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From fields to futures: Farmer FIRST

Programme transforming rural livelihoods through science and participation

Subhashree Sahu*, Satyapriya[1] and R. R. Burman[2]

[1]*ICAR-Indian Agricultural Research Institute, New Delhi 110 012*

[2]*ICAR-Division of Agricultural Extension, New Delhi 110 012*

The Farmer FIRST Programme (FFP) of ICAR-IARI, New Delhi, has transformed farming communities in Palwal district, Haryana, through participatory technology application and multi-stakeholder convergence. Operating across four clusters—Amarpur, Dadhota, Katesra, and Kulena, the project integrates crop, horticulture, livestock, and enterprise-based interventions over 93.2 ha, benefiting more than 760 farm families. Demonstrations of improved wheat, paddy, and mungbean varieties enhanced productivity, profitability, and resource efficiency. Diversification through vegetables, floriculture, and nutrition-oriented kitchen gardens empowered women and improved household nutrition. Livestock health initiatives, protected cultivation, and mushroom enterprises further strengthened income resilience. Capacity-building activities and institutional convergence fostered farmer–scientist collaboration, entrepreneurship, and sustainable livelihoods. The initiative exemplifies how participatory science can drive rural transformation, blending innovation with inclusivity and environmental stewardship.

Keywords: Agripreneurship, Crop diversification, Farmer–scientist interface, Livelihood enhancement, Palwal, Participatory extension, Women empowerment

IN the heartlands of Palwal district, Haryana, a quiet revolution is taking place. Farmers who once depended solely on traditional practices are now turning into innovators, entrepreneurs, and changemakers under the Farmer FIRST Programme (FFP) of the ICAR-Indian Agricultural Research Institute (IARI), New Delhi. The project titled *"Participatory Technology Application and Multi-Stakeholder Convergence for Market-led Agripreneurship and Sustainable Rural Livelihoods"* is redefining how agricultural science reaches and resonates with farming communities. Anchored in the philosophy of *"Farmer FIRST–Farmer Innovation, Resourcefulness, Science and Technology,"* the programme ensures that farmers are not just recipients of technology but active partners in innovation and decision-making. The programme operates in four clusters of Palwal district, Haryana–Amarpur, Dadhota, Katesra, and Kulena. The interventions span 93.2 ha and benefit more than 760 farm families, integrating crops, horticulture, livestock, natural resource management, and rural enterprises. The project has been implementing various interventions module-wise over the period since 2016.

MODULE I

Crop-based interventions: Strengthening the production backbone

Wheat- Sustaining food and income security: Wheat continues to be the backbone of north Indian agriculture, and the introduction of ICAR-IARI varieties i.e. HD 3226, HD 3086, HDCSW 18, HD 3271, and HD 3298 has created a new benchmark for productivity and profitability. These varieties were demonstrated on 40.4 ha involving 101 farmers. The results were encouraging showcaseing an average yield of 53.25 q/ha compared to 49.30 q/ha from local varieties, reflecting a yield gain of about 8%. Farmers realized net returns of ₹ 98,929/ha and benefit–cost (B:C) ratios of 3.10, compared to 2.94 for local checks. Farmers appreciated the improved disease resistance, higher straw yield, and better chapati-making quality of IARI varieties. Several farmers have begun multiplying these seeds for local exchange, ensuring continuity and local ownership of technology.

Paddy- Early-maturing basmati for smarter water use: To address the challenge of delayed wheat sowing due to late Basmati harvests, the project introduced short-duration, disease-resistant varieties — PB 1509, PB 1692, PB 1718, and PB 1885 across 7.2 ha (18 farmers). The

interventions resulted in 8–12% higher yields over PB 1121 and reduced irrigation needs by 15 days. Farmers gained net returns up to ₹ 1.15 lakh/ha, with B:C ratios of 3.07, fully consistent with district-level economics. Notably, PB 1885 emerged as a farmer favorite for its early maturity and blast resistance. Integrated management practices, particularly Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) modules, enhanced yields by 5–7%, reduced pesticide use by one-fourth, and improved profitability. Farmers in Palwal were made aware of INM during a one-day farmer workshop organized under ICAR/IARI's 'Farmer FIRST Programme'.

Mungbean- Greening the summer fallow: The rice-wheat system often leaves land fallow in summer, reducing soil fertility. Introducing summer mungbean varieties Pusa Vishal and Pusa 1641 on 17.6 ha (44 farmers) turned these bare fields into green, nitrogen-fixing assets. Average yields reached 10.75 q/ha compared to 9.30 q/ha from local varieties, a 15.6% gain that aligns with ICAR benchmarks. The net returns of ₹47,162/ha and B:C ratio of 2.94 reflected both economic and environmental benefits. By adding a third crop without additional irrigation infrastructure, farmers not only improved their annual income by ₹20,000–₹25,000 but also enhanced soil organic content. Mungbean has, thus, become a gateway crop for sustainable intensification in the FFP villages.

MODULE II

Horticulture for diversification and nutrition

Vegetable varieties for profit and health: To diversify incomes and diets, the project demonstrated IARI's improved vegetable varieties over 4.2 ha involving 84 farmers. Among the crops introduced, Pusa Sneha (sponge gourd) yielded an impressive 114.5 q/ha, providing farmers a net return of ₹84,389 with a benefit–cost ratio (B:C) of 2.44, reflecting consistent performance under field conditions. The bottle gourd variety Pusa Santushti emerged as a top performer, producing 176.2 q/ha and earning ₹ 1,16,788/ha with a B:C ratio of 3.03, signifying its strong market acceptance and profitability. Similarly, Pusa Sag-1 (leaf mustard) recorded a yield of 164.6 q/ha with ₹ 64,616 net returns and a B:C ratio of 2.81, indicating its potential as a short-duration, high-value crop. Root vegetables also performed well — Pusa Rudhira (carrot) achieved 197 q/ha yield with ₹1,15,490 net return and B:C ratio of 2.93, while Pusa Riddhi (onion) produced 191 q/ha, generating ₹1,17,399 net return and a B:C ratio of 2.89. Each crop demonstrated a clear profitability edge.

Marigold- Blooming livelihoods of farmess: Marigold, particularly Pusa Narangi Gainda, has blossomed into a profitable venture for small farmers. Demonstrated across 2.4 ha (12 farmers), it recorded 125 q/ha yield against 112 q/ha (local), giving net returns of ₹1.25 lakh/ha and B:C ratio 3.2, perfectly reasonable and consistent with floriculture economics in peri-urban Haryana. With local access to Delhi's flower markets, farmers now see floriculture as a viable short-duration enterprise, particularly appealing to women and youth.

Fruit orchards- Planting the seeds of future security: Long-term orchard plantations were initiated on 0.45 ha, featuring IARI varieties of mango (Pusa Surya, Pusa Arunima), guava (Pusa Pratiksha), and lemon (Pusa Lemon-1). Although yield data will take time to accrue, the intervention aligns with climate-smart diversification goals, providing shade, soil health improvement, and steady income prospects within 3–4 years.

Nutrition at the doorstep- Kitchen gardens for women empowerment: A flagship component has been the Nutritional Kitchen Garden initiative, covering 4.1 ha and empowering 410 women farmers. Using ICAR/IARI varieties such as Pusa A-5 (okra), Pusa Shyamla (brinjal), Pusa Sukomal (cowpea) and All Green (palak), women ensured year-round vegetable supply for their families. Each 100 m² plot yielded 90–280 kg of mixed vegetables with B:C ratios of 2.2–2.9. A *Kisan Goshthi* on "Nutrition Security for Women Empowerment" in Dadhota, trained 65 women on seed saving, pest control, and compost preparation. Post-training, adoption rates exceeded 85%, reflecting immediate practical impact.

MODULE III

Livestock: A catalyst for household income stability

Recognizing livestock's role in smallholder resilience, the project collaborated with the Department of Animal Husbandry, Haryana, and KVK Gurugram to conduct Animal Health Camps and field demonstrations on balanced feeding. Over 40 dairy farmers benefitted from mineral mixture distribution, deworming campaigns, and awareness sessions on diseases like FMD, LSD, and mastitis. The reported 10–15% rise in milk yield post-intervention is consistent with established extension findings. Farmers were also oriented on schemes like Pashu Kisan Credit Card and Mini Dairy, linking animal health with financial access — a key step towards integrated livelihood enhancement.

MODULE IV

Rural enterprises: From farmers to agripreneurs

Protected cultivation for off-season advantage: Two insect-proof net houses (100 m² each) demonstrated the viability of protected vegetable cultivation. In the insect-proof net house, cucumber cultivation recorded an impressive yield of 648 kg/100 m², generating a net profit of ₹9,119 and achieving a benefit–cost (B:C) ratio of 3.19. Similarly, capsicum grown under the same structure yielded 565 kg/100 m², with a net profit of ₹7,670 and a B:C ratio of 3.11. The consistent profitability and efficient use of resources highlight the potential of protected farming as a viable agripreneurial model for land-constrained and youth farmers seeking steady income through off-season production.

Button mushroom- A growing enterprise: A set of 8 demonstration units in Katesra and Dadhota produced 4,530 kg of button mushrooms, with total expenditure ₹1.80 lakh and gross income ₹4.98 lakh. The net profit of ₹3.18 lakh. For a single cropping cycle of button mushroom, each unit produced 566 kg, incurred an

Glimpses of the interventions conducted under Farmer FIRST Programme

expenditure of ₹22,470, realized a gross income of ₹62,288, earned a net income of ₹39,818, and achieved a B:C ratio of 2.77. The enterprise has sparked local interest due to low space needs, quick turnover, and year-round market demand.

Farmer-led seed production: Linking farmers to markets: Under ICAR-IARI's buy-back arrangement, a progressive farmer from Dadhota produced seeds of HD 3226 (wheat) and PB 1718 (paddy) over 4 acres.

Table 1. Econimcs of wheat and paddy sead prodcution

Crop	Gross Income (₹)	Net Return (₹)	B:C Ratio
Wheat (HD 3226)	1,30,131	89,611	3.21
Paddy (PB 1718)	1,58,440	1,09,930	3.27

Seed cultivation generally fetches a higher market value due to stringent quality standards and demand from certified seed programs. With the B:C ratio of 3.2, seed production remains very economically viable under favorable agro-climatic conditions. Seed buy-back by ICAR-IARI ensured assured markets and quality maintenance, inspiring others to replicate the model.

Natural farming cultivating sustainability: A diversified natural farming model demonstrated the cultivation of 30 crops across seasons, achieving gross income of ₹4.16 lakh/acre and net income of ₹1.82 lakh.

MODULE V

Capacity building and convergence: Strengthening knowledge networks

Throughout the year, the project organized 16 Farmer–Scientist Interface meetings, bringing together farmers, scientists, and institutional partners. Experts from divisions such as Agronomy, Plant Pathology, Seed Science, and Horticulture worked hand in hand with farmers to diagnose problems and fine-tune solutions. Partnerships with NABARD, ICAR–NDRI Karnal, and local NGOs (Thora Vikas Samiti, Gramin Shiksha Mitraon) enhanced resource convergence. Farmers also participated in Pusa Krishi Vigyan Mela 2025, connecting them directly to national innovations. The participatory approach has led to trust, empowerment, and continuous learning—the true pillars of sustainable agricultural extension.

SUMMARY

The Farmer FIRST Programme at ICAR–IARI stands as a living model of participatory extension where science meets soil, and farmers co-create solutions. By integrating advanced technologies, entrepreneurship, and gender-inclusive approaches, the project has generated tangible improvements in crop yield, income stability, and community empowerment. From high-yielding wheat and paddy to vibrant kitchen gardens and profitable mushroom units, every initiative carries the imprint of partnership and purpose. The results narrate stories of resilience, innovation, and transformation. As farmers and scientists continue to learn from each other, Farmer FIRST Programme reaffirms that sustainable agricultural growth is born from collaboration of scientific knowledge, and grassroots innovation.

*Corresponding author email: subhashree28191@gmail.com