SOIL HEALTH TO FARMER WEALTH: IMPACT OF THE FARMER FIRST PROGRAMME IN MADHYA PRADESH

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The Farmer FIRST Programme (FFP), launched by the Indian Council of Agricultural Research (ICAR) in 2016, aims to enhance farmers' livelihoods in India through location-specific solutions developed out of a participatory technology development approach. By blending scientific innovations with farmers' knowledge, the programme has shown notable success over time, as reported from various regions across the country.

The FFP is structured around eight thematic modules, one of which focuses specifically on Natural Resource Management (NRM). This module emphasizes the sustainable use and conservation of critical land resources- on soil, water, and biodiversity- which are essential for crop production, with the goal of improving long-term farm productivity and soil health.

Healthy soil is the foundation of sustainable agriculture, as it is more resilient to climate stresses and supports crop growth by enhancing nutrient availability, improving water retention, and stimulating microbial activity in soil. Also, healthy soils reduce dependence on chemicals like fertilizers and pesticides. Over time, these benefits translate into higher profitability, lower production risks, and greater sustainability, effectively transforming *soil health into farmer wealth*.

This article presents an overview of the NR- based on-farm interventions adopted by FFP farmers under the guidance of ICAR-Indian Institute of Soil Science in the Bhopal district, Madhya Pradesh, during the period 2017-18 to 2022-23.

PROBLEMS AND INTERVENTIONS

An initial survey in the project location showed that livelihood of about three-fourth of the population solely depends on farming. A significant majority of them were small (1–2 ha) and marginal (≤1 ha) landholders. While crop rotation was widely practiced, only a small number of farmers had adopted mixed/multi-storeyed cropping systems. Due to a poor on-farm resource base, most farms relied heavily on off-farm inputs. Adoption of sustainable land management practices such as minimum tillage, cover cropping, and mulching was minimal, as most farmers were unfamiliar with these

techniques. Management of pests and diseases was predominantly chemical based, with limited use of alternative methods.

In general, the survey identified poor soil health—caused by excessive tillage, crop residue burning, and imbalanced fertilizer use—as a major factor contributing to the declining state of agriculture in the area. These unsustainable practices led to low yields and reduced profitability, particularly in the dominant soybean–wheat cropping system. To address these issues, a series of on-farm interventions were implemented under the programme. These included:

- Reduced tillage to conserve fuel and preserve soil structure
- Residue retention to prevent nutrient loss and enhance soil organic matter (Figure 1),
- Soil-test-based nutrient application for balanced crop nutrition,
- On-farm resource recycling through composting (Figure 2) and mulching,
- Introduction of high-yielding varieties of soybean and wheat, and
- Promotion of integrated pest and disease management practices.

Figure 1. Demonstration of reduced tillage: sowing of soybean seeds in fields retained with crop stubbles.

Farmers under the programme were actively engaged through field demonstrations (Figure 1 and 2), hands-on training, and exposure visits, which helped them to overcome initial resistance and significantly improved the adoption of these sustainable agricultural practices.

Figure 2. Demonstration of (a) in-situ management of crop residue through microbial based decomposers (b) recycling farm waste to compost in portable vermibeds

PRODUCTIVITY AND PROFITABILITY

The soybean–wheat system under project intervention consistently outperformed the farmers' practice 9in terms of system yield) throughout the seven-year period. The yield advantage under intervention ranged from 2.77 to 5.48 q ha^{-1}, demonstrating the positive impact of sustainable, resource-conserving technologies on crop productivity. The highest system yield under intervention (43.82 q ha^{-1}) was recorded in 2019–20, while the peak yield under farmers' practice (39.75 q ha^{-1}) occurred in 2018–19. Although both systems experienced some fluctuations during the project period, the intervention yields remained relatively stable around 42–43 q ha^{-1} in recent years, indicating greater resilience. This stability suggests that the improved practices such as reduced tillage, crop residue retention, and soil-test-based nutrient management cumulatively enhanced system productivity. These results highlight the potential for scaling these practices to improve agricultural efficiency and profitability in the region.

Alongside higher yields, the comparative analysis of cost of cultivation and net income from the soybean–wheat cropping system over the project period reveals clear economic advantages of the intervention. The cost of cultivation under the intervention remained consistently lower by 12 to 16 percent compared to farmers' practice. This reduction in cost contributed to a 28 to 30 percent higher net income under the intervention than that achieved through traditional practices.

Figure 3. A view of the (a) soybean and (b) wheat crop in the farmer fields of the project area

These results demonstrate that adoption of sustainable agricultural practices such as reduced tillage, crop residue retention, and soil-test-based nutrient management not only reduces production costs but also enhances income and economic resilience. This underscores the potential of such interventions to improve farm profitability and promote long-term sustainability in the region.

CONCLUSION

The Farmer FIRST Programme interventions in Bhopal district have clearly demonstrated that sustainable practices such as reduced tillage, residue retention, and soil-test-based nutrient management can significantly enhance crop productivity, lower cultivation costs, and increase net farm income. The consistent gains in yield and income over the farmer practice underscore the potential of resource-conserving technologies to build resilient and profitable farming systems.

To replicate this success, these land management interventions should be scaled up across similar agro-ecological regions through sustained farmer engagement, hands-on training, and effective convergence with government schemes. This calls for supportive policies that promote participatory approaches and site-specific interventions, with soil health as the central pillar. Key priorities should include strengthening soil testing infrastructure, promoting on-farm resource recycling, and investing in farmer capacity building. Integrating soil health into broader frameworks for climate resilience and agricultural productivity is essential to realizing the vision of *"Soil Health to Farmer Wealth."*

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