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A CASE STUDY

Effect of front line demonstrations on productivity and profitability of urdbean [*Vigna mungo* (L.) *Hepper*] in mid-western plain zone of Uttar Pradesh

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SUMMARY

The 56 front line demonstrations were conducted in mid-western plain zone of Uttar Pradesh to evaluate the effect of front line demonstrations on productivity and profitability of urdbean during *Kharif* seasons of 2010 to 2012 at farmer's fields of different locations in Budaun district. Improved technology with ICM produced 27.27 per cent higher average grain yield as compared to prevailing farmers practice (791 kg/ha). The maximum technology gap (470 kg/ha) and index (32.41%) was observed in the year 2011 in comparison to the years of 2010 and 2012. The front line demonstrations recorded higher average gross returns (Rs. 35363/ha) and net return (Rs. 24240/ha) with higher cost: benefit ratio (3.15) compared to farmers practice. Further, data show that the average additional cost of cultivation (Rs.708/ha) under integrated crop management demonstrations yielded additional net returns of Rs. 6839 per hectare with incremental benefit cost ratio of 0.50. Majority of the respondent farmers expressed their high (48.57%) to the medium (34.64%) level of satisfaction for the improved ICM technology under real farm situations with very few (16.79%) of respondents expressed lower level of satisfaction.

Key Words : Benefit cost ratio (B: C), Client satisfaction index, Front line demonstration, Integrated crop management, Productivity, Profitability, Technology gap, Technology index, Urdbean

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India is the largest producer, consumer, importer and processor of pulses in the world. Ironically, the country's pulse production has been hovering around 14–15 million tonnes, coming from a near-stagnated area of 22–23 million hectare, since 1990–91. For meeting the demand of the growing population, the country is importing pulses to the tune of 2.5–3.5 million tonnes every year. Strong upward trend in the import of pulses is a cause of concern, since an increase in demand from India has shown to have cascading

effect on international prices, thus, draining the precious foreign exchange. By 2050, the domestic requirements would be 26.50 million tonnes, necessitating stepping up production by 81.50 per cent, *i.e.*, 11.9 million tonnes additional produce at 1.86 per cent annual growth rate (Ali and Gupta, 2012). This uphill task has to be accomplished under more severe production constraints, especially abiotic stresses, abrupt climatic changes, emergence of new species/ strains of insect-pests and diseases, and increasing deficiency of secondary and micronutrients in the soil. This requires a two-pronged proactive strategy, *i.e.*, improving per unit productivity and reducing cost of production. The growing demand of about 20 million tonnes of pulses by 2012 and 28 million tonnes by 2025 can be realized only by adopting increasingly more productive technologies along with sustained developmental efforts and favourable Government policies (Anonymous, 2007).

Urdbean is the third most important pulse crop of India after chickpea and pigeonpea, which is grown in various agro-ecological conditions under diverse cropping systems. It is grown throughout the country and covers 3.24 m ha area, 1.46 m tonnes production with average productivity was 440 kg/ha (Anonymous, 2011) but the major urdbean growing states are Uttar Pradesh, Andhra Pradesh, Karnataka, Maharashtra, Rajasthan and Tamil Nadu. However, in Uttar Pradesh it occupied an area of 0.22 m ha with production of 0.16 m tonnes and average productivity was 724 kg/ha (Anonymous, 2012). Though, urdbean has been in cultivation since long time but its productivity is not achieved up to its genetic potential of 1500 kg/ha. However, improved varieties of urdbean crop with ICM practices hold promise to increase productivity by 20–25 per cent yield advantage over the farmers' practices in a large number of front line demonstrations conducted across the country (Ali and Gupta, 2012).

Hence, improved production technology with full package of practices was demonstrated at farmers' field to augment the urdbean productivity. Therefore, newly released resistant to biotic stress variety was evaluated at farmers' field to match the appropriate variety for agro-climatic condition. Keeping these facts in view, demonstrations were conducted to assess the effect of front line demonstrations on productivity and profitability of urdbean in mid western plain zone of Uttar Pradesh under famers' conditions.

MATERIAL AND METHODS

The front line demonstrations (FLDs) were conducted at farmer's fields at different agro ecological situations locations in Budaun district of Uttar Pradesh by scientists of Krishi Vigyan Kendra, Budaun during three consecutive *Kharif* seasons of 2010 to 2012 to evaluate the effect of front line demonstrations on productivity and profitability of urdbean [*Vigna mungo* (L.) *Hepper*] in mid western plain zone of Uttar Pradesh. The soil of this region was light in texture, with slightly alkaline in reaction (pH 7.7) and was low in organic carbon (0.29%) and medium in phosphorus (38 kg P_2O_5 ha^{-1}) and low in potassium (141 kg ha^{-1}) and suitable for cultivation of pearl millet, urdbean, mungbean, mustard, potato, wheat etc. The temperature ranges from 4.5^0 C to 45.4^0 C with annual average rainfall 861 mm.

Fifty six FLD's were conducted during *Kharif*

Table A : Details of package of practices followed in the front line demonstrations

Sr. No.	Inputs/particulars	Quantity per hectare	
		Demonstration	Farmers practice
1.	Variety	KU-91 (Azad urd-2)	Type-9
2.	Seed rate	25 kg	25 kg
3.	Single super phosphate (SSP)	250 kg	–
4.	Di-ammonium phosphate (DAP)	–	100 kg
5.	Muriate of potash	65 kg	–
6.	Zinc sulphate (21%)	15 kg	–
7.	*Rhizobium* culture	500 g	–
8.	Urea	45 kg	45 kg
9.	Carbendazim	3 gm/kg seed	–
10.	Metasystox	1.25 lit.	1.00 lit.
11.	Pendimethalin	3.3 lit.	–
12.	Weeding	Use of pendimethalin	Manual weeding

season 2010 to 2012 with the objective to transfer the improved technology for increase the productivity of urdbean through demonstrations with full package of practices including improved variety, seed treatment, use of biofertilizers, recommended dose of FYM and fertilizers, timely weed, water and pest management and compared with farmers practice in the area. All the participating farmers were trained on improved production technology of urdbean. The details of inputs and package of practices used in FLDs are given in Table A.

The crop was sown after the onset of monsoon in the month of July. The inputs for demonstrations were supplied to the farmers. Farmers were advised to use proper seed rate and sowing time with recommended package of practices.

Full dose of phosphorus, potash and zinc sulphate through fertilizers (SSP and DAP for N and P, muriate of potash for K and zinc sulphate hepta hydrate for Zn) were applied as basal at the time of sowing. The seed was treated before sowing with carbendazim @ 2 g/kg of seed as per recommendations to control any infection. To control weeds, pendimethalin @ 3.3 lit. per hectare was sprayed with the volume of 650 lit. of water just after sowing of crop in all demonstration plots and farmers done one manual weeding in farmers practice plots. Plant protection measures were under taken as per need of the crop. Finally yield data of demonstrations and farmers practices were collected on the equal area.

The satisfaction level of beneficiaries' as well as neighboring farmers' for the performance of front line demonstrations was also assessed. In all, 280 participating farmers' were selected to measure satisfaction level of farmers' for the performance of the technology demonstrated. The selected respondents were interviewed personally with the help of a pre-tested and well structured interview schedule. The technology gap, technology index and client satisfaction index were calculated using the following formulae :

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield}$$

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

$$\text{Clientsatisfaction index} = \frac{\text{Individual score obtained}}{\text{Maximum score possible}} \times 100$$

The data collected were tabulated and statistically analyzed to interpret the results. The economic-parameters (gross return, net return and C: B ratio) were worked out on the basis of prevailing market prices of inputs and minimum support prices of outputs.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Yield performance :

A comparison of productivity levels between demonstrated plots and prevailing farmers practice is shown in Table 1. It is obvious from the results that integrated crop management practice of urdbean recorded the average higher seed yield (1007 kg/ha) as compared to farmers practice (791 kg/ha). The increase in yield of urdbean due to integrated crop management was 27.27 per cent. Ali and Gupta (2012) also reported that improved varieties of urdbean under front line

Table 1 : Yield performance of urdbean under FLDs at farmers' fields

Year	Yield (kg/ha)		% yield increase over FP	Technology gap (kg/ha)	Technology index (%)
	Demonstration	Farmers practice			
2010	1001	774	29.33	449	30.97
2011	980	780	25.64	470	32.41
2012	1040	820	26.83	410	28.28
Average	1007	791	27.27	443	30.55

Table 2 : Economic performance of urdbean under FLDs at farmers' fields

Year	Cost of cultivation (Rs./ha)		Gross return (Rs./ha)		Net return (Rs./ha)	
	Demonstration	Farmers practice	Demonstration	Farmers practice	Demonstration	Farmers practice
2010	10100	9927	29029	22446	18929	12519
2011	10590	10118	32340	25740	21750	15622
2012	12680	11200	40721	35260	32040	24060
Average	11123	10415	35363	27815	24240	17400

Sell price of urdbean was Rs. 2900, 3300 and 4300 per quintal in 2010, 2011 and 2012, respectively.

demonstrations were conducted during the years of 2006-2009 across the country and found yield advantage of 21.9 per cent over local checks. From these results it is evident that the performance of urdbean was found better when crop was grown under integrated crop management practices including good quality seed of improved variety than the prevailing farmers practice under real farm situations. Farmers were motivated by results of demonstrations of integrated crop management practices in urdbean and they would adopt these technologies in the coming years. Fifty four per cent increases in the yield were obtained under FLD over farmers' practice by Islam *et al.* (2011).

The results (Table 1) of front line demonstrations and potential yield of KU-91 were compared to estimate the yield gaps which were further categorized into technology gap and technology index. The technology gap showed the wide gap in the demonstration yield over potential yield of urdbean. The technology gap was maximum (470 kg/ha) in the year 2011 followed by 449 and 410 in the years of 2010 and 2012, respectively. The observed technology gap may be attributed to dissimilarities in their soil fertility, uneven and erratic rainfall and vagaries of weather conditions in the area as well as management of the farmers.

Technology index showed the feasibility of the technological package at the farmer's field. The lower the value of technology index more is the feasibility. The data (Table 1) revealed that minimum technology index value 28.28 was noticed in the year 2012 followed by 2010 (30.97%) whereas, maximum value of technology index of 32.41 per cent in the year 2011, it is obviously due to uneven and erratic rainfall and vagaries of weather conditions in the area. The findings of the present study are in line with the findings of Hiremath *et al.* (2007) and Dhaka *et al.* (2010).

Economic performance :

The economics of urdbean under front line demonstrations was estimated and the results have been presented in Table 2. Economic analysis of the yield performance revealed that besides higher production, FLD participating farmers' fetched better price of their produce as compared to the prevailing farmers practice in all the three years. This is so because of better quality of the produce. The front line demonstrations recorded higher average gross returns (Rs. 35363/ha) and net return (Rs. 24240/ha) with higher cost: benefit ratio (3.15) compared to farmers practice. These results are in line with the findings of Islam *et al.* (2011) and Hiremath *et al.* (2007).

Further, data (Table 3) show that the average additional cost of cultivation (Rs. 708/ha) under integrated crop management demonstrations and has yielded additional net returns of Rs. 6839 per hectare with incremental benefit cost ratio of 0.50. The results suggest that higher profitability and economic viability of urdbean demonstrations under local agro-ecological situation. Similar results were also reported by Islam *et al.* (2011) and Hiremath *et al.* (2007).

Farmer's satisfaction :

The extent of satisfaction level of respondent farmers over performance of demonstrated technology was measured by client satisfaction index (CSI) and results are presented in Table 4. It is observed that majority of the respondent farmers expressed high (48.57%) to the medium (34.64%) level of satisfaction regarding the performance of urdbean under demonstrations. Whereas, very few (16.79%) of

Table 3 : Additional economic performance of urdbean under FLDs at farmers' field

Year	Additional cost of cultivation (Rs./ha) in demonstration	Additional return (Rs./ha) in demonstration	C : B ratio	
			Demonstration	Farmers practice
2010	173	6410	1: 2.87	1: 2.26
2011	472	6128	1: 3.05	1: 2.54
2012	1480	7980	1: 3.53	1: 3.15
Average	708	6839	1: 3.15	1: 2.65

Table 4 : Extent of farmer's satisfaction over performance of demonstrated technology **(n=280)**

Satisfaction level	Number	Per cent
High	136	48.57
Medium	97	34.64
Low	47	16.79

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 front line demonstration which in turn would lead to higher adoption. The results are in close conformity with the results of Kumaran and Vijayaragavan (2005) and Dhaka *et al*. (2010).

According to Islam *et al*. (2011) the variation in agro-climatic parameters as well as locations of FLD programme was effective in changing the attitude, skill and knowledge of the farmers for adoption of improved technology/HYV of urdbean and further wide scale diffusion to the other farmers. It also improved their relationship between the farmers and scientist and built confidence between them.

Conclusion :

It may be concluded that integrated crop management technology in urdbean was found more productive, profitable and feasible in mid western plain zone of Uttar Pradesh as compared to prevailing farmers practice. Farmers were motivated by results of demonstrations of integrated crop management practices in urdbean and they would adopt these technologies in the coming years. This should be brought to the access of farmers through transfer of technology centres like KVKs.

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