mushroom was obtained. Fresh mushrooms were sold @ Rs.200-250/- per kg in the local markets. Total income earned is Rs.16,500.00 (B:C ratio:2.6).

Table 10: Income from oyster mushroom cultivation

No. of beneficiaries	Spawn packets distributed	Yield (kg)	Rate/ kg (Rs.)	Total income (Rs.)	Cost of production (Rs.)	Net profit (Rs.)	B:C ratio
1	20 pkts. (8 kg)	66	200-250	16,500.00	9,800.00	6,700.00	1.6

Mushroom (Florida) cultivation at Borgang village

d) Establishment of mushroom production unit

One of the interventions proposed in the FFP Action Plan 2021-22 was to install mushroom production unit at the village level. Mushroom production will improve the socio economic status by generating the income opportunities. The main objective was to enhance the farmer's annual income through the production of mushroom. One beneficiary i.e., Mr. Augustine Makri from Mawphrew village was interested in building up the mushroom production unit for himself. Therefore on the 11th November 2023, a site inspection was conducted from Farmers' First project at Mawphrew village for installation of Mushroom production unit. After the inspection, the site was permitted to install the Mushroom production unit. In this regard, Mr. Augustine Makri was provided hands on CGI Sheets on the 28th March 2023.




Inspection of site for construction of Mushroom production unit


Distribution of CGI sheets

4.2.5 NRM based module:

a) Construction of low cost rainwater harvesting structure, Jalkund

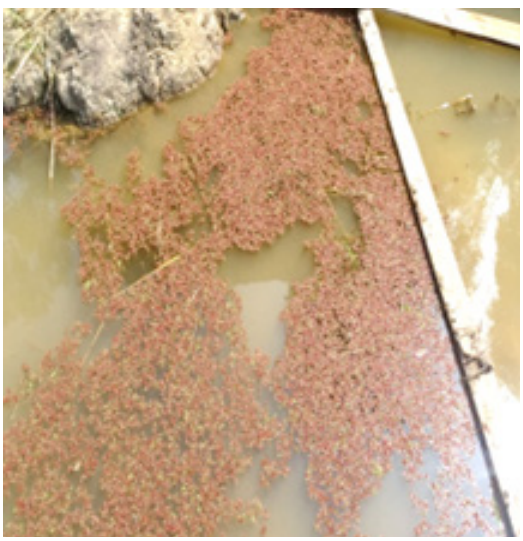
Jalkund act as a low cost, in-situ micro-rainwater harvesting structure developed in the hill-top for collecting and storing rainwater and during dry seasons the water collected can be utilize for Multi-purposes including life-saving irrigation at critical

stages of crop growth, for washing crop produces of ginger, turmeric, carrot, radish, fish rearing, for animal husbandry and livestock rearing and domestic activities. Therefore, in order to fulfil the need of water for agriculture and allied activities during the period of water scarcity, a total of 5 nos. of jalkund (5m x 4m x 1.5m) have been constructed for storage of water before the onset of monsoon where two numbers of jalkund was installed at Mawphrew village, one each at Umtham, Borgang and Borkhatsari village. Hence the water stored can be used for irrigating crops, cleaning of livestock sheds and also for fish rearing.

Jalkund installed at Marngar cluster, Ri Bhoi

b) Introduction of azolla

Azolla is a floating fern mostly utilized as bio- fertilizer for wetland paddy. It belongs to the family of *Azollaceae*. The fern azolla hosts a symbiotic blue green algae Anabaena azolla, which is responsible for the fixation and assimilation of atmospheric nitrogen. Azolla was found to be a very nutritive and cheap organic feed substitute for dairy cattle.



Introduction of Azolla at Purangang village

It is found to be rich in protein. It is also found to contain essential minerals like Iron, calcium, magnesium, phosphorus, copper, manganese etc. apart from appreciable quantities of vitamin A and vitamin B12. It is also found to contain almost all the essential amino acids, many probiotics, biopolymers and beta carotene.

On the 20th January 2023 Azolla was introduced at Mr. Gumbir Syiem farm which is located at Purangang village, Marngar. Azolla is a potential fish feed ingredient due to its high nutritional value, abundant production, and low price therefore Mr. Gumbir Syiem was instructed to use the Azolla as a feed for fish as he is rearing fish in large quantity. Therefore, in order to reduce his expenses in fish feeds azolla can be used as a substitute for fish feed.

c) Vermicomposting

Vermi Beds are designed to convert the kitchen and other green waste into highly fertile organic compost known as vermicompost. This process is known as vermicomposting. Earthworms eat this waste as their food and they decompose the same which later converts into organic composting. On the 1st February 2023 and 31st March 2023 a total 8 nos. of vermi beds were distributed to the selected 8 nos. of interested farmers. The farmers were instructed with the methods and procedure of vermicomposting prior to the distribution of vermibeds.

Distribution of Vermicompost beds

4.2.6 Integrated farming systems (IFS) module

Integrated farming system provides an opportunity to increase economic yield per unit area per unit time by virtue of intensification of crop and allied enterprises. Therefore an inspection programme was conducted to inspect an IFS unit at Mawphrew village at Mrs. Theodora Maring's farm to check the possibility for new installation. As she is having all the essential and required components of an IFS unit, thus her farm

was selected for installation process and for carrying out further activities in order to enhance her annual income.

One numbers of IFS model developed in the adopted village under FFP

i. Mr. Jiten Sohkhwai, Nalapara village

The income generation from the different components of the IFS unit in Nalapara (Area: 1.6 ha) is given below in the table:

Table 11: Income generated from different components of IFS unit, Nalapara village

Component	Area/ no.	Total Income (Rs.)	Expenditure (Rs.)	Net profit (Rs.)	B:C ratio
Fishery	2 ponds (1000 sq.m each)	1,50,000.00	75,000.00	75,000.00	2
Vegetables	0.1 acre (Bitter gourd, Bottle gourd, Brinjal)	2,400.00	1,100.00	1,300.00	2.18
Piggery	Piglets born: 20 nos.	1,45,000.00	75,000.00	70,000.00	1.93
	Piglets sold: 12 nos. Boar sold: 1 nos. Sown sold: 2 nos.				
Rabbitery	Off springs=10	4500	2,100.00	2,400.00	2.14
	Adults=2				
Poultry	7	35,748.00	18,000.00	17,748.00	1.98
	Sold: 27 nos.				
	Eggs sold: 756 nos.				
Goatery	Sold 2 kids	14,000.00	7,500.00	6,500.00	1.86
Duckery	sold:15	7500	3000	4500	2.5
Total		**3,51,648.00**	**1,81,700.00**	**1,77,448.00**	**1.93**

Fig. 24a Duckery

Fig. 24b Piggery

Rabbit

Poultry

4.2.7 Fishery Based module

a) Composite fish culture

Fish rearing has been practiced quite long in the adopted villages and it was found to be a very profitable intervention. On the 6th September, 2022, a total of 1500 nos. of fingerlings of breed Rohu, Gania and Guchi was distributed to 10 nos. of farmers from Marngar Cluster, Ri Bhoi District, Meghalaya. At present the fish are at their growing stage. The data will be collected after harvesting season.

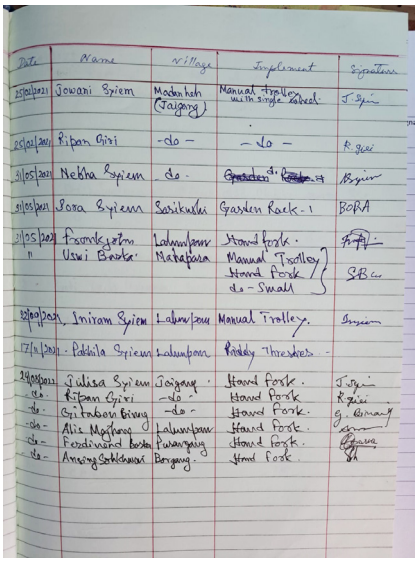
Distribution of fingerlings at Purangang village

4.2.8 Farm mechanization based module

a) Farm mechanization for reducing cost of cultivation

- More than 100 farmers registered under the Marngar Custom Hiring Centre at Borkhatsari village.
- Around 18 nos. of farmers have been using the implements.
- Total revenue generated in the year 2022-23: Rs. 12,000/-
- Fund used for maintenance and repair of the tools and equipments.
- Investment in new machineries is on the cards.

Mini rice mill



Record book of Custom Hiring Centre, Purangang

4.3 Partnership and institution building

Table 12: Details of developed models of partnership

Sl. No.	Name of the organization	Type (NGO/ Private/Public)
1.	AMLAH Multipurpose Cooperative Society, Purangang, Marngar cluster, Ri-Bhoi, Meghalaya	NGO
2.	Self Help Group (SHG) (7 nos.) from Marngar	Private
3.	Farmers Club (3 nos.) from Marngar	Private

4.4 Content Mobilization

A. Content management platform enabling off and online access

1. Folders

Title: "A Guide On Formation and Management of FARMERS INTEREST GROUPS"

Authors: Kamni P. Biam, N. Uttam Singh, Pampi Paul, Chikkathimme Gowda H.R., Anjoo Yumnam, Tasvina R. Borah, H. Rymbai, Naseeb Singh, I. Syiemlieh & B. Rynjah.

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5 Chapter

Budget provision and fund utilization

The Farmer FIRST Programme are presently being implemented by Central Agricultural University, Imphal and ICAR RC for NEH Region, Umiam, Meghalaya with the total budget provision of Rs. 23.4 lakh and Rs. 21.6 lakh respectively. The Centre wise details of budget provision and its fund utilization are highlighted in Table below.

Table 13. Budget Provision and Fund Utilization under Farmer FIRST Programme during 2022-23 (Rs in lakh)

Sl. No.	Centre	Total Budget Allocation	RE for 2022-23			Expenditure		
			Capital	General	Total	Capital	General	Total
1	ICAR- RC for NEH Region, Umiam, Meghalaya	21.6	8.6	13	21.6	4.13864	13.15201	17.29065
2	Central Agricultural University, Imphal	20.9	6.9	16.5	23.4	6.83879	16.49072	23.32951
3	ICAR-ATARI, Zone VII, Umiam	9	1.5	5	6.5	1.4296	4.95446	6.38406
	Total	**51.5**	**17**	**34.5**	**51.5**	**12.40703**	**34.59719**	**47.00422**