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# Assessment of Impact of Demonstrations on Vegetable Crops in Bundelkhand

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## ABSTRACT

During Kharif 2021, an investigation was carried out in Prathvipura village, block Babina, district Jhansi, and the Bundelkhand region of Uttar Pradesh. A total of ten demonstrations on vegetables showed their production potential: bhindi, sponge gourd, brinjal, amaranth, and cowpea bean variety A-5, Pusa Sneha, Pusa Hara, Pusa Kiran, and Pusa Sukomal. Increased yields of 8.33, 9.38, 11.54, and 9.38 percent were recorded from bhindi, sponge gourd, brinjal, and cowpea crops, respectively, where the extension gap was 1500, 1500, 3000, and 1500 kg/ha. The technology gap was observed at 1000, 0, 4000, -50, and 5 kg/ha for cowpea, bhindi, brinjal, sponge gourd, and amaranth, where the technology index was 5.88, 0, 13.33, -0.31, and 3.85 percent, respectively. The highest net returns were observed for 95,000, 102,500, 120,500, 122,500, and 145,500 Rs from sponge gourd, amaranth, cowpea, bhindi, and brinjal, with cost-benefit ratios of 1.46, 2.73, 2.66, 2.13, and 2.32 after each rupee investment, followed by a local check.

**Keywords**: Front line demonstration, Vegetables, Bundelkhand.

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## INTRODUCTION

According to the Ministry of Agriculture & Farmers Welfare, 2021-22-3rd advance estimates, during the years 2021-22, the area under total vegetables in India was 11347.68 thousand hectares, and the total production was 204835.12 thousand tons, while India's vegetable productivity was 18.05 metric tons per hectare. Highlighting the last seven years, the total area under vegetables has increased since the year 2011–12 and has increased from 8990 thousand hectares to 10859 thousand hectares in the year 2020–21 (Fig. 1).

The state of West Bengal has the largest area under cultivation of vegetables in India, followed by Uttar Pradesh, Maharashtra, Madhya Pradesh, etc. While Uttar Pradesh leads the way in terms of production. Bundelkhand region of Uttar Pradesh is a central semi-arid plateau of India that spans seven districts in Uttar Pradesh state comprising Jhansi, Jalaun, Lalitpur, Hamirpur, Mahoba, Banda, and Chitrakoot districts and covering over 7.1 million hectares area. The living difference is widely disparity in terms of condition in different districts of Bundelkhand region. Northern part is more developed as compared to southern part (Das *et al.*, 2021). The region is characterized by a hot climate with temperature variation ranging from 3.0°C to 47.8°C and undulating topography. The zone receives about 867 mm of average annual rainfall. Agriculture is the mainstay of this drought-frequented region. The average irrigation intensity in the zone is approximately 108 percent, with the gross irrigated area accounting for 48 percent of the gross area sown. The Bundelkhand region is among the most vulnerable regions of India concerning climate change (Bisht and Sheikh, 2015). Variability in temperature and rainfall has adversely affected the livelihoods of farmers in this region (Singh, 2020).

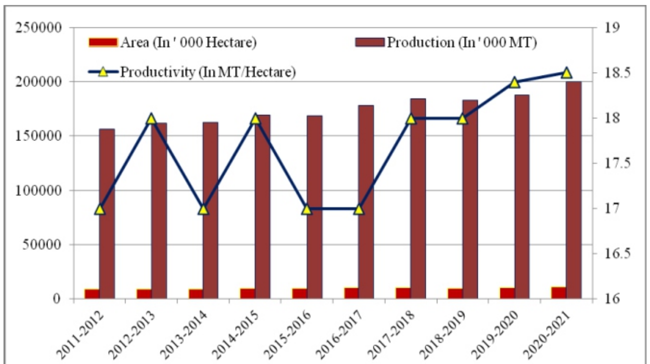

Fig1 Area, production and productivity of total Vegetables in India
*Source : Ministry of Agriculture and Farmers Welfare, Govt. of India. (ON3019) & Past Issues.*

The Block Babina is located in Jhansi tahsil of District Jhansi, Bundelkhand regional state of Uttar Pradesh in India, and the Babina Gram Panchayat governs it. It comes under Babina Community Development Block.

The nearest town is Jhansi, about 27 kilometers away from Babina (Rural). The area under the Babina block is 885.9 km2. The population was 528654 in 2020, and the density was 597 people per km2. The sex ratio was 1:1.12. In this region, deep soil, Rakar, Parwa, Kabar, and maar are the type of soil, while some are un-irrigated, and somewhere irrigated land is available. Black gram, green gram, groundnut, sesame, pigeon pea, sorghum, and paddy are major crops grown in the Kharif season, while wheat, barley, chickpea, field pea, vegetable pea, lentil, mustard, and linseed are grown during rabi season. More than half of the total pulse area in Uttar

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Pradesh comes from Bundelkhand. However, productivity remains below the state average, which requires technological interventions, infrastructure development, and marketing strategies. Additionally, the region's production, processing, and marketing of pulses are constrained. Therefore, policies should embrace technology and infrastructure to keep balance and keep the interest of both consumers and producers (Kumar *et al.*, 2022).

Field demonstrations, called front-line demonstrations, are a new concept aimed at demonstrating newly released varieties in farmer's fields in different agro-climatic regions and under different farming situations with improved practices, technologies, and management practices. By selecting a suitable variety with technology, bhindi, sponge gourd, brinjal, amaranth and cowpea productivity per unit area can be increased through feasible, scientific, and sustainable management practices. Systematically, front-line demonstrations were conducted in farmer's fields to demonstrate high-yielding new varieties and convince them of the potential of improved production technologies to enhance coriander yields.

## MATERIALS AND METHODS

The frontline demonstrations were conducted by several institutes or organizations in Bundelkhand (Uttar Pradesh and Madhya Pradesh). However, due to paucity of time and proximity, the study was confined to FLDs conducted by Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India. During Kharif 2021, a total of 10 frontline demonstrations on bhindi, sponge gourd, brinjal, amaranth and cowpea variety A-5, Pusa Sneha, Pusa Hara, Pusa Kiran and Pusa Sukomal respectively, were conducted at ten farmer's fields in the village Prathvipur (Nayakheda) Babina block district Jhansi (Uttar Pradesh region) Bundelkhand (Table 1).

**Table 1:** Technical detail of FLDs vegetables

| S. No. | Vegetable | Varity | Seed quantity (kg) | Area |
|---|---|---|---|---|
| 1 | Bhindi | A-5 | 5 .0 | 0.5 ha |
| 2 | Sponge gourd | Pusa Sneha | 0.50 | 2000 sq m |
| 3 | Brinjal | Pusa Hara | 0.10 | 2000 sq m |
| 4 | Amaranth | Pusa kiran | 0.10 | 500 sq m |
| 5 | Cow pea | Pusa Sukomal | 0.500 | 500 sq m |

The members selected farmers for our team by visiting the identified village, meeting the farmers, and visiting their fields (Table 2). Under these FLDs, the cost of critical inputs like seed of variety 5.0 kg, 0.50kg, 0.10kg, 0.10kg and 0.500kg for bhindi, sponge gourd, brinjal, amaranth and cowpea, respectively, for a recommended area is provided to selected farmers (Table 2). At the time of seed distribution, the scientists gave the farmers all kinds of information related to crop cultivation. The problems related to the farmers' crops were also heard, and their solutions were discussed. During the crop season, the team members visited selected farmers' fields and assessed the crop.

**Table 2:** Beneficiary details and provided vegetable crop

| SN | Farmer's name | Vegetables |
|---|---|---|
| 1. | Raju | Sponge Gourd, Amaranth |
| 2. | Suraj Sing | Bhindi, Spong Gourd, Amaranth |
| 3. | Gulab | Bhindi, Amaranth |
| 4. | Jayram | Bhindi, Amaranth, Cowpea |
| 5. | Jawar Singh | Bhindi, Sponge Gourd, Cowpea |
| 6. | Harprasad | Sponge Gourd, brinjal, Cowpea |
| 7. | Manoj | Cowpea, Brinjal |
| 8. | Ramsaran | Cowpea, Brinjal |
| 9. | Thakurdas | Bhindi, Sponge Gourd, Brinjal |
| 10. | Jagat Singh | Bhindi, Sponge Gourd, Brinjal |

Along with this, the members kept in constant touch with the farmers through mobile, communicated from time to time, and kept getting information about the crop status. Furthermore, the yield and economic performance of frontline demonstrations and the data on output were collected from fields and a local cultivar of the same crops. Finally, the grain yield, cost of cultivation, and net returns with the benefit-cost ratio were worked out. A well-structured interview schedule was used to collect data from personal contacts. Then, according to the study's objectives, the gathered data were processed, tabulated, classified, and analyzed in terms of mean percent scores and ranks. There was a significant difference between beneficiaries and non-beneficiaries of more than 10 percent. The extension gap, technology gap, and technology index were calculated using the formula:

Extension gap (qha-1) = Demonstration yield - Farmer's yield

Technology gap (qha-1) = Potential yield- Demonstration yield

$$\text{Technology index (\%)} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} x100$$

## RESULTS AND DISCUSSION

The study was conducted as part of a front-line demonstration of various vegetable varieties among farmers in Prithvipur village, Babina Block, District Jhansi, Uttar Pradesh region, Bundelkhand, by comparing them to local or traditional technology. According to the findings, 35.5% of vegetable farmers own 1.0-1.5 ha of land and are small farmers. Marginal farmers come in second. For large farmers, 2.0 ha of land fell into two categories: 15.2 percent and 4.0 percent for 2.0-2.5 ha of land, respectively. Vegetable farmers did not own large tracts of land and had agricultural lands of 1.0 to 1.5 hectares. There is a lower amount of agricultural land per capita in Bundelkhand (U.P.). As a result, Table 3 shows that the demonstration plot's vegetables, such as cowpea, okra, brinjal, and sponge gourd, produced a higher yield than the local variety. Because amaranth had not been grown in this area for a long time, the farmer did not have access to a comparable variety, nor did he have much land. The production capacity of the local vegetable varieties was compared to the improved variety was low. There was a yield difference between the local and improved varieties after the technology intervention, with an additional yield of 1500, 1500, 3000, and 1500 kg obtained from cowpea, okra, brinjal, and sponge gourd, respectively (Table 3). Similar enhancement in yield in coriander under front line demonstrations was documented by Lal *et al.* (2016); Meena *et al.* (2016) and Verma *et al.* (2016).

**Table 3:** Yield and yield difference of vegetable crops under front line demonstrations

| Name of village | Yield (q/ha) | | Additional yield over local check (kg/ha) | Per cent increase yield over local check |
|---|---|---|---|---|
| | FLD | Local check | | |
| Cowpea | 160 | 145 | 1500 | 9.38 |
| Bhindi | 180 | 165 | 1500 | 8.33 |
| Brinjal | 260 | 230 | 3000 | 11.54 |
| Sponge Gourd | 160 | 145 | 1500 | 9.38 |
| Amaranth | 125 | - | - | - |

Meanwhile, to better understand the extension and technology gaps, data from Table 4 revealed that the extension gap received on a crop basis among farmers was very high. As a result, extension communication systems played a minor role in the farmer's daily routine. The study discovered that among farmers, the extent of agricultural knowledge is limited to a few people, a few shops, and a few institutions. When the team of scientists arrives in the village during the visit, the nearby farmers gather and listen to the knowledge talks with great attention, and yes, they also get yes, but in the end, the same trend comes from some farmers who say that we don't have facilities, so the crop cannot be grown properly on our farm. The main reason for this is non-leveling of the field, poor soil quality, low fertile capacity of the soil, inability to provide fertilizers, inability to provide timely water, and sometimes farmers blame the improved variety because the seed was poor.

The "technology gap" refers to the difference in crop production methods between old and new. This disparity reflects farmers' lack of knowledge, application, and communication of scientific methods. When a conscientious farmer employs the aforementioned scientific techniques, they realize their significance, and other farmers are impressed and try to emulate him.

**Table 4:** Yield gap and technology index in front line demonstrations

| Name of village | Extension gap (kg/ha) | Technology gap (kg/ha) | Technology index (%) |
|---|---|---|---|
| Cowpea | 1500.0 | 1000.0 | 5.88 |
| Bhindi | 1500.0 | 00.0 | 0.00 |
| Brinjal | 3000.0 | 4000.0 | 13.33 |
| Sponge Gourd | 1500.0 | -50.0 | -0.31 |
| Amaranth | 00.0 | 500.0 | 3.85 |

The crop data in Table 4 clearly show this technological gap. The difference in yield between improved varieties of cowpea, okra, brinjal, sponge gourd, and amaranth and their potential yield is due to the farmer's lack of scientific technology knowledge. In Bhindi, the technology gap was discovered to be zero. Farmers in the demonstration obtained the okra variety A-5, which was grown using scientific methods. The suggestions made by the scientist were implemented correctly by the farmers, and as a result, the yield of this crop was equal to the potential yield, whereas in the case of sponge gourd, this gap was negative, which was 50.0, indicating that the farmers understood the scientific method very well, and the crop yield was obtained on that basis. Farmers' use of scientific methods has increased vegetable production, but there is still room to increase production. Farmers must understand scientific techniques in order to do so, and scientists must reach out to farmers in order to do so. This decrease is shown in Table 4 for the technology index for cowpea, brinjal, and amaranth vegetables, where it is 5.88, 13.33, and 3.85 percent, respectively. In bhindi, it was zero, and in sponge gourd, it was -0.31%. The extension gap was ranged from 5.10q $ha^{-1}$ to 10.38q $ha^{-1}$ during the study period recorded by Lal *et al.* (2016). This finding corroborates results of Dhaka *et al.* (2010); Dhaka *et al.* (2015); Meena *et al.* (2016) and Verma *et al.* (2016). Additionally, Singh and Singh (2020) find that by bridging the technology gap, using the latest varieties and improved packages of practices under cluster frontline demonstration significantly increases pulse productivity and profitability in the field (Dwivedi *et al.*, 2014; Singh *et al.*, 2018; Mitnala *et al.*, 2018; Saikia *et al.*, 2018 and Singh *et al.*, 2020). The maximum yield gain was obtained 11.54, 9.38, 9.38, and 8.33 percent from brinjal, cowpea, sponge gourd and bhindi crops, respectively. Lal *et al.* (2016) demonstrated coriander variety AFg-2 Pratapgarh district of Rajasthan in Rabi season. The yield appreciation 43.73, 59.11 and 29.14 per cent were recorded in demonstration fields due to technical interventions. The maximum net returned rupee was recorded in the ascending order 95000, 102500, 120000, 122500 and 145500 from sponge gourd, amaranth, cowpea, bhindi and brinjal, respectively (Table 5).

Farmers also earned additional benefit cost ratio 2.66, 2.13, 2.32, 1.46, 2.73 after each rupee invested through front line demonstration of coriander with complete package of practices. Farmers also earned additional net return with benefit cost ratio through frount line demonstration of coriander with complete package of practices (Lal *et al.*, 2016). The conclusions align with the investigation by Undhad *et al.* (2019). These outcomes are even pursuing the determinations of Dhaka *et al.* (2010), Mitnala *et al.* (2018), and Singh *et al.* (2018). Therefore, higher benefit-cost ratios demonstrated the economic viability of the technological interventions and convinced farmers that they were helpful. Increasing farmers' income and self-sufficiency in pulses production could be achieved through large-scale cluster frontline demonstrations for other pulse crops. These findings are consistent with those of Kumar *et al.* (2014) and Singh *et al.* (2019). As Singh *et al.* (2015) reported, the improved technology gave higher gross and net returns with a higher benefit-cost ratio than farmers' practices when studying FLD's impact on pulse yields. In their study, Raj *et al.* (2013) and Singh *et al.* (2017) reported similar findings.

**Table 5:** Economics of front line demonstrations

| Improved Variety | Average yield (q/ha) | Local check yield (q/ha) | Additional yield over local check (kg/ha) | Yield gain (%) | Net returns (Rs) | B:C ratio |
|---|---|---|---|---|---|---|
| Cowpea | 160 | 145 | 1500 | 9.38 | 1,20,000 | 2.66 |
| Bhindi | 180 | 165 | 1500 | 8.33 | 1,22,500 | 2.13 |
| Brinjal | 260 | 230 | 3000 | 11.54 | 1,45,500 | 2.32 |
| Sponge Gourd | 160 | 145 | 1500 | 9.38 | 95,000 | 1.46 |
| Amaranth | 125 | - | - | - | 1,02,500 | 2.73 |

## CONCLUSION

The majority of vegetable farmers in Bundelkhand do not have much land to cultivate. The main reason for this is the single-family system's fragmentation of holdings. Farmers were less likely to be associated with highly participatory organizations such as cooperative societies. Farmers in Bundelkhand didn't have enough farm machinery power and small tools to grow enough vegetables. According to the discussion, the farmer must invest in Bundelkhand's needs and allied farming for his vegetable production based on the innovation trend. The vegetable-producing farmers should deploy for allied farming in Bundelkhand. Working with farmers in Bundelkhand demonstrates that farmers are eager to adopt innovative crop production technology; however, there is a need to rapidly spread this technology in more areas, which necessitates the participation of scientists.

## REFERENCES


Bisht H and Sheikh GG. 2015. Climate Resilient Development in Bundelkhand region of Madhya Pradesh- mainstreaming Climate Change Adaptation in Policy and Planning, Development Alternatives, New Delhi. pp.1.

Das M, Das A and Mandal A. 2021. Assessing the level of living condition in Bundelkhand region of Central India: a households level analysis. *GeoJournal* **86**(4): 2723-2745.

Dhaka BL, Meena BS and Suwalka RL. 2010. Popularization of improved maize production technology through frontline demonstrations in south-eastern Rajasthan. *Journal of Agriculture Science* **1**(1): 3942.

Dhaka BL, Poonia MK, Meena BS and Bairwa RK. 2015. Yield and economic viability of coriander under front line demonstrations in Bundi district of Rajasthan. *Journal of Horticulture Science* **10**(2): 226-28.

Dwivedi AP, Mishra A, Singh SK, Singh SRK and Singh M. 2014. Yield gap analysis of chick pea through frontline demonstration in different agro climatic zones of MP and Chhattisgarh. *Journal of Food Legumes* **27**(1):50- 63.

Kumar J, Singh YP and Rana DK. 2014. Yield and Gap analysis of wheat (*Triticum aestivum*) productivity in NCR Delhi, India. *Journal of Ext. Education* **50**(1): 56-58. 5.

Kumar P, Ankhila RH, Mondal B and Yadav RK.2022. Economics of Pulse Production in Bundelkhand Region of Uttar Pradesh, India: An Empirical Analysis. *Research on World Agricultural Economy* **3**(3):13-21.

Lal G, Mehta RS, Meena RS, Meena NK and Choudhry ML. 2016. Impact of front-line demonstration (FLDS) on yield enhancement of coriander: A case study in TSP area of Pratapgarh. E News Letter ICAR- National Research Centre on Seed Spices **8**(3): 5-6.

Meena KC, Singh DK, Gupta IN, Singh B, Meena SS. 2016. Popularization of coriander production technologies through front line demonstrations in Hadauti region of Rajasthan. *International Journal of Seed Spices* **6**(2): 24-29.

Mitnala J, Prasad BG, Ragavendra CK, Vijayabhinandana B and Subba RM. 2018. Impact of Cluster Frontline Demonstrations (CFLDs) on Pulse Production Productivity, Profitability and Transfer of Technologies in Kurnool District of Andhra Pradesh, India. *Int. J. of Current Micro. and Applied Sc.* **7**(12):937-947.

Raj AD, Yadav V and Rathod HJ. 2013. Impact of Front-Line Demonstrations (FLD) on the yield of pulses. *Int. Journal of Scientific and Research Publications* **3**(9):1-4.

Saikia N, DebNath K and Chowdhury P.2018. Impact of cluster frontline demonstrations on popularization of blackgram var. PU 31 in Cachar district of Barak Valley region of Assam. *J. of Pharmacognosy and Phytochemistry* **7**(4):940-942.

Singh A, Singh RP, Singh RK, Singh V and Singh AK. 2020. Technological options on yield gap analysis, economics, adoption and horizontal spread of pulses crops. *Int. J. of Current Micro. and Applied Sc.* **9**(6): 3165-3179.

Singh D, Singh KB, Gill NS and Grewal IS. 2017. Impact analysis of frontline demonstrations on pulses in Punjab. *Int. J. of Farm Sciences* **7**(1):190- 194.

Singh JB, Singh NK and Tripathi CK. 2019. Impact assessment of cluster frontline demonstration on mustard crops in Sultanpur district of U.P. *Global J. of Research Analysis* **8**(1):17-19.

Singh M, Yadav KS, Singh V, Pachauri V and Dwivedi AP. 2015. Crop cafeteria; an effective approach for technology evaluation and dissemination. National conference on GRISAAS-2015 at RSKVV, Gwalior, MP.

Singh N and Singh AK. 2020. Yield gap and economics of Cluster Frontline Demonstrations (CFLDs) on pulses under rain-fed condition of Bundelkhand in Uttar Pradesh. *Int. J. of Advanced Research in Biological Sc.* **7**(8): 1-7. I:

Singh S. 2020. Farmers' perception of climate change and adaptation decisions: A micro-level evidence from Bundelkhand region, India. *Ecological Indicators* 116.

Singh SP, Paikra KK and Patel CR. 2018. Performance of cluster frontline demonstration on productivity and profitability of Black gram (*Vigna mungo*) in Raigarh District of Chhattisgarh. India. *Int. J. of Current Micr. and Applied Sc.* **7**(06):1325- 1330.

Undhad SV, Prajapati VS, Sharma PS and Jadav NB.2019. Impact of frontline demonstration on the yield and economics of chickpea (Cicer arietinum L.) production in Rajkot District of Gujarat. *Int. Journal of Current Microbiology and Applied Sciences* **8**(8):95-100.

Verma AK, Singh M, Singh N, Jeenger KL and Verma JR. 2016. Dissemination of improved practices of coriander through FLDS in Zone V of Rajasthan province. *Int. J. of Environmental Science and Technology* **5**(5): 3320-27.


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