*Original Research Article*

Voices from the sidelines: Constraints and Suggestions of non-participant farmers of soybean Digital Farmer Field Schools

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ABSTRACT

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| Soybean (Glycine max L.), known as the "golden bean," is a vital oilseed and pulse crop with significant economic and nutritional value in India and worldwide. Despite technological advancements and the introduction of digital extension models like the Digital Farmer Field School (DFFS), many soybean farmers in Maharashtra remain non-participants, facing persistent production and market challenges. This study, conducted in Ahilyanagar district using an ex-post facto research design, explores the constraints and suggestions of non-participant soybean farmers regarding DFFS. Data were collected from 150 respondents (75 participants and 75 non-participants) through personal interviews during 2023-2024. Results revealed that non-participants primarily struggled with the unavailability of quality seeds, price fluctuations, labor shortages, limited credit access, and inadequate input subsidies. Key suggestions included timely supply of genuine seeds, reasonable purchase prices, accessible credit, subsidized fertilizers, and practical training on pesticide use. The findings highlight the need for integrated seed systems, enhanced price support, streamlined credit, targeted subsidies, and comprehensive training to bridge the gap between participant and non-participant farmers. These insights provide actionable recommendations for policymakers and extension agencies to foster inclusive, sustainable soybean cultivation in Maharashtra. |

***Keywords****: Soybean, Digital Farmer Field School (DFFS), non-participant farmers, constraints, suggestions, seed quality, price support, credit access, input subsidies, policy recommendations*

1. **INTRODUCTION**

Soybean (*Glycine max* L.), often referred to as the "golden bean," is a globally significant oilseed and pulse crop, recognized for its high protein content and vital role in food, feed, and industrial sectors (Pachpute et al., 2023). Over the past decades, global soybean production has expanded remarkably, reaching an estimated 371.18 million tonnes from 136.91 million hectares in 2023 (Agricultural Market Intelligence Centre, PJTAU, 2025). Brazil leads global production with 152.14 million tonnes, followed by the United States (113.34 million tonnes), Argentina (25.04 million tonnes), China (19.50 million tonnes), and India (14.98 million tonnes), accounting for 41%, 31%, 7%, 5%, and 4% of world production, respectively (Agricultural Market Intelligence Centre, PJTAU, 2025).

In India, soybean is primarily cultivated in Madhya Pradesh, Maharashtra, and Rajasthan, with Maharashtra being a key contributor. The area under soybean in India during 2023-24 was about 118.32 lakh hectares, producing approximately 126 lakh tonnes, with Maharashtra accounting for 45 lakh hectares and an estimated 50.17 lakh tonnes in the current kharif season (Economic Times, 2024). However, recent trends indicate a decline in soybean cultivation area in Maharashtra, projected to decrease by two lakh hectares in 2024-25 due to poor returns, market instability, and policy challenges (Times of India, 2025).

Despite its economic importance, soybean production in India and Maharashtra faces several constraints. Key production challenges include erratic and insufficient rainfall, limited irrigation facilities, high input costs (especially fertilizers and plant protection chemicals), and labor shortages (Channe & Maurya, 2023). Agro-ecological factors, particularly rainfall variability, have been identified as the most limiting factor, followed by unsuitable weather and inadequate irrigation (Singh et al., 2022). Technological constraints such as non-availability of quality seeds, timely access to fertilizers, and difficulties in pest and disease management further hinder productivity (Channe & Maurya, 2023). Economic and market-related issues, including low and unstable market prices, delays in procurement at the minimum support price (MSP), and unauthorized deductions during marketing, exacerbate farmer distress (Economic Times, 2025).

Addressing these constraints is crucial for enhancing soybean productivity and ensuring the sustainability of soybean-based livelihoods in India and Maharashtra. Strategic interventions focusing on improved irrigation, timely input delivery, better price realization, and farmer training on advanced cultivation practices are essential for overcoming these persistent challenges (Jaybhay et al., 2017).

The transition from traditional Farmer Field Schools (FFS) to Digital Farmer Field Schools (DFFS) represents a significant evolution in agricultural extension and education. While FFS has long empowered farmers through participatory, experiential learning in a group setting, its reach has often been limited by logistical, financial, and geographic constraints (Davis et al., 2012; FAO, 2016). The integration of digital technologies into the FFS framework addresses these limitations by leveraging mobile applications, online platforms, and social media to extend knowledge dissemination and real-time support to a broader audience (Lwasa et al., 2021). This digital transformation not only enhances accessibility and scalability but also enables timely, data-driven decision-making, collective problem-solving, and continuous engagement among farmers and experts. As a result, DFFS holds the promise of making agricultural education more inclusive, efficient, and impactful, particularly in resource-constrained and remote areas, thereby supporting sustainable agricultural development in the digital age.

The **Digital Sheti Shaala (Digital Farmers Field School, DFFS)**, launched by PAANI Foundation in Maharashtra, represents a pioneering, farmer-centric initiative designed to bridge the knowledge gap in sustainable agriculture through digital means. Developed in collaboration with Mahatma Phule Krishi Vidyapeeth and other State Agricultural Universities, the DFFS provides comprehensive, scientifically vetted training on soybean and multiple other crops via weekly videos, interactive live sessions, and real-time Q&A platforms. By leveraging WhatsApp groups and YouTube, the program ensures wide accessibility and direct engagement with agricultural experts. In 2023-24, nearly 35,000 farmers across 3,027 groups in 18 districts actively participated, collectively adopting best practices and standard operating procedures tailored to local needs. The DFFS emphasizes collective action, social inclusion, and the use of modern technology to empower farmers, reduce cultivation costs, and address the significant yield gap between Indian and global soybean producers, ultimately aiming to transform rural livelihoods and agricultural sustainability in Maharashtra.

Despite the widespread reach and positive impact of the Digital Farmers Field School (DFFS) initiative, a significant proportion of soybean farmers in Ahilyanagar, Maharashtra remain non-participants. These non-participant farmers often face persistent constraints in soybean production, such as limited access to the latest scientific knowledge, inadequate exposure to best practices, and a lack of timely, expert advisory support. In contrast, farmers who participated in the DFFS benefited from structured training modules, real-time interactions with agricultural experts, and access to meticulously developed standard operating procedures for soybean cultivation. This direct engagement enabled participant farmers to adopt improved agronomic practices, address challenges promptly, and enhance their productivity. Consequently, the disparity in access to information and advisory services has contributed to a noticeable gap in soybean production outcomes between participant and non-participant farmers, underscoring the importance of inclusive and accessible agricultural extension programs.

# METHODOLOGY

The present study investigates the “**Voices from The Sidelines: Constraints and Suggestions of Non-Participant Farmers of Soybean Digital Farmer Field Schools”** using an ex-post facto research design, as the researcher has no control over the independent variables, which have already occurred. The methodological procedure consisted identification of the problem, research design, sources of data, area of study, sampling procedure, selection and measurement of variables, tools and methods of data collection and statistical framework for analysis of data. The study was conducted in 3 talukas viz. Ahilyanagar, Sangamner and Parner were selected purposely for the present study, which are located in Ahilyanagar district of Maharashtra state. Suitable and appropriate tools were used for the measurement in light of the derived objective. In total 150 respondents (75 participant and 75 non-participant farmers) were selected for present study. The data were collected through personal interview and then after it is compiled, tabulated and analyzed to get proper answer for the specific objectives of the study with the help of various appropriate statistical tools.

The present investigation was based on the primary data. The data on various aspects of the study were collected from personal interviewed with the help of specially designed scheduled. The data pertains to the year 2023-2024.

# RESULT AND DISCUSSION

**3.1 Constraints faced by non-participant farmers of DFFS in soybean cultivation.**

The Table 1 reveal the analysis of constraints encountered by non-participant farmers of the DFFS in soybean cultivation reveals several significant challenges that hinder productivity and profitability. The most pressing issue identified was the unavailability of good quality seeds at reasonable prices, which impacted 68.00 per cent of the surveyed farmers. This shortage not only limits yield potential but also affects the overall viability of soybean farming for these producers. Another major constraint was the volatility of soybean prices in the domestic market, affecting 62.67 per cent of farmers. Such price fluctuations introduce uncertainty and risk, making it difficult for farmers to plan and invest confidently in their operations. Labour shortages, coupled with increased wages during peak agricultural periods, were reported by 56.00 per cent of respondents, further complicating timely and efficient farm management. Access to financial resources also posed a considerable barrier, with 53.33 per cent of farmers experiencing a lack of timely credit facilities. This limitation restricts their ability to purchase essential inputs and invest in improved cultivation practices. The unavailability of subsidized inorganic fertilizers was another notable issue, affecting 49.33 per cent of the farmers and potentially limiting crop nutrition and yields. Additionally, 45.33 per cent of the farmers faced difficulties in accurately calculating pesticide doses, raising concerns about both crop protection and environmental safety. A further 25.33 per cent of respondents indicated limited knowledge of or access to biocontrol agents, highlighting a gap in the adoption of sustainable pest management practices. Collectively, these findings underscore a range of interrelated constraints—spanning input availability, market dynamics, labour, credit, and technical knowledge—that non-participant farmers must navigate. Addressing these issues is crucial for enhancing the productivity and sustainability of soybean cultivation among this group.

The constraints as observed in present investigation was also reported by Namita (2020), Swapnali (2021) and Mayuri (2022).

Furthermore, the findings of this study underscore the need for targeted research and development initiatives. By undertaking such activities, it may be possible to mitigate the difficulties experienced by the non-participants. This approach could lead to more effective solutions and improved outcomes for the farmers involved in soybean cultivation.

**Table 1 Constraints faced by the non-participant farmers of DFFS in soybean cultivation.**

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| **Sr. No.** | **Constraints** | **Frequency** | **Percentage** |
| 1. | Unavailability of good quality seed at reasonable price. | 51 | 68.00 |
| 2. | Price fluctuation of soybean in domestic market. | 47 | 62.67 |
| 3. | Shortage of labour and higher wages during peak periods. | 42 | 56.00 |
| 4. | Lack of credit facilities at time. | 40 | 53.33 |
| 5. | Unavailability of inorganic fertilizers at subsidized rates. | 37 | 49.33 |
| 6. | Difficulty in calculating the pesticide doses. | 34 | 45.33 |
| 7. | Unavailability of biocontrol agents. | 19 | 25.33 |

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**Fig 1 Distribution of the constraints faced by non-participant farmers of DFFS**

**3.2 Suggestions given by non-participant farmers of DFFS.**

Table 2 reveals, that the most prominent suggestion endorsed by 62.67 per cent of non-participants, was to ensure the timely supply of genuine seed varieties at reasonable rates. This was closely followed by 57.33 per cent of farmers advocating for the government to announce reasonable purchase prices for soybean. Additionally, 54.67 per cent of the surveyed farmers emphasized the need for timely and sufficient credit from banks and cooperative institutions at low interest rates. The similar suggestions are reported by Malik and Pazir (2023) and Hiranya and Joshi (2025). The provision of chemical fertilizers at subsidized rates was supported by 46.67 per cent of respondents. The similar suggestions are reported by Sharma and Thaker (2012) and Dorward and Chirwa (2022). Lastly, 28.00 per cent of the farmers suggested offering training on simplifying pesticide dose calculations. The similar suggestions are reported by Damlas and Khan (2017). These results highlight the farmers' priorities in areas such as seed quality, price assurance, financial support, input subsidies, and skill development, providing valuable insights for agricultural policymakers and support programs.

Research confirms that farmers’ key priorities should guide agricultural extension policies. Extension systems must promote integrated seed systems for timely and quality seed access, strengthen price support especially for smallholders, and simplify credit procedures to improve financial inclusion. Input subsidies should be targeted and paired with technical guidance to boost productivity. Finally, comprehensive training programs are needed to build both practical and modern skills among farmers, ensuring they can effectively adopt new technologies and practices.

**Table 2 Suggestion given by the non-participant farmers of Digital Farmer Field School.**

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| **Sr. No.** | **Suggestions** | **Frequency** | **Percentage** |
| 1. | Ensure timely supply of genuine seed varieties at reasonable rates. | 47 | 62.67 |
| 2. | Government should announce the reasonable price for purchase of soybean. | 43 | 57.33 |
| 3. | Offer timely and sufficient credit from banks and cooperative institutions at low interest rates. | 41 | 54.67 |
| 4. | Making chemical fertilizers available at subsidized rates. | 35 | 46.67 |
| 5. | Offer training on simplifying Pesticide Dose Calculations. | 21 | 28.00 |

**Fig 2 Distribution of the suggestions given by non-participant farmers of DFFS**

1. **CONCLUSION**

In conclusion, the findings of this study highlight that non-participant soybean farmers of digital farmer field school in Maharashtra face significant production constraints, particularly regarding the availability and affordability of quality seeds, price volatility, labor shortages, limited access to timely credit, and challenges in procuring subsidized fertilizers and adopting biocontrol measures. The strong consensus among farmers for timely seed supply, assured and reasonable pricing, accessible credit, input subsidies, and practical training underscores the urgent need for targeted policy interventions. Policymakers in Maharashtra should prioritize the establishment of robust seed distribution systems, implement stable and transparent pricing mechanisms, enhance the reach and efficiency of rural credit institutions, and expand input subsidy programs. Additionally, farmer-centric extension services—such as hands-on training in pesticide management and the promotion of biocontrol agents—should be strengthened to bridge the knowledge gap for non-participants. By addressing these key areas, the state can foster greater inclusivity and resilience in soybean cultivation, ultimately improving productivity, farmer incomes, and the overall sustainability of the agricultural sector in Maharashtra.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declares that NO generative AI technologies such as Large- Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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