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Frontline demonstration: An effective tool for increasing productivity of pulses in Gorakhpur district of Uttar Pradesh

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Abstract
The main objectives of FLD's on pulses is to demonstrate and popularize the improved package of practices on farmers' fields for effective transfer of generated technology and fill the gap between recommended technology and traditional farming practices. To boost the production and productivity of pulse crops in district Gorakhpur, Mahayogi Gorakhnath Krishi Vigyan Kendra, Gorakhpur conducted frontline demonstration on pulse crops in which 50 demonstration was on pigeon pea and 10 demonstrations was on chickpea during kharif and rabi season 2017-18. The results compared with the different variables like improved variety seed, seed rate, seed treatment, sowing method, balanced dose of fertilizers, pre-emergence herbicide and need based pesticides application as cash inputs for demonstration and farmers practice included old mix variety, broadcasting sowing method, no use of fertilizer, no weeding and no proper plant protection practices. There was a wide yield gap between the potential and demonstration yields in both the pulse crops due to technology and extension gaps. The result reveals the increases yield of demonstrated plots that was 42.55 and 42.67 percent as compared to existing farming practices for pigeon pea and chickpea, respectively due to adoption of improved package of practices. On an average, technology gap of different pulse crops under front line demonstration was 8.69 q/ha while its range varied from 7.05 to 10.34 q/ha. Extension gap of different pulse crops was 4.37 to 5.07 q/ha with an average of 4.72 q/ha and technology index was varied from 29.37 to 41.36 per cent with on an average of 35.37 per cent. The study also indicates the wide variation in the technology gap and index percentage because of variation in agro-climatic parameters, soil fertility, biotic stresses, socio-economic and management practices. This variation can be narrowed down through dissemination of improved technology among farming community with effective extension methods and demonstrations. Average net profitability of worth Rs. 53208.50/ha as compared to farmers practices (Rs. 31540.00/ha) were obtain and average incremental benefit cost ratio (ICBR) 9.05 was also recorded from demonstrated plots. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. This can be seen as a positive indicator for formulating and disseminating, more extensive, technology specific and farmer centric FLD programme to improve knowledge and adoption amongst farmers in the district to boost Chickpea production.

Keywords: Frontline demonstrations, pulses, technology gap, extension gap

Introduction
Pulses or grain legumes in general are an indispensable source of supplementary protein to daily vegetarian diets, these are regarded as a poor man's meat. Pulses have a wide range of adaptability to latitudes, longitudes and climatic variables. In the production process, pulses improve soil fertility through biological nitrogen fixation, requires less water than cereals, and their rotation with cereals help in controlling diseases and pests. India is the largest producer in the world, with 26 per cent share in the global production by producing 25.23 million tons of pulses from an area of 29.99 million hectares. The average productivity of country is about 841 kg/ha against the average global productivity of 1023 kg/ha (DES, 2018) [2]. The average productivity of pulses in the states Uttar Pradesh is about 974 kg/ha in 2017-18 (Pocket Book of Agricultural Statistics, 2018) [7]. The important pulse crops are Chickpea (45.53 per cent), Pigeon pea (17.06 per cent), Urdbean (13.40 per cent), Mungbean (7.76 per cent), Lentil (5 per cent) and Field pea (5 per cent). The major pulse producing states are Madhya Pradesh (33 per cent), Maharashtra (13 per cent), Rajasthan (12 per cent), Uttar Pradesh (9 per cent), Karnataka (8 per cent), Andhra Pradesh (5 per cent), Gujrat (4 per cent), Jharkhand (3 per cent), Tamilnadu, (2 per cent), Telangana (2 per cent) and which together for about 91 per cent of the total production (DES, 2018) [2]. Adoption of traditional farming system, non-adoption of recommended production technologies due to lack of knowledge and conviction about latest technologies, major abiotic and biotic stresses are responsible for declining of potential yield

of pulse crops. Keeping this in view, Mahayogi Gorakhath Krishi Vigyan Kendra, Gorakhpur, Uttar Pradesh conducted front line demonstrations (FLDs) on pulse crops to popularize the improved package of practices on farmers' fields for effective transfer of generated technology for enhancement of production potential of pulse crops.

Materials and methods

Front line demonstration conducted on pulse crop (Pigeon pea and Chickpea) during Kharif and Rabi season of 2017-18 in selected cluster villages of Gorakhpur district of Uttar Pradesh. The total number of 60 pulses growers (50 of Pigeon pea and 10 of Chickpea) were selected for successful demonstration during *kharif* & *rabi* season 2017-18 in the six blocks of Gorakhpur district viz., Jungle Kaudiya, Campierganj, Pali, Bhathat, Chargawan and Khorabar which comes under the jurisdiction of Mahayogi Gorakhath Krishi Vigyan Kendra. The total area of 20 ha and 02 ha was covered for the pigeon pea and chickpea demonstrations, respectively. The improved varieties of pigeon pea and chick pea that was NA 2 and GNG 1581 respectively, demonstrated with full package of practices viz. proper tillage, proper seed rate and sowing method, balanced dose of fertilizer (18 kg Nitrogen 46 kg P_2O_5/ha), *Trichoderma* and *Rhizobium* culture @ 5 gm/kg of seed as seed treatment, proper irrigation, weed management and improved plant protection measure were applied (Table 1) at farmers fields. In this demonstration control plot was also kept where farmers practices was carried out. The frontline demonstration was conducted to study the technology gap between the potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practice and technology index. The yield data were collected from the demonstrations and control plots (farmers Practice) by random crop cutting method and analyzed by using simple statistical tools. The technology gap, extension gap and technological index (Samui *et al.*, 2000) [8] were calculated by using following formula as given below: -

$$\text{Percent increase yield} = \frac{\text{Demonstration yield-farmers yield}}{\text{Farmers yield}} \times 100$$

Technology gap = Potential yield - Demonstrated yield

Extension gap = Demonstrated yield – Yield under existing practice

$$\text{Technology index} = \frac{\text{Potential yield-Demonstrated yield}}{\text{Potential yield}} \times 100$$

Result and Discussion

The gap between the existing and recommended technologies of pulse crops in district Gorakhpur was presented in table-1. Full gap was observed in case of use of HYVs, seed rate and seed treatment and partial gap was observed in fertilizer dose, weed management and irrigation, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. Farmers in general used local or old-age varieties instead of the recommended high yielding resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons. Farmers applied higher seed rate than the recommended and they were not using seed treatment technique for wilt and collar rot management and to better nodulation for biological nitrogen fixation (BNF) of the plants because of lack of knowledge and interest. The farmers were much concerned about importance of sowing method and land preparation. Burman *et al.* (2010) [1] reported that there is a gap in adoption of technology in major pulse crops both in rain fed and irrigated cropping system. The perusal of data given in table-2 revealed the average yield of frontline demonstration on pulse crops that was 14.64 & 16.95 q/ha in pigeon pea and chickpea from demonstrated plots, respectively as well as 10.27 and 11.88 q/ha from control plots respectively during demonstration period. The crop wise per cent increase in yield recorded 41.36 and 29.37 over farmers practice in pigeon pea and chickpea, respectively. Singh (2002) [9] reported that HYVs with production and protection measures that improve the yield of pulses.

The technology gap, the difference between potential yield and yield of demonstration plots was 10.34 and 7.05q/ha in pigeon pea and chickpea, respectively during demonstration period. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation (Singh *et al.* 2007) [10].

Extensions gap for pulse crops were observe as 4.37 and 5.07q/ha for pigeon pea and chickpea, respectively during demonstration period. The highest extension gap 5.07 q/ha was recorded in chickpea crop which emphasized the need to educate the farmers through various means of adoption of improved production and protection 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. This finding is in corroboration with the findings of Joshi *et al.*, 2014 [4] and Kumar *et al.*, 2014 [5].

The technology index shows the feasibility of the evolved technology at the farmers' field. Higher technology index reflected the insufficient extension services for transfer of technology. The lower value of technology index shows the efficacy of good performance of technological interventions. The average technology index was observed 41.36 per cent in pigeon pea and 29.37 percent in chickpea (Table 2). This variation indicates that the result differ according soil fertility status, weather condition and mismanagement of crop. Similar findings were reported by Joshi *et al.*, 2014 [4] and Kumar *et al.*, 2014 [5].

Economic performance

Different variables like seed, fertilizers, bio-fungicide, bio-insecticide and chemical pesticides were considered as a technological intervention and on an average an additional investment of Rs. 1655/ha and Rs 3918/ha was made under demonstration of pulses for pigeon pea and chickpea, respectively. The average net returns of demonstration for pigeon pea was Rs. 53008/ha as compare to farmers practices of Rs. 32813/ha whereas average net return in chickpea was Rs. 53409/ha as compared to farmers practice of Rs.30267. The study found average additional net returns of Rs. 20195/ha and Rs. 23142/ha from the demonstrated plots of pigeon pea and chickpea. T

he effective gain from both the pulse crop was Rs. 18540/ha and Rs. 19224/ha for pigeon pea and chickpea, respectively whereas incremental benefit: cost ratio (IBCR) was 12.30 and 5.90, respectively (table 3). Similar findings were also reported in frontline demonstrations on pulse crops by Lathwal (2010) [6] and Dwivedi *et al.*, 2014 [3].

Table 1: Difference between technological interventions and farmers practices under frontline demonstrations in pulses.

S. No	Particulars	Technological intervention		Existing Practices	Gap
		Pigeon pea	Chickpea		
1.	Variety	NA 1, NA 2 IPA203	JAKI 9218, GNG1581, RSG963	Local (small seeded)	Full gap
2.	Land preparation	One cultivator ploughing and 3 ploughing	One cultivator ploughing and 2 ploughing	One cultivator ploughing and 2 ploughing	Nil
3.	Seed rate (Kg/ha)	15	75	Higher seed rate	Full gap
4.	Sowing method	Line sowing Raised bed 60 x 15cm (R x P)	30x10cm (R x P)	Broadcasting	Full gap
5.	Seed treatment	*Trichoderma* powder and *Rhizobium* culture @ 5 g/kg seed	*Trichoderma* powder and *Rhizobium* culture @ 5 g/kg seed	No seed treatment	Full gap
6.	Fertilizer dose (Kg/ha)	18 N and 46 P_2O^5	18 N and 46 P_2O^5	Use of Imbalance fertilizers	Partial gap
7.	Weed management	Pendimethalin 30% EC @ 3.3 lit./ha + One hand weeding at 45-60 days after sowing	Pendimethalin 30% EC @ 3.3 lit./ha + One hand weeding at 60 days after sowing	Improper chemical weed management	Partial gap
8.	Irrigation	In absence of rain, at flowering /pod development stage	One at pre flowering and one at pod development stage	Untimely irrigation	Partial gap
9.	Plant protection	Need based Plant protection measure Indoxacarb (15.8% E.C.) @ 500ml/ha)	Need based Plant protection measure Indoxacarb (15.8% E.C.) @ 500ml/ha)	Improper management	Partial gap

Table 2: Gap in Grain yield Production of Pulses Crop under Frontline Demonstrations

Name of Crop	Year	Under FLD Programme		Average Yield (Q/ha.)		% Increased	Technology Gap (Q/ha)	Extension gap (Q/ha)	Technology Index
		No. of Demo	Area (Q/ha)	Demonstration	FP				
Pigeon Pea	2017-18	50	20	14.64	10.27	42.55	10.34	4.37	41.36
Chickpea	2017-18	10	2.15	16.95	11.88	42.67	7.05	5.07	29.37

Table 3: Impact of Improved Technology on Economics of Pulses under Real farm situation.

Name of Crop	Year	Cost of cultivation (Rs/ha)		Additional Cost in IT (Rs/ha)	Sale price of Grain (Rs/ha)	Net Return (Rs/ha)		Additional Net return (Rs/ha)	Effective Gain (Rs/ha)	ICBR
		IT	FP			IT	FP			
Pigeon Pea	2017-18	20192	18537	1655	5000	53008	32813	20195	18540	12.30
Chickpea	2017-18	21171	17253	3918	4400	53409	30267	23142	19224	5.90

Conclusion

There was a technological gap between technological intervention and existing practices in pulse production technology due to lack of knowledge and conviction of improved technologies. Technology and extension gap showed that the farmers were not aware about improved package and practices of pulse production technologies, therefore it is recommended that the farmers should be aware for adoption of improved technologies through various extension aids (training, demonstration etc.). The technology index shows the feasibility of the technology demonstrated at farmer's field. The lower technology index showed that the good performance of technological intervention. So, it is concluded that introduction of improved technologies can fulfil the technological and extension gap and extension agencies can also play a significant role to transfer of improved technologies among farming communities for better production. Thus, it can be said, that the adoption of improved package of practices of pulse production technology may result in higher productivity per unit area.

References

1. Burman, Roy R, Singh SK, Singh AK. Gap in adoption of improved pulse production technologies in Uttar Prasesh. Indian Res. J Ext. Edu. 2010; 10(1):99-104.
2. DES. Directorate of Economics and Statistics, Department of Agriculture Cooperation and Welfare, Ministry of Agriculture, Government of India, New Delhi, 2018.
3. Dwivedi AP, Mishra, Anupam Singh SK, Singh SRK, Singh Mamta. Yield gap analysis of chickpea through front line demonstration in different agro-climatic zones of M. P. and Chhatisgarh. Journal of food legumes. 2014; 27(1):50-63.
4. Joshi NS, Bariya MK, Kunjadia BB. Yield gap analysis through front line demonstration in wheat crop. Int. J Sci. Res. Pub. 2014; 4(9):1-3.
5. Kumar J, Singh YP, Rana DK. Yield and gap analysis of wheat (Triticum aestivum) productivity in NCR Delhi. Indian J Ext. Edu. 2014; 50(1-2):56-58.
6. Lathwal OP. Evaluation of frontline demonstrations on black gram in irrigated agro ecosystem. Annals of Agricultural Research, 2010; 31:24-27.
7. Pocket Book of Agricultural Statistics. Government of India, Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics, New Delhi, 2018.
8. Samui SK, Maitra S, Roy DK, Mandal AK, Saha D. Evaluation on front line demonstration on groundnut. Journal of the Indian Society Coastal Agricultural Research. 2000; 18(2):180-183
9. Singh PK. Impact of participation in Planning on adoption of new technology through FLD. Manage Extension Research Review, 2002, 45-48.
10. Singh SN, Singh VK, Singh RK, Singh Rakesh K. Evaluation of on farm front line demonstrations on the yield of mustard in central plains zone of Uttar Pradesh. Indian Res. J Ext. Edu. 2007; 7(2-3):70-81.