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Improved chilli (*Capsicum annuum* L.) production technologies through frontline demonstrations in Davanagere district, Karnataka

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Abstract
Frontline Demonstrations (FLDs) on chilli (*Capsicum annuum* L.) were conducted during 2023-24 in Arakere village of Jagalur Taluk, Davanagere district, Karnataka, to evaluate the agronomic and economic performance of improved chilli production technologies under farmers' field conditions. The demonstrated package included a high-yielding hybrid 'Sitara', soil test-based nutrient management (RDF 150:75:75 kg N: P_2O_5:K_2O ha^{-1}), application of *Arka Microbial Consortium* (20 ml L^{-1} at 10 DAT), foliar nutrition with Vegetable Special (5 g L^{-1} at 30 and 45 DAT), and integrated pest and disease management (IPDM). Results revealed significant improvement in growth and yield parameters over farmers' practice. The demonstration plots recorded higher mean plant height (107.4 cm), fruit number (234.4 plant^{-1}), and fruit length (12.34 cm), with an average yield of 173.52 q ha^{-1} representing a 36% increase over the check (127.3 q ha^{-1}). Economic analysis showed enhanced gross returns (₹2, 08,224 ha^{-1}), net returns (₹1, 18,294 ha^{-1}), and benefit-cost ratio (2.32) compared to the check (1.77). Incidence of major pests and diseases was substantially reduced under IPDM. The study highlights that adoption of improved production technologies under FLDs enhances chilli productivity, profitability, and sustainability, thereby demonstrating their potential for large-scale dissemination among chilli growers in Karnataka.

Keywords: Demonstration, vegetable special, productivity, agronomic

Introduction

Chilli (*Capsicum annuum* L.) is one of the most important vegetable and spice crops cultivated widely across tropical and subtropical regions, serving as a vital source of income for small and marginal farmers. In India, chilli contributes significantly to domestic consumption and export earnings, owing to its high demand in both fresh and dried forms. Despite its economic importance, the productivity of chilli under farmers' fields remains suboptimal due to a combination of factors, including the use of low-yielding local varieties, imbalanced nutrient management, susceptibility to pests and diseases, and substandard agronomic practices.

Chilli is a significant cash crop in India, contributing substantially to both domestic consumption and export markets. In Karnataka, the cultivation of dry chillies is concentrated in specific districts, with Davanagere being one of the prominent producers. According to the Directorate of Economics and Statistics, Karnataka, during the 2020-21 season, Davanagere district reported an area of 67,749 hectares under dry chilli cultivation, yielding 55,872 tonnes. This highlights the district's pivotal role in the state's chilli production.

Frontline Demonstrations (FLDs) have emerged as an effective extension strategy to demonstrate proven, location-specific technologies directly in farmers' fields. These demonstrations facilitate the adoption of improved varieties, integrated nutrient management, and integrated pest and disease management (IPDM) practices, thereby bridging the gap between potential and actual yield. Adoption of such technologies not only enhances productivity but also improves crop profitability, reduces pest and disease incidence, and ensures sustainable production.

Soil fertility and nutrient management play a crucial role in achieving high chilli yields. Soil test-based fertilizer application ensures balanced nutrition, which enhances vegetative growth, flowering, and fruit development. Additionally, microbial consortia, such as Arka Microbial Consortium, improve nutrient uptake, soil health, and plant vigor. Foliar nutrient sprays like Vegetable Special supplement essential micronutrients during critical growth stages, further enhancing yield and fruit quality.

Integrated pest and disease management is another key component of modern chilli production. Chilli is prone to major biotic stresses, including chilli leaf curl virus, anthracnose, and infestations by thrips and mites. Use of resistant varieties, cultural practices, and judicious application of bio pesticides and chemical pesticides under IPDM significantly reduce pest and disease incidence, thereby safeguarding yield and quality.

Biradar and Chandragi (2013) [3] revealed that Majority (78.33%) of the farmers expressed problem of price

fluctuation followed by inadequate irrigation (62.50%) and same per cent of them expressed the non-availability of labourers at critical stages and high wages, non-availability of good quality inputs at proper price at right time (59.17%). And the major suggestions made by the respondents were minimum support price should be fixed for chilli (86.67%), followed by market should be nearer, (65.83%), should provide good quality of inputs at right time at proper price (54.16%).
The present study was therefore undertaken to evaluate the performance of improved chilli production technology under Frontline Demonstrations in farmers' fields. The objectives were to assess growth, yield, and economic performance, as well as to quantify the impact of integrated nutrient, microbial, and pest management interventions on productivity and crop health. The study aimed to provide evidence-based recommendations for enhancing chilli production, profitability, and adoption of sustainable practices under field conditions.

Materials and Methods

Study Area

The Frontline Demonstrations (FLDs) on chilli (*Capsicum annuum* L.) were conducted during the 2023-24 cropping season at farmers' fields in Arakere village of Jagalur Taluck in Davanagere District. The soils in the experimental sites were red sandy loamy soil with P^h range of 7.3-7.8. The area is representative of chilli-growing agro-ecologies, allowing assessment of the improved production technology under farmers' field conditions.

Experimental Material

A high-yielding chilli Hybrid Sitara recommended for the region, was used by the farmers in the demonstration plots. Farmers' practice plots (check) represented the conventional management system commonly adopted in the region, including same hybrid, traditional nutrient application, and routine pest management practices.

Experimental Design and Treatments

The FLDs were conducted in a demonstration versus check format, where each participating farmer's field comprised two treatments:

Demonstration plots: Improved production technology package including high-yielding variety, balanced nutrient management, integrated pest and disease management (IPDM), and recommended agronomic practices.

Check plots: Farmers' conventional practice including same hybrid, farmer-managed nutrient application, and routine pest control measures.
Each FLD covered an average plot size of 0.4 ha, with 10 farmers participating. Data were recorded from five randomly selected plants per plot for growth and yield parameters.

Crop Management

- **Land Preparation:** Fields were ploughed, leveled, and beds were prepared. Plant spacing was maintained at 60 × 45 cm.
- **Transplanting:** Seedlings aged 30-35 days were transplanted manually.
- **Nutrient Management:** Demonstration plots received soil test-based recommended dose of fertilizers (RDF) at 150:75:75 kg N: P_2O_5:K_2O ha^{-1}**,** applied through basal and top-dressing as per standard recommendations. Additionally, Arka Microbial Consortium was applied as a soil drench at 20 ml/liter at 10 days after transplanting (DAT) to enhance soil microbial activity and nutrient uptake. Foliar application of Vegetable Special was done at 5 g/liter at 30 and 45 DAT to support vegetative growth and fruit development. Check plots followed farmers' conventional fertilization and nutrient management.
- **Irrigation:** Applied through Drip system as per crop requirement.
- **Weed Management:** Manual weeding and mulching were applied in demonstration plots; check plots followed routine farmer practices.

Pest and Disease Management

- Demonstration plots implemented Integrated Pest and Disease Management (IPDM) strategies, including:
- Application of bio pesticides and chemical pesticides as per recommended thresholds.
- Cultural practices such as rouging, removal of infected plants, and maintaining field sanitation.
- Check plots followed conventional farmer practices with irregular or no IPDM interventions.

Data Collection

- **Growth and Yield Parameters:** The following growth and yield parameters were recorded from five tagged plants per plot:
- **Plant height (cm):** Measured from soil surface to the apex of the main stem at harvest.
- **Number of fruits per plant:** Total fruits harvested per plant.
- **Fruit length (cm):** Average length of ten randomly selected mature fruits per plant.
- **Yield (q ha^{-1}):** Total fresh fruit weight from each plot extrapolated to hectare basis.

Economic Analysis

Economic parameters, including gross returns (₹ ha^{-1}), gross cost of cultivation (₹ ha^{-1}), net returns (₹ ha^{-1}), and benefit-cost ratio (B:C), were calculated based on prevailing market prices and actual input costs.

Pest and Disease Incidence

The percent incidence of major pests and diseases, including chilli leaf curl virus, anthracnose, thrips, and mites, was assessed using the formula:
Percent Incidence (%) = Number of affected plants/ Total number of plants observed X 100
Observations were recorded at regular intervals throughout the crop growth period.

Statistical Analysis

Data on growth, yield, pest and disease incidence, and economic parameters were subjected to statistical analysis using Student's t-test to compare demonstration and check plots. Mean differences were considered significant at $p<0.05$ and $p<0.01$. Standard deviation (SD) and percentage increase were also computed to assess variability and effectiveness of the demonstrated technology.

Results

Performance of growth Parameters

The performance of chilli under the Frontline Demonstrations (FLDs) exhibited notable improvement in growth and yield-attributing parameters compared to the farmers' practice (check). The mean plant height in demonstration plots was 107.4 cm, which was 30.0% higher than that recorded in the check plots (82.6 cm). This increase in plant vigor could be attributed to the adoption of improved agronomic practices, balanced nutrient management, and effective pest and disease control under the demonstration.

A substantial improvement was also observed in the number of fruits per plant, where the demonstration plots recorded an average of 234.4 fruits/plant, representing a 36.2% increase over the check (172.1 fruits/plant). The increase in fruit number clearly indicated better flowering, fruit set, and retention due to the use of high-yielding varieties and scientific crop management.

Similarly, the fruit length in the demonstration plots averaged 12.34 cm, which was 51.1% longer than that of the check plots (8.17 cm). Longer fruits from the demonstration plots are indicative of varietal superiority and improved nutritional management contributing to enhanced fruit development.

The statistical comparison of growth and yield-attributing traits of chilli between demonstration and farmers' practice (check) indicated a significant improvement in all the measured parameters under the demonstration plots.

Rajamanickam *et al* (2023) [10] revealed that demonstrated plot recorded the highest values of traits such as plant height (74.14 cm), number of primary branches per plant (5.20), number of fruits per plant (65.21), fruit length (1.45 cm), fruit girth (4.60 cm), fresh fruit weight (4.96 g), dry fruit weight (2.31 g), fresh fruit yield per plant (290.44 g), dry fruit yield per plant (123..45 g) and dry fruit yield per ha (1.26 t/ha), whereas farmer practices exhibited the lowest values in all the traits viz., plant height (63.25 cm), number of primary branches per plant (4.52), number of fruits per plant (50.10), fresh fruit weight (3.64 g), fruit length (1.21 cm), fruit girth (3.85 cm), dry fruit weight (1.90 g), fresh fruit yield per plant (145.30 g), dry fruit yield per plant (92.30 g) and dry fruit yield per ha (1.12 t/ha).

The mean plant height showed a significant increase of 24.8 cm (t = 14.09; $p<0.01$), reflecting the beneficial influence of improved agronomic and nutrient management practices on vegetative growth. Similarly, the number of fruits per plant was significantly higher in the demonstration plots, with a mean increase of 62.3 fruits/plant (t = 15.53; $p<0.01$), highlighting the impact of better crop management and varietal potential on reproductive performance.

The fruit length also exhibited a marked improvement, with a mean difference of 4.17 cm (t = 16.09; $p<0.01$), indicating that the demonstrated variety and scientific practices enhanced fruit development and overall quality. These findings confirm the statistical superiority of the improved technology over the traditional practices adopted by farmers.

Overall, the results revealed a consistent superiority of the demonstration plots in all key growth and yield traits, thereby confirming the effectiveness of the improved production technology in enhancing chilli productivity under farmers' field conditions.

Performance of Chilli for yield and Income

The economic analysis of Frontline Demonstrations (FLDs) on chilli revealed a remarkable improvement in the gross and net returns over the farmers' practice (check). The mean gross return obtained from the demonstration plots was ₹ 2,08,224 ha^{-1}, which was 36.3% higher than the check (₹ 1,52,760 ha^{-1}). Similarly, the gross cost of cultivation under the demonstration (₹ 89,929 ha^{-1}) was marginally higher than the check (₹ 86,868 ha^{-1}), mainly due to the inclusion of improved inputs and better crop management practices.

The net return realized from the demonstration plots averaged ₹ 1,18,294 ha^{-1}, which represented a 79.5% increase over the farmers' practice (₹ 65,892 ha^{-1}). Correspondingly, the benefit-cost ratio (B:C) under demonstration (2.32) was substantially higher than that of the check (1.77), reflecting the superior profitability of the improved technology. The higher returns and B:C ratio from demonstration plots clearly indicated the economic viability of the improved production package, emphasizing its potential for large-scale adoption among chilli-growing farmers.

The statistical analysis of economic parameters revealed a significant advantage of the demonstration plots over the farmers' practice (check). The gross return under demonstration plots was significantly higher with a mean difference of ₹55,464 ha^{-1} (t = 21.44; $p<0.01$), reflecting the substantial yield and market value advantage achieved through improved management practices. Although the gross cost was marginally higher by ₹3,061.5 ha^{-1} (t = 1.61; ns), the difference was statistically non-significant, indicating that the technological interventions did not substantially increase the production cost.

Yadav and Tripati (2017) [15] studied that IPM Practices was followed as seed and seedling treatment with Trichoderma viride and PSB culture, installation of pheromone trap (20/ha), Yellow sticky trap (50 No./ha), Blue sticky trap (50 No./ha.). General spray of Carbendazim + Mancozeb @ 2.5 g/lit of water was done in vegetative stage to check the foliar diseases. Regular spray of Imidacloprid at 15 days interval from 35 day after planting was given for management of sucking pest. In the improved technology mortality due to wilt reduced by 73.5 per cent in the fields and incidence of sucking pest reduced by 44.8 per cent. By the intervention of KVK, the yield of chilli was found 26.0 per cent more in technology demonstration (116 q/ha) as compared to farmers practice (92 q/ha) during the years. The additional cost Rs. 4285 per ha increased the average net return of Rs. 37535 per ha and incremental benefit cost ratio 8.75 shows higher profitability and economic viability of the technology demonstration.

A significant enhancement was observed in the net return, which increased by ₹52,402.5 ha^{-1} (t = 18.17; $p<0.01$) under demonstration plots compared to the check. Similarly, the benefit-cost ratio (B:C) showed a highly significant improvement, with a mean difference of 0.554 (t = 12.02;

$p<0.01$), clearly demonstrating higher profitability and resource-use efficiency of the demonstrated technology.

Yield and percentage increase in Chilli

The yield performance of chilli under the Frontline Demonstrations (FLDs) revealed a substantial improvement over the farmers' practice (check). The mean yield obtained from the demonstration plots was 173.52 q ha^{-1}**,** which was 36% higher than the mean yield recorded under the check plots **(**127.3 q ha^{-1}**).** The yield increase across individual farmers ranged from 16.67% to 33.24%**,** indicating a consistent advantage of the improved production technology under diverse field conditions.

The standard deviation (SD) of yield in demonstration plots (9.25) was slightly higher than that of the check (3.54), reflecting greater responsiveness of the improved technology to favourable management and environmental conditions. The enhancement in yield could be attributed to the adoption of high-yielding varieties, balanced nutrient application, effective pest and disease management, and better agronomic practices demonstrated during the FLDs.

Percent incidence of major Pest and Diseases in Chilli

The incidence of major pests and diseases of chilli was markedly reduced in the demonstration plots compared to the farmers' practice (check). The mean incidence of Chilli leaf curl virus was significantly lower in the demonstration plots **(**5.76%**)** than in the check **(**17.65%**),** indicating a reduction of 67.4%**.** Similarly, the incidence of Anthracnose disease was considerably reduced from 18.46% in the check to 5.51% in the demonstration, showing a 70.1% decrease due to the adoption of improved management practices and resistant variety.

The infestation of sucking pests such as thrips and mites also showed a remarkable decline. The thrips incidence decreased from 14.12% (check) to 5.28% (demo)**,** representing a 62.6% reduction, while the mite incidence was reduced from 14.33% (check) to 6.32% (demo)**,** accounting for a 55.9% decrease. These results demonstrate the effectiveness of integrated pest and disease management (IPDM) practices adopted under the demonstration plots.

Farmers can alleviate pest pressures with little loss in environmental and economic sustainability by incorporating mechanical, biological, cultural, and physical control techniques. Crop resistance and disruption of the pest life cycle is obtained by cultural techniques like crop rotation, intercropping, and field sanitation as suggested by Rajpoot *et al* (2025) [16].

Statistical analysis further confirmed the significance of these differences. The mean differences for all parameters were highly significant ($p<0.01$), confirming that the demonstrated IPDM practices and improved variety played a crucial role in minimizing pest and disease incidence and enhancing crop health.

Archa *et al* (2024) [1] in their findings aimed to identify superior segregants with desirable combinations of high yield and resistance to the leaf curl virus, which could serve for future chilli breeding programs. The majority of the segregants exhibited resistant nature for chilli leaf curl virus incidence indicating ample resistant sources for further breeding strategies. The superior segregants identified based on the yield and leaf curl resistance from the study can be taken to further segregation studies. The identification of superior segregants will contribute to the development of high yielding and disease resistant varieties, providing a better solution to overcome challenging production systems in chilli cultivation.

Discussion

The present study clearly demonstrated the superior performance of integrated crop management (ICM) practices in chilli cultivation under Frontline Demonstrations (FLDs) compared to the conventional farmers' practice. The consistent improvement across growth, yield, economic, and plant health parameters signifies the synergistic effect of adopting improved production technologies at the farm level.

The substantial increase in plant height, fruit number, and fruit length under the demonstration plots indicates a marked enhancement in vegetative and reproductive growth. The increase in plant height (30.0%) and fruit number (36.2%) may be attributed to the adoption of balanced nutrient management, timely pest and disease control, and the use of high-yielding varieties. Similar observations were reported by Patel *et al.* (2020) [8] and Kumar *et al.* (2021) [7]**,** who found that improved nutrient and pest management practices significantly enhanced vegetative vigor and fruit set in chilli. The greater fruit length (51.1% increase) under demonstration conditions further confirms the role of varietal superiority and efficient nutrient utilization in improving fruit development and marketable quality, as highlighted by Sharma *et al.* (2022) [12].

The yield performance of chilli in the demonstration plots exhibited a significant improvement of 36% over the farmers' practice, reflecting the successful translation of research-based technologies into farmers' fields. The variation in yield increase among farmers (16.67-33.24%) could be attributed to microclimatic and management differences; however, the consistently higher performance across locations underscores the robustness of the demonstrated technologies. Comparable yield enhancements through FLDs in chilli and other vegetable crops were reported by Rathod *et al.* (2019**)** [11] and Jat *et al*. (2020) [5]**,** demonstrating the critical role of FLDs in narrowing the yield gap between research stations and real farm conditions.

The economic analysis corroborated the agronomic superiority of the demonstration plots. The significantly higher gross and net returns under ICM practices, with only a marginal and non-significant increase in cost of cultivation, underline the economic viability and sustainability of the improved production package. The higher benefit-cost (B: C) ratio (2.32 vs. 1.77) indicates greater input-use efficiency and profitability. These results are in agreement with findings of Bairwa *et al*. (2021**)** [2] and Singh *et al*. (2022) [13], who reported that improved agronomic management and scientific pest control enhance farm profitability without proportionate cost escalation.

Equally important was the reduction in the incidence of major pests and diseases under the demonstration plots. The integrated pest and disease management (IPDM) interventions led to a significant reduction in the incidence of *Chilli leaf curl virus* (67.4%), *Anthracnose* (70.1%), thrips (62.6%), and mites (55.9%) compared to the farmers' practice. This substantial decline reflects the combined efficacy of resistant varieties, balanced nutrition, and integrated pest management modules in minimizing biotic stress. Similar reductions in pest and disease pressure following IPDM adoption were reported by Chaudhary *et al*. (2018) [4] and Khan *et al*. (2020) [6] in chilli and other solanaceous crops, supporting the present findings.

Overall, the results confirm the multidimensional benefits of adopting ICM practices in chilli production. Enhanced productivity, improved profitability, and effective pest and disease suppression collectively contribute to sustainable chilli cultivation under field conditions. These findings reinforce the effectiveness of FLDs as a proven approach for technology dissemination and the enhancement of farmers' income and livelihood security.

Table 1: Performance of Chilli for yield and Income in ICM Demonstration

Sl. No	Farmer	Check (GR)	Demo (GR)	Check (GC)	Demo (GC)	Check (NR)	Demo (NR)	Check (BC)	Demo (BC)
1	F1	151800	212640	95689	96584	56111	116056	1.586389	2.201607
2	F2	158880	223680	89457	94568	69423	129112	1.776049	2.365282
3	F3	157680	194760	99658	90124	58022	104636	1.582211	2.161023
4	F4	158880	190680	86451	93694	72429	96986	1.837804	2.035136
5	F5	150960	208920	84578	86548	66382	122372	1.784861	2.413921
6	F6	149160	223440	81245	85214	67915	138226	1.835928	2.622104
7	F7	145440	214680	89568	96542	55872	118138	1.623794	2.223695
8	F8	149520	198240	80012	84654	69508	113586	1.86872	2.341768
9	F9	153000	200160	76598	80124	76402	120036	1.997441	2.498128
10	F10	152280	215040	85426	91245	66854	123795	1.782595	2.356732
	Mean	152760	208224	86868.2	89929.7	65891.8	118294.3	1.767579	2.32194
	SD	4249.762	11100.98	6685.65763	5320.829	6648.302	11099.59219	0.126937	0.162901

Table 2: Statistical interpretation of Chilli for yield and Income in ICM Demonstration

Parameter	Mean Difference	t-value	Significance	Interpretation
Gross Return	55,464	21.44	$p<0.01$	Demo plots gave significantly higher gross return
Gross Cost	3,061.5	1.61	ns	Cost increase not significant
Net Return	52,402.5	18.17	$p<0.01$	Demo plots yielded significantly higher profit
B:C Ratio	0.554	12.02	$p<0.01$	Demo plots more profitable & efficient

Table 3: Performance of growth Parameters in ICM Chilli Demonstration

Sl.No	Farmer	Plant Height (%)		Number of Fruits /plant		Fruit Length (cm)	
		Check	Demonstration	Check	Demonstration	Check	Demonstration
1	F1	78	115	176	241	9.1	12.5
2	F2	84	104	179	238	8.4	13.4
3	F3	86	109	182	219	8.2	11.2
4	F4	72	96	165	247	7.9	11.9
5	F5	76	103	159	236	7.2	12.4
6	F6	89	117	178	258	8.1	11.8
7	F7	82	106	190	250	8.3	13.4
8	F8	86	111	174	217	9.1	13.7
9	F9	84	107	152	222	7.3	10.4
10	F10	89	106	166	216	8.1	12.7
11	Mean	82.6	107.4	172.1	234.4	8.17	12.34
12	SD	5.3516353	5.74804315	10.87612063	14.31921786	0.598414572	0.990151504

Table 4: Statistical interpretation of Chilli for growth Parameters in ICM Chilli Demonstration

Parameter	Mean Difference	t-value	Significance	Interpretation
Plant height	24.8	14.09	$p<0.01$	Demo plants were significantly taller
No. of fruits/plant	62.3	15.53	$p<0.01$	Demo plants produced significantly more fruits
Fruit length	4.17	16.09	$p<0.01$	Demo fruits were significantly longer

Table 5: Yield and percentage increase in Chilli under farmers' practice and frontline demonstrations

Sl. No.	Farmer code	Yield (q ha⁻¹) - Check	Yield (q ha⁻¹) - Demo	Yield increase over check (%)
1	F1	126.5	177.2	28.61
2	F2	132.4	186.4	28.96
3	F3	131.4	162.3	19.03
4	F4	132.4	158.9	16.67
5	F5	125.8	174.1	27.74
6	F6	124.3	186.2	33.24
7	F7	121.2	178.9	32.25
8	F8	124.6	165.2	24.57
9	F9	127.5	166.8	23.56
10	F10	126.9	179.2	29.18
11	Mean	127.3	173.52	26.63
12	SD	3.541468622	9.25081618	

Note: Percentage increase calculated over respective farmers' practice yields

Table 6: Percent incidence of major Pest and Diseases in Chilli under farmers' practice and frontline demonstrations

Sl.No	Farmer	Chilli leaf curl Virus (%)		Anthracnose (%)		Incidence of Thrips (%)		Incidence of Mites (%)	
		Check	Demo	Check	Demo	Check	Demo	Check	Demo
1	F1	16.25	5.31	21.65	4.15	13.24	6.15	12.68	6.48
2	F2	19.26	4.86	19.74	5.04	14.02	5.32	14.38	7.61
3	F3	17.86	6.14	18.34	6.15	15.36	5.26	15.17	7.28
4	F4	18.64	5.38	20.08	6.48	15.34	4.39	12.53	6.29
5	F5	17.31	4.29	16.49	6.30	15.82	4.29	14.05	5.17
6	F6	16.65	6.03	17.35	6.47	12.45	5.27	16.27	5.29
7	F7	15.48	4.78	16.08	6.29	11.39	5.64	14.25	6.48
8	F8	18.61	6.91	18.06	4.08	15.78	4.68	16.20	7.20
9	F9	17.02	8.13	17.34	5.48	14.36	5.20	14.20	6.31
10	F10	19.46	5.78	19.48	4.68	13.45	6.57	13.58	5.06
11	Mean	17.65	5.76	18.46	5.51	14.12	5.28	14.33	6.32

Table 7: Statistical interpretation of major Pest and Diseases in Chilli under farmers' practice and frontline demonstrations

Parameter	Check (Mean)	Demo (Mean)	Mean Difference	SEm ±	CD (5%)	P-Value	Inference
Chilli leaf curl Virus (%)	17.65	5.76	11.89	0.534	1.21	3.50×10^{-9}	Significant
Anthracnose (%)	18.46	5.51	12.95	0.762	1.72	3.82×10^{-8}	Significant
Incidence of Thrips (%)	14.12	5.28	8.84	0.647	1.46	2.53×10^{-7}	Significant
Incidence of Mites (%)	14.33	6.32	8.01	0.458	1.04	2.92×10^{-8}	Significant

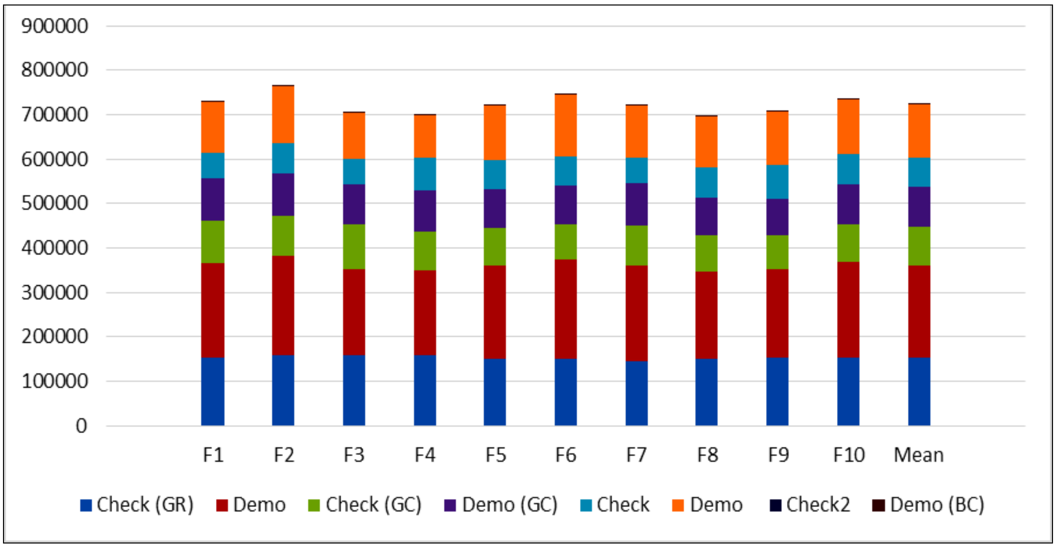

Fig 1: Performance of Chilli for yield and Income in ICM Demonstration

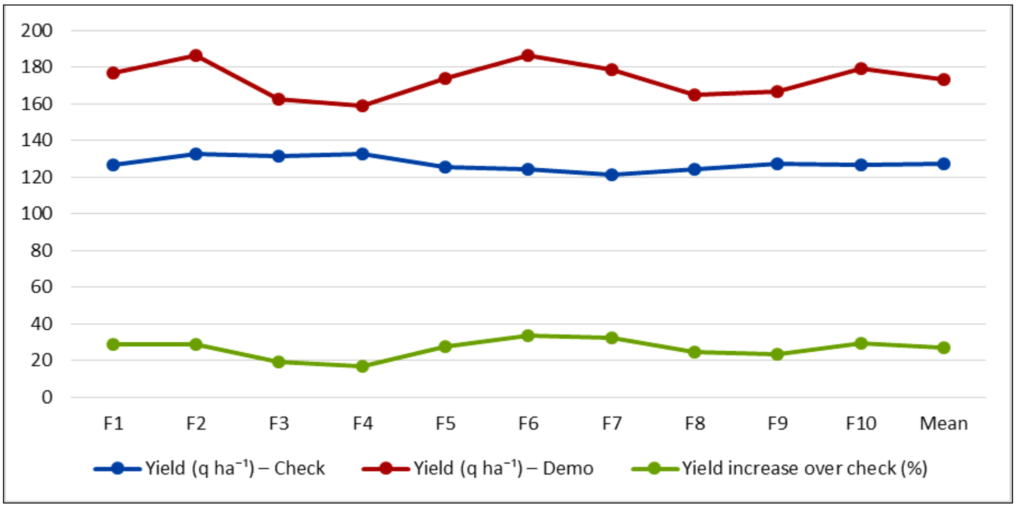

Fig 2: Yield and percentage increase in Chilli under farmers' practice and frontline demonstrations

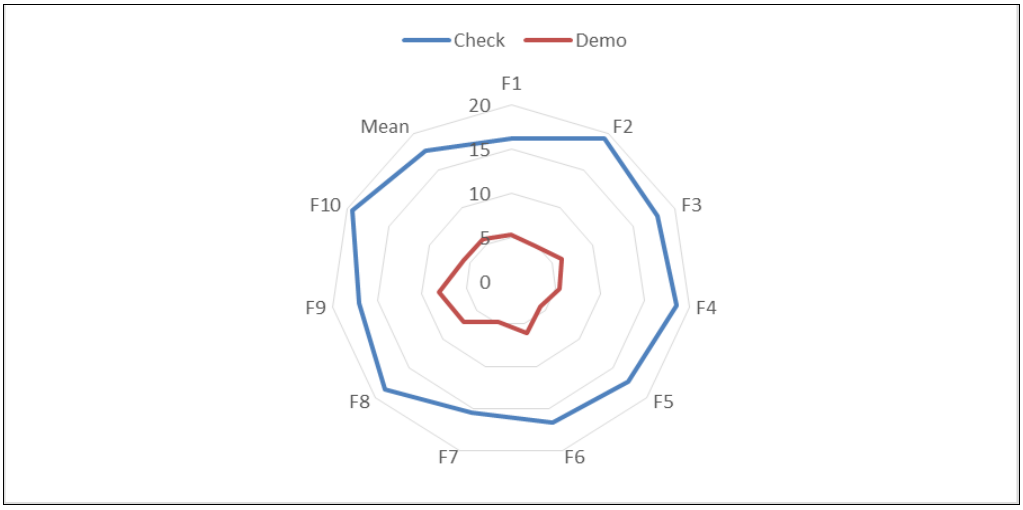

Fig 3: Percent incidence of Chilli leaf curl virus under farmers' practice and frontline demonstrations

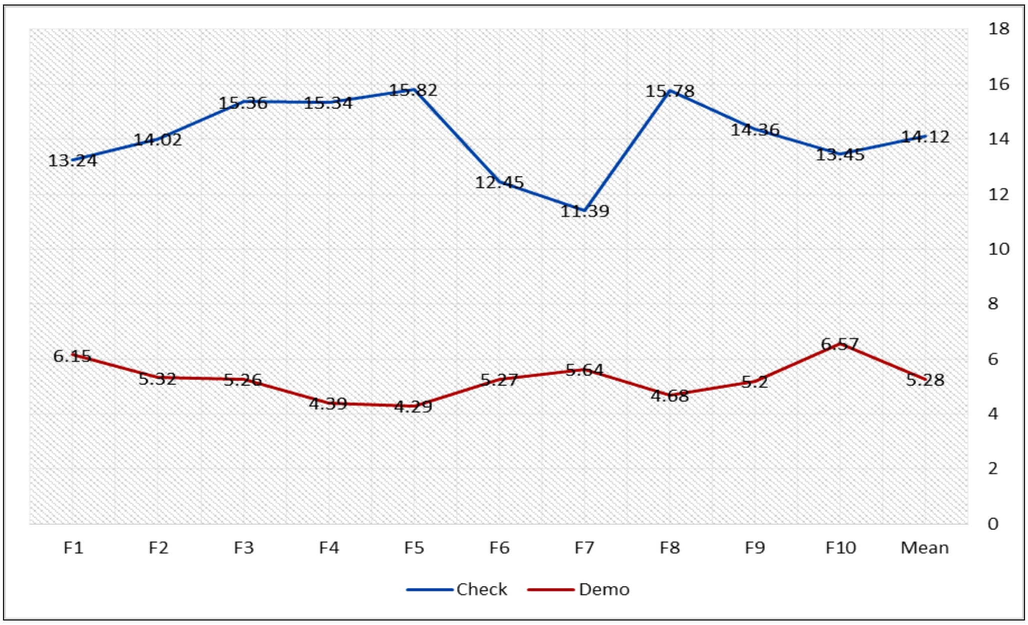

Fig 4: Percent incidence of Thrips under farmers' practice and frontline demonstrations

Training for Farmers on Production Technology of Chilli

Follow up field Visits to FLD plots

Installation of Yellow Sticky Traps in Demonstration plot

Field Day of the Frontline Demonstration

Conclusion

The Frontline Demonstrations (FLDs) on chilli in Davanagere district demonstrated the clear superiority of improved production technologies over conventional farmers' practices. Adoption of high-yielding varieties, soil test-based nutrient management (RDF 150:75:75 kg $N:P_2O_5:K_2O$ ha^{-1}), microbial inoculation (Arka Microbial Consortium), foliar nutrient sprays (Vegetable Special), and integrated pest and disease management significantly enhanced growth, yield, and profitability.

Demonstration plots exhibited higher plant height, greater number of fruits per plant, and increased fruit length compared to farmers' practice, reflecting the combined benefits of varietal potential and scientific crop management. Yield improvements of up to 36% and substantial increases in net returns and benefit-cost ratio underscored the economic viability of the demonstrated technology. Furthermore, the incidence of major pests and diseases, including chilli leaf curl virus, anthracnose, thrips, and mites, was markedly reduced under integrated management practices, indicating improved crop health and sustainability.

Overall, the study confirms that the adoption of improved chilli production technology under farmers' field conditions not only enhances productivity and income but also promotes sustainable crop management. The results provide strong evidence for large-scale dissemination of the demonstrated package of practices to chilli growers, thereby contributing to increased production, profitability, and resilience of chilli cultivation in the region.

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