

Participatory technology integration

to empower and ensure livelihood security of
farmers in Alappuzha district

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Location and selection of the area

The Farmer FIRST Programme location is situated in Pathiyoor panchayath, Alappuzha district Kerala.

The rationale behind the selection of project area is the availability of natural and social resources. The area is predominantly coconut system in small and marginal holdings in a continuous area. The potential in farming is mainly on the location specific integrated farming system that could enable realizing a decent income from the small and marginal holdings and the scope for multi species high density cropping system in the homestead coconut gardens. The social resources of the area includes high literacy rate, politically active and strong decentralized government system in the Panchayath, presence of Joint Liability Groups (JLGs) and Self

Help Groups (SHGs) of women farmers, coconut producers societies (CPS) and institutions and infrastructures. The area is well connected to national highways and good mobility and markets enabling better implementation of the interventions.

Number of farm families

A total of 4,220 farm families with an average land holding size of 0.44 hectares have participated in the project. The farmer categories included 3,058 (72.5 %) of marginal farmers, 138 small farmers and 34 medium farmers. The major cropping system in the region is coconut based homestead farming system and paddy.

OBJECTIVES

- To evolve participatory technology development for coconut based system for nutritional and livelihood security,
- to develop integrated income generating farming models for (individual and community levels) root (wilt) affected areas.

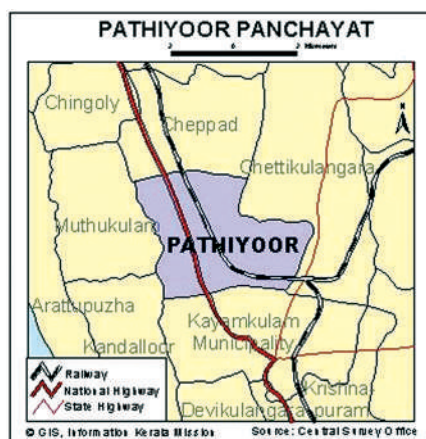
- to evolve appropriate up scalable technology modules for farm women and women empowerment and to build up network and linkages.

Crop based module

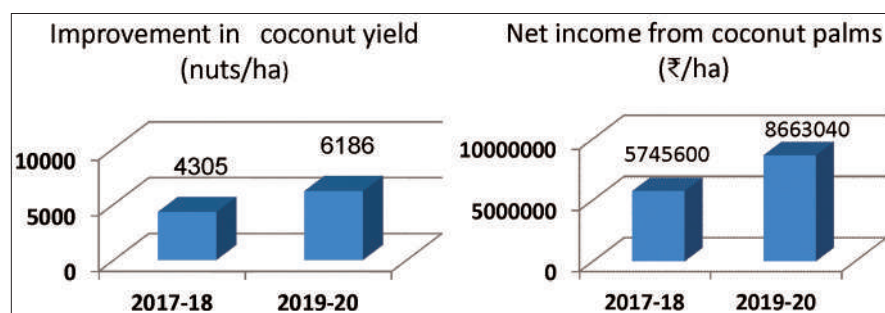
Small and marginal categories of farmers were the participants and the major problems prioritized were the low level of adoption of integrated root (wilt) disease management practices consisting of soil test based nutrient management, IPM and micro nutrient mix for seedlings (Kalpa Poshak) and for bearing coconut palms (Kalpa Vardhini). These technologies were demonstrated in 96 ha consisting of 16,000 palms in 250 coconut farmers gardens. The awareness, knowledge and adoption was less than 30% and the interventions resulted in 43.7% per hectare increase in yield in demonstration plots compared to the check and 50.78% per hectare increase in net income.

Horticulture based module

The horticultural crops were

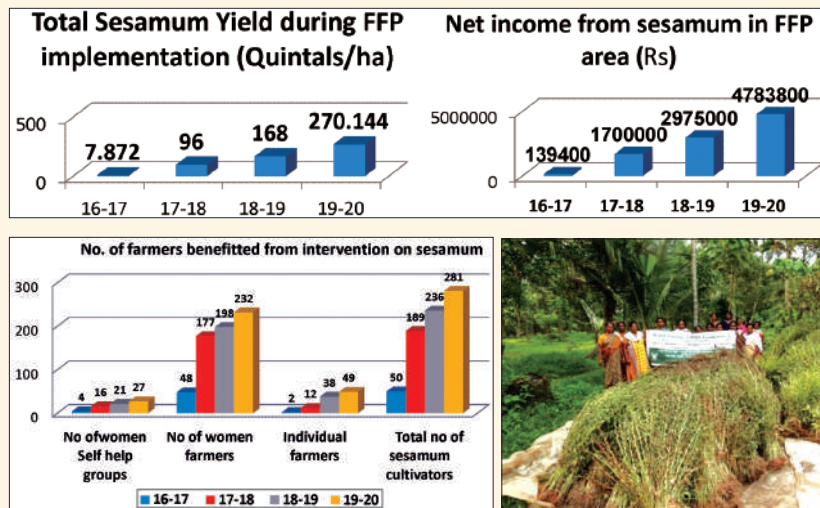


Area: 1627 ha; Coordinates - 9°12'23 N 76°30'03 E



Sesamum: Successful revival and rejuvenation with HYVs

The interventions were mainly Participatory experimentation of HYVs released for the tract and Kayamkulam-1 and Thilak was recorded as highly suitable with 38% higher yield and 48.2% oil content. Kayamkulam-1 was relatively resistant to drought or climate variation. Initiated production and marketing of 'Pathiyoor Karshaka Ellenna' – (Patiyoor farmer Thil Oil) - procuring sesamum from the groups.



cultivated mostly as intercrops in coconut gardens, since coconut is cultivated in individual farmers plots, but in a contiguous manner. The major problems prioritized were very low level of knowledge and adoption of HYV of intercrops, especially tubers and spices, subsistence level of cultivation for home needs only and non commercial attitude that deterred from investing in technology adoption.

The technologies introduced were HYV of ginger (IISR–Mahima), turmeric (IISR –Prathibha and Pragathi), amorphophallus (CTCRI–Gajendra), *Dioscorea* (CTCRI–

Sreekeerthy), vegetables (IIHR and KAU varieties) and APAU varieties of colacassia and lesser yam, along with recommended scientific cultivation practices. The varieties were evaluated through participatory experimentation and IISR–Pragathi, CTCRI–Gajendra and KAU/IIHR vegetable varieties were ranked as most suitable to the local condition with high yield and acceptability. Convergence with MGNREGS and involvement of progressive farmers as well as Coconut Producers Societies created a replicable model for other panchayaths as well.

Gajendra variety was the most

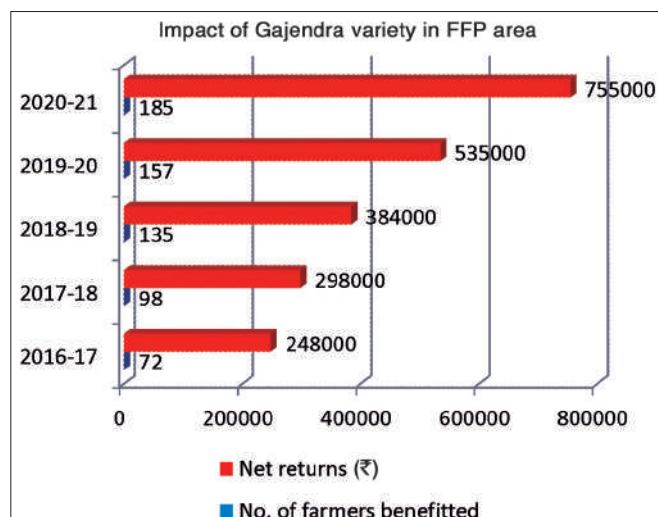
popular in demand (*Amorphophallus*) in FFP village and neighboring villages. The local varieties were replaced by 83% and the demand is on rise for gajendra variety, showing the rapid spread in area due to farmer participatory FFP interventions.

Livestock based module

For sub-marginal land holdings below 0.1 ha, income improvement could be achieved through poultry units which require very low resources. Problem identified were prevalence of Local breeds in 78.3% of poultry units, 92% for home purpose and neighborhood marketing of 5-10 eggs per day, unscientific rearing, protein deficiency and low egg production 60-80 eggs/year, poor poultry housing, difficulty in getting quality chicks. Introduced Gramasree, Gramapriya and BV380 besides kadaknath and desi breeds were promoted through five incubation units.

Outcome

- No. of farmers directly benefitted – 72 households – 4500 birds
- No. of farmers benefitted non adopted village – 6550 from the incubator units.
- Egg yield in beneficiary farmers units – 180 to 230 eggs/ birds/year.
- Egg yield in chick farmers before FFP interventions – 100-130 eggs/ birds/ year.
- Economic returns- 1553 eggs/day production @ ₹ 6 = ₹ 9318/day. Per month gross income in FFP for eggs = ₹ 2.795 lakh



Mr. Sasidharan with his poultry unit

Average gross income from eggs/ month per household = ₹ 3882/month.

- Gross income of 5 incubator units/ year = ₹ 3.55 lakhs @ ₹ 100/chick/month
- Average gross income per incubator units/year = ₹ 0.71 lakh.

Natural resource management (NRM) module

The major problems in this module were unscientific nutrition management in farming, silted or unused ponds in homesteads and water scarcity for drinking purpose or agriculture due to absence of water conservation which is very critical in this sandy loam tract of Alappuzha district.

The technologies demonstrated in this module were soil test based nutrition in the whole panchayath, homestead pond reclamation and revival for water conservation and pond fish culture for increased income and quality proteins for diet of households. Participatory Soil sample collection campaigns organized in 19 wards linked panchayath members, Coconut Producers Societies (CPS) and coconut farmers on a 5 ha grid basis. A total of 207 soil health cards were provided to farmers for soil test based nutrition adoption for all the crops of the panchayath. This intervention benefitted 1,168 farmers of 775.01 ha area. Soil test based nutrition management resulted in 20-30% reduction in cost of fertilizers in



coconut and other crops.

Homestead pond rejuvenation was done by 88 farmers on their own investment. The facilitation from FFP technical support, training programmes linking with Department of Fisheries, Kerala state and supply of fingerlings of Anabas and Nile tilapia on cost sharing basis with 30% by farmers and 70% from FFP. This intervention not only collected and conserved 5360 m³ of water but also provided an average of ₹ 31,771 per unit during 2019 with a gross income of 22.875 lakhs in the whole FFP project area.

Enterprise based module

The major problems in enterprise based intervention were the lack of supply chain and processing units in

the FFP area. Coconut oil, virgin coconut oil (VCO) and coconut food products and two coconut processing units were started, including 3 copra driers for primary processing of coconut to copra. Two virgin coconut oil (VCO) cookers were also provided from FFP for production of quality VCO. These units were serving as training centres also and 402 coconut farmers from Ernakulam, Kollam, Alappuzha and Thiruvananthapuram districts got benefitted. Each unit realized an income of ₹ 6.80 lakh per annum, besides facilitating in procuring an average of 32,000 coconuts per year and supporting fellow coconut farmers.

Another unique “science based rural enterprise is Kalpakam Keraprobio” unit by FFP for production of the ICAR-CPCRI developed bio-input *Bacillus megatherium*- Kalpakam Keraprobio. Seven rural youths were given a week training programme in the microbiology laboratory of ICAR-CPCRI, Kasaragod. The product was rated as supreme quality by the microbiology laboratory and catered the need of 2500 farmers of four districts with 6.4 tonnes of production @ ₹ 100/kg with a net income of ₹ 65,000 per year and regular employment to 4 rural youths.

Five vermicompost production units were started with livestock farmers under this module. Technical



Virgin Coconut Oil (VCO) cooker and milk extractor machine- young entrepreneur earning more than 6 lakhs/year

knowledge, continuous support in design of unit and production of vermicompost from organic wastes were provided. Vermicompost units were breeding grounds for rhinoceros beetle, the major pest of coconut. Hence, these units were designed with netted covering to prevent rhinoceros beetle to entering and breed. Around 2-3 tonnes of vermicompost could be



Introduction of 'climate smart crops' in coconut based cropping systems

Climate change ultimately reflects the challenges posed to small and marginal farmers of this region also. The coconut gardens with potential for intense inter-cropping with food/fruit/cash crops are left fallow by 48.2% of farmers as per our pre FFP survey. Untimely rain and extended summer period with temperatures above 33°C, coupled with severe

shortage of drinking water or irrigation was one of the severe field problem faced by these farmers. Hence there is a need for participatory evaluation of suitable climate smart crops for the location.

Crops with drought tolerance were listed out and a participatory selection, involving farmers were done. Ragi or finger millet, maize, fodder sorghum and horse gram based on their drought tolerance and comparatively lower requirement of inputs were selected for participatory experimentation. Convergence program with MGNREGS and veterinary hospital of FFP panchayath led to the successful cultivation of these crops in 538 acres during 2017-2019 in the FFP panchayath.

- Finger millet could be cultivated as a suitable climate resilient crops, intercrop in coconut garden in the sandy loam tract of Onattukara zone and this was the first initiative of farmer participatory experiment on millet crop in the district.
- Transplanting was found to be the most suited method compared to direct sowing or dibbling as intercrop in coconut garden.
- KMR and Payur varieties were found to be suitable for the region and realized a yield of 300-400 kg/ha.
- A farmer innovation of border cropping of Amaranthus in Ragi beds did not affected the yield besides providing additional income.

The impact on the successful introduction of finger millet as a climate smart crop included the

Table 1. Income from combination of components in small and marginal coconut homesteads in FFP

Technology Intervention groups	No. of Households	Additional income (₹/household)	Total additional income (₹ lakhs)
Coconut only	73	8000.48	5.84
Coconut + poultry	68	38834.44	23.00
Coconut + Fisheries	72	45597.26	32.83
Coconut + Fisheries + Poultry	15	71431.21	10.71
Coconut + Livestock	300	17866.8	53.60
Coconut+ Poultry+ livestock+ pond fisheries + inter/mixed crops	27	63479.26	17.13

produced per year with earning of ₹ 40,000 per unit.

Integrated farming system

The major problem is the unscientific intervention of farming units or systems and mostly to meet the household's needs only. In this module of FFP, ICAR-CPCRI is evolving appropriate combination for IFS based on land holding size, needs and willingness of the farm family members and resources available (Table 1). The lessons learned were

direct marketing; external input production and a neighborhood market for farm fresh products at premium price could sustain the IFS units towards doubling their income. The IFS farmers could realize an annual income of ₹ 2.27 lakhs and the income could be distributed throughout the year besides catering to the household needs which is not included in economic term. Farm family labour is critical in running an IFS unit.



Major drawback	Lessons learnt
VCO cookers developed by CPCRI needed refinement to be gender friendly and drudgery reduction since it was very heavy, risk in transferring the hot oil in short time to avoid overheating.	The modifications needed were discussed with manufacturers and steel bodied low weight and tilting model was accepted by entrepreneurs.
Women farmers had very low access to extension services, land for farming, and miniscule role in horizontal technology transfer and adoption of improved practices.	Women SHGs were linked and labour quality improved through convergence with MGNREGS increasing skill and adoption of scientific practices. Social mobilization for individual farmers' land consolidation model for women groups evolved
Scientific fish culture as an income activity in homestead ponds were absent and ponds were in unused pattern.	Homestead pond farmers were sensitized, clustered, provided training, revived the existing ponds scientifically and fingerlings of their choices were given from FFP with cost sharing basis. After 3 years, the ponds contribute 50-65% of the income of the marginal holdings validating its potential and feasibility.
Mutual integration of ducks over the ponds could not be practically succeeded due to the laying of net over ponds to avoid fish loss.	This will be very difficult and additional investment is needed for refinement. Evolving model to avoid practical difficulties expressed by farmers is in progress in participatory exercises.
Plant protection of coconut is one of the most critical components in coconut farming of root (wilt) disease affected areas. Climbers are scarce and charges and very high, mechanized climbing devices are the need of the hour.	Climbing devices with manual operation could not reduce the climbing cost of ₹ 50-80 per tree. Hence mechanized climbing machines are needed which is presently available in market and have to be purchased. Area wide group approach in plant protection was adopted before Covid 19 and could reduce the cost by 18% only.
When production of turmeric, ragi, sesamum, eggs, fish increased after FFP interventions marketing was felt as a problem by farmers.	Market outlet to sell and procure the produces from the farmers through Farmer producer Company was initiated. Procurement of turmeric, tubers, vermin compost, coconut is in progress in the FFP area.
Quality of copra produced could not be very accurately judged while procuring or extraction of oil, affecting quality of product.	Besides integration with traditional knowledge to assess quality copra moisture meter procured for accuracy in quality determination as a common facility.
Copra dryers with shell as fuel could not be very efficiently used for uniform drying due to problems in hot air circulation and volume of the dryer.	Participatory refinement of the dryer found to be solving major problems faced with the inputs from a farmer with Agricultural engineering background. Good quality white copra could be produced and the FFP farmer group is planning to patent it after trials.
Sowing of <i>Sesamum</i> require skills and women farmers have to depend on skilled persons for sowing timely.	Seed drills for sesamum sowing could not be fabricated so far successfully to reduce the time and drudgery of women farmers where sowing of about 120-200 acres per year is done.

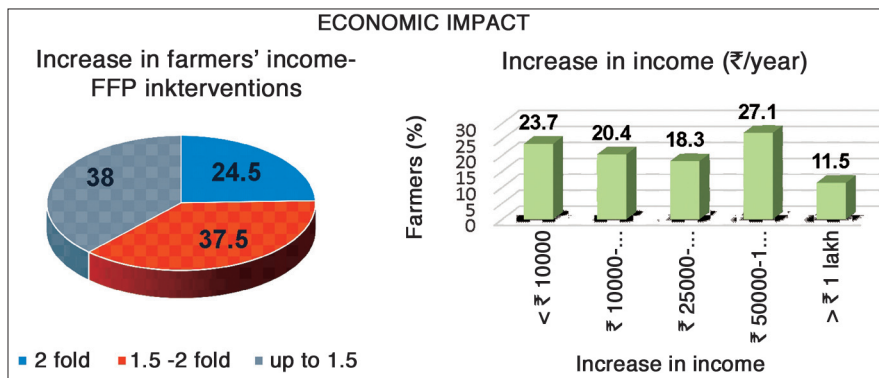
successful introduction for the region, increased area expansion up to 28 ha spread in all the 19 wards of the FFP Panchayath, doubled the diet intake of millets in 289 households. The horizontal spread of this result was in 453 hectares in other panchayaths of the district.

TRAINING

A total of 137 programmes were organized towards the capacity building of participant farmers of FFP. A total of 4,594 persons were benefited including 1,290 male and 3,304 female participants. The capacity building programmes are ably supplemented and supported with 159 extension programmes benefiting a total of 3,858 persons.

IMPACT

The overall improvement in



farmers' income could be achieved through gradual process of convergence with MGNREGS, technology integration and involving individual, self-help groups, farmers' organizations and society also.

LESSONS LEARNT

The Farmer FIRST Program (FFP) provided excellent opportunities to learn, analyse,

evaluate in participatory mode and provide scientific backstopping to the farming community with knowledge/technology and integration. FFP has to be further taken forward for value creation at farm and social level for sustainability and growth.

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*Plant trees,
Conserve water,
Protect environment.*

