

Refinement of farm specific technologies in cluster of villages

of Balaghat district (Chhattisgarh Plain)

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Location and selection of area

Balaghat is one of the tribal district of Madhya Pradesh and uniquely situated in Chhattisgarh plain agro-climatic zone. District has sub-tropical climate characterized by a hot summer and general dryness except during the south-west monsoon season. The normal annual rainfall of Balaghat district is 1294.5 mm.

Soils are deep moderately well drained, clayey on very gently sloping bats (moderately dissected) with moderate erosion, associated with slightly deep, well drained, loamy soils on moderately sloping erosion.

The farmers of Balaghat district are resource poor and form vulnerable class of people which are prone to threats of livelihood insecurity (Report of MPSRLP, 2011-12). The cropping system of Balaghat district viz. Paddy-Fallow-Fallow/Paddy-Paddy-Fallow has also played a major role in pushing the farmers towards the above the threatening situation which calls for remedial situation urgently.

Landless agricultural labour, small and marginal farmers, women farmers and unskilled farm youths were selected from three selected villages, viz.

Lendejhari, Chillod, Koppe of Lalbarra Block of Balaghat District of Madhya Pradesh for the implementation of the interventions under different modules.

OBJECTIVES

- To create sustainable enterprises for livelihood security.
- To enhance household income through developing appropriate modules for farm women.
- To access overall impact of different interventions on socio-economic changes of farm families.
- To enhance farmer-scientist interaction to facilitate continuous

feedback for ensuring sustainable interventions.

- To build network of linkages of organizations around the farm households for improving access to information, technology, input and markets.

INTERVENTIONS

Crop based module

Development of synthesized sustainable model for predominant cropping systems under rain-fed conditions for Balaghat

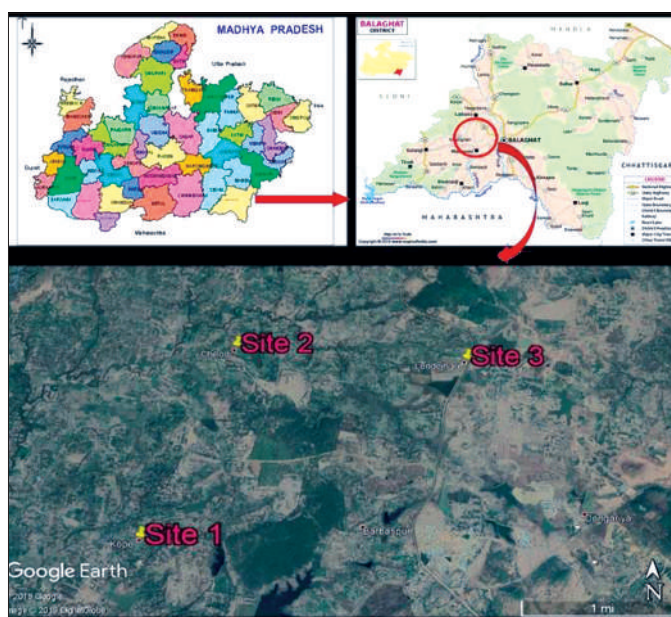
Cultivation of different types of crops having different rooting pattern and duration in the same field. Such as Pigeon pea on the top of bunds, Colocasia on the side of bunds and rice in the main field (45 FF)

Rationale of the intervention:

Marginal and small farming especially rice having low land use efficiency. Crop varieties of Pigeonpea-TJT-501, Colocasia-Indira arbi and rice JRB-1 were sown on top of bunds, side of bunds and on the main field (low land) respectively.

Outcome

The farmer earned



Project Sites/Area Selection of Villages and Farm Families

₹ 55,135/ha more than the existing practice of taking a single rice crop in a year. Maximum utilization of farm land resources particularly the horizontal cropped area and the unused sides and top of the bund area for crop diversification. This practice is providing balance food like carbohydrate, protein and vitamin, minerals from rice, pigeon pea and colocasia.

Income ₹ 95,000
Income after implementation ₹ 1.45 lakh of MFLS

- Sale Rate Rice is ₹ 1868/q, Colocasia is ₹ 2000/q and pigeonpea is ₹ 6000/q. Cost of cultivation Rice- ₹ 33,500/ha, Colocasia- ₹ 3,500/ha and Pigeonpea is ₹ 5,800/ha

Promotion of local rice variety Chinnor among the farmers of Balaghat along with improved production technology for generating sustainable income (45 FF)

Rationale of the intervention: The farmers were initially provided quality seeds of Chinnor along with improved package and practices, and adequate training about quality seed production. The farmers were also trained about the processing and packaging of the Chinnor rice before marketing. The seeds were produced through the farmer participatory mode. Further, to popularize and increase the Chinnor cultivation, and to legally protect the uniqueness of Chinnor, a group of farmers filed application for the Intellectual Property Rights under the Department of Promotions of Industry and Internal Trade, Ministry of Commerce and Trade, Government of India for the grant of Geographical Indication (GI) Tag to Balaghat. The College of Agriculture, Balaghat facilitated the farmers during the preparation, submission and final representation of the GI application before the GI authority. To facilitate the marketing of the Chinnor, the farmer group also registered Chinnor rice as 'Balaghat Chinnor' through Balaghat Chinnor Utpadak Samiti Maryadit, Balaghat.

Outcome

Ninety farmers (90) produced 577

Processing charges and recovery % of Chinnor rice [Gross return ₹ 179400]

Gross return, net return and yearly profit gain by the Farmers producer groups (FPGs) working on processing and marketing of improved Chinnor rice

Name of Group	No of members	Name of village	Production (q)	Production cost of processed rice (₹)	Gross return	Profit gain
Pragati FPG	11	Chillod	38	266950	380000	113050
Om Sai Ram FPG	11	Chillod	52	365300	520000	154700
Maa Durga FPG	13	Chillod	75	526875	750000	223125
Balaghat Chinnor Utpadak Samiti	55	Kaidi, Lendejhari, Maryadit, Balaghat	412.50	2897813	4125000	1227187
		Dongaria etc.	577.5	4056938	5775000	1718062

Village wise economics of linseed

Cluster	Cost of cultivation		Gross return		Net return		Additional income/ha	B:C ratio
	I P	F P	I P	F P	I P	F P		
Lendejhari	11300	6300	31500	21840	20200	15540	4660	1.78
Chillod	11300	6300	32550	23100	21250	16850	4450	1.88
Koppe	11300	6300	28560	20370	17260	14070	3190	1.53
Average	11300	6300	30870	21770	19570	15487	4100	1.73

IP, Indigenous practice; FP, farmers' practice

quintals of milled Balaghat Chinnor rice and earned a profit of ₹ 19089 (Rupees Nineteen Thousand Eighty-Nine) per farmer per season which is ₹ 29.75/kg more than the normal non-scented rice. With the further increase in demand, this margin is expected to increase in future. Self-seed reliance on quality seeds, increase in popularity and consumer demand for Balaghat Chinnor rice had changed the views of farmers and encouraged them to grow Chinnor as a commercial crop. Now the farmers had started processing, packing and selling high quality Balaghat Chinnor rice at high premium to the consumers through the Farmer Producer Organizations (FPOs). The Balaghat Chinnor rice was also selected in the ambitious project of Government of Madhya Pradesh 'One District One Product', which would further popularize the Balaghat Chinnor Worldwide.

Utera/Parra cropping of linseed in rice field (12 FF)

Rationale of the intervention: For the utilization of residual soil moisture in rice field when the rice is at the dough stage (10-12 days before rice harvesting), quality seed of linseed were provided to the farmers and broadcast in rice field as utera in rice field. Green manuring was also done before the transplanting of rice crop in the field. Small and marginal farmer who had left their land due to the unavailability of the water during *rabi* reason were selected to carry out the intervention.

Outcome

Increase in yield due to improved package of practices (interventions) in the three villages, viz. Lendejhari, Chillod, Koppe over farmer's practice was 44.2, 40.9 and 40.6 respectively (~2.2 q/ha increase).

Production potential of *rabi* vegetables at farmers' field under *badi*

Crop	Area (m ²)	Average production (kg)	Duration (Days)
Okra	400	360	87
Bottle Guard	100	160	88
Chilli	300	150	140
Brinjal	400	1640	125
Tomato	400	1360	125
Cabbage	400	1300	115
Total	2000	4970	

Average return (₹) from the production of vegetables from ½ acre area

Crop	Area (m ²)	Cost of cultivation (₹)	Gross return (₹)	Net return (₹)	Net income/day
Okra	400	2800	7200	4400	51
Bottle gourd	100	650	1600	950	11
Chilli	300	1150	2250	1100	8
Brinjal	400	2200	11480	9280	74
Tomato	400	2680	10880	8200	66
Cabbage	400	2400	4550	2150	19
Total	2000	11880	37960	26080	228



Cultivation of Vegetables

It gave an additional income of ₹ 4100/ha. and fetched ₹ 1.73 with per rupee investment.

Horticulture based module

Cultivation of horticultural crops under irrigated and rainfed condition (15 FF)

Rationale of the intervention: The farmers were selected from adopted villages Koppe, Chillod and Lendehari (15 farmers from each village) for the production of vegetables in the Badi (surrounding the house) during *rabi* season. They were provided the improved seed of the vegetables for an area of about 2000 m². The adopted farms had the irrigation facilities.

from their badi with the production of different vegetables.

NRM based module

Fodder production through agro forestry on cultivated and degraded lands (60 FF)

Rationale of the intervention: The fodder yielding tree species such as *Albizia lebbek* (Shirish), *Bauhinia variegata* (Kachnar) and *Syzygium cumini* (Jamun) were planted on bunds of farmer's field in June-July, 2016. Improved fodder grasses such as *Panicum maximum* (Guinea grass), *Pennisetum purpureum* (Napier grass) and *Cenchrus setigerus* (Dhaman grass) were planted in *kharif* on the

lower sides of the farm bund. Whereas, the berseem (*Trifolium alexandrinum* L.) *rabi* fodder crop was cultivated in field area for quality green fodder production.

Outcome

After the feeding of nutritious green fodder, the milk production increased by 2-3 litre per day from 3 milch animals. Total milk production was 20-25 litre per day from 3 buffaloes. The health of buffalo calf and male buffalo also improved. Animals produced 25-30 kg dung and 20-25 litre urine per day. Dung and urine were used for producing compost manure and FYM which was utilized for organic farming. Planting of fodder tree species and improved grasses on bund and bund sides, helped in reduction of soil erosion and improved soil health. Due to this intervention and success of Shri Revan Lal Patle, other farmers were interested in adopting this intervention.

He supplied milk to the local dairy @ ₹ 40/litre. He earned gross income ₹ 24,000-30,000 per month. This intervention reduced the cost of cultivation of cereals and pulse crops through applying organic manures and bio-pesticides produced from urine and leaves of neem, karanj etc. The success of Shri Revan Lal Patle motivated more farmers and educated unemployed youths of the village Chillod.

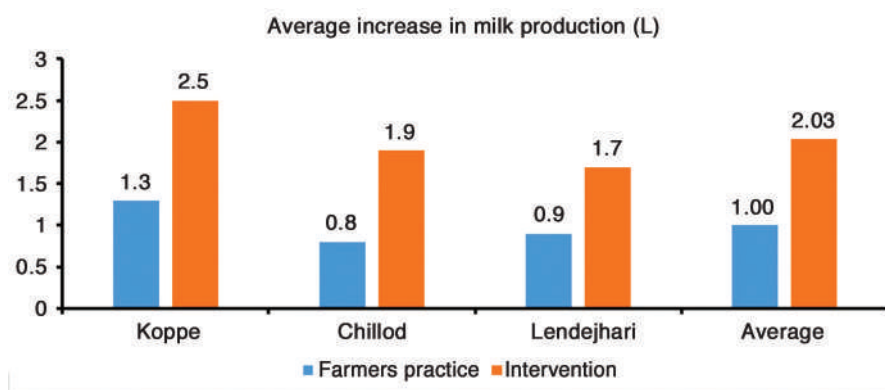
Green fodder production through hydroponic technology (35 FF)

Rationale of the intervention: Small land holdings amongst dairy farmers; non-availability of fertile land for fodder production, irrigation facility, fencing, land preparations; destruction of fodder by stray cattle and wild animals;

Outcome

On the basis of average production and cost involved in the production for the six vegetables shows that a family having an area of about ½ acre could earn ₹ 26080 within 140 days. Further it shows that the farmers got about ₹ 228 per day in addition to their routine work

Practice	Crop/variety	Year	Gross income (₹/ha)	Net income (₹/ha)	Activities of intervention
Before FFP	Berseem (local)		60000	43000	Broadcasting
After FFP	Berseem (JB-1)	2019-20	86250	66750	Berseem broadcasting in main field; fodder trees on bunds and improved fodder grasses on side of bunds



Fodder production

higher cost of labour for cultivation practices; poor participation of educated unemployed youths for fodder farming; high demand of green fodder against existing availability of the fodder were some limitations of the traditional fodder producing systems.

To overcome these problems, we established demonstration unit for low cost hydroponic technology for green fodder production at the centre. Growing of fodder crops using hydroponic technique, (*khariif* and summer crop: Maize; *rabi* crop: Wheat).

Outcome

Hydroponic maize fodder is an alternate to conventional green fodder as both of them have similar effect on milk yield and quality. To

grow green fodder at wider temperature (15-32°C) and humidity (70-80%) range without fungal growth, environmental friendly, contamination free fodder, saves

water and labour, fodder grown is highly palatable and nutritious, fodder improves animal health and reproductive efficiency. Green fodder production (from maize and wheat) from the demonstration unit feeds to the milch animals of the instructional dairy unit of the college. We observed an increase of average 2-3 litre milk per milch animal. Around 4-6 kg green fodder was produced per tray. Production cost was ₹ 17 per tray. Net income from the production was ₹ 43 per tray.

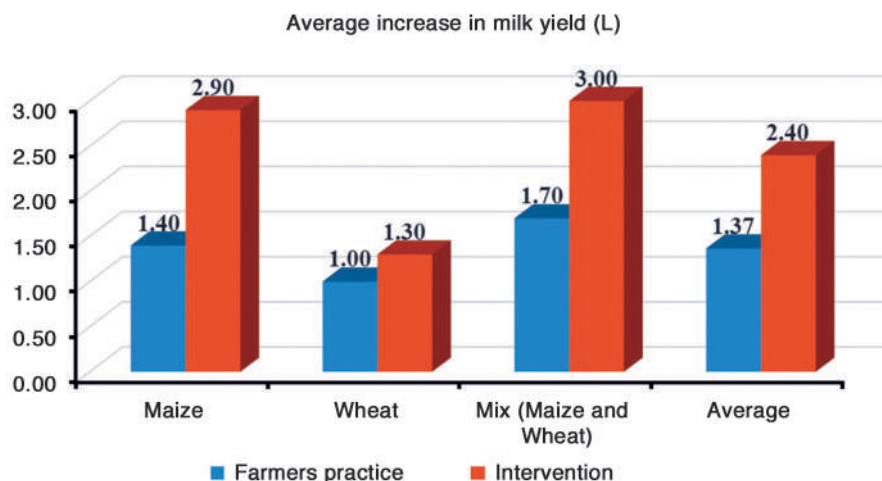
Precautions for hydroponic techniques

1. Chemicals such as pesticides and fungicides treated seeds should not be used for the hydroponic green fodder production.
2. Water used for the green fodder production should be free from microbial contamination.
3. Washing and cleaning of the tray, water tank and other appliances should be needed to reduce contamination to avoid fungal growth.
4. White maize seed better as compared to yellow maize for hydroponic fodder production.
5. The quality seeds should be used for fodder cultivation.
6. The green shed net is important for proper aeration and lighting to prevent yellowing of the leaves



Hydroponic maize fodder

Practices	Crop/variety	Year	Cost (₹ per tray)	Gross income (₹ per tray)	Net Income (₹ per tray)	Activities of intervention
Before FFP	-	-	-	-	-	This technology was not used by the farmers earlier.
After FFP	Local varieties of maize and wheat crop	2019-20	17	60	43	Low cost hydroponic fodder production technology was demonstrated at centre and trainings were given to the farmers.



Enterprise based module

Backyard poultry (50 FF)

Rationale of the intervention:

Integrating other sources of income such as backyard poultry is an attractive strategy to increase the income of marginal and landless farmers. Besides providing assured regular income, rearing and raising poultry also provides nutritional and dietary support to the children and women of such vulnerable farm families. The Madhya Pradesh Geographical Indication Tagged Kadaknath is a bird with high demand throughout the year and fetches high premium in the market. Rearing this bird has the potential to increase the farmers income dramatically.

Outcome

The rearing of Kadaknath under scavenger system of backyard poultry is very remunerative enterprise which has the potential to provide regular income sufficient enough to uplift the

socio-economic and nutritional requirement of marginal and landless farm family. The model presented here was successful and many farmers had come forward to take on this enterprise to increase their farm income. The success of the model also indicates that good remunerative self-employment could be generated at the village level itself that would in turn reduce the outflow of village dwellers to cities in search of employment.

Fish farming (45 FF)

Rationale of the intervention:

Integrating other sources of income such as fish farming is an attractive strategy to increase the income of marginal and landless farmers. Besides providing assured regular income, fish farming also provides nutritional and dietary support to the children and women of such vulnerable farm families. To carry out this intervention three fishing committee having 45 member from all three adopted villages i.e. Kope, Chillod and

Lendejhari were selected. Fish fingerlings (Rohu, Katala and Mirgal), fish feed, fishing net and small fishing boats were supplied to the fish farmers.

Outcome

Fish farmer got 15.40 q fish from per pond and got ₹ 184,800 gross return and ₹ 144000 net return through the farming of Rohu, Katla and Mrigal fish species. Given species in this intervention had different feeding habits i.e. Katla species had top surface feeding habit, Rohu had middle feeding habit and Mrigal had bottom feeding habit so that when fish farmer spread feed in the pond all species took feed as per their feeding habits and feed distributed equally to all species. Farmers had more benefits in farming of these species and got B:C ratio of 4.53 as well as every member of the committee got ₹ 9600/pond.

Livestock based module

Animal health camp (266 FF)

Rationale of the intervention:

Ninety farm families were randomly selected from project area for this study. The collected data were analysed and presented in tabular form by the use of simple statistical tools.

Majority (92.22%) of the farmers suggested to increase the number of camps to be held for effective results. It was followed by 66.67% farmers who suggested animal concentrated feed also provided through this camp, whereas 38.89 and 30% farmers felt that there should be field visits of



Rearing chicks under scavenger system Kadaknath bird

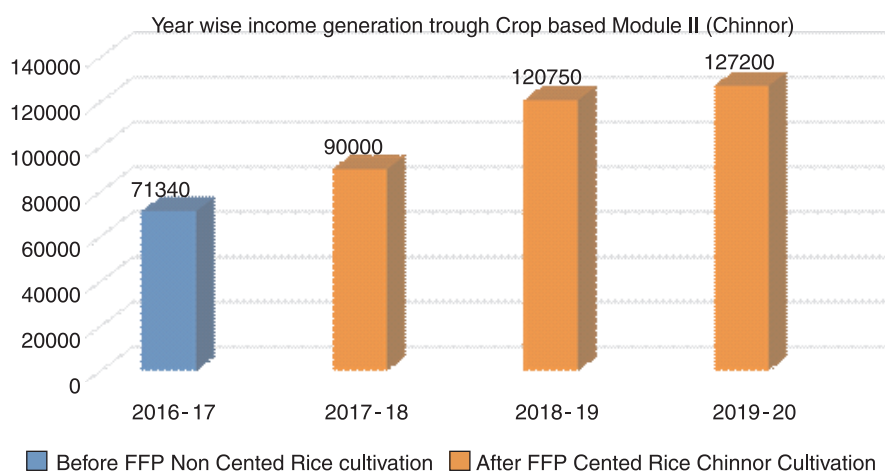
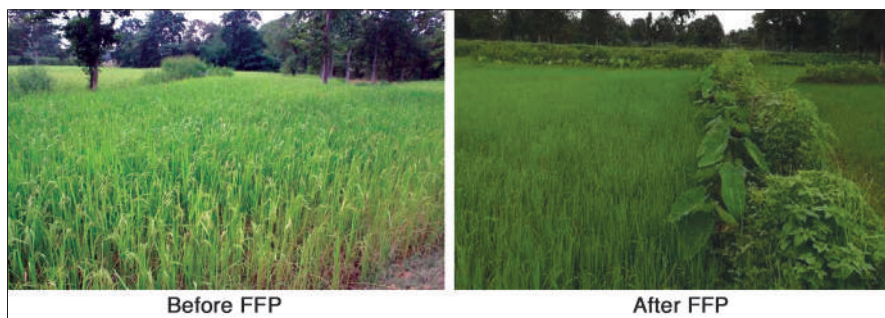
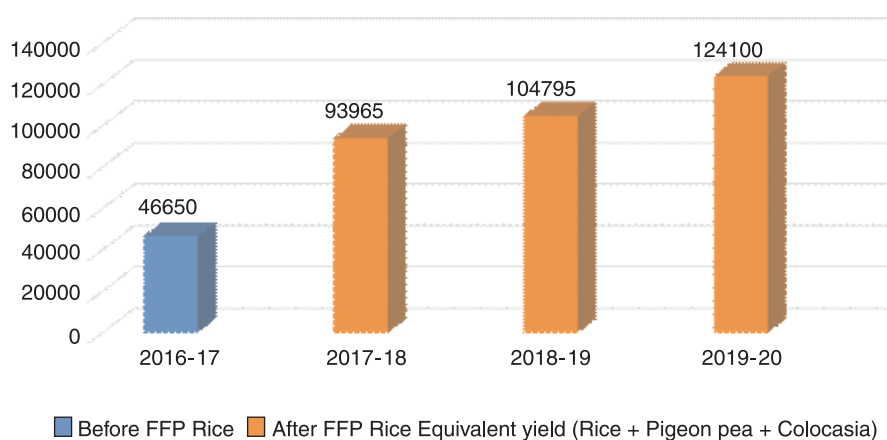


Animal Health camp



Economic Impact of FFP

Year wise income generation through the Crop Based Module I



dairy farm and increase in number of trainings on animal health management, respectively.

Most of the farmers (47.77%) found the animal health camp was satisfactory, whereas, 30 and 10% were partially satisfied and unsatisfied, respectively. Moreover 12.23% were found neutral in their response regarding animal health camp.

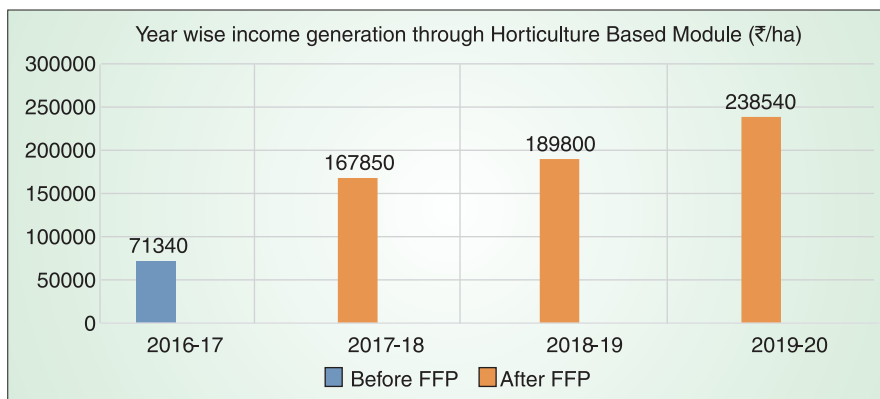
TRAINING

Trainings (6 covering 18 villages and 280 farmers) on entrepreneurship, Pre- *kharif* training, Pre-*rabi* training, fodder production through agroforestry and hydroponics techniques, organic farming were conducted on different technologies which were given under this project to increase their capacity and scientific orientation to achieve sustainable growth in agriculture. Farmers were motivated to create Farmers producer groups (FPG) and Farmers producer company (FPC) for improved scented rice i.e. chinnor. Farm women were also being motivated to create commodity interest groups (CIGs) for fruit and vegetable processing and make processed food material from seasonal fruits and vegetables and got more income for sustainable livelihood.

IMPACT

Social impact

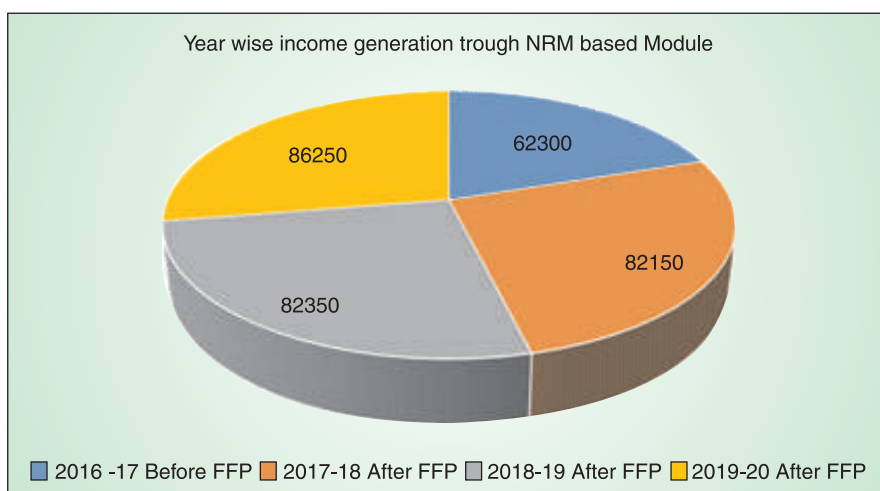
- It helped to increase socio-economic status of farm families of project area.
- Ensures availability of balanced diet to the family members.
- It helped to ensure family employment round the year.

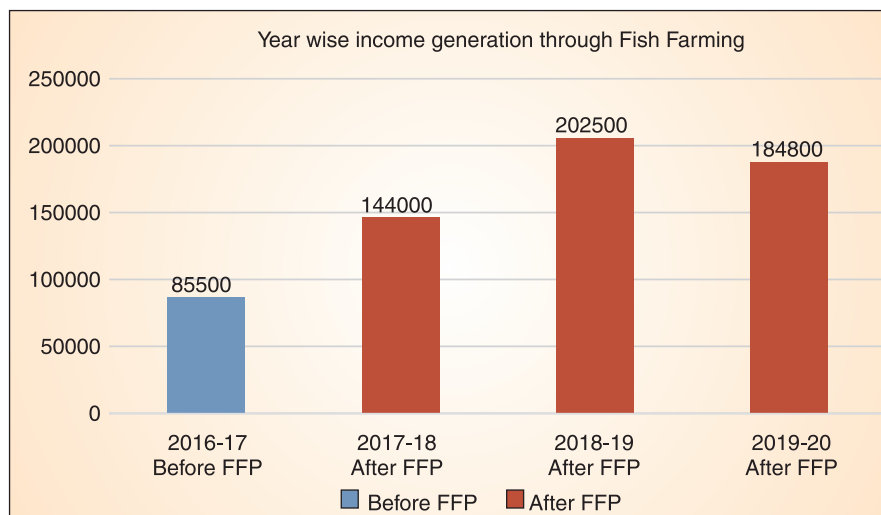


- Decreases the migration percentage significantly after the project activities.
- Nutritional security achieved through diversity in diet pattern.
- Increases the communication channels to acquire technological information.
- Reduces adoption gap significantly.
- Income diversification helps to achieve sustainable livelihood.

LESSONS LEARNT

- Growing of rice in field, pigeon pea on bunds and colocasia on side bunds is practicing with improved varieties of these crops.
- Most of the area is under fallow due to timely unavailability of irrigation water in *rabi* and summer season.
- During *rabi* and summer season, low moisture lowers down the production.
- Cost of the cultivation is high for the Chinnor rice as compared to the other rice varieties. Lodging problem is one important factor which reduces production.
- Growing linseed under utera system is essential for soil moisture conservation and increasing production.
- JB-1 variety of berseem is an excellent variety for nutritious green fodder production under NRM based module.
- Hydroponic technology is used for the nutritious concentrated green fodder production to save water with less labour. It is the one best alternate source for the green fodder required for milch animals. In small area we can produce green fodder round the year.
- Small/marginal farmers and land less agricultural labours rearing fishes in community farm ponds; although growing of water chest nut in these ponds is not successful in Chhattisgarh plain region of Madhya Pradesh.
- Kadaknath birds of poultry gives high return as compared to the Narmadanidhi, while the growth of Kadaknath is slow. Market rate for the Kadaknath bird is higher than the Narmadanidhi. Landless farm labours or small/marginal farmers can rear poultry birds and improve their socio-economic status.





- Animal health camp needs to be organized at 2-3 locations of the village to make farmers aware about health of livestock.
- Need to develop custom hiring centre for the farmers to make available farm machineries in low rates.
- Visits of the farmers to the progressive farmers' field, research centres etc. need to be organized to give knowledge about agriculture technologies through live demonstrations. Trainings for the capacity building of farmers need to be organised before/on the start of the season for particular crops.

WAY FORWARD

- Making farmers self-sufficient and reduce their dependency on market for the seed material.
- GI tagging for Chinnor rice is under progress which would be definitely improve the income of the farmers.
- Varieties of *khairif*, *rabi* and summer crops for drought, insect-pest resistance will be promoted to reduce cost of cultivation and increase income.
- IFS module will be demonstrated on farmers field to improve soil health, cut down production cost and increase farm income.
- Marketing channel need to be strengthen through e-marketing and other means to reduce losses and increase income.
- Emphasis may be given on post-harvest for the traditional fruit crops, bamboo etc and value addition for women self-help groups.
- Intervention regarding hydroponic technology for green fodder production needs to strengthen and need to demonstrate on farmers field.
- Need to develop PPP models for the soil-water conservation measures.
- Incubator cum hatchery machine installation at Centre to reduce the cost of production of poultry chicks.
- Degraded area may have brought under the plantations to develop them for fodder production under NRM module. □

