DRIVING SUSTAINABLE AGRICULTURE AND RURAL LIVELIHOOD IN MANIPUR AND MEGHALAYA THROUGH FARMER FIRST PROGRAMME (FFP)

(ANNUAL REPORT 2024-25)

ICAR-Agricultural Technology Application Research Institute, Zone-VII

Umiam, Meghalaya-793103

(An ISO 9001:2015 Certified Organization)

Driving Sustainable Agriculture and Rural Livelihood in Manipur and Meghalaya through Farmer FIRST Programme (FFP)

(Annual Report 2024-25)

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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 centres one "Livelihood improvement of Hill Farmers through Sustainable Farming Systems in Northeastern 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 centres of the project for the benefit of small and marginal farmers in their respective states.

This document entitled "Driving Sustainable Agriculture and Rural Livelihood in Manipur and Meghalaya through Farmer FIRST Programme" has been prepared by compiling the achievements attained by the two FFP Centres: ICAR Research Complex for NEH Region Umiam and CAU, Imphal during the FY 2024-25 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. Rajbir Singh, 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, Meghalya

Date: July, 2025

(Dr. A.K. Mohanty)
Director

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CHAPTER 1

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 centres 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 Farmer 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 agro ecological 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.

CHAPTER 2

Achievements

2.1 Module wise achievements under FFP during 2024-25

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. During the year 2024-25, Farmer FIRST Programme was strategically implemented across 12 target villages have been covered to promote participatory technology application and strengthen location-specific agro-ecological practices under CAU Imphal, interventions were carried out in Maopungdong (Senapati district) and Sangshak Khullen (Ukhrul district), total of eleven villages were covered by ICAR RC for the NEH Region,while ten villages in Borang, Purangang, Lalumpam, Borkhatsari, Nalapara, Joigang, Umtham, Nongagang, Sarikhusi, Mawtnum and Mawphrew are located in the Marngar cluster of Ri-Bhoi district,while one village in Mawsiathkhnam is located in East Khasi Hills District. A total of 730 farmers were trained using scientific methodologies, including need-based capacity building, module-based demonstrations, and field-level validation of agro-technologies aimed at enhancing productivity, sustainability, and livelihood resilience.

2.1.1 Crop based module

CAU Imphal initiated scientific intervention Sweet corn (Golden Cob-1) cultivation conducted in two villages covering 1 ha. Area (0.50 ha.) each, while ICAR RC in Umiam, led the initiative most farmers practice mono-cropping, cultivating only paddy in a year, leading to low productivity, income, and inefficient land use. Winter vegetable cultivation is challenging due to dry spells and limited irrigation. Raised and sunken beds provide a solution, raised beds improve drainage and accessibility, while sunken beds conserve water and regulate micro-climates, enabling successful vegetable cultivation and additional income.

2.1.2 Livestock based module

ICAR RC, Umiam distributed 2,500 Vanaraja chicks to 100 beneficiaries and six Hampshire crossbred piglets to two farmers in Mawsiatkhnam to promote backyard poultry and pig farming. Concurrently, CAU Imphal implemented scientific backyard poultry , duck farming (Muksan & White Pekin), and pig rearing (Hampshire & local breeds) in Maopungdong (Senapati) and Shangshak Khullen (Ukhrul). These interventions covered a total of 60 farmers, aiming to enhance income generation and promote sustainable livestock practices in rural communities.

2.1.3 Enterprise based module

Paddy is a major crop, and while paddy straw is commonly sold or used as cattle feed, a significant portion is either burned, discarded, or wasted due to limited awareness of its potential uses. This initiative promotes the utilization of surplus paddy straw as a cost-effective substrate for mushroom cultivation, thereby enabling diversification of farm activities and enhancing income opportunities for rural households through sustainable agricultural practices.

2.1.4 NRM based module

Under the Natural Resource Management (NRM) based module, two on-farm demonstrations were successfully conducted, benefiting five farmers. Water scarcity during the dry season remains a critical challenge, significantly affecting both irrigation and livestock water availability. To address this issue, water harvesting structures such as Jalkund were introduced as a sustainable solution. These low-cost water storage systems help conserve rainwater and ensure a reliable supply for agricultural and livestock needs throughout the year. The intervention not only mitigates the adverse effects of drought but also strengthens climate resilience and supports the livelihoods and productivity of rural farming communities in the region.

2.1.5 Fishery based module

The Fishery based module, two scientific demonstrations were conducted, benefiting twelve farmers. The FFP Centre at ICAR RC, Umiam, organized a composite fish culture demonstration and fish fingerling distribution program at Mawsiatkhnam village. As part of the initiative, 1,000 fingerlings of Rohu, Gania, Koi, and Guchi were distributed to two farmers to promote fisheries as a sustainable and alternative livelihood option. Additionally, CAU Imphal distributed Grass Carp and Silver Carp fingerlings to twelve farmers. A hands-on training program was also conducted to build Farmer skills and encourage adoption of scientific fish farming for income enhancement.

2.1.6 IFS based module

Three on farm demonstrations were conducted with the active participation of twelve beneficiaries to show case the development and benefits of Integrated Farming Systems (IFS) at the project sites. IFS integrates various agricultural components such as crops, livestock, poultry, and fisheries, offering a holistic approach to sustainable farming. This system maximizes resource utilization and enhances productivity per unit area and time, leading to improved farm income and livelihood security. The demonstrations were implemented in the adopted villages with the objective of enhancing Farmer annual income, promoting diversification, reducing risk, and ensuring environmental sustainability through efficient use of on-farm resources.

2.1.7 Farm mechanization-based module

To support improved agricultural practices and reduce labour intensity, a range of farm tools and equipment were distributed to farmers, especially tailored for hilly regions. The package included Tulu pumps to ease irrigation by replacing manual water transport, and knapsack sprayers fitted with precision spray guns for efficient and accurate application of pesticides and insecticides. Additionally, 2 Petrol Power Weeder, 2 Mini Rice Mill ,2 Water pump motor, 5 Knapsack sprayer , 2 Foot Sprayer, 5 Tulu pump, 1 power tiller. These resources will be utilized through Custom Hiring Centres to enhance mechanization.

2.1.8 Extension activities

Under extension activities A total no. of 13 demonstration had been conducted during the year with 175 total numbers of participants.

Table 1: Achievement wise during the year 2024-25

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	90	5	110
Livestock based module	2	80	3	104	5	184
Enterprise based module	1	20	2	10	3	30
NRM based module	-	-	2	5	2	5
Fishery based module	1	12	1	2	2	14
IFS based module	2	10	1	2	3	12
Extension Activities	4	60	9	115	13	175
TOTAL	**12**	**202**	**21**	**328**	**33**	**530**

CHAPTER 3

Central Agricultural University, CAU, Imphal

The Central Agricultural University, Imphal is currently implementing the Farmer FIRST Programme (FFP) covering two (2) villages i.e. Maopungdong village of Senapati district and Shangshak Khullen village of Ukhrul district, at hilly region of Manipur. The FFP, CAU, Imphal covering 500 farmers in total in both the villages. The project site Maopungdong village, Senapati district is about 96.7 km to North and Shangshak Khullen village, Ukhrul district is about 61.7 km to North-East direction from the CAU Headquarter, Lamphelpat, Imphal.

3.1 Background of FFP, CAU, Imphal

Project Team

1.	Name of the Centre	Central Agricultural University, Imphal, Manipur
2.	**Name of PI**	Prof. Dipak Nath
3.	**Address and Contact detail of PI**	Directorate of Extension Education, CAU, Imphal Mobile no: **9863110550** Email: **spd020@yahoo.co.in**
4.	**Title of FFP Project**	"Sustainable Livelihood Development of Farmers in Manipur through Participatory Technology Application"
5.	**Site Committee Meetings held**	20th October, 2024 & 18th December, 2024
6.	**Institute Advisory Committee meetings held**	NA
7.	**Changes in Project Team**	Yes
8.	**Project Team**	
Sl. No.	**Name of the Co-PIs**	**Discipline**
i.	Prof. Th. Renuka Devi	Genetics & Plant Breeding
ii.	Prof. Th. Robindro Singh	Entomology
iii.	Prof. Angad Prasad	Agricultural Extension Education
iv.	Prof. Edwin Luikham	Agronomy
v.	Dr. Norjit Singh	Animal Science
vi.	Dr. Ps. Mariam Anal	Horticulture
vii.	Dr. Joseph Koireng	Agronomy
viii.	Dr. L. Sophia Devi	Post-Harvest Technology
ix.	Dr. Th. Nilachandra Singh	Fishery
x.	Dr. Somanath Nayak	Agronomy
xi.	Dr. Singhala Chiphang	Agril. Economics

Project Team & Staff position

Sl. No.	Name	Designation
i.	Mr. Rajkumar Sandeep Singh	Senior Research Fellow (Agricultural Extension Education)
ii.	Mr. Mutum Suraj Singh	Field Assistant (Genetics & Plant Breeding)
iii.	Konsam Cha Shyamananda	Field Assistant (Genetics & Plant Breeding)

3.2 Enchancing Farmer –Scientist Interface

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

The Farmer FIRST Programme, Central Agricultural University (CAU), Imphal, organized the Site Plan Implementation Group (SPIG) Meeting cum One-Day Interaction and Technical Review Programme on 10th October and 18th December, 2024, at the NEC Model Farm, Directorate of Extension Education, CAU, Lamphelpat, Imphal. The event witnessed the participation of approximately 35 farmers from the adopted villages of Maopungdong and Shangshak Khullen, along with the multidisciplinary project team comprising experts in agronomy, animal sciences, and horticulture. The programme served as a platform to evaluate the ongoing field interventions and deliberate on the implementation strategy for upcoming agro-technological activities. Farmers actively shared their experiential insights and constraints related to field-level operations, particularly highlighting limitations in access to farm machinery and mechanized services. Based on stakeholder feedback, the urgent need to upgrade the existing Custom Hiring Centres (CHCs) with improved mechanization infrastructure was emphasized to promote resource-efficient, climate-resilient, and economically viable farming systems.

Fig 1: UAC & Site Meeting of FFP, CAU, IMPHAL held at DEE, CAU, Imphal on 10th October and 18th December, 2024

B. Details of visit of project team and other scientist to project site

As part of the periodic evaluation under the Farmer FIRST Programme, Central Agricultural University (CAU), Imphal, two scientific monitoring visits were conducted in December 2024 to assess field level implementation and gather real time feedback from stakeholders. The first visit took place on 4th December 2024 at Shangshak Khullen village in Ukhrul district, conducted by a team of three domain experts, Prof. Edwin Luikham (Agronomy), Prof. Angad Prasad (Agricultural Extension Education), and Dr. Ps Mariam Anal (Horticulture). The second monitoring visit was carried out at Maopungdong village in Senapati district on 13th December 2024 by a team led by Principal Investigator Prof. Dipak Nath (Agricultural Extension Education), along with Dr. Joseph Koireng and Dr. Somanath Nayak (both from Agronomy).

During these field assessments, the team reviewed ongoing interventions, interacted with the farming communities, and documented site-specific constraints affecting implementation. Key issues raised included irregular rainfall patterns, limited mechanization, pest incidences, and access to quality inputs. As part of the livelihood enhancement strategy, fish seeds/fingerlings comprising Rohu, Mrigal, Common Carp, and Grass Carp were distributed to participating farmers to promote composite fish culture as an integrated enterprise.

A noteworthy outcome observed was the successful utilization of low cost polyhouse technology by a group of women farmers for nursery raising of King Chilli. This climate-resilient intervention enabled them to produce high-quality seedlings and market them at Rs. 30 per unit, earning a cumulative income of Rs. 10,500 by selling 350 seedlings within a two-month period. This case highlights the potential of protected cultivation structures in empowering women farmers, improving off-season nursery management, and enhancing household income through scalable, scientific practices.

Fig 2: Field Monitoring: Real-time Feedback & Implementation Review

C. Coverage under Farmer FIRST Programme, CAU, Imphal

The Farmer FIRST Programme, (CAU), Imphal, a comprehensive range of advanced agricultural technologies and essential inputs were distributed across multiple

thematic modules, including crop production, horticulture, livestock management, fisheries, and integrated farming systems (IFS). These inputs were strategically provided to enhance productivity, promote sustainable agricultural practices, and improve the overall livelihoods of beneficiary farmers in the project villages.

To bolster farm mechanization and improve service delivery, various farm implements and equipment were supplied for the upgradation of the Custom Hiring Centres (CHCs) in both adopted villages. Notable machinery distributed included Combined Mini Rice Mills to post-harvest processing, battery-operated sprayers designed for precise application of agrochemicals, and manual sprayers suited for small-scale farming operations. These interventions are expected to reduce labor intensity, optimize input use efficiency, and increase the accessibility of mechanized services to smallholder farmers.

Furthermore, under the protected cultivation component, the construction of three low-cost polyhouses was initiated for nursery raising of crops such as King Chilli, lemon, and various vegetables. This technology aims to enhance seedling quality, extend the growing season, and boost income generation opportunities, particularly empowering women farmers and marginal cultivators through diversified and resilient agricultural enterprises.

Table 1: Details of Inputs Provided for Demonstrations under Various Modules

Sl. No.	Modules	Types of input provided for conducting demonstration	Quantity of inputs provided	Village covered	No. of farm families covered
1.	Fish/IFS based module	Fish (Grass carp, Rohu, common carp)	2000	2	120
		Vegetable seeds (Beetroot, French bean, cabbage, pumpkin)	30 pkts. (10 gm/pkt)		
2.	Livestock based	FFG	507		
3.	Custom Hiring Centre	Combined Mini Rice Mill	6 nos.		
		Battery operated sprayer (16 lit.)	8 nos.		
		Manual Sprayer (15 lit.)	4 nos.		
		Pressure sprayer (2 lit.)	2 nos.		
4.	Protected technology	Polyhouse (20x15x9 ft)	3 nos. (installation initiated)		

3.3 Technology assemblage, application , and feedback

3.3.1. Crop based modules

a) Scientific cultivation of Sweet Corn (Golden Cob F1)

The intervention focused on the cultivation of Sweet Corn (Golden Cob-1) was implemented in two villages, Maopungdong (Senapati district) and Shangshak Khullen (Ukhrul district), covering a total area of 1 hectare (0.50 ha in each village). A total of 20 farmers participated in this initiative. The cultivation of this high-yielding hybrid variety aims to enhance crop productivity, improve nutritional security, and generate supplementary income for smallholder farmers. The intervention was conducted in two villages covering 1 ha. Area (0.50 ha.) each. Farmers could get and income of **Rs. 2,91,000/-** with a net income of **Rs. 1,93,000/-** in about 3 months with a **B:C Ratio** of **2.9.**

Table 2: The economics of the sweet corn cultivation

Crop	Variety	Yield (kg)	Rate/ kg (Rs.)	Gross income (Rs.)	Expenditure (Rs.)	Profit (Rs.)	B:C ratio
Sweet corn	Golden cob	4850	60	2,91,000	98,000	1,93,000	2.9

3.3.2. Livestock based module

a) Scientific backyard poultry and duck farming

The intervention on Scientific Backyard Poultry Farming, including the rearing of Ducks (Muksan and White Pekin breeds), was implemented in two villages: Maopungdong in Senapati district and Shangshak Khullen in Ukhrul district. This initiative targeted 60 farmers, aiming to enhance small-scale poultry production through improved management practices and breed selection. The adoption of scientifically validated rearing techniques is expected to increase productivity, improve nutrition, and provide sustainable livelihood opportunities within these rural communities.

Table 3: Income from backyard poultry and duck farming

Birds	Birds sold (nos.)	Body weight (Av.)	Rate/kg live weight (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C Ratio
Poultry	70	3.2	280	19,600	4,500	15,100	4.3
Duckery	50	3.0	320	16,000	4,500	11,500	3.5:1

Fig 3.a : Poultry (FFG), Shangshak Khullen

Fig 3.b: Duck (Muksan) at Maopungdong

b) Scientific Pig Rearing (Hampshire & Local)

The intervention was implemented in two strategically selected villages Maopungdong in Senapati district and Shangshak Khullen in Ukhrul district targeting a total of 20 farmers.

Table 4: Income generated from pig farming

Piglets sold (nos.)	Rate/piglets (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C Ratio
13	6,500	84,500	9500	75,000	8.8

Fig.4: Pig Rearing (Hampshire & Local)

3.3.3 Enterprise based module

a) Scientific Cultivation of Mushroom (Oyster)

Under the enterprise-based module of the Farmer FIRST Programme, CAU, Imphal, scientific cultivation of Oyster mushroom was introduced in two villages Maopungdong (Senapati) and Shangshak Khullen (Ukhrul) covering 20 selected farmers. As part of

the intervention, three low-cost mushroom production units were constructed to promote sustainable and scalable mushroom cultivation. Farmers were trained in scientific techniques including substrate preparation, spawn inoculation, and post-harvest handling. Oyster mushroom cultivation, known for its short production cycle and high market demand, offers significant potential for income generation and livelihood enhancement, particularly in hilly and resource-constrained farming communities.

Table 5: 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
10	20	48	200	9600	2500	7100	3.8:1

3.3.4 Fish& IFS based module

a) Agri-Horti-Livestock-Fishery based Integrated Farming System.

Agri-Horti-Livestock-Fishery based Integrated Farming System (IFS) was implemented across 1.5 hectares in Maopungdong (Senapati) and Shangshak Khullen (Ukhrul) villages. Prior to intervention, peripheral farm pond areas remained underutilized and fishery-livestock practices lacked scientific guidance, limiting returns. The IFS model integrated crops like paddy (local), sweet corn, and pea; horticultural crops including cabbage, broccoli, cauliflower, cucumber, and chilli; and livestock components such as poultry (FFG), ducks (Muksan & White Pekin), piggery (local), and composite fish culture. The scientifically managed system yielded a gross income of Rs. 1,79,500 annually, with a net return of Rs. 1,16,000.

Table 6: Income generated from different components of IFS unit

Component	Area (ha)/ no.	Total Income (Rs.)	Expenditure (Rs.)	Net profit (Rs.)	B:C ratio
Fishery	0.5	142500	50000	92500	2.8
Livestock	20 nos.	8000	2500	4500	3.2
Horticulture	0.10	17000	5000	12000	3.4
Agriculture	0.10	12000	5000	7000	2.4
Total (Rs.)		**179500**	**62500**	**116000**	**11.8**

Fig 5: Agri-Horti-Livestock-Fishery based Integrated Farming System

3.3.5 Custom Hiring Centre (CHC)

The Farmer FIRST Programme (FFP) implemented by Central Agricultural University (CAU), Imphal, two Custom Hiring Centres (CHCs) were established in Maopungdong village (Senapati district) and Shangshak Khullen village (Ukhrul district) of Manipur. These centres were strategically developed to bridge the gap in access to essential farm machinery and tools among smallholder and marginal farmers. The CHCs provide affordable, need-based mechanization services, enhancing agricultural productivity while reducing drudgery in hilly terrain.

Till date, approximately 1,100 farmers have availed services from the CHCs, resulting in the generation of around Rs. 1,20,000 in revenue by 2024. This income has been effectively reinvested into machinery maintenance and for remunerating outsourced operators. Among the various interventions, the introduction of the Mini Rice Mill emerged as particularly impactful. The unit processes nearly 20 tins of paddy per day at Rs. 20 per tin, yielding Rs. 400 daily. Additionally, rice bran is sold at Rs. 10 per tin, providing further economic value. Encouraged by its success, the number of rice mills in the village has increased from two to three. The CHC model has thus not only enhanced mechanization but also promoted rural entrepreneurship, resource-use efficiency, and sustainable livelihood development in the region.

Fig 6.a: Shangshak Khullen village, Ukhrul

Fig 6.b: Maopungdong village, Senapati

Table 7: Details of equipment under Custom Hiring Centre

1	Mini Rice Mills 3 HP
2	Combine Mini Rice Mills
3	Egg Incubator cum hatchery (500 eggs Capacity)
4	Power Generator
5	Battery operated Sprayer
6	Manual Sprayer
7	Pressure sprayer
8	Garden hoe
9	Spade
10	Sickle
11	Shovel
12	Hand cultivator

3.4 Success Stories

1. Mr. Songaning's Success in Pig Rearing under FFP Intervention

Mr. Songaning, a resident of Shangshak Khullen village in Ukhrul district, Manipur, is among the progressive farmers benefitting from the Farmer FIRST Programme, implemented by the (CAU), Imphal. As part of the intervention, he initially received four piglets as part of the livestock-based livelihood intervention. Although one piglet succumbed early, he continued rearing the remaining three using locally available and low-cost feed resources such as leftover kitchen waste, Colocasia, banana stem, pumpkin, maize, and rice brew residue. Additionally, he invested approximately Rs. 3,000 annually on basic veterinary care and limited commercial feed supplementation.

Prior to the intervention, Mr. Songaning had a keen interest in piggery, but his efforts were constrained by limited scientific knowledge and technical skills in pig management. The implementation of the FFP significantly bridged this knowledge gap by providing hands-on training, scientific guidance, and continuous technical support. This enabled him to adopt improved pig husbandry practices, enhance pig health and productivity, and maintain hygiene and disease control measures effectively.

As a result of the intervention, Mr. Songaning achieved notable success in pig rearing, generating an annual net income of Rs. 56,500 from his piggery unit. He sells adult male pigs at Rs. 16,000 each and piglets at Rs. 6,500 per head. To expand his enterprise, he has also incorporated local pig breeds, catering to both household consumption and market demand, thereby improving household nutrition and income security.

This case exemplifies the impact of integrated technical support and resource optimization in enhancing rural livelihoods through scientific pig farming under the Farmer FIRST Programme. It demonstrates the potential for replication in other remote areas with similar agro-ecological conditions.

Fig 7: Mr. Songaning at his piggery unit

2. Enhancing Livelihoods through Pig Rearing - Mr. S. Lawrance, Maopungdong Village

Mr. S. Lawrance, a progressive farmer from Maopungdong village in Senapati district, is a trained beneficiary of the Farmer FIRST Programme implemented by the (CAU), Imphal. Before the intervention, he had minimal exposure to scientific practices in pig husbandry. Following training and capacity building sessions organized under the project, he adopted improved practices in pig rearing.

Under the FFP initiative, he received three piglets two males and one female. One of the male pigs was reared to maturity and sold for Rs. 15,000. The female pig reached reproductive maturity within the first year and farrowed eight piglets. Unfortunately, two piglets were lost at birth, a common occurrence due to pre-weaning mortality.

However, the remaining six piglets were successfully reared under improved management practices.

In the same year, Mr. Lawrance sold three piglets at the rate of Rs. 6,500 each, generating an income of Rs. 19,500. The remaining piglets were retained to sustain and expand his piggery unit. Demonstrating a community-oriented approach, Mr. Lawrance also donated one healthy female piglet to his elder brother, Mr. S. Puijon, thereby promoting horizontal dissemination of the technology within the village.

The success of Mr. Lawrance's piggery enterprise highlights the positive impact of scientific training, input support, and continuous technical guidance provided under the Farmer FIRST Programme. It not only improved his household income but also contributed to the local spread of scientific pig farming practices.

Fig 8: Mr. Lawrance's at his piggery unit

CHAPTER 4

ICAR-RC for NEH Region Umiam, Meghalaya

4.1 Background information

1.	Name of the Centre:	ICAR Research Complex for NEH Region, Umiam, Meghalaya
2.	**Name of PI:**	Dr. N. Uttam Singh, Senior Scientist
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4.	**Title of FFP Project:**	"Livelihood Improvement of Hill Farmers through Sustainable Farming Systems in North Eastern Hill Region"
5.	**Site Committee Meetings held:**	Nil
6.	**Institute Advisory Committee meetings held:**	Nil
7.	**Changes in Project Team:**	Nil
8.	**Project Team:**	
Sl. No.	**Name of the Co-PIs**	**Discipline**
i.	Dr. H. Rymbai	Scientist (Horticulture)
ii.	Dr. Rahul Katiyaar	Scientist (Animal Production)
iii.	Dr. Tasvina R. Borah	Scientist (Plant Pathology)
iv.	Dr. Pampi Paul	Scientist (Agricultural Extension)
v.	Dr. AnjooYumnam	Scientist (Agricultural Extension)
vi.	Dr. S. Gojendro Singh	Scientist (Fishery science)
vii.	Er. Naseeb Singh	Scientist (Agricultural Engineering)
viii.	Mr. Chikkathimme Gowda H. R.	Scientist (Agricultural Economics)
ix.	Mr. Kamni P. Biam	Scientist (Agricultural Extension)
9.	**Project Staff:**	
Sl. No.	**Name**	**Discipline**
i.	Dr. MayanglambamBishonath Singh	Senior Research Fellow

A. Coverage under FFP

Table 8: Module-Wise Summary of Interventions and Input Distribution

Coverage of FFP							
Sl. no.	**Modules**	**Intervention**	**Types of input provided**	**Date of distribution**	**Quantity of inputs provided**	**Name of the villages covered**	**No. of farm families covered**
1	Crop based	Rabi vegetables seed	Broccoli Cabbage Cauliflower Garden pea	11/12/2024 13/12/2024	300g 250g 250g 40Kg	Mawsiatkhnam	90
2	Horticulture based module	Summer vegetables	Tomato Capsicum	07/06/2024	100g 200g	Mawsiatkhnam	8
		Fruit crop	Lemon (*Citrus limon*) Pineapple (Kew and queen)	11/08/2023	500 cuttings 1000 suckers	Mawtnum, Borgang, Borkhatsari	11
3	Livestock based modules	Piglets	Cross breed Hampshire	21/02/2025	6	Mawsiatkhnam	2
		Chicks	Vanaraja breed	21/02/2025	2500	Mawsiatkhnam	100
4	Enterprise based module	Mushroom production unit	Mushroom Spawn	18/03/2025	10 Packets	Mawsiatkhnam	10
5	NRM based module	Construction of jalkund	Silpaulin sheet for Jalkund 5ft x 4ft x 1.5 ft	02/09/2025	5	Mawsiatkhnam	5
6	Fishery based module	Fingerlings	Rohu, Gania, and Guchi breeds	21/02/2025	1200	Mawsiatkhnam	2

7	Farm Mechanization	Custom Hiring Centre	Petrol Power Weeder	02/09/2024	2	Mawsiatkhnam	19 (In CHC)
			Mini Rice Mill		2		
			Water Pump Motor		2		
			Knapsack Sprayer		5		
			Foot Sprayer		2		
			Tulu Pump		5		
			Power tiller	16/09/2024	1		
8	Integrated farming system	Crops-Livestock-Fishery	Site selected, yet to be implemented	21/02/2025	Two sites has been selected for establishment of IFS unit in Mawsiatkhnam Village. Input required for each components has been distributed to the selected individuals. Inputs Distributed till now are listed below: 1. Fish fingerling- 1200 no. 2. Poultry chicks (Vanaraja)- 100 no. 3. Piglets (Hamshire cross breed)- 4 no. 4. Feeds (for chicks, piglets and fingerling)	Mawsiatkhnam	2

4.2 Enhancing Farmer –Scientist Interface

4.2.1. Capacity building/HRD interventions conducted for farmer-scientist interface Programmes, Demonstrations and Trainings Conducted

a) Research extension-farmer-interface meeting

A Research-Extension-Farmer Interface Meeting was organized by the ICAR Research Complex for NEH Region, Umiam, under the Farmer FIRST Programme at Sarikushi village on the 8th of May, 2024. The meeting served as a platform for fostering collaborative dialogue between researchers and farmers, facilitating the exchange of knowledge, and addressing critical challenges faced by the local farming community.

During the session, in-depth discussions took place between the Principal Investigator of the Farmer FIRST Programme and the members of the Multipurpose Cooperative Society of Sarikushi Village, which comprises 25 active members. The farmers articulated various difficulties and hardships they encounter in agricultural production, livestock management, and natural resource utilization. Additionally, they submitted specific requests for strategic interventions and technical support under the programme.

In response, the PI provided a comprehensive overview of available government schemes and benefits that could be leveraged by the cooperative society to enhance agricultural productivity and sustainability. Emphasis was laid on the importance of collective action, resource optimization, and scientific interventions tailored to the region's agro-climatic conditions. The discussion also covered topics such as improved irrigation techniques, livestock health management, and integrated farming approaches to mitigate challenges associated with seasonal water scarcity and soil fertility depletion.

The event was efficiently coordinated by Dr. N. Uttam Singh, Senior Scientist and Principal Investigator of the Farmer FIRST Programme, alongside Lutmonhaki Dkhar (Senior Research Fellow) and Wanbiang Dkhar (Project Assistant). Their efforts ensured a structured and informative dialogue that reinforced the commitment of research institutions to grassroots-level agricultural development.

The meeting concluded with a consensus on the need for continuous engagement, adaptive strategies, and participatory research to empower the farming community of Sarikushi village. Further initiatives will be undertaken to implement suitable interventions that align with the needs and aspirations of the farmers, ensuring sustainable and resilient agricultural growth in the region.

Fig.1: Research extension-farmer-interface meeting

b) Construction of a New Jalkund in Sarikushi Village, Ri-Bhoi District

On 1st April2024, a new jalkund was successfully constructed in Sarikushi Village, Ri-Bhoi District, under the Farmer FIRST Programme. This initiative was organized by the ICAR Research Complex for NEH Region, Umiam, and executed by the Division of Technology Assessment and Capacity Building. The primary objective of this intervention was to mitigate water scarcity during the dry season by effectively harvesting rainwater. The stored water is expected to play a crucial role in supporting agricultural activities and livestock management, thereby enhancing the resilience of the local farming community.

To ensure that the jalkund was built in a scientifically sound and efficient manner, special attention was given to its design, construction techniques, and overall functionality. The event facilitated knowledge-sharing among the local farmers, equipping them with practical insights into rainwater harvesting and water conservation strategies. This effort aligns with broader initiatives aimed at promoting sustainable natural resource management (NRM) in the region.

The construction and coordination efforts were led by Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), with valuable contributions from Lutmonhaki Dkhar (Senior Research Fellow) and Wanbiang Dkhar (Project Assistant). Their dedicated involvement ensured the smooth execution of the project, fostering community participation and awareness regarding the significance of water conservation. This initiative marks an important step toward securing water availability for farmers in Sarikushi Village, reinforcing the commitment of ICAR and its allied programs to enhancing agricultural productivity and sustainability in Meghalaya's rural landscape.

Fig. 2: Construction of Jalkund

c) Monitoring of fruit orchard at Umtham village

On 5th April 2024, a monitoring and evaluation program was conducted at Umtham village to assess the performance of fruit saplings distributed under the Farmer FIRST Programme. The objective of this initiative was to evaluate the survival rate, growth status, and overall health of the plants while identifying challenges faced by farmers in orchard management. The saplings, distributed in 2022, have exhibited active vegetative growth, with vigorous shoot development, enhanced foliage formation, and promising canopy expansion, indicating successful establishment in the local agro-climatic conditions. Farmers reported that regular cultural practices such as irrigation, mulching, and nutrient application have contributed significantly to plant health and growth.

During the monitoring visit, pest and disease infestations were observed, particularly on the leaves of several fruit plants. Symptoms such as leaf curling, chlorosis, necrotic patches, and minor defoliation suggested possible infestations by aphids, mealybugs, scale insects, or fungal and bacterial pathogens. The team recommended an Integrated Pest and Disease Management (IPDM) approach to mitigate these issues, including cultural practices such as pruning to improve air circulation and the use of organic mulches, biological control through the introduction of beneficial insects like ladybird beetles and parasitic wasps, and organic treatments such as neem based biopesticides. In cases of severe infestations, judicious use of chemical pesticides was advised under expert supervision, ensuring proper dosage and environmental safety.

The monitoring activity was coordinated by Dr. N. Uttam Singh (Senior Scientist and Principal Investigator of the Farmer FIRST Programme), Lutmonhaki Dkhar (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). The team conducted extensive field surveys, interacted with farmers, and provided technical guidance on nutrient management, irrigation scheduling, pruning techniques, and plant protection measures. Farmers were encouraged to maintain field records documenting plant growth, flowering patterns, and pest-disease occurrences to support data-driven decision-making.

Overall, the monitoring visit revealed growth trajectory for the orchard, signifying the success of the horticulture-based intervention. However, the observed pest and disease challenges require timely interventions to prevent crop losses and ensure long-term productivity. Moving forward, the Farmer FIRST Programme team will continue periodic monitoring and provide technical support to enhance orchard sustainability. Additionally, plans are underway to organize training programs and capacity-building workshops for farmers, focusing on horticultural best practices, plant health management, and organic farming techniques. The next follow-up visit will assess the impact of recommended pest control strategies and monitor the flowering and fruiting progress of the saplings. By integrating scientific expertise with farmer participation, the initiative aims to strengthen orchard productivity and contribute to sustainable livelihood improvement in Umtham village.

Fig. 3 a: Assam lemon orchard

Fig. 3 b: Inspection of pest infestation in orchard

d) Power Tiller to Nalapara Custom Hiring Centre for Farm Mechanization

In an effort to enhance technological accessibility and mechanization among the adopted farmers of Marngar and Sarikushi clusters, a power tiller was officially handed over to the Custom Hiring Centre (CHC) at Nalapara on May 8, 2024. This initiative was undertaken as the Farmer FIRST Programme, implemented by the ICAR ,RC for NEH Region, Umiam.

The provision of modern agricultural machinery to CHCs plays a pivotal role in strengthening rural farming communities. By facilitating access to essential mechanized equipment, this initiative addresses a critical challenge faced by smallholder farmers namely, the high capital cost associated with purchasing such machinery. Through an efficient rental system, CHCs enable farmers to carry out essential agricultural operations in a timely manner, particularly during peak seasons, thus improving productivity and ensuring better resource management. Additionally, this approach mitigates financial strain on individual farmers while fostering the adoption of sustainable and climate-resilient farming practices. The mechanization

support extended through CHCs ultimately contributes to enhancing farm efficiency, promoting rural entrepreneurship, and driving socio-economic development in the region.

The programme was successfully coordinated by Dr. N. Uttam Singh, Senior Scientist and Principal Investigator of the Farmer FIRST Programme, along with Lutmonhaki Dkhar (Senior Research Fellow) and Wanbiang Dkhar (Project Assistant), whose efforts were instrumental in facilitating the smooth execution of this initiative.

Fig.4: Distribution of power tiller

e) Conducting of Participatory Rural Appraisal (PRA) at Mawsiatkhnam village, East Khasi Hills District

On the 1st and 9th of May 2024, a Participatory Rural Appraisal (PRA) was conducted in Mawsiatkhnam village, East Khasi Hills District, under the aegis of the ICAR Research Complex for NEH Region (ICAR RC NEH). PRA is a widely recognized methodology in community-driven rural development that actively engages local communities in the identification, assessment, and resolution of their developmental challenges. This approach leverages indigenous knowledge, ensuring that interventions are contextually relevant, sustainable, and culturally attuned to the needs of the local population.

The PRA exercise in Mawsiatkhnam village aimed to facilitate a deeper understanding of the socio-economic and environmental constraints faced by the villagers, with a special focus on agricultural and livelihood challenges. By involving local stakeholders in structured discussions, resource mapping, and problem analysis, PRA empowers communities to take ownership of the developmental process. This participatory approach enhances the effectiveness of interventions and fosters a sense of inclusivity, particularly among marginalized groups such as women, smallholder farmers, and economically disadvantaged individuals.

As part of the initiative, various vegetable seeds were distributed to farmers on the 9th of May 2024. The provision of these inputs aimed to enhance agricultural

productivity, promote crop diversification, and improve food security in the region. Such interventions align with the broader objectives of sustainable rural development by integrating traditional agricultural knowledge with scientific advancements.

The event was meticulously coordinated by Dr. N. Uttam Singh (Senior Scientist and Principal Investigator of the Farmer FIRST Programme), Lutmonhaki Dkhar (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). Their efforts ensured the smooth execution of the PRA process and the effective dissemination of agricultural inputs to the farming community.

By fostering community engagement, capacity building, and resource optimization, PRA serves as a crucial tool for achieving long-term socio-economic resilience and environmental sustainability in rural regions. The outcomes of this PRA exercise are expected to guide future interventions tailored to the specific needs and aspirations of the people of Mawsiatkhnam village, thereby contributing to their holistic development.

Fig. 5 a: Data collection for PRA

Fig.5 b: Distribution of vegetable seeds

f) Input distribution programme at Nalapara

As part of the Farmer FIRST programme, an input distribution programme was successfully organized on May 14th , 2024, at Nalapara village. The event aimed to support local farmers by providing essential agricultural and aquaculture equipment to enhance productivity and sustainability. One of the key highlights of the programme was the distribution of a water pump to Mr. Gumbir Syiem, a progressive fish farmer from Lalumpam village, who owns and operates a fishery farm in Nalapara.

Mr. Syiem had identified the need for a water pump to improve the management of his fish ponds. The pump would play a crucial role in ensuring an adequate and continuous water supply, thereby maintaining optimal water levels and quality for fish culture. Additionally, it would facilitate the efficient removal of excess and polluted water, mitigating risks associated with water stagnation and contamination. Recognizing the significance of this requirement, the Project Investigator (PI) handed

over the necessary equipment to Mr. Syiem to aid in the sustainable development of his fishery enterprise.

The event was meticulously coordinated by Dr. N. Uttam Singh, Senior Scientist and Principal Investigator (PI), along with the dedicated support of Lutmonhaki Dkhar, Senior Research Fellow (SRF), and Wanbiang Dkhar, Project Assistant. Their collective efforts ensured the smooth execution of the programme, fostering knowledge dissemination and technological intervention among the local farming community.

The Farmer FIRST programme, under which this initiative was conducted, continues to focus on empowering farmers through scientific advancements, resource optimization, and skill enhancement. By facilitating access to essential inputs such as the water pump, the programme aims to improve agricultural and aquaculture productivity, thereby contributing to food security and rural livelihoods.

This initiative exemplifies the commitment of the scientific and agricultural research community towards addressing practical challenges faced by farmers and promoting sustainable farming practices in the region.

Fig. 6 a: Handover of water pump

Fig. 6 b: Fish farm of Gumbir Syiem

g) Distribution of Jalkund silpaulin sheet at Borgang village

On 16th May 2024, an input distribution programme was conducted at Borgang village under the aegis of the Farmer FIRST Programme, implemented by ICAR Research Complex for NEH Region, Umiam. The event focused on the distribution of a Jalkund silpaulin sheet as part of a intervention.

The beneficiary of this initiative, Mr. Rolling Sohkhwai of Borgang village, had previously established a Jalkund under the project. However, the silpaulin sheet used in his Jalkund was unfortunately damaged and destroyed due to an accidental fire. To restore the functionality of his water harvesting structure, a new silpaulin sheet was provided to him as a replacement. This support aims to ensure the sustainability of water conservation practices in the region, which are crucial for irrigation and livestock management during dry periods.

The event was effectively coordinated by Dr. N. Uttam Singh (Senior Scientist and Principal Investigator of the Farmer FIRST Programme), along with the support of Lutmonhaki Dkhar (Senior Research Fellow) and Wanbiang Dkhar (Project Assistant). Their active involvement ensured a smooth distribution process and reinforced the commitment of ICAR NEH towards enhancing water conservation and resilience among farming communities.

This initiative underscores the significance of Jalkund technology in addressing water scarcity issues in rural areas and highlights the role of timely interventions in sustaining agricultural productivity and livelihood security.

Fig. 7: Distribution of Silpaulin sheet

h) Launching of Farmer FIRST Programme and opening ceremony of Custom Hiring Centre in Mawsiatkhnam village, East Khasi Hills District

The ICAR Research Complex for the North Eastern Hill (NEH) Region officially launched the Farmer FIRST Programme (FFP) in Mawsiatkhnam village, East Khasi Hills, under Mawlai Block on the 3rd September, 2024. Organized by the Division of Technology Assessment and Capacity Building (DTAC), the event marked a significant milestone in promoting participatory research, knowledge dissemination, and technology adoption among the farming community. In conjunction with the program launch, a Custom Hiring Centre (CHC) was also inaugurated to enhance mechanization in local agricultural practices, enabling farmers to access modern tools and technologies at affordable rates.

The inaugural ceremony was graced by the Honorable MLA of Mawlai Constituency, Shri Brightstarwell Marbaniang, who served as the chief guest. He formally inaugurated the Custom Hiring Centre by cutting the ceremonial ribbon, thereby signaling the beginning of a new era of agricultural mechanization in the region.

Dr. N. Uttam Singh, Senior Scientist at the ICAR Research Complex for NEH Region and the Principal Investigator (PI) of the FFP, spearheaded the program. The event was further enriched by insights from eminent scientists and agricultural experts, including Dr. Heiplanmi Rymbai (Senior Scientist), Dr. Gojendro Singh (Scientist,

ICAR Research Complex for NEH Region), and Shri Shanmebansan Marbaniang (SMS-Extension, Krishi Vigyan Kendra, East Khasi Hills). The event was also actively supported by project staff members.

A critical aspect of the program was the distribution of essential agricultural inputs to farmers. Vegetable seeds and Jalkund silpauline sheets were provided to promote vegetable cultivation and rainwater harvesting, respectively. Additionally, a range of farm machinery was formally handed over to the newly established Custom Hiring Centre, ensuring that farmers have access to modern equipment to enhance productivity and efficiency in their agricultural operations.

The event was meticulously coordinated by Dr. N. Uttam Singh (Senior Scientist and PI), Dr. M. Bishonath Singh (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). Their combined efforts ensured the smooth execution of the program and the effective engagement of the farming community in this initiative.

The launch of the Farmer FIRST Programme and the establishment of the Custom Hiring Centre in Mawsiatkhnam village are expected to significantly contribute to the empowerment of local farmers by promoting mechanized farming, optimizing resource utilization, and enhancing agricultural productivity in the region. This initiative aligns with the broader goal of sustainable agricultural development and resilience-building among farming communities in Meghalaya.

Fig. 8a : CHC in Mawsiatkhnam

Fig. 8b : Ribbon cutting ceremony CHCs

Fig. 8c : Input distribution

i) Equipment Handover Programme for Custom Hiring Centres (CHCs) Established under the Tribal Sub Plan (TSP)

In a significant initiative to strengthen farm mechanization and enhance agricultural productivity in tribal regions, the ICAR Research Complex for NEH Region, Umiam, Meghalaya, organized an Equipment Handover Programme for Custom Hiring Centres (CHCs) on October 16th , 2024. This event was jointly coordinated by the Division of Technology Assessment and Capacity Building and the Division of System Research and Engineering. The initiative aims to empower farmers by providing access to modern agricultural equipment, thereby promoting sustainable farming practices and improving rural livelihoods. Representatives from CHCs in the villages of Umket, Umrynjah, and Umktieh Mawkhim were the beneficiaries of this program, receiving vital farm machinery to enhance their agricultural activities. Each CHC was provided with two petrol-powered weeders, two knapsack sprayers, one turmeric washer, and one power tiller. Additionally, a power tiller was allocated to the CHC in Mawsiatkhnam village under the Farmer FIRST Programme. These machines are expected to play a crucial role in supporting small and marginal farmers by improving operational efficiency, reducing labor dependency, and ensuring timely execution of various agricultural tasks.

The establishment and reinforcement of CHCs under the Tribal Sub Plan (TSP) serve as a strategic approach to democratize access to farm mechanization. Many smallholder farmers in rural Meghalaya face financial constraints that limit their ability to invest in modern agricultural machinery. By facilitating access to mechanized tools through CHCs, this initiative addresses key challenges such as labor shortages, time constraints, and operational inefficiencies. CHCs function as resource hubs that allow farmers to rent agricultural equipment at nominal charges, ensuring affordability and sustainability. The availability of modern machinery contributes to improved crop management practices, enhanced yield, and overall economic growth in the region. Furthermore, it enables farmers to adopt precision agriculture techniques, minimize post-harvest losses, and promote environmentally sustainable farming systems.

The event was successfully coordinated by an esteemed team of scientists and research professionals dedicated to agricultural development and rural empowerment. The following individuals played a pivotal role in the organization and execution of the programme: Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), Er. Naseeb Singh (Scientist, Agricultural Engineering), Dr. H. Rymbai (Scientist, Horticulture), Dr. A. Balusamy (Scientist, Environmental Science), Dr. M. Bishonath Singh (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant).

The Equipment Handover Programme marks a significant milestone in the promotion of mechanized farming in Meghalaya's tribal villages. By equipping CHCs with advanced agricultural tools, the initiative not only enhances the efficiency of farm

operations but also contributes to the socio-economic up liftment of rural farming communities. As CHCs continue to expand their outreach and services, they are poised to become instrumental in fostering resilient and sustainable agricultural systems in the region. This initiative reaffirms ICAR's commitment to rural development through technological interventions, ensuring that smallholder farmers receive the necessary support to transition towards modern, efficient, and environmentally sustainable agricultural practices.

Fig. 9: Handing over of modern equipment to Custom Hiring Centres

j) Sustainability Analysis of Farmer FIRST Programme (FFP) Adopted Villages in Marngar Cluster: Data Collection and Field Visits

The sustainability analysis of villages under the Farmer FIRST Programme (FFP) is an essential step in evaluating the long-term effectiveness and impact of the various interventions implemented. This analysis aims to assess the economic, social, and environmental sustainability of the program, ensuring that its objectives-enhancing farm productivity, improving rural livelihoods, and fostering environmental stewardship-are realized in a manner that remains viable over time.

To facilitate this sustainability analysis, a series of field visits were conducted across multiple villages within the Marngar cluster on the 29th and 30th October 2024, as well as on the 5th and 6th November 2024. These visits were systematically planned to gather relevant data that would contribute to a comprehensive understanding of the program's impact on the farming community. A structured questionnaire was meticulously developed to capture critical insights into various aspects of the Farmer FIRST Programme, including improvements in agricultural productivity, economic benefits, environmental sustainability, and social inclusivity. The data collection process was designed to ensure the representation of diverse farmer groups, incorporating feedback from both progressive farmers who have actively adopted advanced agricultural techniques-and small marginal farmers who are more vulnerable and often constrained by limited resources.

During the field visits, data were collected from a total of ten farmers in each village. This sampling approach facilitated a balanced perspective on how the interventions have influenced different strata of the farming community. Farmers provided insights into various parameters such as yield improvements, adoption of sustainable farming practices, financial benefits, soil and water conservation efforts, and socio-economic changes resulting from the program.

The data collection and field visits were meticulously coordinated and executed by a dedicated team comprising Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), Dr. M. Bishonath Singh (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). Their collective expertise and field experience ensured the effective implementation of the data collection process, thereby enhancing the reliability and accuracy of the gathered information. The presence of agricultural experts and project coordinators facilitated meaningful discussions with farmers, allowing for an in-depth understanding of the challenges and opportunities associated with FFP interventions. Farmers were encouraged to share their experiences and perceptions, providing qualitative and quantitative data essential for a robust sustainability analysis.

The systematic collection of data from FFP adopted villages in the Marngar cluster serves as a crucial step in assessing the program's long-term sustainability. The insights gained from this exercise will contribute to a well-informed evaluation of the program's effectiveness in fostering resilient and self-sustaining agricultural communities. By ensuring that the interventions remain economically viable, socially inclusive, and environmentally sound, the sustainability analysis will aid in refining and improving future agricultural development strategies within the region. The findings from this data collection effort will be instrumental in shaping evidence-based policy recommendations, ensuring that the Farmer FIRST Programme continues to support rural communities in a sustainable and impactful manner.

Fig. 10: Collection of data for sustainability analysis

k) Review workshop of the Farmer FIRST Programme for the year 2024-25

The Review Workshop for the Farmer FIRST Programme (FFP) 2024-25 was held at Marngar, Ri-Bhoi, under the supervision of ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-VII, and ICAR RC NEH. The event brought together scientists, farmers, and other stakeholders to assess progress, share insights, and strategize for future initiatives. With a participatory approach, the workshop aimed to enhance socio-economic benefits for farmers.

The workshop had several objectives, including reviewing achievements and challenges in ongoing FFP projects, sharing successful technologies and models implemented during 2024-25, strengthening collaboration between farmers and scientists, and identifying future focus areas to ensure sustainability and scalability of best practices.

The workshop commenced with a welcome address by Dr. A.K. Mohanty, Director of ICAR-ATARI, Zone-VII. Distinguished guests included Dr. Aniruddha Roy (Senior Scientist, Agricultural Economics, ICAR RC NEH), Dr. Pampi Paul (Scientist, Agricultural Extension, ICAR RC NEH), Dr. A.K. Singha (Principal Scientist, ATARI Zone-VII), Dr. Amrutha T (Scientist, ATARI Zone-VII), Smt. Divya Parisa (Scientist, ATARI Zone-VII), and Dr. Dipak Nath (Deputy Director of Extension Education, CAU, Imphal). The inaugural speech highlighted the significance of farmer-centric research and the programme's achievements in improving livelihood security. During the review meeting, ICAR RC NEH, Umiam, and Central Agricultural University, Imphal, presented their progress reports. The Director of ICAR-ATARI, Zone-VII, expressed satisfaction with the work and emphasized the need to strengthen documentation through increased research publications, popular articles, and policy papers.

The technical sessions covered several key areas. The progress review included updates on FFP initiatives related to integrated farming systems, natural resource management, value addition, and market linkages, along with impact analysis covering improvements in productivity, income, and quality of life. Success stories featured case studies on innovative practices such as the adoption of climate-resilient crops, improved piggery management practices, and women empowerment through self-help groups. Challenges identified included climate variability, limited market access, and capacity building gaps. Recommendations emphasized utilizing digital platforms for market linkages, strengthening input supply chains, and conducting hands-on training sessions for farmers. A panel discussion focused on emerging agricultural issues such as sustainability, digital transformation, and public-private partnerships, with farmer feedback integrated to refine programme strategies.

As part of the workshop, a cleanliness drive was carried out under Swachhta Pakhwada (16^{th} to 31^{st} December 2024). Additionally, four dustbins were handed over to the villagers to promote hygiene and cleanliness.

The workshop provided a platform for productive dialogue and knowledge exchange. The insights gathered will guide the future direction of the Farmer FIRST Programme, ensuring it remains farmer-centric and responsive to evolving agricultural challenges. The commitment to innovation, collaboration, and inclusivity continues to drive sustainable agricultural development.

Fig. 11 a: Review workshop of the FFP

Fig. 11 b: Observation Swachhta Pakhwada

l) Strengthening Rural Agriculture: CHC MoU Signed in Mawsiatkhnam, East Khasi Hills

On 6th March 2025, a significant step towards enhancing agricultural productivity and mechanization in Mawsiatkhnam village, East Khasi Hills, was marked by the signing of a Memorandum of Understanding (MoU) for the establishment of a Custom Hiring Centre (CHC). The MoU was signed between Mr. K. Wallamkupar Lyngrah, Secretary (Mawsiatkhnam village), Mr. F. Fullmoon Pasi, Treasurer, and Director of the ICAR Research Complex for the North Eastern Hill Region, Dr. N. Uttam Singh, PI of the Farmer FIRST Programme (FFP). The signing ceremony was held in the presence of esteemed dignitaries from ICAR, including Dr. B.P. Singh, Head of the Division of Technology Assessment and Capacity Building (DTAC), Dr. Pampi Paul, Scientist in Agricultural Extension, and Dr. Aniruddha Roy, Senior Scientist in Agricultural Economics.

The initiative, undertaken as part of the Farmer FIRST Programme, is aimed at addressing the challenges faced by small and marginal farmers in accessing timely and affordable agricultural machinery. The Custom Hiring Centre will provide farmers with access to essential farm equipment on a rental basis, thereby reducing their dependency on manual labour and increasing efficiency in various farming operations. This is particularly relevant in the hilly terrain of East Khasi Hills, where traditional farming methods often limit productivity.

Through this MoU, ICAR-RC-NEH and the local community of Mawsiatkhnam have

established a collaborative framework that seeks to empower farmers by improving their access to technology and promoting sustainable agricultural practices. The presence of key scientists and experts from ICAR highlights the importance of this initiative and reflects a shared commitment to rural development and capacity building. The Custom Hiring Centre is expected to serve as a model for other villages in the region, demonstrating how institutional support and community participation can together transform rural livelihoods.

Fig. 12: Signing of MoU for CHC in Mawsiatkhnam

4.2.2 Demonstration /Awareness Conducted

a) Enhancing Farmer livelihoods by promoting mushroom cultivation

As part of the strategic interventions under the Farmer FIRST project, implemented by the ICAR Research Complex for the Northeastern Hill (NEH) Region, Umiam, Meghalaya, an initiative was undertaken to promote sustainable and profitable mushroom cultivation among rural farmers. One such beneficiary, Mr. Augustine from Mawphrew village under the Marngar cluster, received partial financial and technical support to upgrade his traditional mud-plastered, thatched-roof hut into a semi-permanent, cost-effective mushroom production unit equipped with a durable tin roof.

Dr. Tasvina R. Borah and Dr. Naseeb Singh, serving as Co-Principal Investigators (Co-PIs) of the project, provided critical guidance in site selection and structural design, ensuring that the newly constructed mushroom house adhered to scientifically validated parameters for optimal mushroom growth. Their expertise facilitated the establishment of a controlled environment conducive to round-the-year mushroom cultivation, thereby reducing seasonal constraints and enhancing productivity.

To further strengthen the initiative, Mr. Augustine was provided with essential infrastructural and material inputs, including a chaff cutter for efficient substrate

preparation and high-quality mushroom spawn to initiate cultivation in the upcoming season. The intervention aimed at enabling consistent and high-yield mushroom production, thereby enhancing his livelihood through sustainable agribusiness.

This initiative was carried out under the Enterprise component of the Farmer FIRST programme, which seeks to integrate scientific innovation with traditional agricultural practices to improve rural livelihoods. The programme is being coordinated by Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), Dr. Tasvina R. Borah, with operational and technical support from Dr. M. Bishonath Singh (Senior Research Fellow) and Wanbiang Dkhar (Project Assistant).

By facilitating the adoption of mushroom cultivation as a viable agribusiness model, this intervention underscores the role of scientific advancements in empowering rural farmers, fostering economic resilience, and ensuring food security in the region.

Fig. 13 a: Handing over of chaff cutter

Fig. 13 b: Semi-permanent mushroom cultivation

b) Awareness cum demonstration programme on Jalkund

On September 20th, 2024, the ICAR Research Complex for the North Eastern Hill (NEH) Region, Umiam, Meghalaya, successfully organized an awareness-cum-demonstration programme on Jalkund in Mawsaitkhnam village, East Khasi Hills. This initiative was conducted under the Farmer FIRST Programme, spearheaded by the Division of Technology Assessment and Capacity Building, with the primary objective of educating local farmers on the construction and utilization of Jalkund for rainwater harvesting.

The demonstration provided a comprehensive overview of Jalkund technology, emphasizing its critical role in addressing water scarcity issues in hilly terrains. Participants were guided through key technical aspects such as site selection, selection of appropriate materials, and step-by-step construction methodologies. The programme also highlighted the effective management of harvested water for sustainable crop cultivation, particularly in the dry season.

Notably, this programme marked the first formal introduction of Jalkund technology to the farmers of Mawsaitkhnam village. The interactive session included an in depth discussion on beneficiary selection, during which the community actively engaged in identifying the next five farmers who would benefit from the installation of Jalkund structures in their fields. Furthermore, to enhance agricultural productivity and promote Rabi season cultivation, Rabi vegetable seeds were distributed among the participants.

The event was meticulously coordinated by a team of esteemed scientists and experts, including Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), Dr. Balusamy Arumugam (Scientist, Environmental Science), Dr. M. Bishonath Singh (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). Their expertise and guidance ensured the successful execution of the programme, fostering a deeper understanding of water conservation practices among the local farming community.

The awareness-cum-demonstration programme on Jalkund represents a significant step towards sustainable water management and agricultural resilience in Meghalaya's challenging agro-climatic conditions. By equipping farmers with practical knowledge and resources, this initiative aims to enhance water availability for irrigation and livestock rearing, thereby improving livelihoods and ensuring food security in the region.

Fig. 14: Initiation of awareness cum demonstration programme on jalkund

c) Awareness and Inputs Distribution Programme cum Exposure visit of Jalkund beneficiaries of FFP adopted village (Mawsiatkhnam) at Umket village, Ribhoi; under Tribal Sub Plan

On the 26th of September, 2024, the ICAR Research Complex for the North Eastern Hill (NEH) Region, Umiam, Meghalaya, successfully organized an Awareness and Inputs Distribution Programme, coupled with an exposure visit, for the beneficiaries of jalkund water harvesting systems from the Farmer FIRST Programme (FFP) adopted village of Mawsiatkhnam, East Khasi Hills. This initiative was conducted under the

ambit of the Tribal Sub Plan (TSP) and aimed at enhancing the knowledge and technical capabilities of farmers regarding in-situ water conservation and utilization.

As part of the event, selected beneficiaries from Mawsiatkhnam visited Umket village, a TSP implemented site, to observe firsth and the practical execution and operational efficacy of jalkund water harvesting structures. The exposure visit provided an opportunity for the participants to examine jalkunds at different stages of construction and functionality, thereby gaining insights into site selection, construction methodologies, maintenance protocols, and the diverse applications of harvested water.

Dr. A. Balusamy, Scientist (Environmental Science), provided an in-depth technical briefing on the critical aspects of jalkund construction, including site assessment, excavation techniques, lining materials, and water conservation strategies. He elaborated on the significance of these structures in addressing seasonal water scarcity and their potential in augmenting irrigation, livestock watering, and domestic usage. The visiting beneficiaries also interacted with the farmers of Umket village to understand their experiences, challenges, and adaptive strategies in utilizing jalkund systems effectively.

A constructive discussion was facilitated between the ICAR team and the local stakeholders of Umket village regarding future collaborations and the scope for scaling up water conservation measures. The dialogue emphasized the need for continued technical support, community participation, and sustainable management practices to maximize the benefits of jalkund systems in the region.

The programme culminated in the distribution of essential inputs, including water pumps and jalkund related materials, to selected beneficiaries in Umket village. This initiative was designed to empower local farmers with the necessary resources to establish and maintain water harvesting systems effectively.

The successful execution of the programme was made possible through the coordinated efforts of Dr. N. Uttam Singh (Senior Scientist and Principal Investigator), Dr. A. Balusamy (Scientist, Environmental Science), Dr. M. Bishonath Singh (Senior Research Fellow), and Wanbiang Dkhar (Project Assistant). Their dedicated contributions ensured a seamless knowledge transfer and enhanced the capacity of the participating farmers to adopt improved water conservation techniques.

This initiative underscores the commitment of ICAR Research Complex for NEH Region towards promoting sustainable water management practices in tribal-dominated areas, thereby fostering resilience against water scarcity and enhancing agricultural productivity in Meghalaya.

Fig. 15 a: Input distribution to jalkund beneficairies

Fig. 15 b: Visiting jalkund in Umket village

4.2.3 Training and workshop

a) Workshop on Pineapple leaf fibre extraction and utilization

The Division of Technology Assessment and Capacity Building, under the ICAR Research Complex for the North-Eastern Hill Region (Umiam, Meghalaya), and the National Institute of Natural Fibre Engineering and Technology (NINFET, Kolkata), jointly organized a workshop on pineapple leaf fibre extraction and utilization on November 21st 2024. The event took place in Purangang village, Marngar cluster, Meghalaya. During the workshop, Dr. Laxmikanta Nayak, Head of the Transfer of Technology Division, and Dr. Nagesh Kumar T., Scientist at NINFET, demonstrated the process of extracting fibre from pineapple leaves using a fibre extraction machine, which significantly accelerates the process compared to traditional methods. The primary goal of the workshop was to create awareness among the farmers, many of whom cultivate pineapples, about the additional income potential that can be generated from their crops. Extracting fibre from pineapple leaves holds considerable promise for improving the economic conditions of local communities. This natural fibre can be used to produce a range of products such as textiles, ropes, and eco-friendly materials. By promoting fibre extraction, farmers can diversify their income source, reduce waste, and access global markets for sustainable products. This initiative not only creates jobs and enhances livelihoods but also contributes to sustainable agricultural practices, thereby fostering the region's economic development. The event was attended by Dr. N. Uttam Singh, Senior Scientist and PI at ICAR-NEH, and Dr. Braj Pal Singh, Head of DTAC at ICAR-NEH. The workshop was coordinated by Dr. N. Uttam Singh, Dr. Braj Pal Singh, Dr. Laxmikanta Nayak, Dr. Nagesh Kumar T., Dr. M. Bishonath Singh (Senior Research Fellow), and Mr. Wanbiang Dkhar (Project Assistant).

Fig.16: Workshop on Pineapple leaf fibre extraction

b) Animal Health Camp cum Input Distribution Programme

On February 18th 2025, an Animal Health Camp was organized at Mawsiatkhnam, East Khasi Hills, Meghalaya, by the Division of Technology Assessment and Capacity Building, ICAR-RC for NEH Region, Umiam. The initiative aimed to address the veterinary healthcare needs of livestock and poultry while equipping local farmers with essential knowledge on disease prevention, nutrition, and sustainable livestock management. A team of experienced scientists and researchers led the camp, providing valuable veterinary services and guidance to the participating farmers.

During the programme, Dr. Rahul Katiyar from the Division of Animal and Fisheries Science conducted insightful sessions on the importance of deworming and vaccination in maintaining the health and productivity of livestock and poultry. Farmers were educated on effective methods to prevent parasitic, bacterial, and viral infections through proper vaccination and deworming protocols. Special focus was given to vaccination strategies for pigs and poultry against common diseases such as Swine Fever, Ranikhet Disease, Fowl Pox, and Marek's Disease, emphasizing their role in preventing disease outbreaks and ensuring animal well-being.

A total of 17 farmers from Mawsiatkhnam village actively participated in the camp, gaining hands-on knowledge about balanced nutrition and supplementary feeding practices to improve livestock growth and productivity. Farmers received expert advice on the appropriate proportions of supplementary feed required for different livestock species to ensure optimal health and performance. Additionally, essential veterinary medicines and nutritional supplements were distributed, including oral calcium, multivitamins for poultry, deworming agent (Piperazine) for pigs, mineral mixture, and anti-diarrheal drug to support animal healthcare.

The camp encouraged farmers to adopt regular deworming and vaccination schedules, reinforcing the long-term benefits of preventive healthcare in enhancing livestock productivity and disease resistance. The enthusiastic participation of the farmers

demonstrated their keen interest in learning modern veterinary practices, and they expressed gratitude for the scientific knowledge and vital resources provided during the programme.

By disseminating information on scientific livestock management and equipping farmers with necessary veterinary inputs, the initiative played a crucial role in empowering rural farmers with the tools and knowledge needed for sustainable livestock farming.

Overall, the camp served as a valuable platform for knowledge exchange and capacity building, fostering stronger collaboration between scientists and farmers for the collective benefit of Meghalaya's agricultural community. The programme was successfully coordinated by a team of experts, including Dr. N. Uttam Singh (Senior Scientist and PI, FFP), Dr. Rahul Katiyar (Scientist and Co-PI), Dr. Tasvina R Borah (Senior Scientist and Co-PI), Dr. Gojendro Singh (Scientist and Co-PI), Dr. M. Bishonath Singh (SRF, FFP), and Mr. Wanbiang Dkhar (Project Assistant).

Fig.17: Animal Health Camp cum Input Distribution Programme at Mawsiatkhnam

c) Input Distribution cum Technology Sensitization Workshop

The Farmer FIRST Programme, implemented by the Division of Technology Assessment and Capacity Building of ICAR Research Complex for NEH Region, Umiam, Meghalaya, organized an Input Distribution Cum Technology Sensitization Workshop at Mawsiatkhnam, East Khasi Hills, Meghalaya, on 21st February 2025. The workshop aimed to promote Integrated Farming System (IFS) models, ensuring enhanced productivity, sustainability, and livelihood security for the participating farmers.

The primary objective of the workshop was to introduce and promote the Integrated Farming System (IFS) approach, which integrates crop, livestock and fisheries components to optimize resource utilization and improve farm income. Additionally,

the workshop aimed to distribute essential agricultural inputs, including improved poultry chicks, fish fingerlings, piglets and feeds (for poultry, pig and fish), to selected farmers for effective implementation of IFS models.

Dr. S. Gojendro Singh from Division of Animal and Fishery Science, ICAR-RC-NEH Region provided detailed insights into the IFS model and its advantages in the hilly terrains of Meghalaya. Emphasis was laid on sustainable resource management, scientific fish farming and diversification of farm enterprises to mitigate risks associated with climate variability. The role of integrating livestock and aquaculture with crop production was highlighted to enhance farm productivity and economic returns. To support the adoption of IFS, essential inputs were distributed to the selected farmer. High yielding fingerlings (1200 nos.) were provided to the selected farmer to promote aquaculture based IFS units. Additionally, improved poultry breeds (100 nos.) and 6 nos. of piglets adapted to local conditions were distributed along with feeds (for fish, poultry and pigs, respectively), and farmers were educated on advanced poultry rearing techniques and piggery, with special reference to disease control and nutritional management.

The Input Distribution cum Technology Sensitization Workshop successfully empowered the farming community with knowledge, skills, and essential inputs required to implement Integrated Farming Systems. The initiative under the Farmer FIRST Programme is expected to significantly improve rural livelihoods by fostering sustainable agricultural practices. Future follow ups and technical support will further enhance the impact of IFS adoption in the region, contributing to food security and economic resilience. The programme was successfully coordinated by a team of experts, including Dr. N. Uttam Singh (Senior Scientist and PI, FFP), Dr. S. Gojendro Singh (Scientist and Co-PI), Dr. Rahul Katiyar (Scientist and Co-PI), Dr. Tasvina R Borah (Senior Scientist and Co-PI), Dr. M. Bishonath Singh (SRF, FFP), and Mr. Wanbiang Dkhar (Project Assistant).

Fig.18: Input Distribution cum Technology Sensitization Workshop

d) Plant Health Camp cum Inputs Distribution Programme

The Plant Health Camp, organized on March 18th 2025, at Mawsiatkhnam, East Khasi Hills, Meghalaya, under the Farmer FIRST Programme by the Division of Technology Assessment and Capacity Building, ICAR-RC for NEH Region, Umiam, served as a vital platform for disseminating scientific knowledge on plant health management, disease prevention, and sustainable agricultural practices. The camp aimed to enhance Farmer capacity to mitigate crop losses due to biotic and abiotic stress factors through the integration of innovative and eco-friendly approaches.

Dr. Tasvina R Borah, Senior Scientist, Division of Crop Science, delivered a comprehensive lecture highlighting the significance of proactive plant health management to sustain agricultural productivity. She elaborated on the role of early disease diagnosis, integrated pest management (IPM), and soil health enhancement in ensuring long-term farm sustainability. Dr. Tasvina R Borah emphasized the necessity of crop rotation, organic amendments, and bio-control agents to minimize dependency on chemical pesticides, thereby reducing soil degradation and ecological imbalance.

The initiative significantly empowered local farmers by equipping them with essential inputs and practical knowledge to improve farm productivity while adhering to sustainable agricultural principles. As part of the programme, participating farmers received mushroom spawns to promote agro-diversification, bio-pesticides (SAFE ROOT and Sparsha) to enhance plant defence mechanisms against soil-borne and foliar diseases, and anti feed ant/repellent (MULTINEEM) to naturally deter pests without harming beneficial organisms. These bio-inputs align with eco-friendly plant protection strategies, reducing chemical load in agro ecosystems while ensuring crop health and yield stability.

The successful execution of the Plant Health Camp was facilitated by a dedicated team of experts, including Dr. N. Uttam Singh (Senior Scientist and PI, FFP), Dr. Tasvina R Borah (Senior Scientist and Co-PI), Dr. Rahul Katiyar (Scientist and Co-PI), Dr. Gojendro Singh (Scientist and Co-PI), Dr. M. Bishonath Singh (SRF, FFP), and Mr. Wanbiang Dkhar (Project Assistant). Through this initiative, the Farmer FIRST Programme reinforced its commitment to bridging the gap between scientific research and farm-level implementation, ensuring that local agricultural communities have access to sustainable and scientifically validated solutions for improved crop health and productivity.

Fig.19: Plant Health Camp cum Input Distribution Programme at Mawsiatkhnam

Table 9: Details of visit of project team and other scientist to project site

Date of visit	Purpose & details of visit	Persons accompanied	Villages covered	Photo
01.05.24 & 09.05.24	PRA collection	Project staff and DTAC team	Mawsiatkhnam	
08.05.24	Research-extension-farmer-interface meeting	Dr. N. Uttam.Singh (PI), Lutmonhaki Dkhar (SRF), Wanbiang Dkhar	Sarikushi	
08.05.24	Input distribution of power tiller for development of Custom Hiring Centre	Dr. N. Uttam.Singh (PI), Lutmonhaki Dkhar (SRF), Wanbiang Dkhar	CHC, Nalapara	

14.05.24	Input distribution of water pump to beneficiary	Dr. N. Uttam.Singh (PI), Lutmonhaki Dkhar (SRF), Wanbiang Dkhar	Nalapara	
16.05.24	Input distribution of jalkundsilpauline sheet for repairing of jalkund	Dr. N. Uttam.Singh (PI), Lutmonhaki Dkhar (SRF), Wanbiang Dkhar	Borgang	
11.09.24	Inspection of semi-permanent mushroom cultivation house	Dr. Tasvina R. Borah	Marngar	
26.09.24	Exposure visit of Jalkund beneficiaries of FFP adopted village (Mawsiatkhnam) at Umket village	Dr. N. Uttam Singh, Dr. A. Balusamy Dr. M. Bishonath Singh (SRF, FFP) Wanbiang Dkhar (Project Assistant)	Umket	
28.11.24	Site inspection for jalkund installation	Dr. M. Bishonath Singh (SRF, FFP), and WanbiangDkhar (Project Assistant)	Mawsiatkhnam	
23.01.25	Site selection for IFS unit establishment.	Dr. S. Gojendro Singh Dr. M. Bishonath Singh (SRF, FFP), and WanbiangDkhar (Project Assistant)	Mawsiatkhnam	

27.02.25	Assessment of the Custom Hiring Centre and Proposed Site for the IFS Unit	Dr. M. Bishonath Singh (SRF); Mr. Wanbiang Dkhar (Project Assistant); Dr. Nivetina Laitonjam (YP-II) and Ph. Menaka Sharma (Project Associate)	Mawsiatkhnam	

4.3 Technology Assemblage, Application and Feedback

4.3.1 Crop based modules

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

To optimize the utilization of rice fallow land after the harvest of Kharif rice, broccoli seeds were distributed to 30 beneficiaries from the adopted villages in December 2024. Additionally, a variety of vegetable seeds, including cabbage, cauliflower, and green pea were provided to 40 beneficiaries in Mawsiatkhnam Village. Among the cultivated crops, broccoli yielded the highest net income of Rs. 674671.07, followed by cabbage with Rs. 255322.15, while other vegetable crops generated comparatively lower returns. The benefit-cost (B: C) ratio was also highest for broccoli at 3.23, followed by cauliflower at 3.03, as shown the table below.

Table 10: The economics of the vegetables cultivation

Crop	Variety	Yield (MT)	Gross income (Rs.)	Expenditure (Rs.)	Net income (Rs.)	B:C ratio
Broccoli	Megha	37.42	976622.56	301951.49	674671.07	3.23
Cabbage	KSP99	19.13	384521.28	129199.13	255322.15	2.98
Cauliflower	Amazing	16.43	321642.68	106306.50	215336.18	3.03
Garden pea	KSP 110	8.69	349065.18	159200.00	189865.18	2.19

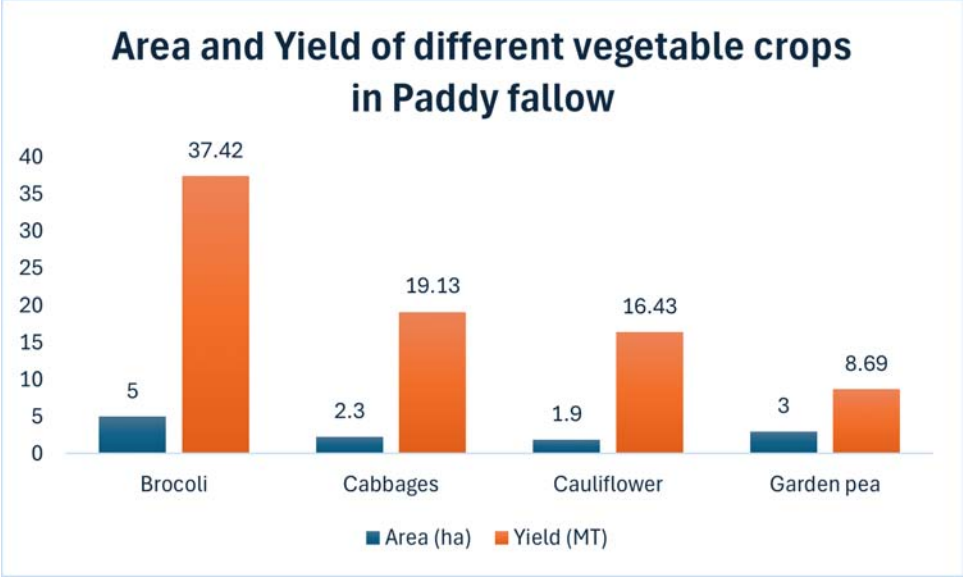


Fig 20: Area under different vegetable crops in Paddy fallow

Fig 21 a: Broccoli cultivation

Fig 21 b: Cabbage cultivation

Fig 21 c: Garden pea cultivation

4.3.2 Horticulture based module

a) Promotion of second cropping in rice and maize fallow

During a field visit to Mawsiatkhnam in June 2024, aimed at inspecting vegetable crop fields, several farmers with a strong interest in cultivating summer vegetables were identified. In response, they were provided with hands on vegetable seeds, including tomato and capsicum, to support their agricultural endeavours. A total no. of 12 farmers benefited from this initiative. Based on the economic analysis of summer vegetable cultivation, tomato generated the highest net return of Rs. 431491.65, followed by capsicum with Rs. 226756, while other vegetable crops yielded comparatively lower returns. The benefit-cost (B: C) ratio was also highest for tomato at 3.46, as indicated in below table.

Table 11: The economics of the summer vegetables cultivation

Crops	Varieties	Area (ha)	Yield (MT)	Cost of cultivation (Rs.)	Gross return (Rs.)	Net return (Rs.)	B:C ratio
Tomato	S-017	1.5	55.57	175175	606666.65	431491.65	3.46
Capsicum	Mahabharata	1	10.17	90700	290277.80	226756.00	3.20

Fig. 22 a: Capsicum cultivation

Fig. 22 b: Tomato cultivation

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

An orchard establishment program for fruit, spice, and plantation crops was conducted in Mawtnum village, Ri Bhoi District, Meghalaya, in August 2023. As part of this initiative, a total of 500 lemon (Citrus limon) suckers and 1,000 pineapple (Kew and Queen) suckers were distributed to 10 farmers. The planting of these fruit saplings took place in mid-August 2023. The status of the saplings is detailed in the table below.

Table 12: Status of Plantation and fruit crops distributed under the project

Year of plantation	Age (year) of orchard	Fruit Spp. (Variety)	No. of farm families benefitted	No. of plants	Area (ha)	Status/ stage
11/08/2023	1 year, 7 months	Lemon (*Citrus limon*) Pineapple (Kew and queen)	9 2	500 1000	0.5 0.3	Active fruiting stage

Fig. 23: Lemon orchard

4.3.3 Livestock based module

a) Backyard poultry farming

On February 21st 2025, a total of 2,500 Vanaraja breed chicks were distributed to 100 beneficiaries in Mawsiatkhnam to promote backyard poultry farming. This initiative aimed to enhance livelihood opportunities and improve nutritional security among farmers in the region. The economics of Vanaraja breeds distributed for backyard poultry farming during 2023-24 is given in table below.

Table 13: Income from backyard poultry farming

Birds sold (No.)	Body weight (Av.)	Rate/kg live weight (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C ratio
200	2.5	400	200000	114000	86000	1.75

Fig. 24: Vanaraja chick's distribution for Backyard Poultry Farming

b) Backyard pig farming

On February 21st 2025, a total of 6 Hampshire crossbred piglets were distributed to 2 farmers in Mawsiatkhnam Village to help boost their income. The economic aspects of Hampshire crossbred piglets distributed for backyard pig farming during 2023-24 are presented in the table below.

Table 14: Income generated from backyard pig rearing

Piglets sold (No.)	Piglets (Rs.)	Income (Rs.)	Cost of production (Rs.)	Net Profit (Rs.)	B:C ratio
30	7000	210000	110000.00	100000.00	1.91

Fig. 25: Backyard Pig Farming

4.3.4 Enterprise based module

a) Oyster Mushroom Production

Mushroom spawn (10 packets) were distributed to beneficiaries in Mawsiatkhnam, to promote diversified income sources. This initiative aims to encourage mushroom cultivation as an alternative livelihood, enhancing economic stability and self-sufficiency among the recipients. By adopting mushroom farming, beneficiaries can generate additional income while making efficient use of available resources. The economic aspects of oyster mushroom cultivation recorded from previously FFP adopted village (Marngar) during 2023-24 are presented in the table below.

Table 15: Income from oyster mushroom cultivation

No. of beneficiaries	Spawn packets distributed	Yield (Rs.)	Rate/ kg (Rs.)	Total income (Rs.)	Cost of production (Rs.)	Net profit (Rs.)	B:C ratio
1	10	40	350	14000	6039.00	7961.00	2.32

Fig. 26 a: Oyster mushroom spawn

Fig. 26 a: Oyster mushroom spawn

4.3.5 NRM based module

a) Construction of a cost-effective Jalkund for harvesting rainwater

Jalkund is a cost-effective, in-situ micro-rainwater harvesting structure built on hilltops to collect and store rainwater. During the dry season, the stored water serves multiple purposes, including life saving irrigation at critical crop growth stages, washing harvested produce like ginger, turmeric, carrot, and radish, fish rearing, livestock and animal husbandry, and domestic activities. To address water scarcity for agriculture and allied activities, a total of five Jalkunds (each measuring 5m x 4m x 1.5m) have been constructed at Mawsiatkhnam village before the onset of the monsoon. Additionally, five more beneficiaries have been selected, and Jalkund sheets will be distributed once the digging process is completed.

Fig 27: Jalkund construction at Mawsiatkhnam

4.3.6 Integrated farming systems (IFS) module

On January 23rd 2025, the Division of Technology Assessment and Capacity Building (DTAC) under the ICAR, RC for the NEH Region conducted a site identification and survey in Mawsaitkhnam Village for the implementation of an Integrated Farming System (IFS). This initiative aims to enhance agricultural productivity, promote sustainable livelihoods, and optimize resource utilization for farmers in the region.

During the survey, Dr. S. Gojendro Singh, Scientist from the Division of Animal and Fishery Science, carried out a physical assessment of agricultural fields, ponds, and other farming resources owned by local farmers. He also interacted with farmers to understand their landholding sizes, cropping patterns, and livestock management practices. These discussions highlighted the potential impact of the IFS model in improving Farmer economic conditions and ensuring long term agricultural sustainability. Based on the survey two individuals were selected for the establishment of IFS units.

Input required for each component has been distributed on 21st February, 2025 to the selected individuals. Inputs Distributed till now are listed below:

1. Fish fingerling- 1200 no.
2. Poultry chicks (Vanaraja) - 100 no.
3. Piglets (Hamshire cross breed) - 6 no.
4. Feeds (for chicks, piglets and fingerling)

Fig 28 a: Inputs distributions for implementation of IFS units at Mawsiatkhnam

Fig 28 b: Construction of poultry shed for IFS unit

4.3.7. Fishery Based Module

a) Composite fish culture

Fish rearing has proven to be a highly profitable venture in the adopted villages (Mawsiatkhnam). Dr. S. Gojendro Singh (Scientist, DAFS, ICAR-RC-NEH) delivered a lecture on composite fish rearing at Mawsiatkhnam, emphasizing its scientific approach to maximizing fish production through species diversification. He highlighted the selection of compatible fish species, such as surface, column, and bottom feeders, to ensure optimal resource utilization and ecological balance within the pond ecosystem. Key aspects covered included pond preparation, water quality management, stocking density, species ratio, feed optimization, and disease prevention. The lecture aimed to equip farmers with the knowledge and techniques necessary for sustainable and profitable fish farming. To further promote scientific fish farming, a demonstration and fish fingerling distribution program was held at Mawsiatkhnam village on February 21st, 2025. The initiative aimed to educate farmers on adopting fisheries as an alternative livelihood to enhance their income. As part of the program, 1000 fish fingerlings of Rohu, Gania, Koi, and Guchi breeds were distributed to two farmers from the Mawsiatkhnam village. The economic benefits of fisheries will be assessed and documented after the harvest.


Fig 29: Releasing of fingerling in pond

4.3.8 Farm Mechanization Based Module

- 89 farmers have registered under the Mawsiatkhnam, Custom Hiring Centre.
- Fund generated will be used for maintenance and repair of the tools and equipment.
- Plans are underway for investing in new machinery

Fig 30 a: Custom Hiring Centre, Mawsiathknam

Fig 30 b: Handing over of power weeder to CHC

Fig 30 c: Handing over of mini rice mills to CHC

4.4 Success Story

Promoting Mushroom Cultivation: Shri Raymond B. Marwein's Low-Cost Spawn Production Initiative

Mushrooms, especially oyster mushrooms, are highly valued. Their cultivation requires minimal labour, space, and investment, making it an increasingly popular agricultural activity in rural, suburban, and urban areas of the state. However, the availability of quality spawna critical input for sustainable mushroom cultivation-remains a significant challenge for the industry.

This is the story of Shri Raymond B. Marwein, an unemployed youth from Umsmu village, Ri-Bhoi district, Meghalaya, who holds an M. Pharm degree with distinction. During his first visit to the ICAR,RC for NEH Region in Umiam, he was inspired to pursue agri-entrepreneurship. Recognizing the gap between the demand and supply of high-quality mushroom spawn, Shri Raymond decided to address this need by learning scientific production technologies.

He enrolled in a seven day intensive training program on "Mushroom Spawn Production and Entrepreneurship Development," organized under the Farmers FIRST project. The program provided him with comprehensive theoretical and practical knowledge, including hands-on experience in tissue culture preparation, substrate development, and the production of mother and commercial spawn. The training also emphasized low cost methods of spawn production, which were developed by the institute to support small-scale entrepreneurs.

Armed with this knowledge, Shri Raymond established a low cost mushroom spawn production laboratory in his village. He converted two small rooms into functional workspaces: a 5x4 sq. ft. inoculation room and a 4x4 sq. ft. incubation room fitted with wooden racks. To minimize initial costs, he used conventional equipment, such as a pressure cooker for sterilization, an inoculation hood instead of a laminar airflow cabinet, and a well-maintained room for incubation in place of a BOD incubator.

Starting small, Shri Raymond prepared 500 ml of culture media in two conical flasks. While half of the initial media was contaminated, his determination led to success in producing pure cultures from the samples provided by the institute. With these, he successfully prepared 23 mother spawn packets (250 g each) with a success rate of 91.3%. From this foundation, he produced 230 commercial spawn packets (500 g each) in his first batch.

Currently, Shri Raymond produces approximately 500 packets of commercial spawn weekly. With a consistent demand of 350-400 spawn packets in his neighborhood and nearby villages, he supplies the spawn at a rate of Rs. 100 per kilogram. Alongside spawn production, he has ventured into fresh mushroom cultivation for tissue culture and as a source for mother spawn production. These mushrooms are also supplied to his homestay business.

To establish his enterprise, Shri Raymond made an initial investment of Rs. 90,000, which covered infrastructure renovations and labor costs for 120 mandays. Today, his gross monthly income from spawn and fresh mushroom sales is Rs. 40,000. His long-term vision includes scaling up production with advanced equipment, transforming Umsmu village into a hub for mushroom production, and generating employment for local youth.

Shri Raymond's entrepreneurial journey does not stop at mushrooms. His success has sparked the development of an integrated farming system on his family's land, incorporating piggery, fish culture in two ponds, vermicomposting using spent mushroom beds, and vegetable cultivation. His efforts, coupled with his homestay venture, have created a sustainable and diversified income stream, inspiring other young people in his community to explore opportunities in agriculture and allied sectors.

Fig 31: Mushroom unit of Shri Raymond's

4.5 Content Mobilization

A. Content management platform enabling off and online access

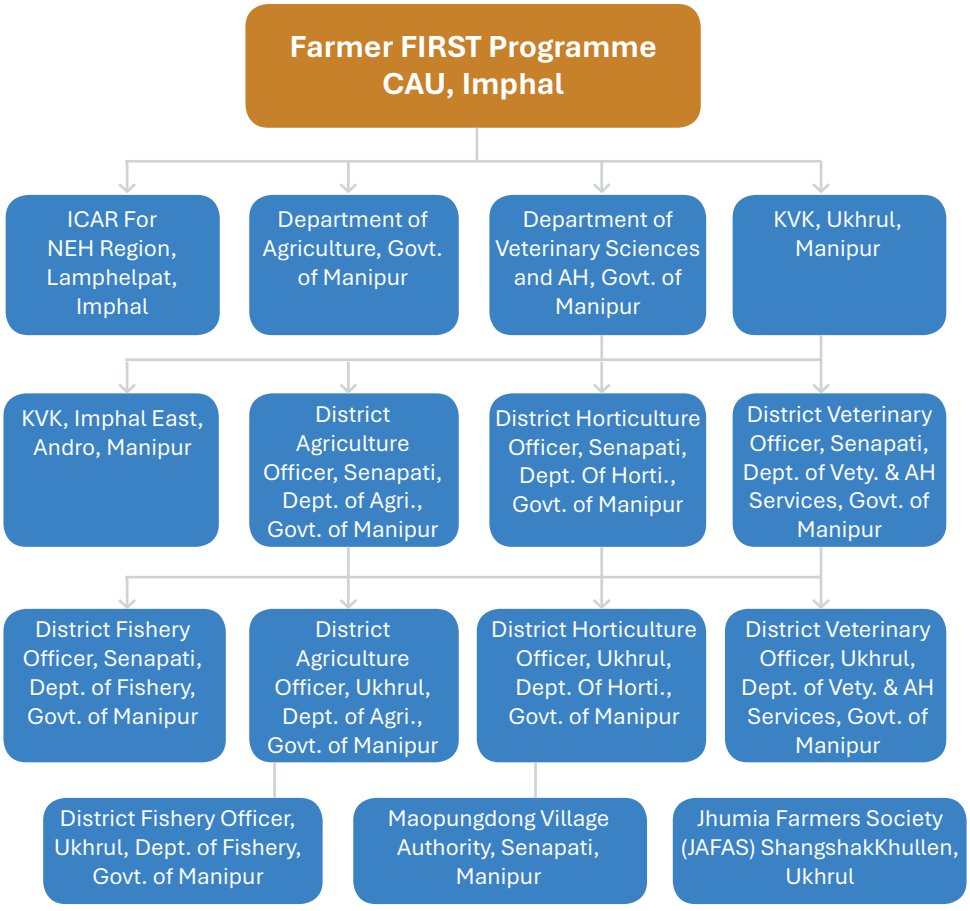
1. A review paper entitle "Backyard Poultry Farming as a Catalyst for Socio-Economic Advancement in Rural Hill Regions: a Review." have been submitted to Journal of Livestock on 24th March, 2025
2. An article "Farmers Amenity Centre for Tribal (FACT): A New Approach to Agricultural Extension" was published on 10.02.2025, in AgriTech Today.
3. An article "Addressing Soil Acidity for Agricultural Growth in Northeast India" was published on 27.02.2025, in Vigyan Varta, An International E-Magazine for Science Enthusiasts (E-ISSN: 2582-9467)

CHAPTER 5

Partnership and Institution Building

5. A. Name of Centre: Central Agricultural University; Imphal

Details of developed models of partnership



5. B. Name of Centre: ICAR Research Complex for NEH Region, Umiam Meghalaya

Details of developed models of partnership

Sl. No.	Name of the organization	Type (NGO/Private/Public)
1.	Self Help Group (SHG) (10 nos.) from Mawsiatkhnam	Private

CHAPTER 6

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. 16.38980** lakh and **Rs. 22.41640** lakh respectively. The Centre wise details of budget provision and its fund utilization are highlighted in Table below.

Table 16: Budget Provision and Fund Utilization under Farmer FIRST Programme during 2024-25 (Rs. in lakh)

Sl. No.	Centre	Total Budget Allocation	RE for 2024-25				Expenditure	
			Capital	General	Total	Capital	General	Total
1	ICAR- RC for NEH Region, Umiam, Meghalaya	22.41640	10	12.4164	22.4164	10	12.4164	22.4164
2	Central Agricultural University, Imphal	16.38980	7.5	8.8898	16.3898	7.5	8.8898	16.3898
3	ICAR-ATARI, Zone VII, Umiam	4.19380	2.5	1.6938	4.19380	2.49999	1.6938	4.19379
	Total	**43**	**20**	**23**	**43**	**19.99999**	**23**	**42.9999**

ICAR-Agricultural Technology Application Research Institute, Zone-VII

Umiam, Meghalaya-793103

(An ISO 9001:2015 Certified Organization)