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2023-24

DEMONSTRATION OF CLIMATE SMART TECHNOLOGIES IN LAWNGTLAI DISTRICT UNDER TDC-NICRA

KVK Lawngtlai,
Chawnhu
Lawngtlai District, Mizoram - 796891

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Authors

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1. INTRODUCTION

NICRA project aims to achieve climate resilience through demonstration of proven climate resilient technologies as well as innovations made towards it through several institutional interventions. The technologies are divided into six module viz.

- Module I: Natural Resource Management (NRM): It consists of NRM(A) – *in situ* moisture conservation measures, NRM(B) – *ex situ* moisture/water conservation measures and NRM(C) – *ex situ* soil health improvement interventions.
- Module II: Crop production interventions: All crop related interventions come under this module
- Module III: Livestock & fisheries: It includes climate resilient interventions under poultry, piggery, beekeeping, cattle farming, fisheries, goatkeeping, etc.
- Module IV: It includes Seed & fodder production systems as well as Custom Hiring Centres (CHCs).
- Module V: Capacity building: It consists of topic-based trainings and on-hands experiences to solve existing problems as well as equip farmers and beneficiaries with new, relevant and improved farming practices/technologies and information to improve the existing systems of crop & animal production at the village level.
- Module VI: Extension activities: The programmes under this module provides new information and ideas developed by the research component/agricultural research institutions to the farmers at the village level. It includes exposure visits of farmers, students, field days, method demonstrations, awareness programmes and strengthening of SHGs and Kisan clubs, etc.

The Technology Demonstration Component of NICRA project was started in the village Chawnhu from the year 2022. Several climate resilient technologies were demonstrated and outscaled. The same was done in 2023-24 through modules 1-6 for each farming system typologies.

Village Profile:

Details of the selected village Chawnhu, Lawngtlai district, Mizoram is given in Table 1.1.

Table 1.1 Village profile

Village:	**Chawnhu**
District	Lawngtlai
Distance from KVK	0 km
Major climatic constraints	Drought, late onset of monsoon and erratic rainfall, soil erosion
Geographical area	7.23 sq.km
Latitude	22°30'12.0“ N
Longitude	92°53'40.7“ E
Elevation	1097 msl
Rainfall average	201.7 mm
Normal Rainfall	224.8 mm
Annual rainfall (2023)	2420.6 mm
Population	694 (M=335, F = 358)
No. of Households	200
Per capita income	0.35-1.0 lakh
Total cultivated area	200 ha
Total rainfed area	200 ha
Agro-climatic zone	Humid sub-tropical Hill Zone

Major crops grown	Rice, maize, mustard, tomato, Mizo chilli, etc.
Major soil type	Colluvial soil

Farming System Typology (FST)

The village was divided into two (2) Farming System Typologies (FSTs) namely

FST I: Rainfed Upland with Animal This typology constitutes the steep hilly areas with mainly laterite, alluvial and/or colluvial soil having degree of slopes ranging from 15-40% and average pH of 5.7. The main source of water is southwest monsoon rain and the crops are cultivated purely by rainfed during *Kharif* season and by winter rainfall/ northeast monsoon rain during *Rabi* season.

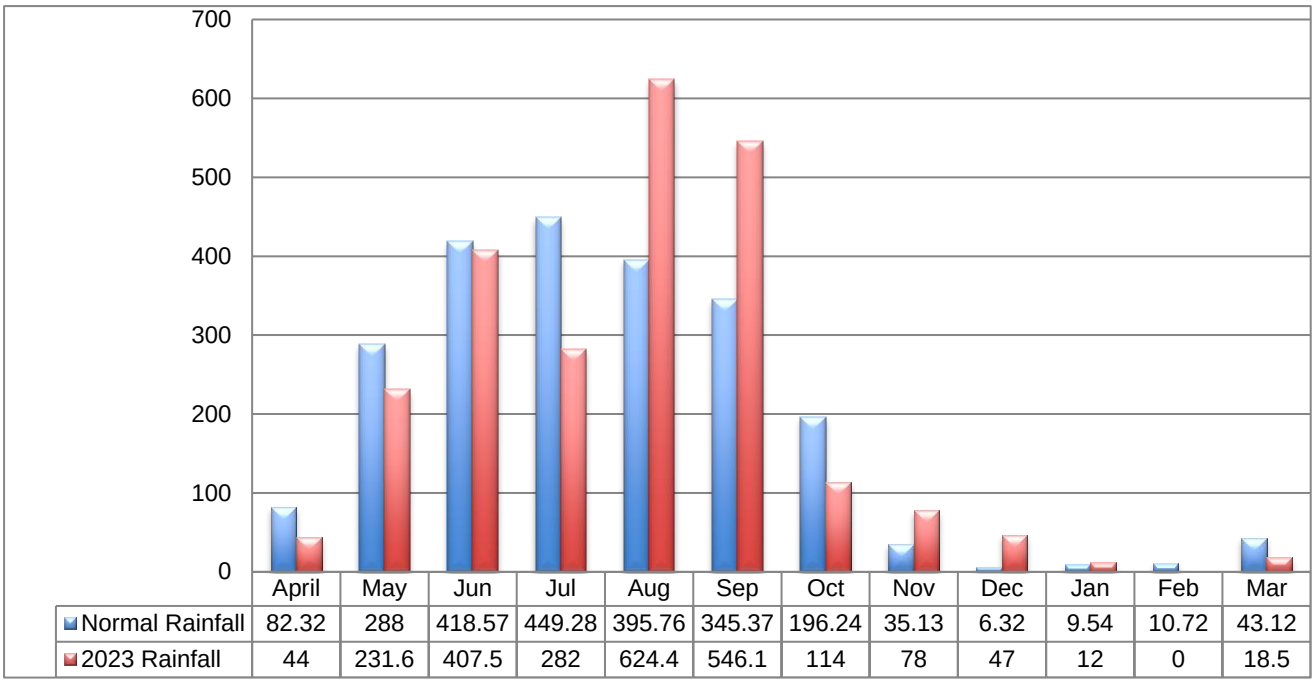
FST II: Irrigated Lowland without Animal This typology consists of areas having laterite, and/or colluvial soil having degree of slopes ranging upto 0-15% and average pH of 5.4. The main source of water is received from south west monsoon in *Kharif* and northeast monsoon in *Rabi* season. Supplemental irrigation is given based on scarcity and need using water tanks, channeled spring water, etc. Cropping systems mainly include Crop + Livestock/Fisheries.

2. RAINFALL AND TEMPERATURE DURING 2023-24

The total rainfall received recorded at the NICRA village during Jan 2022-March 2023 is given below:

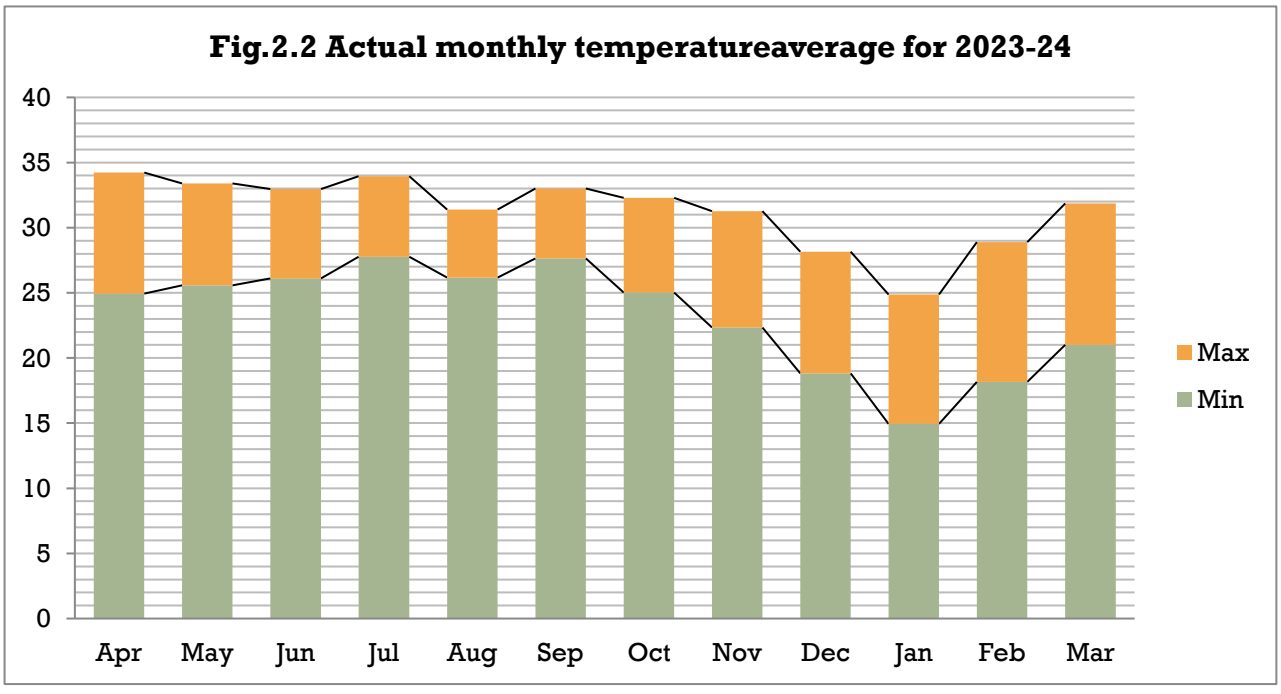
Date of the month	Normal (mm)	Actual (mm)	No. of rainy days (>2.5 mm in a day)	Dry spells during cropping period			Heavy rains received: Quantity: >60 mm- (from _to_)
				10-15 days	16-20 days	>20 days	
January	15.47	0.0	0	2	1	1	
February	21.95	0.0	0	2	1	1	
March	44.62	46	3	1	-	-	
April	82.32	44	3	2	-	-	
May	288	231.6	10	1	-	-	70 mm, 12th
June	418.57	407.5	14	-	-	-	78 mm,5th
July	449.28	282.0	23	-	-	-	
August	395.76	624.4	25	-	-	-	64 mm 5th, 97 mm 6th, 110 mm 7th
September	345.37	546.1	22	-	-	-	62 mm 9th, 78 mm 11th, 75 mm 13th, 75 mm 17th
October	196.24	114.0	5	1	1	1	-
November	35.13	78.0	3	2	-	-	-
December	6.32	47.0	2	2	1	1	-
Total	2301.87	2420.6	110	9	1 day	5	9 days

Table 2.1: Total rainfall during 2023



	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Normal Rainfall	82.32	288	418.57	449.28	395.76	345.37	196.24	35.13	6.32	9.54	10.72	43.12
2023 Rainfall	44	231.6	407.5	282	624.4	546.1	114	78	47	12	0	18.5

Fig 2.1: Actual monthly rainfall data 2023-24 compared to normal rainfall



3. DETAILS OF INTERVENTIONS DURING 2023-24

Module I: Natural Resource Management - A

FST II: Irrigated Lowland without Animal

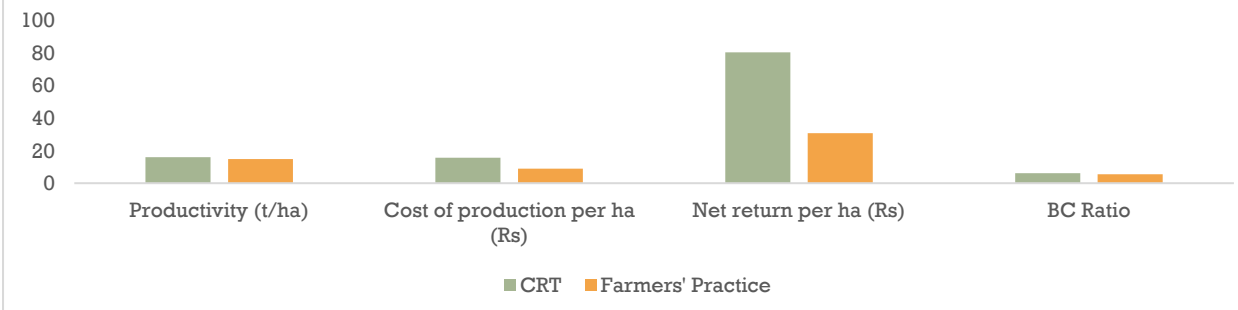
CRT: Polythene mulching in watermelon

To demonstrate this climate resilient technology, 10 selected farmers were each provided with 2 rolls of plastic mulch having 200 m length and 2.5 micron thickness, while for farmers' Practice, no mulching was provided and only the crop was cultivated. The crop cultivated was Basf Nunhems Madhuri 64 F1 hybrid watermelon which have a growing duration of 70-75 days and having yield potential of 8-12 kg/fruit. Cultivation was done on lowland areas of Lawngtlai during *rabi* season when there is water stress and low temperature. Polythene mulching was demonstrated as a climate resilient technology for its use in soil moisture retention, suppression of weeds and as an insulator against fluctuations in soil temperature. For the demonstration, the total area cultivated was 2.5 ha, average productivity 160 q/ha with a BCR of 6.11, while for Farmers' practice, the average productivity was 148 q/ha from an area of 1.5 ha with a BCR of 5.15. Weedicide & insecticides used by selected farmers for the technology was lower compared to those without polymulching done. Reduction in cost of labour as well as better fruit quality was observed in polymulch-cultivated watermelons.

Module II: Crop Production

FST I: Rainfed Upland with Animal

Fig. 3.1 Economic comparison of Climate resilient technology with farmers' practice



CRT: Sequential Cropping of Maize-Soybean

. The farmers selected for CRT demonstration were supplied with composite maize seeds (RCM-75) having yield potential of 5-5.5 t/ha and crop duration of 100-110 days, and Soybean (JS 335) a semi-dwarf VHYV and early duration with tolerance to moisture stress conditions and resistance to girdle beetle and stem fly, non-lodging and non-shattering characteristics. For Farmers' practice, local maize was used. Cropping was done on the hilly areas of the village with a total of 6.32 ha for CRT-demonstrated farmers and an area of 3.23 ha for farmers' practice.

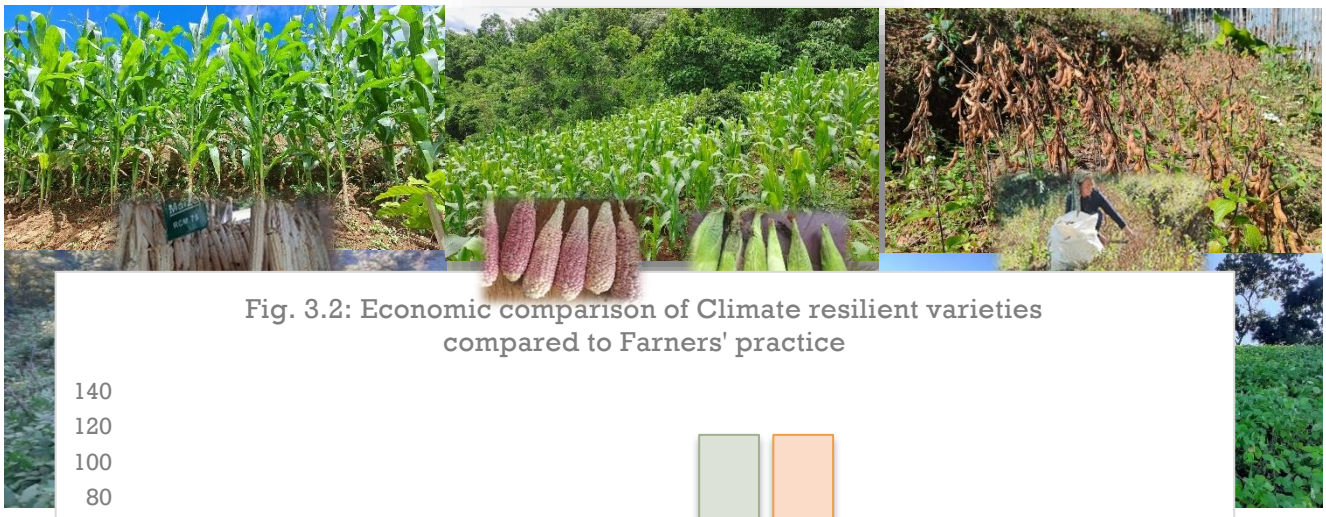
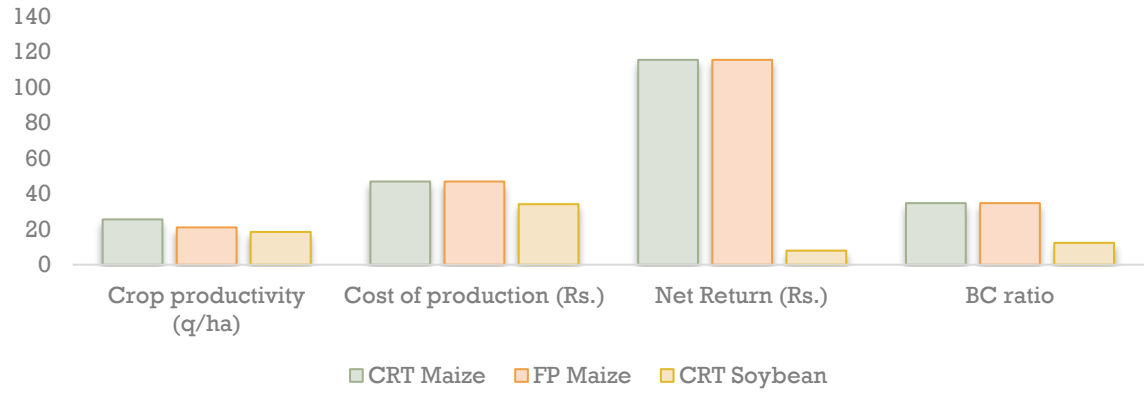


Fig. 3.2: Economic comparison of Climate resilient varieties compared to Farners' practice



NICRA farmers had an average productivity of 25.5 q/ha maize and 18.5 q/ha soybean, with BCR of 3.46 for both seasons combined, while Farmers' practice had an output of average productivity 21 q/ha for maize and average BCR of 1.23. Since traditionally, cropping is rarely done on hilly areas during *rabi* season due to no rainfall except in some lowland areas, sequential cropping was demonstrated as a CRT as well as using CRVs such as JS 335 for this typology

FST I: Rainfed Upland with Animal

CRT: Cultivation of drought tolerant, pest resistant variety of brinjal

NICRA farmers who were selected for this technology demonstration were provided with F1 hybrid brinjal variety, *Kashi Sandesh,* which has drought and pest tolerance. The variety has a

yield potential of 780q/ha and has semi-upright growth habit, round purple medium sized fruits and purple flowers which can start flowering 45 DAS and picking of fruit can start after 76 DAS. On average, the farmers had crop productivity of about 237 q/ha, net return of Rs. 5,45,958 and BC ratio of 4.29 compared to FP's 198 q/ha from local brinjal, net return of Rs 4,36,658 and BC ratio of 4.12.

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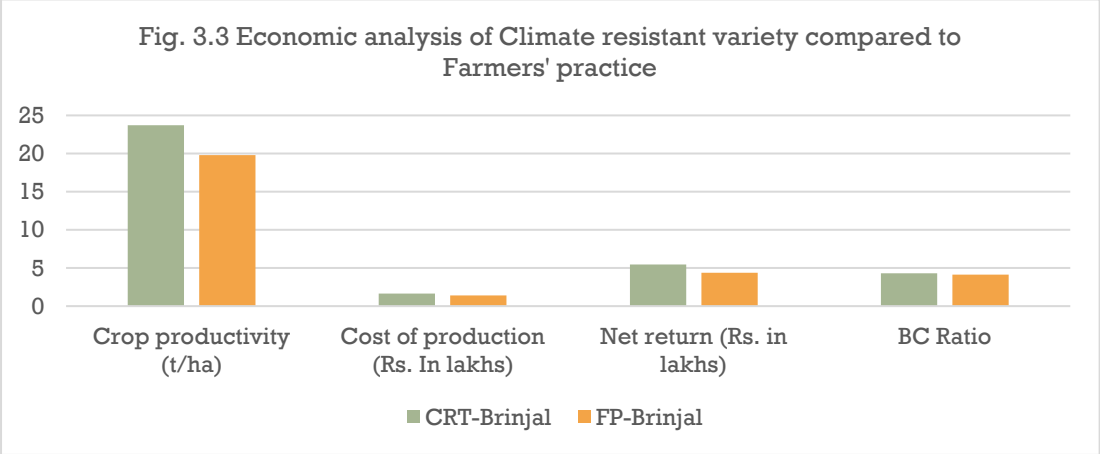
FST II: Rainfed Lowland without Animal

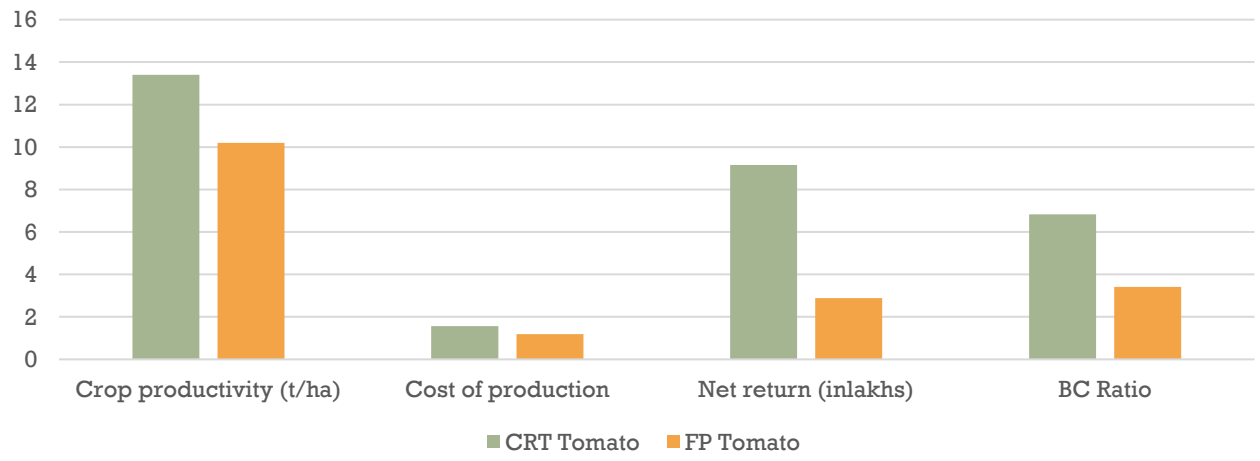
CRT: Climate resilience through cultivation of multiple disease resistant F1 hybrid tomato

10 newly selected farmers were given tomato seeds *Arka Abhed* while for farmers' practice, *Arka Rakshak* was given by KVK Lawngtlai. *Arka Abhed* is a r HYV with resistance toTomato Leaf Curl Disease (*Ty2+Ty3*), Bacterial wilt, Early blight and Late blight (*Ph2+ Ph3*) with yield potential of



70-75 t/ha in 140-150 days, while *Arka Rakshak* is a F1 HY hybrid with triple disease resistance to ToLCV, BW and early blight having yield potential of 75-80 t/ha in 140 days. On average, the crop productivity of the NICRA farmers was 134 q/ha with net return of Rs. 9,15,198 and BC ratio of 6.83 from a total area of 5.3 ha meanwhile the Farmers' practice was 102 q/ha and net return of Rs. 2,88,358 and BC ratio of 3.41.

Fig.3.4. Economic analysis of Climate resilient variety compared to Farmers' practice



Module III: Livestock & Fisheries

FST I: Rainfed Upland with Animal

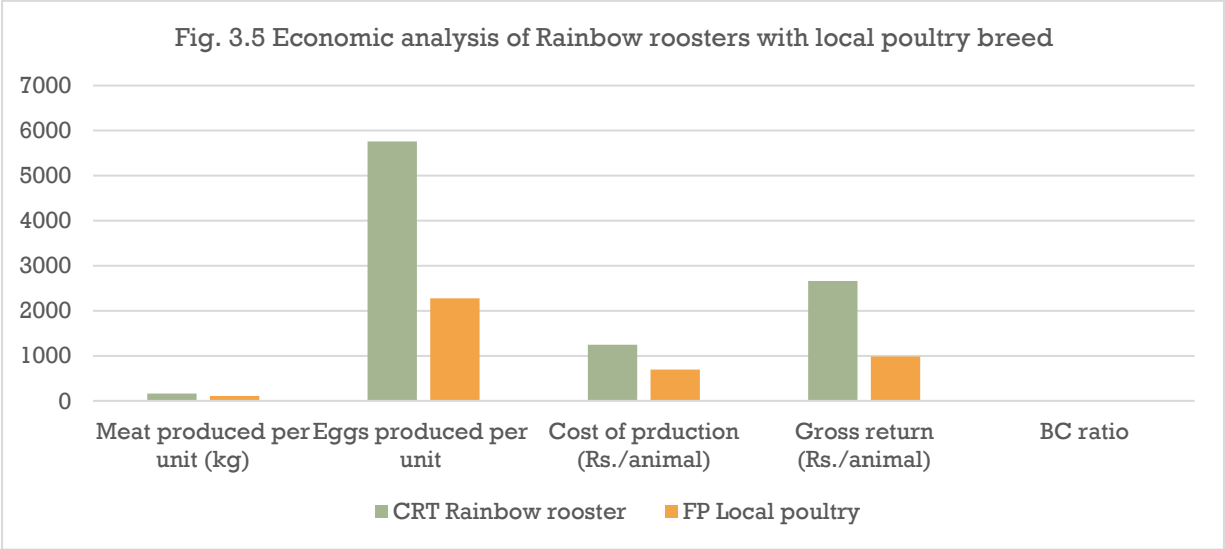
CRT: Backyard Raising and Outscaling of Climate resilient breed of Poultry-Rainbow rooster

Backyard poultry farming for rainbow roosters was introduced in the village under KVK Lawngtlai, and then outscaled to 3 farmers in 2022 as a climate resilient poultry breed for their high feed conversion ratio, disease resistance and low mortality rate during chick stage. During 2023-23, this technology was outscaled to 6 farmers who were provided with 50 chicks and 2 bags of chick feed each. After 6 months, they were provided with 2 bags of adult poultry feed again. For farmers' practice, local poultry breed was used. On average, the NICRA farmers had a meat yield of 160 kg/unit and 5670 egg/unit, with BC ratio of 2.13, while the Farmers' practice using

local breed of poultry had an average meat yield of 110 kg/unit and 2275 egg/unit with BC ratio of 1.6.

Module IV: Institutional Interventions

Seed production systems



Community-based seed production was done to save locally produced seeds and are utilized for sowing of crops for the next season by the members involved. Proper cleaning, drying and storage was done for the seeds in hermetic bags. The list of seeds saved is given below.

Crop	Variety	Farmers involved	Quantity produced (q)	Quantity utilized (q)	Revenue generated	Type of storage structure
Soybean (JS 335)	JS 335	5	30,400	30,400	30,400	Hermetic Bags, Godown
Groundnut	Girnar 4	5	1,05,000	1,05,000	1,05,000	Hermetic Bags, Godown
French bean -Zorin (MZFB 48)	Local (Ṭialte)	8	32,000	32,000	32,000	Hermetic Bags, Godown
Rapeseed (TS 67)	Local, small seeded	3	38,400	38,400	38,400	Hermetic Bags, Godown
Sesame (Local)	TS-67	5	27,200	27,200	27,200	Hermetic Bags, Godown

Maize (RCM 76)	Girnar-4 (ICGV 15083)	4	6,480	6,480	6,480	Hermetic Bags, Godown
Total		30	2,39,480	2,39,480	2,39,480	

Table 3.1: List of crops under Seed Production

Custom Hiring Centers (CHCs)

After a Custom Hiring Centre was established on 13th April, 2022 in the NICRA village Chawnhu, several farmers have decided to use the tools and implements at a subsidized rate so as to reduce drudgery in farmwork, especially weeding and ploughing. CHC supplies farm tools, implements and machineries at a subsidized rate to small and marginal farmers with objectives to provide easy and nearby access to implements, reduce drudgery, time and cost saving, etc.

Since its establishment, it has a total of 92 beneficiaries andrevenue generated of Rs 13510 during 2023-24.

Establishment of Custom Hiring Centre

Module V: Capacity Building

Through 9 programs regarding awareness on topics such as climate change & its impact on agriculture, utilization of agro-meteorological information for agriculture, on-hands experience and capacity building programs, a total of 117 male and 63 female participants engaged with KVK Lawngtlai during during 2023-24. These programs aim to engage with farmers and equip them with the skills and tools needed to move towards climate resilience in agriculture so as to adapt to and mitigate the effects of climate change and risks that it brings.

Module VI: Extension Activities

Extension of information and technologies in agriculture and allied activities to outscale climate resilient technologies and knowledge on was carried out during 2023-24. The programmes include field days, exposure visits, free animal clinics and awareness programmes. A total of 9 programmes were conducted wby KVK Lawngtlai under NICRA having 82 male and 92 female participants.