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Yield enhancement and popularization of improved production technologies in wheat through frontline demonstrations of eastern Uttar Pradesh

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Abstract
The present study was carried out by Krishi Vigyan Kendra (ANDUAT), Basuli, Maharajganj to study the yield gaps between improved package of practices under frontline demonstration (FLD) and farmer's practice (FP) of wheat crop. Frontline demonstrations (FLDs) were conducted on 75 farmers' fields to demonstrate the impact of improved techniques on production and economic benefits under the irrigated tarai region of Uttar Pradesh during rabi seasons of three consecutive years i.e. 2017-18, 2018-19 and 2019-20. The technologies demonstrated in FLDs recorded grain yield 41.37q/ha, additional yield of 12.90 q/ha over farmers practice grain yield 28.47 q/ha. Under FLDs the grain yield of wheat was increased by 45.48 percent over FP. The extension gap, technology gap and technology index were calculated as 12.90 q/ha, 8.63 q/ha and 17.27percent, respectively. Adoption of improved package of practices in wheat cultivation recorded higher B:C ratio (2.67) as compare to FP (2.04). Yield enhancement and higher net returns of Rs. 75,839/- observed under FLDs of improved technologies in wheat extra returns of Rs. 23,650/-.Thus, the productivity of wheat could be increased with the adoption of recommended improved package of practices. The present study resulted to convincing the farming community for higher productivity and returns.

Keywords: economics, extension gap, FLD, yield, technology gap, technology index, wheat

Introduction
Wheat (*Triticum aestivum*) is the second most important cereal crop in India after rice and it contributing substantially to the national food security by providing more than 50% of the calories to the peoples. In India, wheat cultivated on 29.6 m ha area with 93.5 m tonnes of production and 31.5 q/ha of average productivity (FAO, 2013) [5]. In Uttar Pradesh, it is grown on 9.73 m ha area with production 30.3 m tons and productivity of 31.14 q/ ha (Anonymous, 2013) [1]. The requirement of wheat will be around 109 million tonnes for feeding the 1.25 billion populations by 2020 AD (Singh, 2010). Increased population together with eating preferences has resulted in a considerable upsurge in mandate for wheat in last 50 years (Kajla *et al.*, 2015) [9]. Consequently, wheat is now grown more widely than any other crop with global wheat production pegged at 748 million tons (FAO 2017) [6]. Thus, around 15 mt of wheat production has to be increased by adopting improved production practices. There is no scope for area expansion in near future; additional production could be harvested by increasing the productivity per unit area (Nagarajan, 1997) [11]. The share of Wheat in total food grain production is around 35.5% and share in area is about 21.8% of the total area under food grains. There are several constraints of low productivity of wheat in India, out of which poor extension of improved agronomic practices is on the top (Singh, 2017) [14]. Moreover, poor agronomic practices such as higher seed rate, unsuitable varieties, faulty nutrient management as well as weed control etc. are responsible for low productivity of wheat in India (Tiwari *et al.*, 2014) [15]. Krishi Vigyan Kendra (Farm Science Centre) an innovative science– based institution, plays an important role in bringing the research scientists face to face with farmers. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and

demonstration of proven technologies under different 'micro farming' situations in a district. Front line demonstration (FLD) is a long term educational activity conducted in a systematic manner in farmer field to worth of a new practice/technology. Farmers in India are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. As a result of these they often fail to achieve the desired potential yield of various crops and new varieties. Front-Line Demonstration is the new concept of field demonstration evolved by the Indian Council of Agricultural Research with the inception of the Technology Mission on Oilseed Crops during mid-eighties Objective of study 1. To know the profile of FLD and non-FLD beneficiaries. 2. To know the impact of FLD on area and productivity of wheat growers. 3. To work out the association between independent and dependent variables of FLD beneficiaries. 4. To know the problems faced by the beneficiaries and to suggest ways and means for improvement. Front line demonstrations on different crops grown in the district is the mandatory activity of Krishi Vigyan Kendra.

Materials and Methods

The present study was carried out by Krishi Vigyan Kendra Basuli, Maharajganj, Achrya Narendra Dev University of Agriculture and Technology, Kumarganj, Ayodhya for three consecutive years from 2017-18 to 2019-20 of three years in the farmers field in five blocks viz. Sadar, Mithora, Siswa, Ghughli and Laxmipur of Maharajganj district through front line demonstration. Front Line Demonstration is one such powerful tool for transfer of technology which practically exhibits the strength of new technologies in increasing yield and profit. Total 75 demonstrations were conducted in different villages viz. Goniriya Babu, Derauwa, Parsagith, Gopala, Parsaraja, Basmtput and Samedesa of 75 farmer's on 30.0 ha lands. Each frontline demonstration was laid out on 0.4 ha area while adjacent 0.4 ha was considered as control for comparison (farmer's practice). Front-line demonstration on improved package of practices i.e. high yield variety, seed treatment, nutrient management, disease management, weed management and sowing by seed drill. Prior to conducting FLDs, group meeting and specific skill training was given to the selected farmers regarding package of practices of wheat. To popularize the improved wheat production practices, constraints in wheat production were identified though participatory approach. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in wheat production. Farmers were also asked to rank the constraints they perceive as limiting factor for wheat cultivation in order of preference. The Field demonstrations were conducted under close supervision of the scientists of KVK, Basili, Maharajganj. Socio economic study of the demonstration area was also conducted. Majority of the farmers were found resource poor having small land holding. The improved technologies selected for FLDs given in table 1.Soil samples were collected and analysed for major nutrients. The soils of the study area are generally sandy sandy loam in texture. The pH of the soils ranged from 7.2-8.0, and organic carbon (%) ranged from 0.32-0.45. The status of soil organic carbon was low in all the soil samples. The available N, P and K contents of the soil varied from 160-230 kg/ha, 20-32 kg/ha and 180-248 kg/ha. The seeds were treated with Thiram @ 1.5 to 2g/kg seed and 3 g Thiram/kg + 3g Carbendazim/kg of seeds. Application of sulfosulfuron + metsulfuronmethyle @32g a.i./ha at 25-30 DAS for effective weed management; used flat fan nozzle. Farmer's practice constituted there were no deep ploughing was done during summer, Since the balanced use of these nutrients was essential for realizing the full potential of the variety, recommended dose of fertilizer 120:60:40:25 NPKZnSo4 kg/ha was applied in all the demonstrations. To manage the assessed problems seeds of wheat variety HD 2967, fertilizer and plant protection chemicals were provided to the farmers as critical inputs and scientific recommended technologies were followed as intervention during the course of front line demonstration programme. The wheat crop was sown at 22.5 cm (row-row) apart in line using seed rate of 100 kg/ha in 2nd week of November during both the years. Crop was harvested on the same time of harvesting of demonstration plots. Before conduct the demonstration training to farmers of respective village was imparted with respect to envisaged technological interventions. All other steps like site selection, farmers selection, layout of demonstration, farmers participation etc. were followed as suggested by (Choudhary 1999) [2]. The average yield of the individual FLD/ local practice for the three years has been taken for interpretation of the results. Based on top rank farmers problems identified, front line demonstrations were planned and conducted at the farmer's fields. The improved technologies selected for FLDs given in table 1. From front line demonstration plots and farmers practice plot (control plot) and finally extension gap, technology gap, and technology index were calculated as given as formula suggested by Samui *et al.* (2000) [12] and Dayanand *et al.* (2012) [3] as given below.

1. % increase over farmers practices = Improved practices – Farmers practices / farmers practices x 100
2. Technology gap = Potential yield – Demonstration yield
3. Extension gap = Demonstration yield – farmers yield
4. Technology index = [(Potential yield – Demonstration yield) /Potential yield] x 100

The satisfaction level of participating as well as neighbouring farmers' for the performance of improve demonstrated technology was also assessed. In all, 75 participating farmers' were selected to measure satisfaction level of farmers' for the performance of improve technology. The selected respondents were interviewed personally with the help of a pre-tested and well-structured interview schedule. Client Satisfaction Index was calculated as below. Client Satisfaction Index (CSI) = (Individual score obtained / Maximum score possible) x 100. The data on yield were recorded and statistically analysed to interpret the results. The economic-parameters (gross return, net return and B: C ratio) were worked out on the basis of prevailing market prices of inputs and Minimum Support Prices of outputs.

Results and Discussion

Constraints in wheat production

Problems faced by the farmer's in wheat cultivation were documented during the study, perusal the data from table 2. Socio economic survey of the adopted villages for the demonstration showed that majority of the wheat farmers were resource poor having small land holdings. Major constraints in wheat production were identified and documented. indicated that non-availability of improved varieties seed (88%) was given the top most rank followed by low technical knowledge (76%), use of weed infestation (74%), use of higher seed rate (68%), low fertility status (64%), damage of wheat by wild animals (34%) were the major constraints to wheat cultivation and disease

management (22%). Dhruw *et al*. (2012) [4] and Meena *et al*. (2014) [10] have also found similar constraints i.e. lack of suitable varieties, low technical knowledge etc.

Yield and contributing characters

The data on wheat yield (Table 3) indicated that the frontline demonstration had given a good impact on the farming community of Maharajganj district as they were motivated by the new agricultural technologies adopted in the demonstrations. The yields contributing characters like ear head (no./m2) and number of tillers/m2 wheat obtained over the years under recommended practice as well as farmers practice. Observation revealed that, ear head numbers were high registered with FLD plots compare to farmer's practice. Ear head (no./m2) mean of 276 with improved practices on farmer's field as against a mean of 218 in farmer's practice. The number of tillers/m2 of wheat from mean of 281 under improved technology as against a mean value of 227 recorded under farmers practice. Frontline technology gave mean wheat yield of 41.37 q/ha which was higher by 45.48% over the prevailing farmers practice (28.47 q/ ha). The results are in close conformity with the Sharma *et al.* (2016) [13].

Extension and Technology gap

The extension gaps average from 12.90q/ ha during the period of demonstration emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinuance of old varieties with the new technology. The technology gap was 8.63 q/ha., observed may be attributed to the variability in edaphic and climatic factors. Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations.

Technology index

The technology index indicates the feasibility of the evolved technology at the farmers' fields. The lower value of technology index more is the feasibility of the technology. The data showed that maximum technology index value 19.20% was noticed in the year 2017-18 followed by 16.20% (2018-19) whereas, average value of technology index of 17.27%, it may be due to uneven and erratic rainfall and weather conditions of the area. The results are corroborating with the findings of Hiremath and Nagaraju (2009) [7].

Economic analysis

The higher cost of cultivation Rs 28,437 involved in FLDs as compared to Rs. 25,546 under Farmers practice (Table 4). The front line demonstrations plots fetched higher mean gross returns (Rs. 75,839/ha). Economic returns was analyzed on basis of grain yield revealed that mean additional return of Rs. 23,650/ha was obtained in the demonstrations due to higher grain yield, with higher benefit: cost ratio (2.67) as compared to gross returns (Rs. 52,189) and B:C ratio of (2.04) with farmers practice. Joshi *et al.* (2014) [8] also reported higher net returns and B: C ratio in the FLDs on improved technologies compared to the farmers' practices and are at par with results of the present study which also resulted in higher net returns through FLDs on improved technologies

Farmer's satisfaction

Client Satisfaction Index (CSI) presented in Table 5 observed that majority of the respondent farmers expressed high (65.3%) to the medium (42.7%) level of satisfaction regarding the performance of FLDs, whereas, very few (28.0%) of respondents expressed lower level of satisfaction. The higher to medium level of satisfaction with respect to performance of demonstrated technology indicate stronger conviction, physical and mental involvement of in the frontline demonstrations which in turn would lead to higher adoption.

Thus, it may be concluded that yield the adoption of improved production technologies significantly increased the yield and returns in wheat crop. However, the yield level under FLD was better than the local practice and performance of these varieties could be further improved by adopting recommended production technologies. So, there is need to disseminate the improved technologies among the farmers with effective extension methods like training and demonstrations. The farmers should be encouraged to adopt the recommended package of practices for the crop for higher returns. From the above research findings it can be also concluded that the maximum number of the respondents had medium level of knowledge and extent of adoption regarding recommended wheat production technology.

Table 1: Details of package of practices followed in the frontline demonstrations vs farmers practice

S. No.	Inputs	FLDs	Farmers practice
1.	Wheat variety	HD 2967	PBW 550
2.	Seed rate	100 kg/ha	180 kg/ha
3.	Seed treatment	Thiram @ 1.5 to 2 g / kg seed, 3 g Thiram/kg + 3 g Carbendazim/kg seed.	No use of fungicides for seed treatment
4.	Fertilizer used (N:P:K and Zink in kg/ha)	120: 60:40:25	100: 50:0:0
5.	Sowing method	Seed drill	Broadcasting
6.	Weed management	Sulfosulfuron @ 33 g + Carfentrazne @ 25 g/ ha	Isoproturon @ 1.0 kg/ha
7.	Disease management	Use of Propiconazole @ 1.0 ml/l.	No use of fungicides for disease

Table 2: Ranks for different constraints (f=75) given by farmers

S. No.	Constraints	Farmers	Percentage	Rank
1	Non availability of the seeds of high yielding varieties	66	88.00	I
2	Low technical knowledge	38	76.00	I I
3	Use of higher seed rate	34	68.00	IV
4	Low soil fertility	32	64.00	V
5	Weed infestation	37	74.00	III
6	Damage by bull	17	34.00	VI
7	Karnal Bunt	11	22.00	VII

Table 3: Yield and contributing characters performance of wheat under FLD (extension gap, technology gap and technology index)

Year	Area (ha)	Potential grain yield (q/ha)	Earhed No./m2		Tiller No./m2		Grain Yield (q/ha)		% increase over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index
			FLD	FP	FLD	FP	FLD	FP				
2017-18	10.00	50	267	211	273	217	40.10	27.15	47.70	12.95	9.90	19.80
2018-19	10.00	50	273	221	278	230	41.90	28.10	49.11	13.80	8.10	16.20
2019-20	10.00	50	289	221	293	235	42.10	30.15	39.64	11.95	7.90	15.80
Mean	**30.00**	**50**	**276**	**218**	**281**	**227**	**41.37**	**28.47**	**45.48**	**12.90**	**8.63**	**17.27**

Table 4: Economics, additional cost and returns in wheat under frontline demonstrations (FLDs) vs framers practice (FP)

Year	Potential grain yield (q/ha)	Cost of cash input		Additional cost in demonstrations (Rs./ha)	Sale price of grain (MSP) (Rs./qt)	Grain Yield (q/ha)		Total returns Rs. (ha		Net returns	Incremental Benefit: Cost ratio	
		FLD	FP			FLD	FP	FLD	FP		FLD	FP
2017-18	50	27300	24489	2811	1735	40.10	27.15	69574	47105	22468	2.55	1.92
2018-19	50	28600	25900	2700	1840	41.90	28.10	77096	51704	25392	2.70	2.00
2019-20	50	29410	26250	3160	1925	42.10	30.15	81043	58039	23004	2.76	2.21
Mean	**50**	**28437**	**25546**	**2890**	**1833**	**41.37**	**28.47**	**75839**	**52189**	**23650**	**2.67**	**2.04**

Table 5: Extent of farmers satisfaction over performance of FLDs (n=75)

Satisfaction level	Number	Percent
High	49	65.3
Medium	32	42.7
Low	21	28.0

References

1. Anonymous, Statistical Abstracts of Punjab. http:// ww.esopb.gov.in/ static/PDF/ Statistical -Abstract-2013.pdf.
2. Choudhary BN. Krishi vigyan Kendra-A guide for KVK mangers. Publication, Division of Agricultural Extension, ICAR, 1999, 73-78.
3. Dayanand VRK, Mehta SM. Boosting mustard production through front line demonstrations. Indian Res J Ext Edu.; 2012; 12(3):121-123.
4. Dhruw KS, Sengar RS, Yadav KN. Level of knowledge and adoption about recommended maize production technology. Agril. Update, 2012; 7(3&4):311-315.
5. FAO (2013) FAO Agricultural Production Statistics, http:// faostat3.fao.org/ as accessed on 17 April 2015.
6. FAO. FAO Cereal Supply and Demand Brief. http://www.fao.org/ worldfoodsituation/csdb/en/ accessed on September 24, 2017.
7. Hiremath SM, Nagaraju MV. Evaluation of front line demonstration trials on onion in Haveri district of Karnataka. Karnataka J. Agril. Sci. 2009; 22(5):1092-1093.
8. Joshi NS, Bariya MK, Kunjadia BB. Yield gap analysis through front line demonstrations in wheat crop. International J. Scientific Res. Pub., 2014; 4(9):1-3.
9. Kajla M, Yadav VK, Khokhar J, Singh S, Chhokar RS, Meena RP, *et al.* Increase in wheat production through management of abiotic stresses: A review. Journal of Applied and Natural Sciences. 2015; 7:1070-1080.
10. Meena BL, Meena RP, Meena RR, Bhim Singh. Popularization of improved maize (Zea mays L.) production technology through frontline demonstrations in semi arid zone IVA of Rajasthan. J. Appl. Nat. Sci. 2014; 6(2):763-769.
11. Nagarajan S. Perspectives on wheat demand and research needs. Wheat-research needs beyond 2000 AD Proc. Int. Group Meeting held at DWR, Karnal, India, 1997, 2-14, 14-15.
12. Samui SK, Maitra S, Roy K, Mondal AK, Saha D. J. of Indian Society of Costal Agriculture Research, 2000; 18(2):180- 183.
13. Sharma V, Kumar V, Sharma SC, Singh S. Productivity enhancement and popularization of improved production technologies in wheat through frontline demonstrations. Journal of Applied and Natural Science, 2016; 8(1):423-428.
14. Singh SB. Impact of frontline demonstrations on yield of Wheat (Triticum aestivum) under rain fed Condition in Uttarakhand. International Journal of Science and Technology. 2017; 6(1)779–786.
15. Tiwari BK, Sharma A, Sahare KV, Tripathi PN, Singh RR. Yield gap analysis of wheat through front line demonstration under limited irrigation conditions. Plant Archives, 2014; 14(1):495-498.