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Effect of front-line demonstrations on foliar nutrition in enhancing cotton yield in Kalaburagi district, Karnataka, India

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Abstract
Cotton is a vital cash crop in India, contributing significantly to the Indian agricultural economy. However, its productivity is often limited by the non-adoption of recommended fertilizer doses and application schedules. To address this issue, Krishi Vigyan Kendra (KVK), Kalaburagi-II (Raddewadagi), UAS Raichur, conducted frontline demonstrations (FLDs) on foliar nutrient management in the Kalaburagi district of Karnataka.
These demonstrations were carried out during the Kharif seasons of 2023-24 and 2024-25 at selected farmers' fields in villages such as Ullandigera, Ladlapura, Sonna, Kallahangarga and Wasthare villages of Kalaburagi district.
The FLD plots employed a balanced nutrient management approach based on university package of practice incorporating major and micronutrients. Farmers applied the recommended fertilizer dose of 100:50:50 NPK kg/ha along with $MgSO_4$ + 19:19:19 @ 1% spray each and two time spraying of Potassium nitrate @ 1% and EDTA Zn, Fe and Mn @ 0.5%.
This resulted in a significantly higher average seed cotton yield of 22.55 q/ha compared to 19.85 q/ha under traditional practices (150:25:25 NPK kg/ha). The FLD plots recorded a 12.00% yield increase over farmers' practices.
Despite this improvement, a mean technological gap of 7.44 q/ha, an extension gap of 2.70 q/ha, and a technology index of 24.78%.

Keywords: Cotton, Foliar nutrient management, Frontline demonstrations, Seed cotton yield, Technology gap

Introduction
Cotton is a pivotal commercial crop that significantly contributes to the national economy. Beyond its economic importance, the cotton industry generates employment for thousands of workers in textile mills and millions more in decentralized sectors such as power looms, handlooms, and traditional spinning wheels (charkas).
Krishi Vigyan Kendra or Farm centre is an innovative, science-based institution designed to bridge the gap between agricultural research and farmers. Its primary objective is to reduce the time lag in transferring technology from research institutions to farmers, thereby increasing agricultural productivity and income sustainably. KVKs are grassroots organizations tasked with assessing, refining, and demonstrating proven technologies under diverse micro-farming conditions in each district (Das, 2007) [6].
Frontline demonstrations (FLDs) are systematic educational initiatives conducted in farmers' fields to showcase the effectiveness of new practices and technologies. Despite advancements in agricultural research, many farmers in India continue to rely on traditional knowledge passed down through generations. This often results in unscientific agronomic, nutrient, and pest management practices, limiting the potential yield of crops and new varieties.
The potential yield of crops is influenced by factors such as solar radiation, temperature, photoperiod, atmospheric carbon dioxide levels, and genetic characteristics, assuming no limitations from water, nutrients, pests, or diseases. In rainfed farming systems, where water supply is beyond the farmer's control, water-limited potential yield becomes.

a critical benchmark for yield gap analysis. Seasonal variations, particularly in rainfall, further affect this potential yield (Singh *et al.*, 2001) [5].

Although significant strides have been made in agricultural productivity since the mid-1960s, continued efforts are essential to meet the demands of a growing population. Demonstrating recommended improved technologies through FLDs on farmers' fields remains one of the most effective approaches. This study aims to analyze input costs and monetary returns, identify yield gaps, assess technology adoption, and explore reasons for the non-adoption of proven technologies.

Materials and Methods

- The study was conducted in the operational area of Krishi Vigyan Kendra (KVK), Kalaburagi-II (Raddewadagi), Karnataka. The region receives an annual precipitation of 750 mm, primarily between June and the end of September. The maximum temperature in Kalaburagi district reaches 44°C, while the minimum temperature drops to 10°C.
- Ten frontline demonstrations (FLDs) on cotton were conducted during the Kharif season from 2023-24 and 2024-25 across five adopted villages in the operational area namely Ullandigera, Ladlapura, Sonna, Kallahangarga and Wasthare and each demonstration covered an area of 0.4 ha.
- The soils in the study area were slightly alkaline, with low to medium organic carbon, medium available phosphorus, and very high available potassium.
- The treatment involved the recommended practice of applying 100:50:50 NPK kg/ha along with one time foliar spray of $MgSO_4$ +19:19:19 @ 1% each at flowering (65-75 DAS), Boll development (80-95 DAS) and Boll formation (100-110 DAS) and two times (flowering stage between 10 days interval) spraying of Potassium nitrate @ 1% at 80 and 100 DAS and EDTA Zn, Fe and Mn @ 0.5%, compared to the existing farmer practice of 150:25:25 NPK kg/ha excluding micronutrient foliar application.
- An entire dose of nitrogen and phosphorus was applied through diammonium phosphate, potassium through muriate of potash, and 25% of nitrogen, along with full phosphorus and potassium, as a basal dose at sowing.
- The remaining nitrogen was applied in two equal doses at 30 and 45 days after sowing along with seed treatment by Azotobacter and phosphorus-solubilizing bacteria at 25 g/kg seed.
- Farmer practices often involved imbalanced nutrient management (150:25:25 NPK kg/ha), simultaneous sowing without seed treatment, and lack of proper agronomic practices.
- To address these challenges, FLDs aimed to demonstrate the productivity and profitability of improved cotton production technologies under real farm conditions, even in variable weather.

Key diagnostic issues identified during the PRA survey included

1. Improper nutrient management and lack of soil testing.
2. Low nutrient availability and minimal use of organic manures and biofertilizers.
3. Limited application of secondary and micronutrients.
4. Faulty methods and improper timing of fertilizer application.
5. Inadequate plant protection measures.
6. Lack of intercultural operations, with reliance on chemical weed control.
7. Uncertain market prices, particularly during harvest.
8. Lack of crop rotation practices.

Data Analysis

Participating farmers were trained in cotton production technologies, including fertilizer dosage calculations, soil sampling, seed treatments, and recommended agronomic practices. Primary data were collected using interviews and analysed for yield improvement percentages.

The primary data were collected from the selected farmers with the help of interview schedule and interpreted and presented regarding percentage increased yield.

The observation yield and economic performance of front line demonstration, the data on output were collected from FLDs (demonstration) as well as local check plots from all selected farmers and finally the grain yield, cost of cultivation, yield, net returns of different farmers were analyzed by the formula.

Average = (F1+F2+F3............. Fn)/N

- F1= Farmer
- N= No. of Farmers
- Gap Analysis

Technology gap, extension gap, and technology index were calculated using the following formulas (Samui *et al.*, 2000; Sagar and Chandra, 2004).

1. Technology gap= Potential yield - Demonstration yield
2. Extension gap= Demonstration yield - Farmer's yield
3. Technology Index% = (Potential yield-Demonstration yield)/Potential yield *100

Results and Discussion

Seed Cotton Yield

The data on seed cotton yield from frontline demonstrations (FLDs) conducted during Kharif 2023-24 and 2024-25 are presented in Table 1. The average highest yield of 22.90 q/ha in the demonstration plot was recorded during the Kharif season of 2023-24, compared to 20.30 q/ha in the farmers' practice plot. This was followed by yields of 22.21 q/ha in 2024-2025 under recommended technologies, as opposed to 19.40 q/ha in the local check representing a 11.35% and 12.65% increase in yield due to the balanced nutrient application based recommendations. The findings indicate that balanced fertilization enhances cotton productivity. Farmers are encouraged to avoid imbalanced nutrient applications.

Technology Gap

- A wide technology gap was observed across the years, with the lowest gap (7.10 q/ha) recorded in 2023-24 and the highest (12.65 q/ha) in 2024-25. The mean technology gap for all 10 demonstrations was 7.44 q/ha.
- These differences are attributed to varying feasibility levels of the recommended technologies across years, influenced by factors such as soil fertility and erratic rainfall.

- The gap between potential yield and demonstration yield highlights the need for location-specific recommendations to minimize the technology gap.

Extension Gap: The extension gap, representing the difference between FLD and farmers' practice yields, ranged from 2.60 to 2.81 q/ha. The lowest gap (2.60 q/ha) was recorded during Kharif 2023-24, while the highest (2.81 q/ha) was observed in 2024-25. The higher extension gap underscores the need to educate farmers on adopting improved practices, particularly balanced nutrient management for higher yields.

Table 1: Productivity, technology gap, extension gap and technology index of Bt cotton foliar nutrition under Front Line Demonstrations on Farmer's fields

Year	Area (ha)	No. of farmers	Seed cotton yield (q/ha) Recommended practice				Farmers practice (FP)	Percent increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology index
			Potential yield	Highest	Lowest	Average	Average				
2023-24	5	10	30	25.60	17.90	22.90	20.30	11.35	7.10	2.60	23.60
2024-25	5	10	30	23.60	19.50	22.21	19.40	12.65	7.79	2.81	25.96

Table 2: Gross return, cost of cultivation, net return and B:C ratio as affected by improved and local technology under FLDs on farmer's fields

Year	No. of farmers	Gross Cost (Rs/ha)		Gross Returns (Rs/ha)		Net Returns (Rs/ha)		Additional net returns (Rs/ha)	B:C Ratio	
		RP	FP	RP	FP	RP	FP		RP	FP
2023-24	10	41913	41300	164933	152250	123020	110950	12070	3.94	3.70
2024-25	10	42814	42500	156240	135333	114212	92417	21795	3.63	3.16

RP- Recommended practice FP-Farmers practice

Technology Index

The technology index, which indicates the feasibility of technology at farmers' fields, was recorded at 24.78% (Table 1), indicating a high suitability of the recommended technology for the Kalaburagi district.

These findings are consistent with those of Ravindra and Mandar (2025) for wheat production technology in the same region.

Economics

The economic analysis (Table 2) revealed that adopting improved cotton cultivation technology resulted in higher profitability. The average additional net return from demonstration fields was ₹118616/ha, compared to ₹101683/ha from farmer's practices. The mean benefit-cost (B:C) ratio was 3.78 for demonstration plots and 3.43 for farmer's practices. These results highlight the substantial potential of improved technology to enhance farmer's income and livelihoods in the Kalaburagi district of Karnataka state.

References

1. Mithun J. Zonal Coordinating Unit, Zone-III, Barapani, Meghalaya, India. In: Venkatasubramanian V, Sanjeev MV, Singha AK, editors. Concepts, approaches and methodologies for technology application and transfer: a resource book for KVKs. 2nd ed. New Delhi: ICAR; 2007. p. 6.
2. Bhowate RT, Geete MH. Effectiveness of frontline demonstrations on soil test-based nutrient management for enhancing cotton yield in Hingoli District, Maharashtra, India. Int J Curr Microbiol App Sci. 2025;14(2):116-121.
3. Sagar RL, Chandra G. Evaluation of frontline demonstrations on mustard in Sunderbah, West Bengal. Indian J Exten Educ. 2004;40:96-97.
4. Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. Evaluation of frontline demonstration on groundnut (*Arachis hypogaea* L.). J Indian Soc Coastal Agric Res. 2000;18:180-183.
5. Singh P, Vijaya D, Chinh NT, Pongkanjana A, Prasad KS, Srinivas K, *et al.* Potential productivity and yield gap of selected crops in the rainfed regions of India, Thailand and Vietnam. Natural Resource Management Program Report No. 5. Patancheru: International Crops Research Institute for the Semi-Arid Tropics; 2001. p. 1-25.
6. Das P. Proceedings of the Meeting of DDG (Agricultural Extension), ICAR, with officials of State Departments, ICAR Institutes and Agricultural Universities, NRC Mithun, Jharmapani, Meghalaya. 2007.