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Empowering Farmers through Participatory Research: Insights from the Farmer FIRST Programme

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ABSTRACT

represents a paradigm shift in agricultural research by positioning farmers as central stakeholders in the innovation process. This study explores the participatory model adopted across five ICAR institutes - ICAR-IIMR, ICAR-CRIDA, ICAR-IIOPR, TANUVAS, and ICAR-IIOR - emphasizing the co-development and validation of context-specific technologies. Through extensive farmer-scientist interface activities including trainings, field visits, and exposure programs, over 24,000 farmers were engaged in adaptive problem-solving. Empirical findings reveal significant gains in crop productivity, resource efficiency, and household incomes. Notable successes include enhanced millet yields, improved irrigation efficiency, reduced input costs, and the empowerment of women through value-addition initiatives. The participatory approach has not only bridged extension gaps but also enabled farmers to emerge as community knowledge leaders. The FFP offers a replicable model of inclusive innovation, showcasing the transformative potential of collaborative research in addressing the socio-economic and environmental challenges of smallholder agriculture in India.

Keywords: *Farmer FIRST Programme (FFP), Farmer - Scientist interface, feedback, technology dissemination, Participatory Research*

INTRODUCTION

The challenges faced by smallholder farmers are multifaceted, including limited access to resources, vulnerability to climate variability, and market instabilities. These constraints necessitate innovative agricultural practices that align with their specific needs. Acknowledging this, the Indian Council of Agricultural Research (ICAR) introduced the Farmer FIRST Programme (FFP), a pioneering initiative designed to bridge the gap between farmers and scientists. This program reorients agricultural research by placing farmers at the heart of the innovation process, facilitating a dynamic knowledge exchange and collaborative problem-solving framework [12].

Unlike traditional models focusing primarily on production metrics, FFP recognizes the socio-economic and environmental complexities faced by smallholder farmers. Through a participatory approach, emphasizes a two-way exchange: farmers contribute valuable experiential insights, while scientists deliver customized technological interventions that address local challenges [2]. This partnership fosters a robust farmer-scientist interface, enabling researchers to understand field-level conditions better and co-develop adaptive technologies that enhance productivity and resilience.

Empirical evidence underscores the program's impact. For example, studies have documented significant improvements in crop yields, resource use efficiency, and farmer incomes in regions where FFP interventions have been implemented [8].

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These outcomes demonstrate the potential of participatory agricultural research in transforming rural livelihoods and promoting sustainable farming practices.

METHODOLGY

The methodology focused on a collaborative and participatory approach involving five institutes under ICAR-ATARI, Hyderabad: ICAR-IIMR, ICAR-CRIDA, ICAR-IIOPR, TANUVAS, and ICAR-IIOR. Each institute implemented location-specific interventions aligned with the Farmer FIRST Programme in their respective regions. Participatory Rural Appraisals (PRA) and baseline surveys were conducted to assess the socio-economic conditions, resource use patterns, and challenges of farmers. The program emphasized co-developing and validating technologies with farmer involvement to address crop production, natural resource management, and livelihood diversification. Multi-stakeholder engagements, including feedback loops between farmers, scientists, and extension agents, facilitated adaptive technology refinement. Periodic impact assessments were carried out to evaluate the effectiveness of interventions, ensuring scalability and sustainability of the initiatives.

RESULTS AND DISCUSSION

Across five FFP centers under the umbrella of ICAR's Agricultural Technology Application Research Institutes (ATARIs) - namely ICAR-IIMR, ICAR-CRIDA, ICAR-IIOPR, TANUVAS, and ICAR-IIOR this collaborative model has had a profound impact.

These centers have collectively organized 944 programs, engaging 24,462 farmers in a wide range of activities, such as training sessions, awareness campaigns, field visits, animal health camps, and interface meetings.

The numbers, however, tell only part of the story. The true success lies in how these interactions have strengthened the farmer-scientist relationship, leading to a better understanding of farm challenges and the development of more targeted, effective solutions.

ICAR-IIMR conducted a total of 75 programs, engaging 3,944 farmers. These programs included various activities such as trainings, awareness campaigns, field days, and interface meetings. By organizing these initiatives, ICAR-IIMR facilitated farmer-scientist interactions, providing opportunities for knowledge exchange and capacity building. The interface meetings enabled discussions on farming practices, challenges, and potential solutions, fostering a collaborative approach to agricultural development [4].

The outcomes of these efforts were multifaceted. For example, the introduction of new millet varieties and enhanced crop management practices in Telangana led to a 20-25% increase in millet yields. Interventions such as kitchen gardening significantly improved household food security, while organic wild animal repellents reduced crop losses by 15-20%. Additionally, the establishment of a primary millet processing unit empowered women farmers, allowing them to produce and market value-added millet-based products, which increased household income by ₹5,000–7,000 annually [8]. These initiatives demonstrated the effectiveness of participatory agricultural research in addressing rural challenges.

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

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	13	563	22	1350	18	873	6	202	264	3147	323	6135
Field Visits	25	1023	25	1157	198	2436	35	356	17	643	300	5615
Awareness Campaigns	15	1356	17	1010	26	840	11	497	38	408	107	4111
Exposure Visits	3	152	19	1070	6	93	5	99	14	556	47	1970
Training Programmes	17	650	38	1750	11	401	23	879	37	787	126	4467
Others extension activities	2	200	2	100	30	1658	3	101	4	105	41	2164
Total	**75**	**3944**	**123**	**6437**	**289**	**6301**	**83**	**2134**	**374**	**5646**	**944**	**24462**

ICAR-CRIDA organized 123 programs involving 6,437 farmers. These initiatives included trainings, awareness campaigns, and interface meetings aimed at addressing challenges in natural resource management, livestock, and horticulture. Through these programs, farmers were able to discuss their challenges and collaborate with scientific experts to co-develop solutions. Field visits to selected plots fostered a strong farmer-scientist relationship, facilitating the continuous exchange of ideas and resources for the development of appropriate technologies [3]. A notable intervention was the construction of gabion check dams, which reduced water runoff velocity and enhanced groundwater recharge. These structures stored 60% of rainwater, raising the water table in adjacent wells by 0.6 meters on average, thereby mitigating the impacts of water scarcity in drought-prone areas [11].

ICAR-IIOPR conducted a total of 289 programs with the participation of 6,301 farmers. These programs included trainings, awareness campaigns, and field visits that enriched technical knowledge and facilitated the implementation of various technological interventions. A prominent outcome was the adoption of biomass recycling in oil palm cultivation, where chaffed oil palm fronds were used for mulching and vermicomposting. This practice enhanced soil moisture retention and reduced inorganic fertilizer requirements by 25-30%. Weather-based irrigation scheduling saved farmers approximately 40,000–45,000 liters of water per hectare daily and reduced electricity consumption by 3-4 hours per day. Additionally, mechanized harvesting improved labor efficiency, reducing harvesting time by 50% and operational costs by ₹2,873 per hectare annually [5].

TANUVAS implemented 83 programs involving 2,134 farmers, covering activities such as veterinary health camps, interface meetings, and training programs. These initiatives promoted knowledge sharing and skill development in agriculture, animal husbandry, horticulture, and allied sectors. Improved poultry strains like Aseel and Kadaknath achieved near-zero mortality (0-0.5%) and boosted egg production to 85-90 eggs per bird annually, generating ₹900 per bird in income. In livestock, mineral supplementation for milch animals increased milk production by 450-480 ml per animal daily, contributing an additional ₹4,100 per lactation. In crops, bio-fertilizer use in black gram and green gram reduced fertilizer costs by ₹2,090 per acre, while Bhindi Hybrid Co 4 increased yields to 4,500 kg/acre, raising income by ₹5,000 per acre [14].

ICAR-IIOR conducted 374 programs with 5,646 farmers, focusing on customized solutions and technological advancements. The introduction of rice variety KNM 118, a non-shattering cultivar, mitigated yield loss due to shattering, resulting in a 10-12% productivity increase. Soil test-based integrated nutrient management improved rabi groundnut yields from 10.65 q/ha to 16.60 q/ha, adding ₹43,584/ha in net returns across 254 hectares. Similarly, the adoption of Rajasri poultry birds improved household nutrition and provided an additional monthly income of ₹280 per family through increased egg production [10].

These interface activities created a strong farmer-scientist bond for continuous exchange of ideas and better knowledge of 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.

Success Stories: Empowering Farmers, Transforming Communities

Beyond the statistics, the true measure of FFP's success is seen in the lives it has transformed. Farmers who once struggled with outdated practices have now become champions of innovation in their communities. Many have adopted new technologies that have increased their crop yields, reduced input costs, and boosted their incomes. For example, farmers trained through FFP have embraced sustainable farming techniques, such as water conservation methods and integrated pest management, leading to healthier crops and improved resilience against climate variability.

One of the most remarkable aspects of FFP is its ability to empower farmers as technology agents. Farmers who have shown exceptional innovation in their fields are being groomed to become local leaders, sharing their knowledge and expertise with their peers. This farmer-to-farmer knowledge transfer is a key element in the program's scaling strategy, ensuring that the benefits of FFP reach a wider audience.

Bridging the Extension Gaps: A Participatory Approach

The farmer-scientist interface activities conducted under FFP have been instrumental in identifying extension gaps in existing agricultural practices. By adopting a participatory approach, where farmers are involved in research problem identification, prioritization, and experiment management, these gaps have been addressed with customized interventions. The result is a more dynamic and adaptive research process that not only solves immediate challenges but also builds long-term capacity among farmers.

A Future of Collaborative Growth

The Farmer FIRST Programme has demonstrated the power of collaboration between farmers and scientists in enhancing agricultural productivity and sustainability. By nurturing this bond, the program has not only helped refine agricultural technologies but has also empowered farmers to become active participants in the research process. As the program continues to grow, its impact is likely to extend far beyond the current numbers, transforming smallholder agriculture in India and paving the way for a more resilient and prosperous farming community.

In a world where agricultural challenges are becoming increasingly complex, the Farmer FIRST Programme stands as a beacon of hope, proving that the best solutions come from working hand in hand with those who know the land best - the farmers themselves.

CONCLUSION

The Farmer FIRST Programme (FFP) has demonstrated the critical importance of fostering a strong farmer-scientist interface to address the multifaceted challenges faced by smallholder farmers. By placing farmers at the center of agricultural research and promoting a two-way exchange of knowledge, the program has successfully integrated cutting-edge technologies with practical field experience. This collaborative approach has not only improved agricultural productivity but also empowered farmers to become active participants in the research process. The initiative has bridged extension gaps, refined technologies through farmer feedback, and contributed to sustainable agricultural practices. Overall, the FFP serves as a model for future efforts to enhance resilience and innovation in smallholder agriculture.

CONFLICTS OF INTEREST: All authors declare that they have no Conflict of interest.

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