With the Farmers and For the Farmers

Farmer FIRST Programme

- Experiences from Zone X

भाकृअनुप-कृषि तकनीकी अनुप्रयोग अनुसंधान संस्थान (अटारी)

ICAR-Agricultural Technology Application Research Institute (ATARI)

Zone-X/क्षेत्र 10, क्रीडा परिसर/CRIDA Campus, संतोषनगर/Santoshnagar, हैदराबाद/Hyderabad - 500059

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A. R. Reddy
Y. L. Meghana
A. Bhaskaran
J. V. Prasad
Shaik N. Meera

ICAR-Agricultural Technology Application Research Institute (ATARI)

Zone-X, CRIDA Campus, Santoshnagar, Hyderabad - 500 059.

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Contributors:
Dr. M. V. Prasad, Principal Scientist, ICAR-Indian Institution of Oil Palm Research, Pedavegi, Andhra Pradesh

Dr. S V Ramana Rao, Principal Scientist, ICAR-Indian Institute of Oilseeds Research, , Hyderabad

Dr G Nirmala Principle Scientist ICAR-Central Research Institute for Dryland Agriculture, Hyderabad

Dr. Rajendra R. Chapke Principal Scientist, ICAR- Indian Institute of Millets Research, Hyderabad

Dr. N K Sudeep Kumar Professor and Head Tamil Nadu Veterinary and Animal Sciences University, Chennai

Published by:
Dr. Shaik N Meera
Director
ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-X
CRIDA Campus, Santoshnagar, Hyderabad – 500 059
Tel: +91-40-24006500; 24530300; Fax: +91-40-24533543
Email: zcu5hyd@gmail.com; atari.hyderabad@icar.gov.in
Web:https://atari-hyderabad.icar.gov.in

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PREFACE

Farmers FIRST Programme (FFP) is one of the prestigious projects of Agricultural Extension Division, ICAR, New Delhi which is being run at 52 different locations under ICAR Research Institutes and State Agricultural Universities in this country. In this programme, farmers are being involved in addressing problems relating to agricultural production using their innovations, resources available with them and their management at farm situations. Small and marginal farmers and women were the major target groups.

ICAR has sanctioned five projects to ICAR-ATARI Hyderabad under this programme. Four ICAR institutes, IIMR, IIOPR, IIOR and CRIDA and one State University, TANUVAS, are implementing these projects in Andhra Pradesh, Telangana and Tamil Nadu. I am happy to note that the projects are implemented successfully with focused interventions. Farmer-scientist interface module provided platform to exchange knowledge between farmers, scientists and other stake holders. Various technology interventions related to new crop varieties, poultry strains, improved breeds dairy animals, goat and sheep, natural resource conservation, small farm mechanization, horticulture etc., are assembled and demonstrated with the participation of farmers in the module of technology assemblage, application and feedback. Small enterprises related to value addition and secondary agricultural are established to support the income of rural households. Partnership and institutional building module provided opportunity to develop models of partnership, organizational capability, marketing ability, attitude and leadership quality. Content mobilization through e-enabled knowledge sharing and various other channels enabled farmers to update their knowledge.

This document contains details of various activities carried out in this programme by the implementing partners. Gist of the successful technologies was also provided for the reference of readers.

I appreciate the efforts of the Principal Investigators and Co-Principal investigators of the individual projects for the successful implementation of the programme and their contribution to this publication. I acknowledge the guidance and support received from Agricultural Extension Division, Indian Council of Agricultural Research, New Delhi in bringing out this publication.

(Shaik N. Meera)
Director

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1 Introduction

The Farmer FIRST Programme (FFP) is an ICAR initiative to focus on farmer's Farm, Innovations, Resources, Science and Technology (FIRST) introduced during 2016-17. It is an effort to move beyond the production and productivity of the small holder agriculture through enhancing farmers-scientists interface. It was developed as farmer in a centric role for research problem identification, prioritization and conduct of experiments and its management in farmers' conditions. This project emphasizes the need for the research system as well as farmers to learn from each other in the context of farm environment. Technology integration is looked at from the perspective that the scientific outputs coming out from the research institutions, many times do not fit as such in the farmers' conditions and thus, certain alterations and adaptations are required at field level for their acceptance, adoption and success. Project focusses on the resource management, climate resilient agriculture, production management including storage, marketing, supply chains, value chains, innovation systems, information systems etc. with four major components viz., enhancing farmer –scientist interface, technology assemblage, application and feedback, partnership and institution building and content mobilization

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 in the individual household level who are involved in the project or who are selected by the village as the representatives to conduct 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 knowledge as a vital element for the development of useful innovations.

Farmer FIRST is expected to create linkages between farmers-researchers and extensionists to support farmers to conduct appropriate experiments selected by them. It helps 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.

Objectives

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 settings.
5. To build network of linkages of organizations around the farm households for improving access to information, technology, inputs, and market.
6. To institutionalize Farmer FIRST process.

The following five projects have been implemented by Four ICAR institutes (IIMR, IIOPR, IIOR and CRIDA) and one University (TANUVAS, Chennai) in Zone 10, ICAR-ATARI, Hyderabad under Farmer First Programme.

Centres and projects

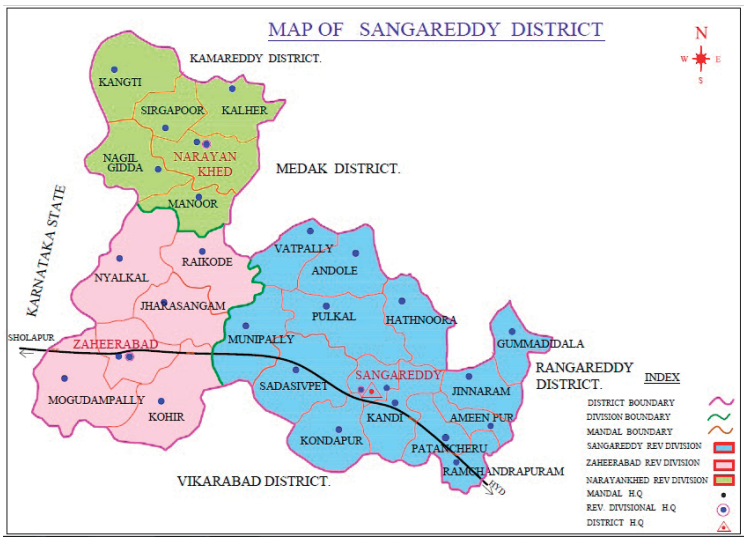
S.No.	Name and Address of FFP Centre	Name of the project
1.	ICAR Indian Institute of Millets Research, Rajendranagar, Hyderabad-500 030, Telangana	Participatory technology validation, diversification, value-addition for small-holders livelihood improvement of Central Telangana Zone
2.	ICAR-Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad - 500 030 Telangana	Competitive oilseeds production technologies for improving profitability and socio-economic conditions of small holders in rainfed oilseeds production system of Telangana
3.	ICAR-Indian Institution of Oil Palm Research, Pedavegi-534450, West Godavari district, Andhra Pradesh	Enhancing profitability of oil palm based cropping system through resource use efficient technologies with farmer-scientist and stakeholders interface
4.	ICAR-Central Research Institute for Dryland Agriculture, Santhoshnagar, Saidabad (PO), Hyderabad- 500 059, Telangana.	Farmers Centric Natural resource development for Socio economic empowerment in Rain fed Areas of Southern Telangana
5.	Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Madhavaram Milk Colony, Chennai – 600 051	Improving livelihood of farmers through technological interventions in Tiruvallur district of Tamil Nadu

2 Projects and Area of Operation

2.1. Participatory technology validation, diversification, value-addition for small- holders livelihood improvement of Central Telangana Zone: ICAR-IIMR, Hyderabad

With the aim of improving livelihoods of small land holders in central Telangana, ICAR-IIMR, implemented Farmer FIRST programme in Nyalkal, Raikode and Jharasangam mandals of Sangareddy district of Central Telangana Zone. The selected mandals are situated at around 100 km from Hyderabad. Many of the households are cultivators and more than 80 percent of the population are dependent on agriculture. Very few are landless. Rainfed crops such as redgram, black gram, sorghum, cotton, maize, soybean and safflower are the principal crops of the villages. Though rainfed farming is predominant, irrigated crops have also been noticed. Sugarcane is grown as irrigated crop while vegetable crops such as potato and ginger are cultivated in irrigated land. Most of the marginal farmers do not cultivate their land as it is non-remunerative and keep as fallow. They work in the fields of others for their livelihood. They are also dependent on Mahatma Gandhi National Rural Employment Generation Scheme (MGNREGS) for earning income.

The selected villages are predominant with medium deep black soils (60-75%) and red sandy loams (25-40%). The other soil types seen are sandy soils and saline soils are found near irrigation tanks. The red *chalka* soils are shallow in depth (10 - 45cm), severely degraded with multiple slopes ranging from 2 -5%; contain very low organic carbon, low in fertility (Zn, N and P) and characterized by low water holding capacity.



The selected villages predominantly grow crops such as redgram, black gram, cotton, sorghum etc. In *rabi* season, Bengal gram, *rabi* sorghum and safflower are grown. Sugarcane and potato are grown in the irrigated areas. Redgram is grown as intercrop in soybean while other crops are grown as sole crop. Sorghum is grown for household consumption and fodder purpose. A variety of fruits and vegetables were grown under limited irrigated conditions through tanks, open wells and tube wells both in *rabi* as well as in summer seasons.

Several local races of millets are grown by the farmers primarily to meet the fodder requirements of domestic livestock animals and for human food for household requirement. The crop care taken by the farmers is minimal. Scarcely, the recommended practices are followed with application of inputs at critical stages, often resulting in low yields. Organized and systematized primary processing facilities are also lacking in the villages. Creation of demand for millets through value-addition and commercialization of products is need of the hour. This has to be initiated at on-farm level so as to reinvent millets as remunerative crop in the dryland ecosystem, thereby strengthening demand for millet cultivation at grass root level. In long term such efforts would lead to increase in crop cultivation area. Processing at farm level would result in increase in producers share in consumer rupee also.

Diversification from crop-based to poultry, animal (small ruminants) will enhance the risk bearing ability with expected higher income and employment of rural youth. This project aims at enriching farmers-scientists interface for technology development and application. It will be achieved with focus on innovations; feedback; multiple stakeholders' participation, multiple realities, multi-method approaches, vulnerability and livelihood interventions.

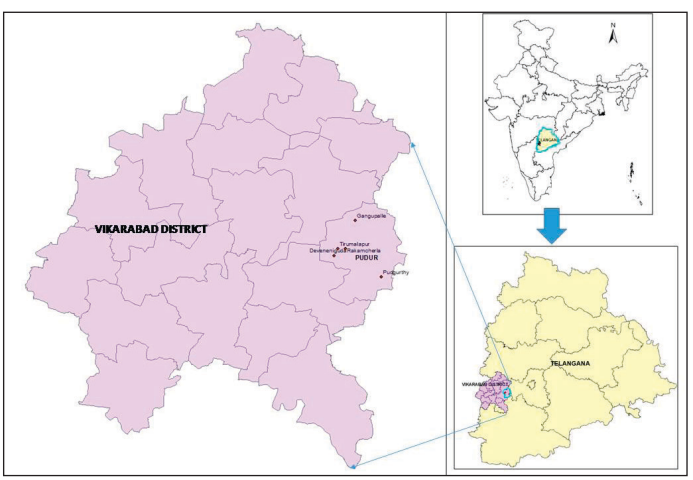
This project was initiated to address above enlisted problems in a holistic manner to improve the socio-economic conditions of the farmers with the following objectives.

- To initiate participatory technology development process relevant to identification of local farmer grown millet cultivars for end product specificity
- To facilitate adoption of improved production technologies to improve the incomes from cropping systems thorough village communication centre.
- To extend mechanized millets primary processing technologies at on farm level and to enable marketing of value-added millets.
- To enable resource poor farmer's diversification from crop-based enterprise to livestock and poultry-based enterprises for additional income and risk aversion.
- To study performance of technologies and farmer's perceptions in the intervened clusters and assess the impact of interventions on livelihoods of stakeholders for build-up of policy framework

2.2. Farmers Centric Natural Resource Development for Socio Economic Empowerment in Rainfed Areas of Southern Telangana: ICAR-CRIDA, Hyderabad

This project has been implemented by ICAR-CRIDA in Pudur Mandal situated in Vikarabad district in Southern Telangana with the main aim of developing natural resources and socio-economic empowerment with the participation of farmers. Rainfed production systems are fragile and fraught with many challenges from management of natural resources to bridging yield gaps to deriving livelihood and income source from crop production and value addition. In rainfed ecosystems, the success of crop production depends on effective and timely utilization of available natural resources. Rainfed farming faces complex environmental extremes to whom, farmers have traditional wisdom for combatting. These knowledges have the reservoir of untapped potentials to sustain agricultural practices suitable to the local environmental conditions. Most of the technologies generated in the institutions are partially adopted due to lack of active participation of farmers in technology generation and validation processes. Though large farmers are able to utilize the agricultural developmental benefits to some extent by hiring services in the form of improved hybrids, quality chemicals and other machinery services. Small farm holders (<2 ha) are still relying on natural resource due to lack of proper awareness, availability, cost considerations and low risk bearing capacity.

Pudur Mandal was selected in consultation and after a series of meetings, discussions with Joint Director of Agriculture, other officials of State Agricultural Department, officials at mandal level, Agriculture Officers and progressive farmers. The Pudur mandal has 22 grama panchayats and 44 habitations with population of 41,319 compromising 20,914 males and 20,405 females. The SC population constituted 28.50% of total population. The literacy level of the mandal is 46% and highest illiteracy percentage is in the group with above 35 years of age. It is noteworthy to mention that girls accounted for majority of school dropouts in this mandal. Out of 8,982 families in the mandal, majority of families are poor (4,998) followed by middle class (1,930), and poorest of poor (1,384) and rich



category accounted for 670 families. As per wealth ranking through PRA, people earning below Rs. 10,000.00 per annum were categorized as poorest of poor, Rs. 10000-12000 per annum as Poor; Rs. 12000-50000 per annum as Middle and More than Rs. 50000 per annum as Rich. The cluster of villages selected based on soil type and socio-economic status were Gangupally, Rakamcharla, Devanoniguda, and Pudugurthy. All the villages equally represent red and black soil areas with majority of small and marginal farmers. The villages are situated at about 110 kms from ICAR-CRIDA, Hyderabad.

The results of the PRA and a baseline survey conducted in the adopted villages revealed that the majority of farmers are of marginal and small and have low to medium socio-economic status. Red and black soils are predominant and the use of organic manures is very low. Farmers of these villages cultivate maize, cotton, red gram, vegetables and flowers with low yield levels. Heavy dependence on private firms for seed, pesticides and even for marketing of crops like cotton is also observed. Farmers have less knowledge of new hybrids/ varieties and use poor-quality seedlings for transplanting in vegetable cultivation. Lack of knowledge to diagnose pests and diseases resulting into delay in controlling diseases. Marketing of cotton is major problem due to lack of proper transport and farmers rely on private firms for marketing. There is no veterinary dispensary in all the villages leading to improper animal health care. To address these problems this project was implemented with the following specific objectives.

- To initiate participatory technology development process module-wise (crops, cropping system, horticulture, livestock, soil and water management practices, etc) relevant to create livelihood options pertaining to small farm holders including women.
- To develop viable social institutions through building suitable linkages, farmer-producer group and promoting grass root SHG groups for upscaling of participatory climate resilient rainfed technologies
- To evaluate performance of adopted technologies and farmer's perceptions on participatory technology development process in the intervened clusters for re-evaluation and upscaling of the technologies in other rainfed regions

2.3. Enhancing Profitability of Oil Palm Based Cropping System Through Resource Use Efficient Technologies With Farmer-Scientist and Stakeholders Interface : ICAR-IIOPR, Pedavegi, Andhra Pradesh.

Oil Palm is the highest oil yielding crop among the oilseed crops in the world. Crop is being cultivated commercially in India to meet the ever-growing demand for vegetable oil. This crop is encouraged for reducing burden on foreign exchequer and attain self-sufficiency in vegetable oil production in the country. An area of 19.33 lakh ha has been identified as potential to grow oil palm in 18 states in India. Oil palm is cultivated in irrigated / rainfed conditions, in an area of 3.0 lakh ha in Andhra Pradesh.

ICAR -IIOPR: Preparation of compost from the Palm waste

To enhance the profitability of oil palm based cropping system, this project is being implemented in Challachintalapudi and Makkinavarigudem villages of Denduluru and Makkinavarigudem madals of West Godavari district of Andhra Pradesh. Red sandy, sandy and black soils are predominant in these villages.

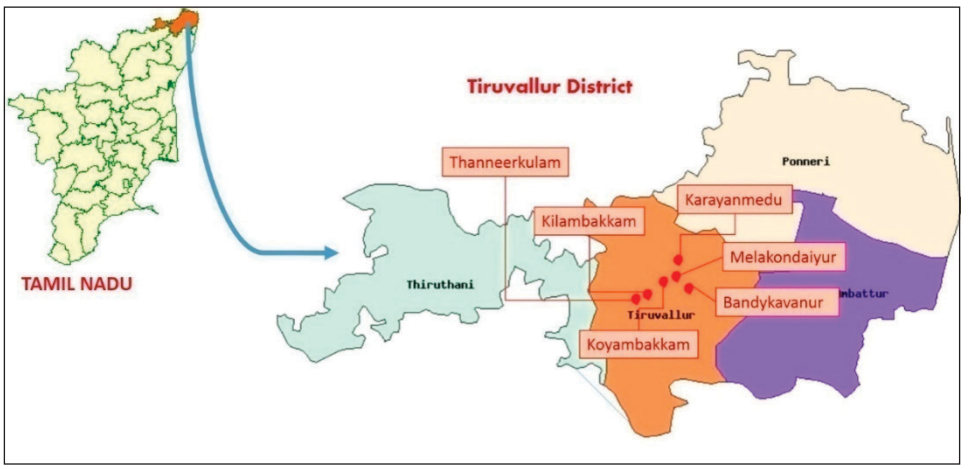
Coconut, oil palm, mango, cashew nut, cocoa and banana are grown in upland conditions. Cropping pattern followed in these villages include Paddy-maize, groundnut, sugarcane, chillies, tobacco, and cotton. Livestock in the villages consists of cow, sheep, goat, buffaloes and poultry. Total area under cultivation is 11725 ha. Net sown area is 5650 ha. Total number of farm families are 6416 and landless population is 8969.

This project aims at enriching oil palm grower - scientists interface for technology assessment, refinement for their resource use efficiency and adoption by growers. This will be achieved with focus on technology innovations, assessment, refinement, feedback and participation of multiple stakeholders *viz.,* Oil Palm growers, Oil Palm developers & processors, officials of State Department of Horticulture/ Agriculture, other line departments, Scientists of SAU etc., to achieve sustainable oil palm production. Specific objectives of the project are

- To assess and refine resource use efficient technologies for enhancing profitability of oil palm based cropping system.
- To identify and integrate economically viable and socially acceptable entrepreneurial activities as models of enhanced earnings to the oil palm growers, women and rural youth.
- To build a network of linkages with different entities around oil palm plantations of farm households for facilitating access of information, technology, inputs and other deliverables to attain higher returns.

2.4. Improving Livelihood of Farmers Through Technological Interventions In Tiruvallur District of Tamil Nadu: TANUVAS, Chennai

Low productivity, inadequate access to inputs, lack of awareness about scientific technologies and inadequate infrastructure are the major problems faced by farmers of Tiruvallur district of Tamil Nadu. To address these problems and to improve agricultural production and productivity and thereby increasing the farmers' income, TANUVAS implemented this project in the villages of Tiruvallur district. Tiruvallur district belongs to the Northeastern Agro Climatic Zone. Rice is the major crop in Tiruvallur district and



farmers are growing rice in three seasons viz., Sornavari, Samba and Navarai with good ground water potential. Green gram and black gram are the major pulse crops in this district. Green gram is cultivated mainly in Minjur, Sholavaram, Ponneri, Ellapuram and Tiruvallur blocks and Black gram is grown in Kadambathur, Tiruthani, Pallipat and RK Pet blocks during Rabi season. Tiruthani, Tiruvalangadu, RK Pet and Pallipat blocks are the main areas of Sugarcane cane cultivation. The average normal rainfall of Tiruvallur district is 1152.8 mm. Apart from field crops, vegetables and flowers are also cultivated in this district. Animal husbandry activities like dairying, sheep and goat farming, poultry with native chicken and quail farming are done by the farmers of this district.

Specific objectives of this project are

- To introduce newer technologies in agriculture, animal husbandry, horticulture and allied sectors for enhancing production, productivity and income of the farm households.
- To identify and integrate economically viable and socially acceptable farm innovations for promoting entrepreneurial activities among the rural households.
- To build a network with various stakeholders involved in farm enterprise to promote better sharing of ideas, knowledge and skill.

2.5. Competitive Oilseeds Production Technologies for Improving Profitability and Socio-Economic Conditions of Small Holders in Rainfed Oilseeds Production System of Telangana: ICAR-IIOR, Hyderabad

This project focusses on enhancing the productivity, profitability and resource use efficiency of rainfed oilseeds based production systems in Dharur mandal of Vikarabad district of Telangana. The marginal and small farmers dominate the agrarian sector in the study area. Hence interventions to ameliorate the social well-being of this group is high priority for institutional interventions. Due to the preponderance of farming under rainfed conditions, the cropping pattern is confined to the rainfed production system. The institutional interface for improvised micro level farming can have additive effect on the economic wellbeing of the rainfed ecosystem through technology backstopping, improved technical kknowledge,establishing small holders' enterprise through appropriate interventions, fostering stakeholder participation towards increasing income and supplementing to the domestic production of rainfed production system.

This project is being implemented in four villages of Dharur mandal covering 768 households encompassing approximately 1110 ha. The whole village approach was adopted for taking up activities under the aforesaid project. As these villages are in the rain shadow region, institutional interventions on a decentralized mode would benefit the small holder agriculture. These identified villages have high potential for enhancing the income from the agricultural sector (rainfed oilseed based eco - systems) considering the operational environment of farming and the levels of convergence on institutional and infrastructural front. Further, with farmer as the nerve centre; interface/ linkages between various stakeholders (Researchers, SHGs, NGO's, Private industry, development agencies and extension functionaries) are being developed to give a fillip to the rainfed based production system. Specific objectives of this project include

ICAR-IIOR Scientist interacting with ground nut farmer

- To initiate technology assemblage for oilseed based rainfed cropping systems for increased profitability of marginal and small farmers.
- To create enterprise based activity for marginalized sections in backyard poultry and sheep lamb production.
- To facilitate developing viable local institutions through identifying appropriate linkages; farmer-producer group for upscaling / large scale adoption of technology assemblage
- To explore creation of value addition in the rainfed eco-system.
- To evaluate the performance of adopted technologies / interventions and farmer's perceptions on technology assemblage in the cluster village.

To ensure effective implementation of the need based modules, in-depth interactive meetings and situation analysis were done in the villages with the participation site committee members of the respective villages. Accordingly, interventions with focus on doubling farmers income, appropriate modules (NRM; INM, crop and cropping systems modules; horticulture modules encompassing vegetable and fruits, poultry and small ruminant models, freshwater fish farming, need based mechanization including processing) are identified and implemented in the selected villages.

3 Enhancing Farmer –Scientist Interface

A strong farmer-scientist bond with continuous exchange of ideas and feedback will enable the researchers for continuous interaction with farm conditions, problem orientation, exchange of knowledge between farmers and other stakeholders, prioritization of problems and setting up of research agenda. During these interactions, scientists will identify farm innovators and groom them as technology agents for farmer-to-farmer technology dissemination, up-scaling and out scaling.

All the five participating institutes conducted 825 programmes with the participation of 19634 farmers. These programmes include interface meetings, field visits, awareness campaigns, exposure visits and training programmes which enhanced the farmer scientist interaction. Number of trainings cum exposure visits have been imparted to farmers right from cultivation to processing of various crops.

Interface meeting of ICAR-IIMR scientists with farmers

ICAR-IIMR conducted 12 Farmer and scientist interface meetings with the participation of 553 farmers, staff of line departments (agriculture, horticulture and animal husbandry) and village administration like sarpanch, farmers society president and PJTSAU staff etc. Similarly, 21 field visits, 12 awareness campaigns, 3 exposure visits, and 12 training programmes were conducted by ICAR-IIMR.

ICAR-CRIDA conducted 18 Farmer and scientist interface meetings at FFP villages and CRIDA research farm with participation of farmers and other stakeholders. About 1230 farmers participated in these interaction sessions. Similarly, 24 field visits, 16 awareness campaigns, 17 exposure visits, and 37 training programmes were also conducted by ICAR-CRIDA. During these activities farmers problems in natural resource management, livestock and horticulture interventions were discussed in detail followed by a field visit to selected plots. These activities created a strong farmer-scientist bondage for continuous exchange of ideas, innovations, resources, feedback for development of appropriate technology and human resource development.

Table. Farmer- scientist interface activities of Farmer FIRST Programme centres

Programmes/ activities organized	ICAR-IIMR		ICAR-CRIDA		ICAR-IIOPR		TANUVAS		ICAR-IIOR		Total	
	No.	No. of farmers	No	No of farmers	No	No of farmers	No.	No. of farmers	No.	No. of farmers	No.	No. of farmers
Interface Meetings	12	533	18	1230	16	673	5	192	257	2897	308	5525
Field Visits	21	953	24	1120	178	2090	35	356	14	348	272	4867
Awareness Campaigns	12	1236	16	970	21	701	9	250	33	323	91	3480
Exposure Visits	3	152	17	990	6	93	4	78	14	556	44	1869
Training Programmes	12	480	37	1710	9	291	21	797	31	615	110	3893
Total	60	3354	112	6020	230	3848	74	1673	349	4739	825	19634

IIOPR also conducted 411 such programmes with the participation of 8095 farmers and other stakeholders. This enriched the technical know-how and successful implementation of nine technological interventions under 4 modules. This also helped in acquaintance, facilitation and implementation of possible technical interventions to solve the prioritized problems. The two way interaction also facilitated to get the feedback from the stakeholders to assess and refine the process of implementation of interventions.

ICAR-IIMR scientists interacting with farmers

TANUVAS established a network with farmers and other stakeholders by conducting interface meetings, field visits, awareness campaigns, exposure visits, training programmes, veterinary health camps, etc. to promote better sharing of ideas, knowledge and skill. They integrated economically viable and socially acceptable farm innovations

for promoting entrepreneurial activities among the rural households. Further, awareness on new technologies in agriculture, animal husbandry, horticulture and allied sectors could be created for enhancing production, productivity and income of the farm households. A total of 88 such activities were conducted by TANUVAS from the year 2016-17 to 2022-23 under FFP, by the involvement of 2124 farmers in Tiruvallur district of Tamil Nadu.

ICAR-IIOR organized 349 programmes with the participation of 4739 farmers which include, 257 interface meetings, 14 field visits, 33 awareness campaigns, 14 exposure visits and 31 training programmes. These activities provided insights to the scientific fraternity to provide customized solutions / interventions to enhance the productivity and profitability of various crops and livestock enterprises. These activities also facilitated technology assemblage and enabled the acceptance of the technology components. Establishment of linkages with various government and private organizations was fostered by using this platform.

ICAR-IIOR scientists interacting with farmers

These interface activities created a strong farmer-scientist bond for continuous exchange of ideas and better knowledge on the problems faced by the farmers. Feedback on the various interventions helped to refine the technologies to suit the specific area. Training and exposure visits imparted the right technical know-how and built confidence among the farmers about technologies. Through Farmer Scientist interaction extension gaps have been identified and interventions planned in participatory mode.

IIOR scientists interacting with groundnut farmer

IIOR Scientists visiting castor + redgram intercrop

4 Technology Assemblage, Application and Feedback

The Farmers FIRST Project Approach focusses on the development of existing farming systems where effective soil and water conservation modules, improved crop varieties, new horticultural techniques, livestock-based technologies, have been integrated into local systems majorly to increase productivity and income of farmers. Besides, the farm machinery technologies demonstrated, in combination with farmers' resources and innovations, have led to drudgery reduction and livelihood improvement. Based on the necessity implementing centres assembled various technologies and demonstrated them with the participation of farmers in the adopted villages. These technologies include management of natural resources, improved genotypes, animal management technologies, backyard poultry etc. Some of the prominent technologies are elaborated in the following sections.

4.1. Management of Natural Resources

Plastic film embedded gabion check dams (ICAR-CRIDA)

In watersheds, loose boulder structures or gabion check dams are constructed in upper reaches to stabilize the gully or stream and reduce the flow velocity and thereby minimizing soil erosion. In farmers FIRST project, an intervention, gabion structures embedded with 1 mm HDPE film at the centre of the structure was made by ICAR-CRIDA. These plastic films embedded gabion structures reduced the sediment concentration by 70% than the traditional gabion check dam without using plastic films. These gabions were able to store the rainwater in the range of 9000-15,000 m^3/structure and conserve the rainwater up to 60%, increasing the water table in the surrounding wells by 0.6 m. The stored rainwater in each structure was able to provide irrigation to an area of 1 ha.

HDPE film embeded Gabion checkdams

Raised water level in open wells

Farm Pond for protective irrigation (ICAR-CRIDA)

Farm pond is considered as a climate resilient technology where surface runoff from catchment area is collected at a common point which is important from hydrology point of view. Two farm ponds with a capacity of about 40 cu m capacity were constructed in the farmers' fields which can irrigate about 0.2 ha. This helped the farmers to cultivate winter vegetables like cabbage, cauliflower, green leafy vegetables etc.,

Micro-irrigation (Drip systems) and fertigation system for vegetable crops and portable rain gun system for field crops was designed and installed at different locations of the village to demonstrate effective management of harvested water for high value crops such as chilli, tomato and field crops (sorghum). 21 micro irrigation systems were installed in the project area.

Portable rain gun

Conservation furrow for in situ moisture conservation (ICAR-CRIDA)

Conservation furrow as one of the *in-situ* moisture conservation practices was demonstrated in cluster villages of Vikarabad district in redgram. After completion of tillage operations and first weeding at 30 DAS, a conservation furrow was opened with bullock drawn plough between two rows (3m interval) to conserve rainwater in low rainfall events and for drainage of surplus water during intensive rainfall events. This technology

Conservation furrow opened with bullock drawn plough in pigeon pea

was demonstrated in 245 ha with the involvement of 210 farmers. Conservation furrow enhanced *in-situ* moisture conservation and protected the crop from intermittent dry spells during vegetative growth and grain setting stage. Rainfall received during 2019 was 581.2 mm against the normal of 865.8 mm (33% deficit). The farmer was able to fetch 25% higher yield as compared to without conservation furrow.

Contour cultivation /soil and moisture conservation in redgram (ICAR-IIOR)

ICAR-IIOR also demonstrated ridge and furrow method / contour cultivation in redgram involving 222 farm families. The farmers of project villages are cultivating redgram in sloppy lands and are not practicing soil and moisture conservation measures. Customized training programmes were organized for the selected farmers on the importance of soil and moisture conservation techniques for protection of soil health, prevention of erosion besides conservation of moisture which will provide resilience to drought conditions. This practice in redgram enabled the farmers to obtain higher productivity levels ranging from 12-16 per cent and additional net returns of Rs. 10368 per ha.

Redgram on ridge and furrow method

Recycling of biomass obtained from oil palm plantation (ICAR-IIOPR)

Biomass of 7-10 t/ha/year is produced in oil palm plantations which is not being economically used, rather burnt, or thrown outside. Organic recycling of this biomass is possible through composting with oil palm frond cut material by using chaffcutter and

Vermicompost unit in oil palm plantation

Oil palm farmers with vermicompost bags

vermicomposting. ICAR-IIOPR created awareness among farmers about the use of chaffed fronds as mulch for moisture and soil conservation and vermicomposting. Chaff cutter was used for chaffing of fronds. Chaffed material is used for mulching in oil palm basins. The remaining chaffed material was used as base material for vermicomposting. Ten chaff cutters were distributed to 10 farmers groups in cluster basis. Skill demonstrations were conducted to use chaff cutters and vermicompost beds. Ten brush cutters and four grass cutters were also distributed to group of farmers in cluster basis to utilize machinery for removal of weeds, to maintain weed free oil palm basins. This intervention was demonstrated in 174 farmers' fields covering 1281 ha. By seeing the advantage of this technology oil palm growers adopted in an area of 6425 ha. This increased the availability of organic compost round the year and insitu mulching for soil and moisture conservation. Soil and moisture conservation through mulching, paved way for organic farming and reduced application of fertilizers (25-30%) through inorganic source.

Weather based irrigation scheduling in oil palm (ICAR-IIOPR)

Proper irrigation management is crucial for achieving better growth and yield in oil palm plantations. The water requirement of oil palm depends on various factors such as age, soil type, and climatic conditions. According to season, the monthly water requirement varies. The exact amount of water needed to deliver to plantation was calculated and informed to farmers on monthly basis. Based on jet discharge capacity, run time (LPH), the exact time duration, motor to be turned on/off will be adjusted by farmers by setting alarm with the help of sensor based mobile pump starters which avoids excess/deficit irrigation. For example, during peak summer months the water requirement is 310 l/tree/day then based on jet discharge capacity; if the farmers are having 2 jets with 35LPH, then they run motor for a duration of discharge (recommended to apply water) for a period of 4 hours 42 minutes by fixing timer in mobile pump starter. Similarly, during winter seasons if the recommended water requirement is 245 litre/tree/day then farmers with 2

Oil palm growers participating in awareness programme on weather based irrigation scheduling in oil palm

jets with 35 LPH capacity are allowed to run motor for a period of 3 hours 30 minutes only. In this way the accurate amount of water required during different months in oil palm is scheduled by adjusting the irrigation schedule with the help of mobile pump starters.

Awareness was created among farmers to adopt micro irrigation based on weather based irrigation scheduling during various months. Provided Mobile Pump Starters to 26 farmers with mobile based auto pump starters and demonstrations were organized on use of starters. WhatsApp messages were sent on duration of irrigation to be given

Mobile Pump Starter installed in Oil palm orcherd

(for keeping alarm) to groups. With this intervention about 40000 to 45000 litres of water could be saved per day in one ha of oil palm orchard. In addition, 3 - 4 hours/ day electricity could be saved apart from one manpower per day in normal irrigation. Farmers are taking up additional crops like Banana, Cocoa, Maize and fodder crop with this saved irrigation water.

Drip irrigation and fertigation (ICAR-ICAR-IIOPR and TANUVAS)

In oil palm farmers were applying fertilizers (Urea, SSP, MOP) in one/two splits per year through basal application method. This method is time consuming, laborious, high input (fertilizers) cost, excess wastage of fertilizers through evaporation. ICAR-IIOPR demonstrated application of fertilizers @ 5 kg Urea, 3 kg DAP, 5 kg MOP per acre per month in 12 equal splits at monthly interval through 2 inch fertigation ventury unit. Awareness was created among farmers of two adopted villages about fertigation in oil palm. Fertigation units (Venturies) were provided to 26 farmers. This technology was spread to an extent of 869 ha in the two adopted villages. Horizontal spread of technology was observed in 6 adjoining villages surrounding to FFP villages.

Cost benefit analysis of fertigation based on soil and leaf nutrient status for doubling farm income in oil palm plantations

S. No	Treatment	Cost of reduction of fertilizers (Rs./ha)	Cost of reduction labour (Rs./ha)	Total cost of cultivation (Rs/ha)	Yield (t/ha)	Gross Returns (Rs./ha)	Net Returns (Rs./ha)	B:C Ratio
1	Fertigation based on soil and leaf analysis	25000	5800	94500	26	4,58,296	3,60,796	3.82
2	Farmers' practice	--	--	120000	22	3,86,312	2,66,312	2.22

Chilli crop with mulch and drip irrigation (TANUVAS)

TANUVAS also introduced drip irrigation and mulching to save water and control weeds. A total of 53 drip irrigation and mulching units were established thereby benefitting 53 farm families with the coverage of 26.47 acres of horticultural land. The income increase due to this intervention was Rs.60,000/ ha in brinjal, Rs.53,000 per ha in bhindi and Rs. 40,000 per ha in chillies

Soil sampling and distribution of soil health cards (ICAR-CRIDA)

The method of soil sampling techniques has been demonstrated to farmers of Gangupally, Devanoniguda, Rakamcharla and Pudugurthy villages. Farmers were provided with soil sampling bags and labels with instructions of how to fill it. 560 soil samples were collected from farmers and analyzed for pH, EC, OC, available N, P, K, Fe, Cu, Mn, Zn, etc. Soil health cards were prepared and provided to the farmers along with the recommendations of

Demonstraton of soil sampling

fertilizer to major crops (rice, maize, sorghum, red gram, pigeon pea, etc.). By following the soil test based fertilizer recommendations farmers were able to reduce the cost of fertilizers especially potassium and phosphorus. Chickpea farmers were able to increase yield by 20- to 30 percent by applying boron. On World Soil Day, an awareness campaign on soil health management was organized. Soil scientists, farmers and state department officials delivered lectures supplemented with pamphlets depicting information related to methods of soil analysis and importance of soil health management to farming community to inform the importance, role and seeking participation in world soil day.

Soil test based integrated nutrient management in rabi groundnut (ICAR-IIOR)

One of the problems identified during the discussions and base line survey was indiscriminate usage of fertilizers in rabi groundnut. Integrated nutrient management

Groundnut : Soil test based integrated nutrient management

coupled with proper soil and moisture conservation was the technology assemblage made during focused group discussions for reducing the fertilizer requirement leading to reduction in cost of cultivation. The soil test-based results paved way for reduction of DAP and supplementing with SSP and Gypsum which enabled higher productivity and income. This technology was demonstrated in 254 ha area with the participation of 428 farm families. Integrated Nutrient Management in groundnut resulted in an average productivity of 16.60 q/ha as against the traditional practice of 10.65 q/ha. The additional net returns accrued over operational costs were Rs. 43584/ha.

Introduction of bio-agents, bio-fertilizers and weed control (TANUVAS)

Use of bio-control agents for crop protection has been in vogue for many years. However, adoption is very low in the FFP villages. Demonstration of application of bio control agents and biofertilizers was organized using Azospirillum, Pseudomonas and Trichoderma in Rice, Green gram, Black gram, Gingelly, Chillies and Ground nut. Weedicides were also demonstrated to minimize weeding cost. This technology aims to reduce the usage of chemicals in field application and to promote residue free farming for the control of pathogens. The following interventions were implemented in the above mentioned crops.

Rice farmer applying bio agents (TANUVAS)

- Seed treatment using bio-control agents i.e., *Pseudomonas* and *Trichoderma viridi*
- Weedicide application i.e., Butachlor (500 ml/acre), Pendimethalin (500 ml/acre), Bispyribac Sodium 10% SC – 100 ml/acre
- Bio-fertilizers application i.e., Azospirillum (1kg/acre), PPGR (Plant Growth Promoting *Rhizobacteria - 250g/acre)* and *Phosphobacteria (1kg/acre)*
- DAP for pulses (*2kg/acre)*
- Micronutrient application ie., Zinc and Manganese sulphate for gingelly

These demos were conducted in an area of 2267 acres involving 1259 farmers. Highest area was covered in rice followed by green gram, gingelly and black gram. The highest benefit was observed in black gram and green gram in the form of reduction in the cost of fertilizers. On an average Rs. 2090 per acre was reduced on the cost of fertilizers in these two crops due to the application of *Rhizobacteria.* Similarly, Rs. 200 to 300 per acre was saved due to the application of *Azospirillum* and *Phosphobacteria* in other crops.

Establishment of Azolla units and vermicompost units (TANUVAS)

Azolla units were established at adopted villages of FFP at the farmers' field to sensitize and bring awareness on usefulness of azolla. The purpose is to create awareness and popularization of organic farming. A total of 59 azolla units were established as demonstration units and thereby 59 farmers were directly benefited.

Similarly, to utilize cow dung in efficient manner and to promote organic farming, vermicomposting was popularized. Demo units were established at farmers' fields to sensitize and promote vermicomposting at field level that is helpful to produce organic inputs in the farm itself. A total of 27 vermicompost units were established for demonstration and thereby 27 farmers were directly benefited.

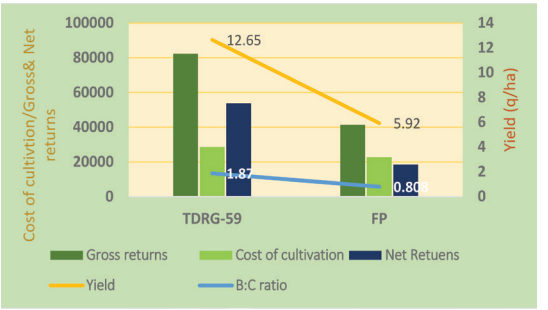
Vermicompost unit of woman farmer of Bandikavanur village

Azolla unit developed by a farmer at Thaneerkulam village

4.2. Introduction of Improved Varieties

Pigeon pea variety TDRG 59 (ICAR-CRIDA)

ICAR-CRIDA demonstrated three improved pigeon pea varieties – PRG-176(Ujwala), TDRG- 59 (Telangana Kandi -2) and WRG-97(Warangal Kandi -2). These demos were conducted in 1703 ha involving 855 farmers. The performance of TDRG 59 was found to be better which was resistant to root wilt disease. This variety outperformed the farmers' practice by yielding 12.65 q/ha. TDRG 59 gave better net income and BC ratio.



Economics of Demonstrations of Pigeon pea

Woman farmer with Pigeon pea crop

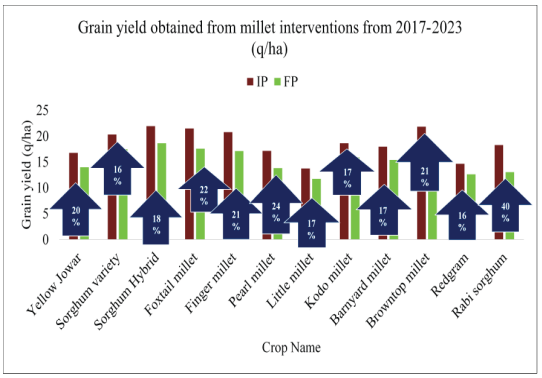
Chickpea varieties NBEg 47 and NBEg 49 (ICAR-CRIDA)

Two new chickpea varieties, NBeG 47 and NBeG 49 were demonstrated in farmers' fields in adopted villages of Pudugurthy, and Gangupally. Bengal gram is cultivated in an area of 1.12 lakh hectares covering Vikarabad, Jogulamba, Kamareddy Adilabad and Sangareddy. 330 demonstrations were conducted with the involvement of 469 farmers. NBEG -47 performed better with an average yield of 15 q/ha. This is a semi erect taller variety with a duration of 95-100 days, suitable for mechanical harvesting and resistant to Fusarium wilt.

Chickpea variety : NBeg 47

Varietal demonstrations conducted by IIMR

ICAR-IIMR focused on intensification and diversification of existing crop systems with introduction of new varieties and production technologies to substantially enhance farmer's income. Under crop-based module, improved cultivars of millets namely, sorghum, foxtail millet, finger millet, pearl millet, barnyard millet, little millet and redgram with crop management practices were demonstrated in Nyalkal, Raikode, Narayankhed and Jharasangam mandals in Sangareddy district of central Telangana. Two pre-season meetings were organized during *kharif* and *rabi* season to identify the technology gaps and select interventions involving farmers, village leaders, IIMR scientists and state government officials.



All the varieties performed better when compared with the farmers' practice. Highest yield increase was found with Rabi sorghum followed by pearl millet and foxtail millet. Redgram varieties showed 16% yield increase over local varieties. Net returns were also comparatively better with the demonstrations hence the farmers accepted the new varieties.

Sorghum variety CSH 41 in the field

Comparison of income in farmers practice and interventions.

Technology/Variety Introduced	Income in farmers practice (Before Intervention)	Income in Intervention	Difference
Foxtail Millet (SiA 3088)	Rs. 43,200/ha	Rs. 52,560/ha	Rs. 9360
Jowar (CSV-27)	Rs. 82,800/ha	Rs. 1,04,548/ha	Rs. 21748
Sorghum CSH 41	Rs. 133858/ha	Rs. 95925/ha	Rs. 37933
Little Millet (DHCM 36-3)	Rs. 30,000/ ha	Rs. 34,750/ha	Rs. 4750
Redgram (ICPL-87119)	Rs. 41,870/ha	Rs. 54,370/ha	Rs. 12,500
Kudo Millet (JK-92)	Rs. 45000/ha	Rs. 51250/ha	Rs. 6250
Pearl Millet (PA-9285)	Rs. 43500/ha	Rs. 53750/ha	Rs. 10250
Barnyard Millet (VL-207)	Rs. 57181/ha	Rs. 64061/ha	Rs. 6883
Finger Millet (GPV-67)	Rs. 1,20,519/ha	Rs. 1,37,078/ha	Rs. 16559
Brown Top Millet (AK-2)	Rs. 172520/ha	Rs. 212710/ha	Rs. 40,590
Jowar (CSH-25)	Rs. 40837/ha	Rs. 48778/ha	Rs. 7941
Redgram + Foxtail millet cropping system	Rs.22,800/ha	Rs.58,140 /ha	Rs. 35340

Field view of SiA 3085

Rabi sorghum crop of Niranjan (farmer) from Mungi, Nyalkal mandal

Field view of VL 207

Farmer Family Showing his Redgram ICPL-87119 (*Asha*) crop

Summer sorghum variety CSH 14 (ICAR-IIOR)

Sorghum variety CSH 14 was introduced by ICAR-IIOR for the situations of low water table conditions in summer season. This variety was demonstrated in 22.5 ha area with the participation of 48 households. This introduction resulted in productivity ranging from 12.25 to 19.50 q /ha providing additional net returns of Rs.9357 / ha over operational costs.

Sorghum variety CSH 14

Introduction of rice cultivar KNM 118 (ICAR-IIOR)

Most of the rice area in the project villages was under the cultivar MTU 1010. Though a promising variety, the shattering of the grains was a problem perceived by the farmers'. To overcome the problem, cultivar KNM 118 was selected as it is a non-shattering variety. 10 kg of the cultivar KNM 118 was provided to each of the farmers in the adopted village with the objective of spreading in large area under the above cultivar as replacement. The cultivar was accepted by the farming community due to its relative advantage of non-shattering nature and acceptance of the buyers resulting to 10-12 per cent increase in the productivity ultimately resulting in higher net returns. Farmers multiplied seed in their own fields and significant area in the adopted village and adjoining villages were brought under the cultivation of this variety.

Non shattering rice variety KNM 118

Improved varieties of rice, sesame and groundnut (TANUVAS)

TANUVAS introduced high yielding, disease resistant varieties of rice, sesame and groundnut to enhance productivity. Co 55 of rice, TMV 7 of sesame and Virudhachalam-1 variety of groundnut were successfully demonstrated in the adopted villages. Co 55 was demonstrated in 13 acres, TMV 7 in 20.5 acres and Virudhachalam-1 in 7.2 acres involving 41 farmers.

Paddy - Co55

Gingelly - TMV 7

Groundnut - Virudhachalam-1

Bhindi hybrid Co 4 (TANUVAS)

To increase the vegetable yield, high yielding and disease resistant hybrid Bhindi seeds (Co4) were distributed and popularized in the adopted villages of FFP. A total of 25 farm families benefitted with the coverage of 25 acres in the year 2020-21. This hybrid yielded 4500 kg / acre which was higher when compared with the yield of Rathika and Samrat (4000 kgs per acre) which were grown by the farmers. There was an increase of Rs. 5000 per acre in income due to this intervention.

Green gram (*kharif*)-Castor (late *kharif*/*rabi*) sequence (ICAR-IIOR):

ICAR-IIOR demonstrated green gram-castor sequence in 38 ha area of 24 tribal households in the project villages. This sequence resulted in providing additional returns of Rs.4020 per ha in rainfed *kharif* eco system and Rs.21020 per ha in *rabi* irrigated system.

4.3. Horticulture

Pro-trays for vegetable seedlings (ICAR-CRIDA)

Vegetable seedling production is a specialized activity and farmers buy the seedlings from the nurseries. Seedling production has come up as a specialized enterprise in the areas. where vegetables are predominenty grown. The Pro-tray nursery is an upcoming technique for quality vegetable seedling production, where seedlings are produced under shade net and such seedlings have better establishment, healthy and are protected from pest and diseases and build up well developed root system within 25-30 days. The benefits of pro-tray nursery include production of pest free quality seedlings, having independent area for each seed, improved seed germination, better root development, minimized seedling mortality and damping off disease, provides uniform, healthy and early maturity, easy handling and cheaper transportation and good main field establishment and crop stand. Since hybrid seeds are expensive, this method helped farmers to reduce cost by minimizing the seed wastage. Using a Pro Tray for seed germination ensures 100% success when compared to growing nursery plants in outdoor conditions. This activity was done in 96 acres with the involvement of 47 farm families.

Management of fruit fly in cucurbitaceous vegetables (ICAR-CRIDA)

The melon fruit fly, *Bactrocera cucurbitae* is one of the important insect pest on cucurbitaceous vegetables, particularly in bitter gourd (*Momordica charantia*), muskmelon (*Cucumis melo*), snap melon (*C. melo* var. *momordica*), and snake gourd (*Trichosanthes anguina*) in the project villages. The extent of losses varies between 30 to 100%, depending on the cucurbit species and the season. Fruit fly management was done using local area management and wide area management. This involved bagging fruits, field sanitation, cue-lure traps and soft insecticides. Cue Lure mix (Ethyl Alcohal-60 ml + Cue Lure (p-Acetooxyphenylbutanaoe-2) 40 ml + malathion 20 ml in the ratio of 6:4:2) was used in bitter gourd, ridge gourd and cucumber crops. This intervention was demonstrated in 265 acre area. Cue lure traps were more successful for controlling fruit fly and getting higher crop yield in cucurbits.

Kitchen gardening (ICAR-IIMR)

To improve nutritional status of the farm labour and marginal farmers along with millets, technological interventions of vegetables were introduced in kitchen gardening. Kitchen gardens were identified as an important supplemental source contributing to food, nutritional and livelihood security. A total eight kitchen garden kits were allocated in villages of Nyalkal mandal during 2022-23.

Field demonstration was conducted for establishing their kitchen garden. All the beneficiaries utilized the produce for house consumption which was sufficient for 2 months for a family of four. Farmers saved a monetary expenditure of about Rs.1100-1500 per two months without purchasing vegetables from market.

Coconut and Oil Palm based cropping system (ICAR-IIOPR)

Inter crops Cocoa, Pepper, Heliconia, Red ginger, Turmeric, fodder grass and Ginger were introduced in adult coconut / oil palm plantations while Banana and Maize were introduced in Juvenile plantations for better utilization of horizontal and vertical space as well as provide extra income to the farmers. Awareness programmes were conducted to make the oil palm growers about the importance of intercrops in providing additional income to the farm. Field visits to IIOPR, Pedavegi were also arranged to show the farmers oil palm inter crop systems. Demonstrations were conducted in 102 ha area involving 142 farmers. Farmers were trained about cultural practices to be adopted for growing intercrops in oil palm / coconut plantations and were provided with planting materials.

Oil palm inter cropped with turmeric

With these interventions farmers could get extra income by raising intercrops in oil palm viz., Rs 15,000 / ha from fodder grass, Rs. 40,000 / ha from Cocoa in adult oil palm plantations. Rs. 1,85,000 / ha from Banana, Rs. 87,500 / ha from Maize in juvenile oil palm plantations.

Integrated management of leaf eating caterpillar and bag worm in oil palm (ICAR-IIOPR)

Integrated management of rugose spiraling whitefly and rhinoceros beetle in oil palm plantations was demonstrated in project villages. IPM technology includes mass multiplication and application of entamopathogenic fungi *Isaria fumasorosia* @ 5 ml/litre of water, application of biocontrol agent (*Metarhizium anisopliae* @ 5 ml/litre of water) and insecticide, Lamda cyhalothrin @ 1 ml/litre of water to manage rhinoceros beetle incidence. Awareness was created on identification of pest infested palms/plantations

Application of pesticides in oil palm orchard

and conducted demonstration on application of entamopathogenic fungi *Isaria fumasorosia* against rugose spiraling whitefly. Provided *isasria* fungus to the needy farmers and provided required sprayers. Formed groups for utilizing sprayers on cluster basis. Created awareness to manage pest infestation at grub stage and adult stage on oil palm and coconut plantations. Advised the farmers to manage the pest with the application of bioagents and non-systemic pesticides. This technological intervention is helping to protect the plantations against pest incidence and found plantation growth as normal.

Integrated disease management of Basal Stem Rot (*Ganoderma*) and stem wet rot in oil palm (ICAR-IIOPR).

Basal stem rot is predominant in sandy soils and ill managed oil palm plantations. Integrated disease management practices including isolation of *Ganoderma* affected palms from healthy palms, application of bio control agent *Trichoderma sp.* (100 g/palm), trunk surgery of stem wet rot infested palms and adoption of sanitation and prophylactic measures were demonstrated in 336 ha involving 257 farmers. Created awareness on identification of disease infested palms/plantations. Conducted demonstration on application of bio control agents / fungicide to manage Ganoderma and Stem wet rot respectively. Provided bio control agent *Trichoderma viridae* for application against *Ganoderma.* Disease spread was arrested and incidence brought under control in the affected plantations.

4.4. Mechanization

Mechanization of harvesting of bunches in oil palm (IIOPR)

Harvesting of oil palm bunches is done manually involving drudgery, increased cost, non-availability of labour during peak season and insecurity among harvesters. Harvesting of bunches by using chisels and aluminium (telescopic) poles attached with sickle is safe and easy method which reduces drudgery. Awareness was created among farmers and oil palm harvesters about harvesting of oil palm bunches with chisel and aluminium pole attached with sickle. Sixteen harvesters groups were formed in two villages with 250 farmers/harvesters and provided aluminium poles with sickles and safety devices for harvesting oil palm fruit bearing bunches from tall palms. Skill demonstrations and hands on trainings were organized on pole harvesting. Merits in terms of drudgery and other aspects to overcome manual climbing were demonstrated. This technology drastically reduced the time required for harvesting to half and is safe to perform harvesting oil palm bunches. Cost of operation was also reduced to Rs. 236.6 Rs. /tonne from Rs. 351.51/tonne. Thus, an oil palm farmer can save about Rs. 2873/- Rs. /year/ha using pole harvesting over climbing method. A harvester can earn about Rs. 70,000/- per year by changing from climbing method to pole harvesting method with reduced drudgery and safe harvesting. Due to these advantages this technique was adopted by 959 farmers/ harvesters. Almost 90 per cent of the oil palm growers in the two adopted villages are harvesting oil palm bunches by using pole attached with sickle.

Demonstration of Harvesting by Mechanical Harvester in Oil Palm Plantation

Small Farm implements (ICAR-CRIDA)

ICAR-CRIDA introduced seven types of need-based implements i.e. dryland weeders, self-propelled weeders, bullock drawn weeders, brush cutters, crop stalk shredder, disc harrow and six row planter. Exposure visits were conducted for farmers to ICAR-CRIDA Research Farm and provided hands-on-practice on the operations of the implements. Small hand weeders have been extensively used by the farmers in the fields that helped in reduction of drudgery apart from improving field efficiency. Farmers feedback to this implement was highly positive. Demonstration with a manually operated hand weeder in vegetables and maize crop was also provided. Woman farmers are also able to use with reduced drudgery. Farmers suggested insertion of a plastic tyre that enables free mobility when operated in black soils. There was good crop stand when pigeon pea crop was sown with Nine-row planter. In all the activities selected, operations with traditional practices demanded more energy expenditure when compared with improved tools; planter, bullock drawn implements, hand weeders, power weeders, power sprayers, and threshers. The energy expenditure in traditional working style ranged from 9.0 to 9.88 kJ/min when compared with 7.81 to 9.26 kJ/min of improved tools and practices.

ICAR-CRIDA scientist demonstrating manual weeder

Rotavator, drum seeder, power weeder and brush cutter (TANUVAS)

Being peri-urban villages, availability of labour and wage rates are major constraints in farming in FFP adopted villages. In this context, FFP farmers demanded introduction of farm machineries in reducing labour and for increased land coverage. One group comprising 10 farmers was formed for the utilization of Rotavator in their fields. They

contributed 50% of the value for the purchase of the Rotavator. The group used the Rotovator on sharing basis. This was institutionalized to have better utilization and 10 farm families utilized the rotavator in 30 ha area.

Similarly, drum seeder was introduced as an intervention to reduce labour shortage and to promote direct seeding of rice to reduce nursery cost and increase land coverage. A total of 75 Paddy drum seeders were distributed with the coverage of 850 acres and 450 farm families. Abut Rs. 3000/ha was saved due to the use of drum seeder.

A total of 12 units of power weeder and 12 units of brush cutters were also distributed among the adopted villages benefiting about 240 farmers involved in cultivation crops like paddy, black gram, green gram, gingelly, groundnut.

Thaneerkulam village farmer using paddy drum seeder

Utilizing brush cutter in a Guava orchard in Bandikavanur village

4.5. Backyard Poultry

Popularization of Improved Strains of Backyard Poultry (TANUVAS)

TANUVAS popularized Improved strains of poultry birds Aseel / Kadaknath/ Siruvidai / Peruvidai /Nandanam4/ Naked neck/ Nicobari for Backyard Poultry. Awareness was created among the identified farmers on desi bird management practices to improve their productivity and reduce mortality. Further, the birds were supplemented with oral pellet vaccine for Ranikhet disease to reduce the outbreak and mortality. A total of 1940 farmers were supplied with oral pellet vaccine, poultry feed and cages along with the birds. This activity led to reduced mortality (0-0.5 %) and increased egg production (85-90/year/bird). On an average farmers generated an income of Rs.900/ year/ bird.

Oral pellet vaccine and improved poultry feed for poultry management

Improved poultry farming (ICAR-IIMR)

The poultry farming was done traditionally in Sangareddy district and was non remunerative. Therefore, poultry farmers who had interest, skill and locally available resources to rear birds were selected to from self-help groups from the adopted village as first line beneficiaries. Exposure visits were organized to provide them latest knowledge particularly, on rearing of *Vanaraja* birds. It is a dual-purpose chicken breed developed by the ICAR-Directorate of Poultry Research. A total of 10862 birds of *Vanaraja* were distributed to 876 farmers in adopted villages. Every year, birds were given timely vaccination as per their need and their performance was evaluated. On an average each family received an income ranged betwen of Rs. 10,000 and Rs. 32,000 per annum by selling eggs and meat from the given unit of the poultry birds. The female laid first egg at the age of 156 days and each produced up to 225 eggs per year.

Dual-purpose improved backyard poultry breeds, Srinidhi, Vanraja and Kadaknath along with good management practices (ICAR-CRIDA)

To improve nutrient availability of poor households in rural areas of Vikarabad district, Telangana, backyard poultry farming using Srinidhi, Vanaraja and Kadaknath breeds have been introduced which will also supplement the earnings of poor farmers and landless labourers. Srinidhi and Vanraja are dual-purpose poultry varieties developed by ICAR-DPR had potential to produce more eggs and meat than local chicken. It can be let on in free range in backyards after 6 weeks of nursery management. Fifty landless and small farmers having prior experience of poultry farming from Pudugurthy and Gangupally village, Pudur Mandal, Vikarabad District, Telangana were selected and given day-old chicks (25 each) after imparting training to them. The annual egg production observed was 140-150 nos and they achieved 3-5 kg weight. The Kadaknath breed of chicks were also given to the farmers of Medikonda village (25 chicks to each farmer) after training. Good management practices were followed in every intervention under backyard poultry farming, like bamboo basket for protection from cold and predators, heating arrangement using hover and bulb, vaccination for Marek's disease and Ranikhet disease, starter feeding and supplementation of liquid mineral vitamin drops through drinking water. In case of Kadaknath, annual egg production observed was 130-150 eggs and achievement of body weight of 2-3 kg. Mortality rate of chicks were 10-12% and net profit per family observed was Rs. 12625.00.

Rajasri birds for nutritional security (ICAR-IIOR)

ICAR-IIOR also introduced Rajshri poultry birds with complete technology support to 15 farm families. This improved the nutritional security by enhancing the egg consumption. It was noticed that eggs consumption increased to 2-3 times (around 10 eggs per week) in the households in which these birds were introduced. Especially children were habituated to take eggs in the morning. Monthly imputed value of eggs was worked out to be is Rs.280 per family.

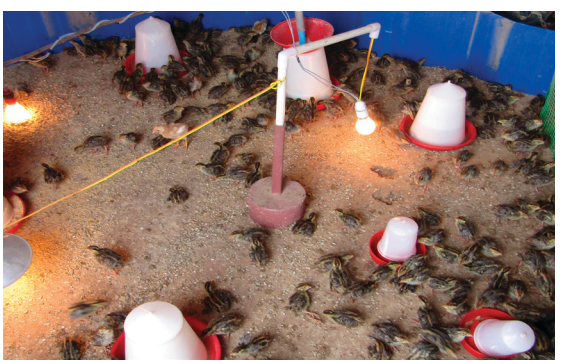
Establishment of Community Hatchery units (TANUVAS)

To encourage the backyard poultry TANUVAS established 14 community hatchery units in the project villages. Interested farmers were organized into groups and community hatching units were established by providing incubators. Training was given to the members about the operation of the incubators. Farmers used these incubators to hatch the eggs from their own backyard poultry units as well as the other farmers. The

hatchability per cent was 65-75% (on total eggs set) under field conditions. About 160 farm families were involved in this activity. Successful farmers earned a net income of Rs.900 through hatching the eggs and Rs.3600 by selling of day old chicks. Thus, these hatching units provided self employment opportunity and income generation besides encouraging the backyard poultry in the adopted villages.

Quail farming: an alternative poultry entrepreneurial avenue (TANUVAS)

To encourage quail farming as an alternative to poultry, six batches (9700 quails) of Japanese quails were distributed to farmers along with necessary materials like concentrate feed, feeder and waterers. Interested farmers were identified and training was imparted on scientific management practices of quail farming before supplying quails. Further, the birds were supplemented with concentrate feed to improve their productivity. In a span of 4-5 weeks, farmers earned about Rs.4000 (Rs.40/live quail) to Rs.5000 (Rs.50/dressed quail). The support was withdrawn after supply of six batches of Japanese quails to assess the sustainability. Around 15 farmers sustained themselves after withdrawing the support and continued quail farming. These farmers reared day old chicks and marketed them successfully. The mortality per cent and body weight was around 5-10 % (0-35 days) and 180-210gms (35 days) respectively with an average feed consumption of about 600gms/quail. The net income generated by the individual farmer in quail farming was around Rs.1600/100 quails.



4.6. Management of Dairy animals

Estrous synchronization for infertility management of cattle (TANUVAS)

Bovine infertility is a major field problem which leads to increase in inter-calving period resulting in major economic loss. All milch animals of 4 villages were screened for estrous synchronization to overcome the infertility problems. Intra-vaginal progesterone sponges / nano cream or patches were used for managing infertility. Animals were also supplemented with mineral mixture. A total of 452 animals were estrus synchronized benefitting 452 farmers during the years 2016-17 to 2018-19. Out of total animals treated with intra-vaginal progesterone sponges for managing infertility, conception rate was recorded to be 51.9 per cent. There is an additional income of Rs. 6000/- per month due to savings on feed cost and milk sales. The technique of treating infertile animals with nano cream/patch was not successful under field conditions with the conception rate achieved was only 7.69 per cent. The feedback was provided to the scientists for refining the technology.

A2 Milk screening (TANUVAS)

Keeping in view of huge urban market for A2 milk facilitation was made through screening and identification of A2 milch animals, thereby the milk from that animals would be marketed as A2 milk with premium price (@ Rs.100-120/ litre), thereby increase the farmers' income. A total of 500 animals were screened for A2 benefiting 284 farmers. About 15 animals were identified as A2 milch animal and the farmers are selling their milk as A2 milk in Chennai city. The farmers are getting an additional income of Rs. 85-90 per litre.

Protecting cattle from the occurrence of Mastitis (TANUVAS)

Mastitis is economically important field problem faced by the dairy farmers. In this context, TANUVAS teat protect sprays were distributed and farmers were made aware about the importance of mastitis and its control. Somatic Cell Count was made to assess the incidence of mastitis before and after usage of teat protect spray. A total of 2034 teat

Dairy Farmer using teat protect spray after milking

sprays were distributed benefiting 920 dairy farmers during the years 2016-17 to 2019-20 and 2022-23. No case of Mastitis was recorded during the usage period. As perceived by farmers, teat ulcers and inflammation have been cured by using this spray. 60 % of farmers adopted the practice of using teat protect spray after milking.

Mineral mixture supplementation to milch animals (TANUVAS)

Mineral / micronutrient deficiency among milch animals leads to infertility which increases service period, inter-calving period and poor productivity. Hence, milch animals were supplemented with mineral mixture for improving animal fertility and to increase the milk yield. A total of 7018 kgs of TANUVAS SMART mineral mixture were distributed benefiting 1292 animals. As perceived by the farmers, the supplementation of mineral mixture regularized the estrous signs of dairy cattle. Assessing the effect of supplementation of mineral mixture @ 40 g/animal/day over a period of 3 months proved that, milk production of milch animals improved by 450-480 ml/animal under normal feeding and management conditions. Revenue generated from additional milk yield was about Rs. 4100/lactation.

Dairy farmers feeding mineral mixture to cattle (TANUVAS)

Disease screening tests for Tuberculosis (TANUVAS)

Keeping in view of economic impact of Tuberculosis testing / screening was done for Tuberculosis in dairy cattle and calves in adopted villages. A total of 723 animals were screened for Tuberculosis benefiting 404 farmers.

TB-test performed at Thaneerkulam, Kilambakkam and Karayanmedu villages in cattle

4.7. Goat and Sheep

Superior goat germplasm: Tellicherry (TANUVAS)

Non-availability of superior germplasm in goats was the major problem perceived by the goat farmers. In this context, intervention was made through supply of Tellicherry goat germplasm to four farmers. Each farmer was provided with two animals each. Crossing of the Tellicherry males with the local/non-descript goats will aid in improvement of the production potential of the local goats through crossbreeding/ upgradation. A total of 8 male Tellicherry goats were distributed, thereby directly benefitting 4 farmers and other farmers located in their villages. Cross breeding of the local/non-descript goats with superior germplasm (Tellicherry males) lead to upgrade the local population and improvement of the production potential of the local goats.

Improved Goat and sheep farming (ICAR-IIMR)

Small ruminants, especially goat and sheep in the village were of local breeds. Hence, genetically superior breeds of rams were introduced to replace the local inferior breeds to improve genetic potentiality of local sheep by producing superior lambs. 237 sheep were provided to 4 SHGs in four villages which were being managed following improved management practices. On an average each SHG obtained an income of Rs. 36,900/- per annum by selling the sheep and goats.

Introduction of indigenous sheep breeds, Nellore and Deccani (ICAR-CRIDA)

To improve nutrient availability of poor households in rural areas of Vikarabad district, Telangana, low input technology sheep farming coupled with improved forage production was introduced which will supplement the income. Deccani and Nellore sheep breeds each five ewes and one doe were given to pre-trained six small farmers from Gangupally village, Pudur Mandal, Vikarabad District. In case of Deccani breed, good growth rate of 45.0-65.0 g day^{-1} of Average Daily Gain (ADG) was observed and at 12 months of selling age, 21.6% higher body weight than local breed was observed. In case of Nellore breed, a growth rate of 67.0-79.0 g day^{-1} of ADG was observed and at 12 months of selling age, 80.24% higher body weight than the local breed was observed. The nutritional status at pre-and post-intervention were also assessed which suggested protein sufficiency in the family of intervening farmers and net profit per family observed was Rs. 8097.00.

Nellore and Deccan breed sheep introduced by ICAR-CRIDA

Small ruminant/ calf's first aid kit and Nano-methicone sprays (TANUVAS)

To overcome the occurrence of wound and subsequent maggot infestations, overgrowth of hoof, which is the root cause of occurrence of lameness, small ruminant first-aid-kit was distributed among sheep and goat farmers in all the six villages. The first aid kit contains surgical scissors, thumb forceps, hoof cutter, cotton rolls, povidone iodine solution, potassium permanganate, feeding cup for drenching, fly repellant sprays and antiseptic ointments. In the absence of veternary medical facilities in rural areas, this kit is very helpful to the sheep and goat / calf farmers for first aid. A total of 206 first aid kits for small ruminants, 150 first aid kits for calves and 300 nano-methicone sprays were distributed benefitting 656 farmers.

Area specific mineral and vitamin supplementation in livestock (ICAR-CRIDA)

Minerals are required by dairy animals for their metabolic functions, growth, milk production, reproduction and health. Animals cannot synthesize minerals inside their

Goat farmer using first aid to kids at Koyambakkam village

body and usually feed and fodders fed to the dairy animals do not provide all the minerals in the required quantity. Therefore, animal should be supplemented with adequate amount of good quality mineral mixture in their ration. The level of minerals in feed and fodder varies from region to region, thus mineral availability to the animal also varies. So, it is necessary to provide region specific mineral mixture accordingly.

Area Specific Mineral Mixture supplementation was provided to all dairy cattle in Pudugurthy and Gandupally villages during initial phase of lactation for 3 months @ 50 gms per day per cattle. An improvement of 0.5 to 1.0 kg per day in milk productivity and attainment of higher peak yield of 17.6% was observed in the dairy cows.

Fodder grass for livestock (ICAR-IIOPR)

Fodder grass variety Super Napier was introduced in adult coconut / oil palm plantations to overcome non availability of sufficient fodder to live stock. Created awareness among farmers owning coconut and oil palm plantations to raise fodder as intercrop / border rows. A study tour to KVK, Venkataramannagudem and Buffalo research station, Venkataramannagudem was also organized to show various fodder crops. Demonstrated rising of fodder crop variety, Super Napier in the orchards. Farmers were provided fodder grass suckers. This technology has been adopted by 210 farmers in an area of 185 ha.

4.8. Other technologies

Introducing fish in farm ponds in coconut / oil palm cropping system (ICAR-IIOPR)

Most of the growers of coconut and oil palm are having either water harvesting ponds or farm ponds for irrigating the crop, which are unused during monsoon season. These ponds can be used for fish production. Created awareness to the farmers about rearing of fish (Catla, Rohu and Mrigala 2:7:1) ratio in the empty farm ponds. Organised study tour to Fisheries Research Station and KVK, Undi and exposed them to fish rearing practices. Farmers from adopted villages were provided with fish fingerlings to earn additional income. Fish fingerlings of 4-6 inch (Catla, Rohu and Mrigala @ 2:7:1) were released in unused farm ponds located in oil palm and coconut plantations of two adopted villages. Releasing/Introducing fish fingerlings of Catla, Rohu and Mrigal in the ratio of 2:7:1 in the unused farm ponds improved the fish production. This intervention almost doubled the income from fish production with a Benefit Cost ratio of 1.87.

Wild animal repellent (ICAR-IIMR)

With rising number of cases of wild animal menace in agriculture especially in millets, farmers are suffering huge crop damage resulting in low yield. To prevent wild animals and to increase yield, a wild animal repellent "Herboliv^{+}" solution was demonstrated in farmer's fields in villages of Sangareddy district. Demonstrations were conducted in sorghum, redgram and sugarcane involving 26 farmers. Farmers were advised to spray the solution with 15-20 days of interval on *rabi* sorghum to prevent wild boar attack. Farmers were satisfied with the intervention as this organic solution was found more effective in preventing wild boar damage and thereby, reducing heavy yield loss.

Herboliv+ spray on crops

5 Enterprise module

Enterprise-based module focuses on covering various income generating activities like, seeds and other input production, bee keeping, mushroom production, vermi-compost production, handicraft, product processing, marketing through federating farmer groups and community approach. The farmers, youth, landless and farm women were important target groups.

5.1. Establishment of Primary processing facilities of millets (ICAR-IIMR)

The main intention of this primary processing unit was to create demand for millets through value-addition using processing technologies which have to be initiated at farm level. So, a primary processing unit was established during 2017-18 with the help of NGO of Mr. Veer Shetty, Bhavani foods Pvt. Ltd. at Gangapur, Sangareddy. Advanced millet primary processing equipment like de-hullers, shifters, grader, etc., were installed for beneficiaries of near and around the area. Apart from that, trainings on value-addition of millets were organized for women at the unit.

Over the years, several skill development trainings related to value addition of millets were conducted for about 950 women to enhance yield, production and promotion of entrepreneurship on millets value-addition. Women farmers who were trained set up their own business in their villages by selling millets-based products and earning an income of about Rs. 2,00,000 per annum.

5.2. *Roti* making as small enterprise (ICAR-IIMR)

Traditionally, *roti* making from millets is a tedious process and thereby a reduction in consumption happened. The main intention of this technology intervention was to enhance livelihood opportunities with promotion of millets through entrepreneurship among the women farmers. Two *roti* making machines were introduced to two women self-help groups in Chalki and Gangapur villages during 2020-21. Method demonstrations and hands-on training was conducted on functioning of machine especially on dough

making with proper consistency and maintaining thickness of *roti*. Only raw material cost and operational expenditure need to be spent by the group members. From each unit, they were earning Rs. 26,040/- per month as net profit. They were linked with an entrepreneur to promote their business of *roti* selling in and around big cities. The profit was shared among all members of that self-help group.

5.3. Value added milk products (TANUVAS)

To promote entrepreneurial awareness through Post-Harvest Technology-value added milk products, rural youth / women / farmers were given training on value added milk product preparation by TANUVAS. They were facilitated to start enterprises on value added milk products. A total of 28 rural women were trained on value added milk product preparation and were facilitated to establish enterprises. Out of these 4 started enterprises and earning an additional income of Rs. 3060 per month

5.4. Apiculture (TANUVAS)

A capacity building programme was conducted on Apiculture at FFP village to impart knowledge on bee keeping, handling techniques and its importance in maintaining the eco-system. Interested farmers from FFP village were selected to promote bee keeping. A total of 16 apiculture units were established, thereby directly benefiting 16 farm families.

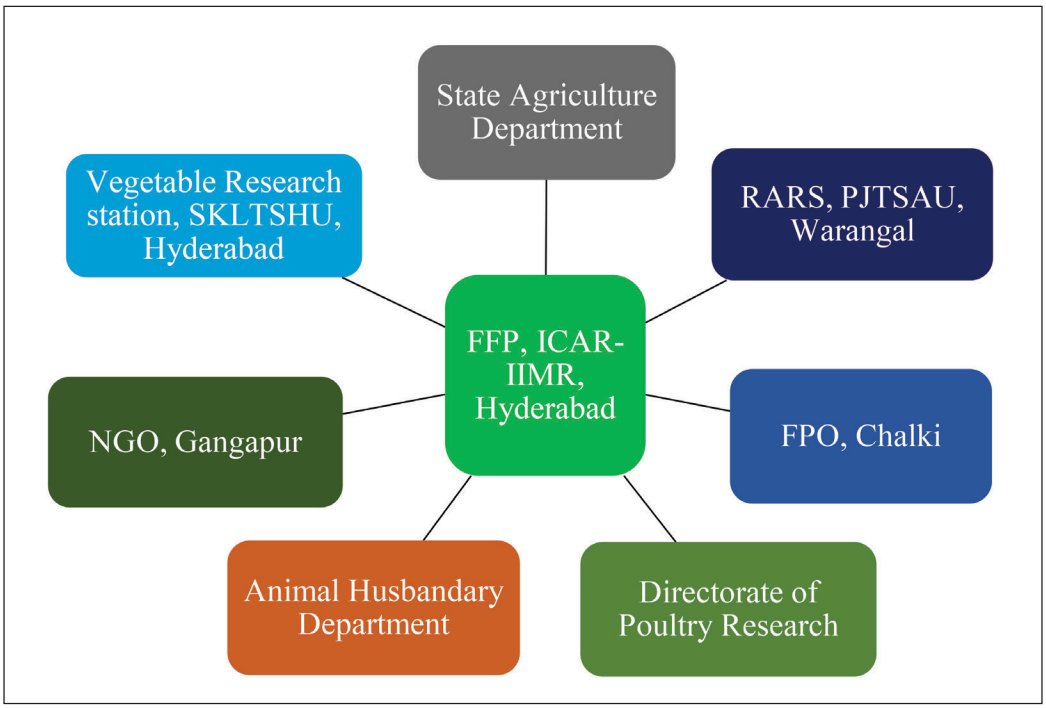
6 Partnership and Institution Building

One of the objectives of the farmers first programme is to build network of linkages of organizations around the farm households for improving access to information, technology, input and market. Institution building helps for bringing professionalism, leadership, marketing ability, organizing capability among farmers. Efforts were made by the Farmer FIRST centres to build partnerships involving different stakeholders, development of rural based institutions, agro-ecosystem and stakeholders analysis and impact studies. Different models of partnerships were developed in the project area.

ICAR-IIMR created linkages by signing MoU's with local NGO and direct contacts with local players and farmer producer organizations (FPOs) under Farmer FIRST Project (FFP). The farmers facilitated marketing of their produce. Linkages with different research institutes were also established to obtain technical inputs for crop, horticulture and livestock based modules for getting maximum profits.

The following activities were conducted by ICAR-IIMR to mobilize groups and their capacity building

- Awareness campaigns and orientation program online sowing in millets cultivation



- Orientation program on entrepreneurship development in Gangapur village on *roti* making machine and value-addition of millets.
- Created WhatsApp group with millet farmers to access needful and timely agricultural advisory from the scientists and experts.
- Provided advisory through literature on improved millet cultivation practices and processing technologies in local language, Telugu.
- SMS based timely information with respect to their problems was provided through mobile.

ICAR-CRIDA established a farmers society 'Kranti mutually aided farmer society' to develop natural resources of village, crops and cropping systems, livestock development and vegetable cultivation. Society also has facilitated input supply, mobilizing farmers for exposure visits and farmer to farmer information exchange. It also provides loans from members savings. This group was initially formed with 11 farmers, which later expanded to 80 farmers. Functions of the group include credit and thrift functions and utilization of savings for purchase of agricultural inputs, facilitation in farmers mobilization to field visits and exposure visits, facilitation of inputs flow among members for field demonstrations, Farmer to farmer extension and exchange of information and participation in training programs.

Farmer led extension model stood as testament for other farmers in adjoining villages to organize themselves into groups. A proposal about formation of another society is received which is in the process of registration under MACS Act of Telangana district cooperative department. Farmers associations with successful farmers were connected to other farmers associations and progressive farmers of the other districts. Partnerships with state line departments of Agriculture, Horticulture, Animal husbandry and marketing; PJTSAU, ICAR institutes (IIRR, DPR, IIMR, NAARM, IIOR), RFRS (DAHD), DAATTC, ATMA, DWMA, etc. were developed.

Visit to farmer society fields

ICAR-IIOPR established linkages with various government and private organizations for various activities in the adopted villages. Groups of various oil palm growers were formed for Bio mass recycling, spraying operations using high raise sprayers and harvesting of bunches. Farmers were encouraged to form groups (who are nearby in the same village) to make use of chaff cutters to make harvested fronds into pieces, to use as mulch (for weed control) and for faster decomposition through vermicompost beds. Formed 10 groups in two villages, three groups in Challachintalapudi and seven groups in Makkinavarigudem village. Farmers were encouraged to form guidelines to use chaff cutter. Organized skill demonstration of use of chaff cutter, use of chaffed material for mulching and base material for vermicomposting. Field visits were organized to demonstrate use of biomass (by using chaff cutter) for effective mulching during summer for moisture conservation, weed control and in situ decomposition of biomass. A skill demonstration was organized for organic farming.

Organizations having linkages with FFP programme of ICAR-IIOPR

Department of Horticulture, Govt. of A.P.
Dr. YSR Horticultural University, A.P.
ANGRAU, A.P.
PJTSAU, Hyderabad, TS.
Sri Venkateswara Veterinary University, A. P.
M/s. Patanjali Industries Ltd.,
M/s. Navabharat Agro-Products Pvt. Ltd. A.P.
M/s. Mondelz India Pvt. Ltd., A.P.
A. P. Micro irrigation Project, A. P.

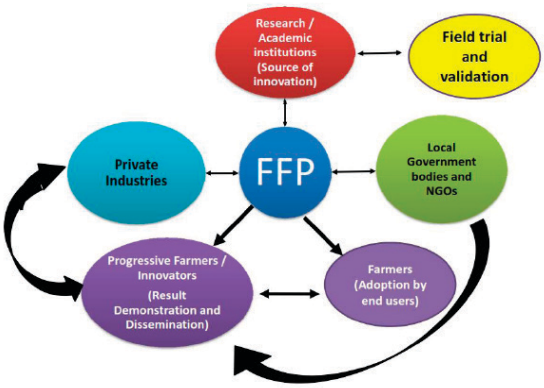
Similarly, another two groups were formed for making spraying to pest and disease management through high raised sprayer in oil palm gardens. Four power sprayers, 1 turbo sprayer, two sprayers were provided to two farmers groups in FFP villages. Skill demonstrations were organized to use sprayers, method of application, site of application and maintenance of sprayers. Six harvester groups were also formed for harvesting bunches from tall palms. One of the main challenges is harvesting of bunches from oil palm plantations, farmers and harvesters were facilitated to form groups to use harvesting tools in an effective manner. Farmers and harvesters were involved very actively in the formation of groups. Farmers of Challachintalapudi and Makkinavarigudem villages were provided with 49 aluminium poles along with sickles for harvesting purpose.

TANUVAS encouraged farmers to develop partnerships by forming into groups for using farm machinery. 35 groups (10 partners per group) in six villages were formed for using Paddy drum seeders. Similarly 6 groups (10 partners per group) were formed in six villages for using Power weeder, 50 groups (10 partners per group) in six villages for Power sprayer, 8 groups (10 partners per group) in six villages for Community hatching unit, 6 groups (5 partners per group) in six villages for Mushroom production and one group each for rotavator and power weeder.

To build the capacity of the groups as well as individual farmers several training programmes were organized and exposure visits were conducted to various institutions. Partnerships were built with the following institutions for achieving specific objectives.

Infrastructure facility for establishing office at the project site: Local Panchayat (Koyambakkamvillage)

Procurement and supply of resource materials, desi chicks, quails, incubators, swillfeeder, vaccines etc. and conduct of exposure visits: Tamil Nadu Agricultural University (TNAU), Coimbatore , Indian Institute of Horticultual Research (IIHR), Bangalore, Livestock Farm Complex (LFC), Chennai, Central Feed Technology Unit (CFTU), Kattupakkam, Post Graduate Research Institute in Animal Sciences (PGRIAS),Kattupakkam, TRPVB, TANUVAS, Chennai, Poultry Research Station (PRS), Chennai , Dept. of Veterinary Microbiology, Madras Veterinary College, Chennai, Dept. Of Veterinary Physiology, Veterinary College and Research Institute, Namakkal



Identification of farmers, Capacity building: Srinivasan Service Trust, Tiruvallur district

Supply of beehives and incubators: Amudha bee farms, Manikandan incubator manufacturers, FPO – Ekkadu Agro Service

Procurement of machineries: Marketing of milk: Co-operative societies

ICAR-IIOR facilitated one Farmer Producer Company and one women group for value addition in pulses and oilseeds. Vikarabad Farmer producer company Limited was formed for input marketing with a membership of 502 farmers. This company procures fertilizers from Telangana MarkFed and private fertilizer companies and supplies to its members at a reasonable price. This will also ensure timely availability of fertilizers.

Similarly, one women group CIG on Value Addition was formed with the assistance of ICAR-IIOR for value addition of pulses and oilseeds. Hands on training was provided to the members on the preparation of value added products of pulses and oilseeds. Currently the group is procuring raw material and performing primary processing, cleaning and packing. Packed produce is marketed for higher profit.

7 Content Mobilization

Content mobilization includes identification and pooling of available transferrable technologies with different institutions including project outcomes, preparation of knowledge models as network representation of agricultural knowledge and establishment of content management platform enabling off and online access.

ICAR-IIMR identified the following available transferable technologies for mobilization to the beneficieries.

- Quality seed of improved varieties of barnyard millet, foxtail millet and little millet were provided for farm trials.
- Seeds of improved redgram variety (WRGE 97) was taken as farm trials from Regional Agricultural Research Station, PJTSAU, Warangal, Telangana
- Management practices to maintain improved sheep breed (*Nellore*) was availed from ICAR-National Research Centre on Meat, Hyderabad
- Management practices to improved backyard poultry breed (*Vanaraja*) was taken from ICAR-Directorate of Poultry Research, Hyderabad
- Advanced de-huller was purchased from a Karnataka-based post-harvest machinery company *viz*., Bhavani Industries Pvt. Ltd., Mysuru.
- *Roti*- making machine was purchased from Hyderabad-based entrepreneur.
- Kitchen gardening kits were taken from Vegetable Research Station, SKLTSHU, Hyderabad to conduct trials under horticulture-based module.
- Animal repellent (Herbolive^{+}) was purchased from TamilNadu-based private limited company (Mivipro Products Pvt. Ltd.)

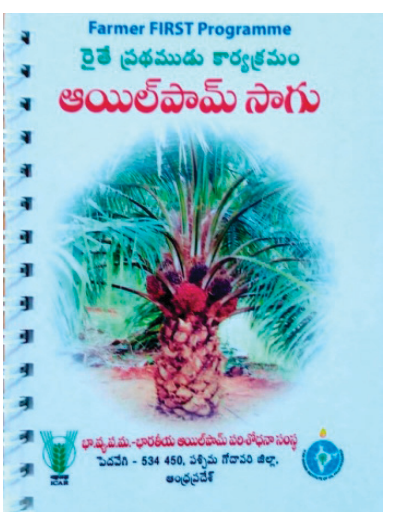
All these pooled technologies were transferred to beneficiaries under each module that gave considerable positive results where beneficiaries are willing to continue with these technologies. Books and bulletins published on the latest millet technologies in production and processing were distributed to beneficiary famers under FFP project. These were made available in languages like English and Telugu.

ICAR-CRIDA Printed the following literature in the form of brochures, bulletins, pamphlets on technologies and distributed to farmers during training and discussion forums.

- Farm machinery and implements in two languages- Hindi and English
- Horsegram – English, Hindi, Telugu languages
- Women friendly tools- English language
- Soil test based nutrient application (*Bhusaara pariksha aadharita poshakala yajmanya) Telugu*
- Soil and water conservation in rainfed areas (*Varshadharita prantalalo nela mariyu neeti samrakshana padhatulu)*
- Nutritional security through poultry. Popular article published in Indian farming
- Monthly calendar on package of practices developed.

Different extension methods adopted are Farmer to farmer, use of mass media system like WhatsApp, SMSs etc., cross-visit, meeting in the field, development of extension material, farmer to farmer exchange during farmers scientist interactions, project site meetings and interaction and preparation and distribution of literature. Establishment of trust and rapport with exposure visits and field days. Mass media contacts established**.** Award and reward systems like recognition of good work by presentation of awards on CRIDA foundation day and NAARM foundation Day

ICAR-IIOPR prepared Farmers' mobile database consisting of 1025 mobile numbers, to disseminate technologies as advisories through SMS and voice calls. WhatsApp groups were formed to inform the quantity of water to be given, precautions to be taken during summer in oil palm plantations and field visit details etc. The quantity of irrigation water to be provided in each month was communicated through WhatsApp groups. Thereby farmers were advised to provide irrigation as per the schedule and operate mobile pump starters accordingly. Monthly advisories were disseminated through WhatsApp group and provided literature. Diagnostic field visits were organized based



on the feedback received through group chats. Two farmers WhatsApp groups formed for disseminating technology/sending weather based alerts and management practices to be adopted during summer and during weather aberrations.

TANUVAS identified various available transferable technologies with different institutions which are relevant to the farmers of the project area. The content regarding technologies relevant to livestock and poultry were mobilized inhouse from Tamil Nadu Veterinary and Animal Sciences University. Other technologies related to agricultural and horticultural crops were mobilized from Tamil Nadu Agricultural University. These contents were made available to the farmers through direct visit by the scientists and farmers as well as one to one encounter during the training program/method demonstration conducted at the FFP villages. Farmers were also taken to ICAR institutes to see the technologies available and to choose the ones of their choice for introduction in the FFP villages.

ICAR-IIOR Identification and pooling of available transferrable technologies available with different institutions was carried out and enabled content management platform offline and online access. Provided leaflets, brochures in local language on Good Agricultural Practices on important crops, Soil sampling, Soil and moisture conservation techniques for enhancing the knowledge base of the farming community.

8 Way Forward

Five projects are operational in ICAR-ATARI, Hyderabad zone under Farmer FIRST programme in Telangana, Andhra Pradesh and Tamil Nadu aiming at enhancing Farmers–Scientist interface, technology assemblage, application and feedback, partnership and institutional building and content mobilization. These projects are implemented by four ICAR institutes i.e., ICAR-IIMR, ICAR-IIOPR, ICAR-IIOR and ICAR-CRIDA and one state university TANUVAS. These centres implemented various activities in the respective project area to achieve the objectives of the project as indicated in the previous chapters. Farmer scientist interface activities created cordial relations between farmers and scientists which helped in continuous exchange of ideas and better knowledge on the problems faced by the farmers. Feedback given by the farmers enabled the scientists to refine the technologies to suit the specific problem. These activities increased the confidence among the farmers about technologies which resulted in better adoption.

Technological interventions of the crops module enhanced productivity of various crops and cropping systems. Resource conservation technologies of NRM module paved way to better climate resilience by conserving soil and water. Coupled with the introduction of new varieties empowered the farmers to fight against the adversaries of climate. Small farm mechanization helped to reduce the drudgery and ensured timely operations. Interventions of animal component enhanced the farm income and improved nutritional security of the farm families. Though it was on a small scale, enterprise module helped to develop small entrepreneurs in value addition front. Partnership and Institution Building activities created linkages with various governmental and non-governmental organizations facilitating exchange of information, input flow and output marketing. Content mobilization in various modes enhanced the farmer's access to information enabling him to take correct decisions.

Farmer FIRST programme is a small initiative to encourage participation of farmers in agriculture research and extension activities which is proven to be successful. Though it is successful, the focus of the project remained on production aspects like the introduction of new varieties of crops and animals, resource management etc. Activities like marketing, value addition, entrepreneurial development, group action etc. were not included substantially. These activities need to be expanded for greater coverage and impacts. Content mobilization needs to be transformed into digital mode as most of the farmers are having access to digital devices like smart phones. Innovations of the farmers may be given more priority and studied scientifically for their validity and greater adoption. With enhanced farmer participation, farmer centric research and extension models need to be developed for large scale adoption.

भाकृअनुप-कृषि तकनीकी अनुप्रयोग अनुसंधान संस्थान (अटारी)

ICAR-Agricultural Technology Application Research Institute (ATARI)

Zone-X/क्षेत्र 10, क्रीडा परिसर/CRIDA Campus, संतोषनगर/Santoshnagar, हैदराबाद/Hyderabad - 500059

An ISO 9001:2015 Certified Institute