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Evaluation on Front Line Demonstrations on Pigeon Pea [(*Cajanus cajan* (L.) Millsp.)] Crop in Saran District, Bihar

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A B S T R A C T

The front line demonstrations (FLD) programme on pigeon pea crop were conducted during 2011-12 and 2012-13 in Saran District, Bihar. The farmer's field were selected from different village (0.4ha) from the district. These demonstrations focused on increased productivity and replacement of old variety with promising high yielding improved variety Narendra Arhar - 1 (NDA-1) and get the feedback from farmers on the performance of pigeon pea variety. The study revealed that over years, NDA-1 variety was superior over traditional farmer's practices. The economic influence of pigeon pea observed i.e. net return (Rs. 41066), Benefit cost ratio (4.10:1), extension gap (4.56 q/ha), and technology index (17.80%). By conduction of front line demonstration (FLDs) on farmer's field there was significant increase in knowledge level of the farmers and majority of farmer's showed high level of satisfaction about demonstrated technologies.

Introduction

Pigeonpea [(*Cajanus cajan* (L.) Millsp.)] is cultivated in tropical and sub-tropical areas between 300N and 300S latitude. It is an important grain legume of Asia (especially, the Indian subcontinent), Latin America and Eastern and Southern Africa. Globally, it is grown on ~ 5 million hectares (m ha) in about 82 countries of the world. Pigeon pea has a unique place in Indian farming and India accounts for about 90% of the global production. It is the second most important pulse crop next to chickpea, covering an area of around 4.42 m ha (occupying about 14.5% of area under pulses) and production of 2.86 mt (contributing to 16% of total pulse production) and productivity of about 707 kg/ha. It is mainly consumed as dry split dhal throughout the country besides several other uses of various parts of pigeon pea plant. It is an excellent source of protein (20-22%),

supplementing energy rich cereal diets in a mainly vegetarian population (Saxena *et al.*, 2010). It is mainly grown as intercrop with urdbean, moonbean, castor, sorghum, soybean, cotton maize and groundnut in states, Maharashtra, Karnataka, Andhra Pradesh, Telangana, Madhya Pradesh, Uttar Pradesh, Bihar, Gujarat, Jharkhand, Rajasthan, Odisha, Punjab and Haryana. Pigeon pea is a multi-purpose crop that fits very well in the context of sustainable agriculture. The highest yield has been recorded by Bihar (1695 kg/ha) followed by West Bengal (1450 kg/ha), Haryana (1100 kg/ha) and Gujarat (1082 kg/ha). The lowest yield has been observed in the state of A.P. (536 kg/ha) followed by C.G. (575 kg/ha) and Karnataka (591 kg/ha). In Bihar, Saran district has the sizeable area under pigeon pea cultivation but the productivity level is very low. The reasons for low productivity about newly released crop production technologies and their management practices have not applied in the farmer's field. Keeping the above point in view, the FLDs on pigeon pea using production improved technologies was conducted with the objective of showing the productive potential of the new production technologies under actual farm situation.

Materials and Methods

The present study was conducted at Krishi Vigyan Kendra, Manjhi, Saran under Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar in five adopted village (Nandpur, Samahauta, Dumari, Stalpur and Bareja) during *Kharif* season in 2011-12 and 2012-13. Before conducting FLDs, a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspect of cultivation (Venkattakumar *et al.,* 2010). The difference between the demonstration package and existing farmers practice are given in Table 1.

In demonstration plots, use of quality seeds of improved varieties, Seed rate, Method sowing and timely weeding, need based pesticide, weedicide as well as balanced fertilization were emphasized and comparison has been made with the existing practices (Table 1). The necessary steps for selection of site and farmers, lay out of demonstration etc. were followed as suggested by Choudhary (1999). The traditional farmer practices were maintained in case of local checks. The data output were collected from both FLD plots as well as control plots and finally the extension gap, technology gap, technology index along with the benefits cost ratio were work out (Samui *et al.*, 2000) as given below:

Technology gap
= Potential yield ─ Demonstration yield

Extension gap
= Demonstration yield ─ Farmers yield

Technology index (%)
= (Technology gap × 100)/Potential yield

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Results and Discussion

The result of 45 front line demonstration (FLDs) conducted during 2011-12 and 2012-13 in 18 ha area at five adopted village in Saran District of Bihar state. The results finding obtained from the present study have been distributed in Yield and Economics of pigeon pea cultivation as per Table 2 and Table 3. In Table 1 is conducted that demonstration yield of NDA-1 variety performance better than traditional farmer practices. The NDA-1 recorded maximum and minimum yield in the *kharif year* 2011-12 and 2012-13 with 15.47 q/ha and 14.12/ha, respectively. The average yield of two years

was recorded 14.80 q/ha as compared to local variety 10.24 q/ha. The per cent increase in yield was ranging from 42.19 to 46.77 during the study. The results are in conformity with the finding of Suthar *et al.,* (2016), Tomer *et al.,* (2003) and Tiwari and Saxena (2001). The results clearly indicate the positive effects of FLDs over existing farmer practices toward enhancing the yield of pigeon pea. Results of Table 2 revealed that yield of the front line demonstration and potential yield of the crop was compared to estimate the yields which were further categorized into technology and extension gaps. The technology and Extension gaps were ranged between 2.53 - 3.88 q/ha and 4.19 - 4.93 q/ha with a mean of two years 3.21 q/ha and 4.56 q/ha during period of study. Technology and Extension gaps indicated the needs to educate farmers more and more through various extension means to increase awareness and adoption of improved variety especially NDA-1for narrow down the both gaps. The technology gap increased may be attributing to the dissimilarity soil fertility status and weather conditions (Mitra and Samajdar, 2010). The technology index shows the feasibility of the improved technology at the farmer's fields. The lower the value of technology index more is the feasibility of the technology. As such, fluctuation in technology index was from 14.05 to 21.55 per cent during study period (Table 2). These findings corroborate with the finding of Mokidue *et al.,* (2011). The Year wise economics of pigeon pea cultivation with adoption of improved technology and farmers practices has been presented in Table 3. The adoption of improved technology under FLDs recorded higher average gross returns (54321 Rs/ha), net returns (41066 Rs/ha) and B: C ratio (4.10:1) compared to farmers practice i.e. 37571 Rs/ha, 25354 Rs./ha, 3.07:1, respectively. Varietal characters of NDA-1 (stalk, straw yield and price of pigeon pea grain) play additional role for higher gross return. This fluctuating income trend was obtained due to variable price of pigeon pea and improper marketing system. These results are in conformity with the findings of Katare *et al.,* (2011).

Table.1 Comparison between frontline demonstrations and farm's practices

S. No.	Particulars	Existing farmer practices	Improved practices on demonstration
1	Variety	Use of local variety	Narendra Arhar -1
2	Time of Sowing	25 June to 15 July	25 June 15 July
3	Method of sowing	Broadcasting method	Line sowing
4	Seed rate	30-40 kg/ha	20 kg/ha
5	Seed treatment	No seed treatment	Seed treatment by Fungicides and bio-fertilizer
6	Fertilizer dose	No fertilizer use	20 kg/ha Nitrogen and 60 kg/ha phosphorus
7	Weed management	Hand weeding	Use of pre emergence weedicide pendimethalin
8	Plant protection	No use any plant protection technique	Adoption of IPDM practices

Table.2 Yield of pigeon pea by production technologies and high yielding varieties over local farmer's variety in 2011-12 and 2012-13

Years	No. of demonstration	Area (ha)	Yield (q/ha)			% increase over control	Technology gap (q/ha)	Extension gap q/ha)	Technology index (%)
			Potential	Demonstration	Local (farmer's plot)				
2011-12	25	10	18	15.47	10.54	46.77	2.53	4.93	14.05
2012-13	20	8	18	14.12	9.93	42.19	3.88	4.19	21.55
Mean	-	-	**18.00**	**14.80**	**10.24**	**44.48**	**3.21**	**4.56**	**17.80**

Table.3 Economic influence of pigeon pea by production technologies over farmer's field in 2011-12 and 2012-13

Years	Gross Return		Cost of cultivation		Net return		B:C ratio	
	Demo	Local	Demo	Local	Demo	Local	Demo	Local
2011-12	55692	37944	13876	12496	41816	25448	4.01	3.04
2012-13	52950	37238	12635	11978	40315	25260	4.19	3.10
Mean	**54321**	**37591**	**13256**	**12237**	**41066**	**25354**	**4.10**	**3.07**

Sale rate of pigeon pea grain during 2011-12: Rs. 3600/q and 2012-13 : Rs 3750/q

The present study observed that cultivation of pigeon pea with improved technologies has been found more productive and grain yield might be increase up to 44.48 per cent.

Wide technological and extension gaps existed between research recommendation and traditional farmer practices. However, the yield level under FLD was superior over local pigeon pea variety and performance and potentiality of this variety could be further improved by adopting recommended management practices.

Hereof, it can be concluded from the study that increased yield was due to adoption of variety NDA-1 and conducting frontline demonstrations of proven technologies yield potentials of crop can be increased to greater extent. This will subsequently increase the yield as well as the livelihood of the farming community.

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