

## Original Research Article

# Impact of Front Line Demonstrations (FLDs) on *kharif* Maize in Bundelkhand Region

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## ABSTRACT

Front Line Demonstrations (FLDs) on maize was conducted in five villages namely; Piprain Jhansi District of Uttar Pradesh, Punchampura, Kunwarpura & Daryan Kala in Tikamgarh District & Sanorain Datia District of Madhya Pradesh. Total 40 farmers were selected on the basis of their socio-economic conditions. The main objective of the FLDs to improve the socio-economic condition of the Bundelkhand farmers, increasing the maize cultivated area during *kharif* season in Bundelkhand region and also utilization of the *kharif* fellow land for cultivation of maize crop. The results revealed that farmers were benefitted from the FLDs practice in comparison to their own traditional practices. The average yield production of maize from farmers practices and from FLDs practices was 12 quintals per hectare and 40 quintals per hectare, respectively. The cost: benefit ratios from farmers & FLDs practices was 1.2 & 3.6, respectively.

### Keywords

Front Line  
Demonstrations  
(FLDs),  
Kharif maize &  
Bundelkhand  
region

## Introduction

Bundelkhand is a geographical and cultural region and also a mountain range in central & North India. The hilly region is now divided between the states of Uttar Pradesh and Madhya Pradesh, with the larger portion lying in the latter state. Bundelkhand region are covered 15 Districts of both Uttar Pradesh & Madhya Pradesh. In Uttar Pradesh seven Districts namely; Jhansi, Jalaun, Lalitpur, Chitrakoot, Banda, Hamirpur & Mahoba and

eight Districts namely; Datia, Chhatarpur, Damoh, Panna, Sagar, Tikamgarh, Vidisha & Niwari in Madhya Pradesh comes under Bundelkhand region. Maize is very old crop of Bundelkhand region after pulses and oilseeds. It is cultivated from several years back in Bundelkhand but due to more damage by the “Anna Pashu” and with low productivity farmers replace the maize by growing pulses & oilseeds either they left the field fallow in *kharif* season. The currently cultivated maize (*Zea mays* ssp. *Mays*)

originates from the human interaction, from wild ancestors, the teosinte, of the parviglumis and Mexican subspecies (*Zeamays* ssp. parviglumis), performed about 9000 years ago by the peoples of Central America, particularly of Mexico. The probable place of domestication is the Central- South region of Mexico, at average altitudes of approximately 1500 m above sea level. Currently, the cultivation is carried out all over the world, at several latitudes (ranging from 58° N to 40° S) and altitudes (from 3500 m to sea level), which demonstrates its wide adaptability.

Maize was the food base which allowed the development of several important civilizations over the centuries, such as the Incas, in Peru and in a wide region located in the Andes, the Aztecs, in Mexico, and the Maya, in Central America and Southern Mexico. The navigators were the ones who took maize seeds to Europe, Asia and Africa, and today, in the African continent, this cereal is the most cultivated crop and with the highest total grain yield. In South America, it is estimated that maize cultivation began over 4000 years ago by indigenous people, who planted different cultivars according to the purpose of use. In Brazil, maize was already cultivated by the indigenous people as well, both for food and for other purposes, before the Portuguese navigators arrived in the country. After the arrival of the colonizers, maize consumption increased due to the population growth and the diversity of uses, not only for human food, but also for the feeding of domestic animals, making maize one of the most important sources of income in family farms. The species became a constituent part of the food culture of the Brazilian population from North to South of the country, because it is present in a variety of foods, such as pamonha, porridge, cuscuz, among other derivatives produced from maize flour.

In nutritional terms, maize has a carbohydrate-rich composition, mainly in the form of starch, and also has proteins, lipids, vitamins and minerals. One important feature is that grains can be directly consumed, without the need for processing to remove the hull as it is done with other cereals, such as rice and wheat. In sub-Saharan Africa, maize is the most important agricultural species, both for being the most cultivated and produced in quantitative terms and for being the one which supplies 40 to 50% of the calories and proteins consumed in Malawi, Zimbabwe and Zambia. In Zambia, maize is the most important cereal, and about 90% of the maize produced is used for human consumption.

In the production systems of commercial plantations, there is a greater economic investment, aiming at obtaining higher yields with higher level of management, through the chemical control of insects and diseases, greater application of fertilizers, use of irrigation and seeds of hybrid cultivars. Hybrids are developed by following methodologies with scientific nature and show characteristics such as high production, response to fertilizers, short stature and synchronicity in the development. The crossing of previously selected endogamous strains leads to a F1 generation with high phenological, morphological and genetic uniformity, and demanding with respect to environment to express all its production potential. On the other hand, if the farmer uses grains produced from F1, the generation F2, as seeds in the next season, will undergo a reduction in production, and the plants will be greatly uneven. The need to purchase new seeds at each season raises the costs of production, since the seeds of F1 hybrid are commercialized with very high values, and it also makes the farmer dependent on the seed-producing companies. The estimated area, production & productivity of maize in India

are 1255 mha, 501 mt & 3.99 q/ha, respectively during 2019-20. In India maize are cultivated in different states name; Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, Bihar, Chhattisgarh, Jharkhand, Gujarat, Maharashtra, West Bengal, Orissa, etc. In Uttar Pradesh maize cultivated Districts are Jhansi, Meerut, Saharanpur, Muzaffarnagar, Bareilly, Muradabad, Rampur, Dhampur, Jalaun, Lalitpur, Kanpur, Sahmli, Aligarh, Etawa, Firozabad, Sikohabad, Allahabad, Varansi, etc (Fig. 1–3).

## **Materials and Methods**

### **About FLDs on maize**

Front Line Demonstrations (FLDs) on maize conducted in five villages name; Piprain Jhansi District of Uttar Pradesh, Punchampura, Kunwarpura & Daryan Kala in Tikamgarh District & Sanorain Datia District of Madhya Pradesh in Bundelkhand region during *kharif*-2020 under Schedule Caste Sub-plan (SCSP) which was funded by Indian Institute of Maize Research (IIMR), New Delhi, Sub-Campus, Punjab Agricultural University, Ludhiana, Punjab. The total sanction amount was 3.5 lakh for successfully conducted FLDs on maize during *kharif*-2020 in Bundelkhand region. Total 40 FLDs were conducted in 40 hectare areas. The FLDs techniques was used as “Hybrid vs. Commercial cultivars (local check)” The complete details are given as below in table-1.

### **Selection of the farmers**

Total 40 Schedule Caste (SC) farmers were selected on the basis of their socio-economic conditions and also on the basis of their own choice for conducted Front Line Demonstrations (FLDs) on maize during *kharif*-2020 in Bundelkhand region for maximize the production and double your

income as per the suggestions of our Hon’ble Prime Minister Shri Narendra Modi Ji. The details are given as below in table-2.

### **Features of hybrids & seed distribution programme**

Two high yielding single cross hybrids namely DHM-117 & DHM-121 were used for distribution of seed under FLDs on maize during *kharif*-2020 in Bundelkhand region. Both the hybrids are suitable for growing in Bundelkhand region, because these hybrids were released for zone-IV. The average yield of these hybrids are 80 q/ha. and mature in medium duration (90-100 days). Farmers was used a local commercial cultivars for grain production of *kharif* maize. Details are given as below in table-3.

### **Fertilizer distribution programme**

Water soluble fertilizers (18:18:18 super phosphate) were distributed to the farmers. 3 kg 18 : 18 : 18 super phosphate fertilizer were distributed for 1 FLDs/ 1 hectare area. The significant responses were recorded of that fertilizers after applying in *kharif* maize under Front Line Demonstrations (FLDs) on maize during *kharif*-2020. The details are given as below in table-4.

## **Results and Discussion**

### **Crop stand, insect infestation and their control**

The results were revealed that the performance of crop stand was good with healthy crops. The number of cobs was recorded 1 to 3 cobs per plant. The number of grain rows was recorded approximately 20 rows per cob and the number of grains was recorded 400-500 grains per cob. In infestation of Fall army worm was seen during the early crop growing (vegetative)

and later (milking to maturity and after maturity) stage. This is the very serious insect of maize crop which is damage the crop in each and every stage of crop. Scientist were suggested that use of Spynosed 45 S.C. 0.5ml/litre of water or Emidamectin benzoate 5 S.C. 100 g or Endoksacarb 14.5 S.C. 200 ml/litre or Fifronil 5 S.C. 500 ml/litre or Chlorentriniliprole 250 ml/litre chemicals spraying the crop with eddying 800-1000 litre of water at insect attacking stage. These findings were also similar to Verma *et al.*, (2007), Chaoudhary *et al.*, (2012), Yadav *et al.*, (2012), Yadav *et al.*, (2013), Choudhary *et al.*, (2013), Choudhary *et al.*, (2013a), Choudhary *et al.*, (2013b) & Pooniya *et al.*, (2015). The complete details are given as below in table-5.

#### **Details of the yield from FP & FLDs practices**

The average yield production of *kharif* maize were recorded 12 quintals per hectare and 40 quintals per hectare, respectively from farmers and FLDs practices. The average net returns (Rs/ha) of *kharif* maize were recorded 15,000 Rs/ha and 50,000 Rs/ha, respectively from farmers & FLDs practices. The average cost of production of *kharif* maize were recorded 6,000Rs/ha and 16,000 Rs/ha,

respectively for both farmers & FLDs practices. The average yield gains & net return gains were recorded 20-25 % & 35,000 Rs/ha., respectively.

These findings were also reported by Dass *et al.*, (2002), Hiremath & Nagaraju (2009), Choudhary *et al.*, (2009), Dhaka *et al.*, (2010), Kumar *et al.*, (2010), Choudhary *et al.*, (2015) & Kumar *et al.*, (2015). The details are given as below in table-6 & 7.

#### **Cost : benefit ratios from FP & FLDs practices**

The significant average cost : benefit ratio of *kharif* maize production were recorded 1.2 & 3.6 from both farmers & FLDs practices, respectively. The details are given as below in table-6.

#### **Differences between FP & FLDs practices**

The significant differences were recorded from farmers practices and FLDs practices in several points such as variety, seed rate, seed treatment, time of sowing, method of sowing, fertilizers management, water management, plant protection, threshing, harvesting & marketing, etc. The details are given as below in table-8.

**Table.1** Details of the FLDs on *kharif* maize during-2020.

S.No.	Details	Quantity to be used
1.	Total number of FLDs conducted	40 FLDs
2.	Total area covered (1 hectare for 1 FLDs)	40 hectare/100acre
3.	Total quantity of seeds used to distribute to the farmers to conduct FLDs on Maize	800 kg/8 Quintal
4.	Quantity of seed distributed for 1 acre area	8 kg
5.	Quantity of fertilizers (18:18:18 super phosphate) used to distribute to the farmers	3 kg/acre
6.	Hybrids used to conduct FLDs on Maize	DHM-117 = 48kg DHM-121 = 752kg
7.	<b>Total</b>	<b>= 800kg</b>

**Table.2** List of the farmers

S.No.	Name of villages	District	State	Total no. of farmers	Caste
1.	Pipra	Jhansi	Uttar Pradesh	05	SC
2.	Punchampura	Tikamgarh	Madhya Pradesh	10	SC
3.	Kunwarpura	Tikamgarh	Madhya Pradesh	10	SC
4.	Daryan Kala	Tikamgarh	Madhya Pradesh	10	SC
5.	Sanora	Datia	Madhya Pradesh	05	SC
6.	<b>Total no. of farmers</b>			<b>40</b>	

**Table.3** Important features of hybrids

S.No.	DHM-117	DHM-121
1.	Medium to late maturity (105-110 days)	Medium maturity (95-100 days)
2.	Single cross hybrid	Single cross hybrid
3.	Released in 2009	Released in 2014
4.	Yield-80 to 100 q/ha	Yield-75 to 80 q/ha
5.	Suitable for Bundelkhand region (Zone-IV <sup>th</sup> )	Suitable for Bundelkhand region (Zone-IV <sup>th</sup> )

**Table.4** Total fertilizers distribute to the farmers under FLDs on maize during *kharif*- 2020

S.No.	Name of villages	Districts	States	Total no.of farmers	Area	Fertilizers quantity
1.	Pipra	Jhansi	Uttar Pradesh	05	05 ha.	15 kg
2.	Punchampura	Tikamgarh	Madhya Pradesh	10	10 ha.	30 kg
3.	Kunwarpura	Tikamgarh	Madhya Pradesh	10	10 ha.	30 kg
4.	Daryan Kala	Tikamgarh	Madhya Pradesh	10	10 ha.	30 kg
5.	Sanora	Datia	Madhya Pradesh	05	05 ha.	15 kg
6.	<b>Totals</b>			<b>40</b>	<b>40 ha.</b>	<b>120 kg</b>

**Table.5** Percent falll army worm infestation on maize field in different villages of Bundelkhand region during *Kharif*-2020

S. No.	Name of Villages	No. of fields	Percent infestations
1	Pipra Jhansi	5	46
2	Sanora-Datia	5	64
3	Daryan Kala-Tikamgarh	5	56
4	Kuwarpura-Tikamgarh	12	48
5	Punchampura-Tikamgarh	25	40.55

**Table.6** Details of the average yield and cost : benefit ratios from FP & FLDs practices

S. No.	Area (ha)	Average yield (q/ha)		Average net returns ('000 Rs/ha)		Average yield gains (%)	Average net return gain (Rs/ha)	Average Cost : Benefit ratio	
		FP	FLDs	FP	FLDs			FP	FLDs
1	1 ha	12	40	15,000	50,000	20-25	35,000	1.2	3.6

**Table.7** Details of the yield from FP & FLDs practices

S. No.	Area (ha)	Yield (q/ha)		Net returns ('000 Rs/ha)		Yield gains (%)	Net return gain (Rs/ha)	Cost : Benefit ratio	
		FP	FLDs	FP	FLDs			FP	FLDs
1	1 ha	10.6	35.5	10486	57110	24.9	46624	1.2	4.11
2	1 ha	15	30	18408	46454	15	28046	2.1	3.5
3	1 ha	11.9	31.4	12841	49079	19.5	36238	1.4	3.5
4	1 ha	12.5	32	13912	50311	19.5	36399	1.6	3.6
5	1 ha	10.5	33.4	10304	53011	23.9	42707	1.1	3.8
6	1 ha	12.7	35	14283	56144	22.3	41861	1.6	4.6
7	1 ha	13.8	30	16241	46141	16.2	29900	1.8	3.4
8	1 ha	14	30	16631	46112	16	29481	1.9	3.4
9	1 ha	15	34	18434	54211	19	35777	2.1	3.9
10	1 ha	10.9	32	11043	50134	21.1	39091	1.2	3.6
11	1 ha	13.9	34	16426	54043	20.1	37617	1.9	3.8
12	1 ha	11.4	33	11953	52103	21.6	40150	1.3	3.7
13	1 ha	14.8	32	18046	50111	17.2	32065	2.1	3.6
14	1 ha	15	35	18424	56032	20	37608	2.1	4.9
15	1 ha	10.2	32.6	9772	51311	22.4	41539	1.1	3.6
16	1 ha	12.4	32.7	13731	51443	20.3	37712	1.5	3.7
17	1 ha	13.6	32	15901	50013	18.4	34112	1.8	3.6
18	1 ha	11.6	34.9	12281	55815	23.3	43534	1.4	3.9
19	1 ha	14.7	33.4	17862	52921	18.7	35059	2.1	3.9
20	1 ha	11.3	32	11744	50013	20.7	38269	1.3	3.6
21	1 ha	12.4	33.4	13743	52911	21	39168	1.6	3.9
22	1 ha	12.8	30	14441	46044	17.2	31603	1.6	3.4
23	1 ha	15	31	18401	48112	16	29711	2.1	3.5
24	1 ha	14.2	32.9	16963	51843	18.7	34880	1.9	3.8
25	1 ha	13.9	33.4	16431	52921	19.5	36490	1.9	3.9
26	1 ha	13.8	32.5	16242	51121	18.7	34879	1.8	3.7
27	1 ha	13	32	14812	50103	19	35291	1.7	3.6
28	1 ha	12	30	13013	46001	18	32991	1.5	3.3
29	1 ha	14	32	16603	50125	18	33522	1.9	3.6

30	1 ha	15	32.8	18501	51613	17.8	33112	2.1	3.7
31	1 ha	14.7	31.2	17862	48513	16.5	30651	2.1	3.5
32	1 ha	13.4	33.8	15521	53713	20.4	38192	1.8	3.9
33	1 ha	12.4	34.2	13722	54543	21.8	40821	1.5	3.9
34	1 ha	13	35.5	14801	57121	22.5	42320	1.7	4.11
35	1 ha	14.5	33.9	17502	53941	19.4	36439	2.1	3.9
36	1 ha	13.6	32.7	15882	51512	19.1	35630	1.8	3.7
37	1 ha	15	31.6	18401	49213	16.6	30812	2.1	3.6
38	1 ha	12.4	30.5	13722	47103	18.1	33381	1.5	3.9
39	1 ha	11.9	32.6	12821	51344	20.7	38523	1.4	3.7
40	1 ha	12.4	33.9	13722	53820	21.5	40098	1.5	3.9

**Table.8** Significant differences between farmers practices & FLDs practices

S. No.	Particulars	Technology Interventions	Farmer's practices
1	Variety	DHM 117 & DHM 121 Hybrids	Local variety
2	Seed rate	8 kg/acre	8-10 kg/acre
3	Seed treatment	√	X
4	Time of sowing	15/07/2020	01/07/2020
5	Method of sowing	Line sowing	Broad caste
6	Fertilizer management	√	√
7	Water management	√	√
8	Plant protection	X	√
9	Threshing	√	√
10	Harvesting	√	√
11	Storage	X	√
12	Marketing	Local market	Local market

**Fig.1**



Fig.2



Fig.3



The Farmers with or without resources keep their land fallow in *Kharif* and cultivate wheat, gram, linseed and lantilin *Rabi*. Here we found *Kharif* Maize a promise crop to increase Cropping intensity in Bundelkhand

region. With majority of Scheduled Castes populations living in villages under studied area were economically isolated. Those were below poverty line and their livelihood dependant solely on agriculture and livestock

rearing the SCST Plan seems to be boon for uplifting their status.

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