Mysore J. Agric. Sci., 52 (3) : 621-625 (2018)

Impact of Frontline Demonstrations on Yield and Economics of Pigeon Pea in Bengaluru Rural District of Karnataka

M. Padmavathi, K. N. Srinivasappa, B. Manjunath and B. G. Vasanthi
Scientists, Krishi Vigyan Kendra, Bengaluru Rural District, Hadonahalli, Karnataka
E-mail : arpitaindia@gmail.com

Abstract

Pigeon pea (*Cajanus cajan* L.) is an important pulse crop grown during *kharif*. Low productivity of pigeon pea is due to inappropriate production practices and diminishing soil fertility. The other reason for low productivity in pigeonpea is continuous adoption of maize based cropping system in Bengaluru Rural district. To overcome this problem, Krishi Vigyan Kendra, Bengaluru Rural district conducted 131 frontline demonstrations using improved management practices in pigeon pea from 2009-10 to 2016-17 in cluster villages of Bengaluru Rural district. There was an appreciable increase in yield level, *i.e.,* 77.5 per cent in pigeon pea under demonstration plots. The highest seed yield of 1625 kg ha^{-1} was recorded in 2010-11, which was 22.64 per cent more over the farmer's practice (1325 kg ha^{-1}). The highest extension gap 300 kg ha^{-1} was recorded during 2010-11. The lower values of technology gap (175 kg ha^{-1}) and technology index (9.72 %) were recorded during 2010-11. The improved technology gave higher gross returns, net returns with higher benefit cost ratio as compared to farmer's practices.

Keywords : Pigeon pea, Extension gap, Farmers practice, Frontline demonstration, Technology gap

Pigeon pea (*Cajanus cajan* L.) generally known as Redgram in India is an important leguminous food grain. It is a highly nutritious grain legume crop and is widely appreciated as health food. It is one of the protein rich supplements to cereal based diets especially to the poor in developing countries where people are vegetarians. In Karnakata, pigeon pea was cultivated in an area of 7.13 lakh ha with an annual production of 4.64 lakh ton and productivity of 650 kg ha^{-1} during 2014-15 (Anonymous, 2014-15). During 2015-16 in Bengaluru Rural district, pigeon pea was spread over an area of 1416 ha with a production of 814 ton and productivity of 673 kg/ha which was less than the state as well as national average of 806 kg/ ha (Anonymous, 2015-16). This is not only because of non-availability of improved varieties, but also due to lack of adoption of improved production technologies.

Since pigeon pea is a drought tolerant crop and can be grown on residual moisture, there is ample scope for expanding area under pigeon pea. Besides this, continuous cultivation of maize has led to the decline in soil fertility. Thus the existing maize cultivation system has to be changed and farmers have to be encouraged to include pigeon pea as pure crop in order to bring more area under pigeon pea, increase annual production of pigeon pea at the district level and at the same time, sustain the soil health. Thus, frontline demonstrations (FLD) were successfully organized by the Krishi Vigyan Kendra to demonstrate and popularize the improved agro-technology to farmers' field under varied existing farming situations and to enhance the pulse productivity and farm gains through pulses intensification and diversification for sustaining the production systems.

Methodology

Frontline demonstrations on pigeon pea were conducted at farmers' field in Bengaluru Rural district, Karnataka State to popularise its performance during *kharif* seasons from 2009 to 2017 in cluster villages. During these eight years, 50 ha under pigeon pea were demonstrated with improved crop management practices using improved varieties BRG 2 and BRG 5. Totally 131 farmers were closely associated with pigeon pea demonstrations. In general, the soil of the area under study was deep red clayey soil which was low in nitrogen, medium in phosphorous and low to medium in potassium status with medium water holding capacity.

Each demonstration was of 0.40 ha area and the components of demonstration comprised of improved varieties, proper tillage, proper seed rate, line sowing using seed cum fertilizer drill, proper fertilization, seed treatment with chemical fungicide, dual inoculation of Rhizobium + PSB, soil application of Trichoderma, proper irrigation, weed management and protection measures. In the demonstration one control plot was also kept in which the farmers practices were carried out. The sowing was done during mid may under rainfed conditions and harvested during last fortnight of november.

The demonstrations on farmers' fields were regularly monitored by Krishi Vigyan Kendra, Bengaluru Rural district right from sowing to harvesting. The yield data were collected from both the demonstration and farmers' practice using random crop cutting method and analyzed to estimate the technology gap, extension gap and technological index. The formulae were considered as suggested by Samui *et al.* (2000), Sagar and Chandra (2004) (Eq. 1 to 4).

$$\text{Percent increase yield} = \frac{\text{Demonstration yield - Farmers yield}}{\text{Farmers yield x 100}} \quad \text{...(Eq. 1)}$$

$$\text{Technology gap} = \text{Potential yield - Demonstration yield} \quad \text{........(Eq. 2)}$$

$$\text{Extension gap} = \text{Demonstration yield - Farmers' practice yield} \quad \text{........(Eq. 3)}$$

$$\text{Technology index} = \frac{\text{Potential yield - Demonstration yield}}{\text{Potential yield} \times 100} \quad \text{.....(Eq. 4)}$$

RESULTS AND DISCUSSION

A total of 131 Frontline demonstrations were conducted at farmer's field in their farming situation.

TABLE 1

Description of technological interventions under FLD on pigeon pea

Particulars	Technological intervention (T)	Farmers Practices (T)	Gap
Variety	BRG-2 and BRG-5	Local & old	Full gap
Seed Rate	12.5-15 kg/ha	20 kg/ha	Partial Gap
Seed treatment	Ammonium Molybdate @ 60 gm/ha Rhizobium - 500 gm/haPhosphorus Soluble Bacteria (PSB) - 500 gm/ha	No seed treatment	Full Gap
Integrated Nutrient Management	Organic fertilizers – 8 t/ha, N:P:K - 10:20:10/ha; Gypsum - 150 kg/ha; Zinc – 15 kg/ha	No organic fertilizers, N:P:K - 5:15:0, No gypsum & zinc	Partial Gap
Integrated Pest Management	Deep Summer ploughing, Bird perches @ 25 /ha Pheromone trap @10-15/ha, HaNPV 500 LE spray Neem seed extract 4%	No spray of Insecticide	Full Gap
Irrigation	1st irrigation - seed germination, 2nd irrigation - Flowering stage, 3rd irrigation - pod formation	No irrigation	Full Gap
Weed Management	Pendimethalin 30 EC	No weeding	Full Gap

Table 1 indicates the factors considered for selection of critical inputs under FLD. A complete gap was observed in adoption of recommended practices over farmer's practice with regard to variety, seed treatment, sowing, weed control, irrigation and plant protection.

The study revealed that, improved technology registered overall 20 per cent increase in seed yield over the farmers practice. Data recorded in Table 2 reflects that the average yield under demonstrations fluctuated and ranged from 404 to 1625 kg ha^{-1} during 2009-10 to 2016-17 and the highest yield of pigeon pea (1625 kg ha^{-1}) was obtained during 2010-11 as compared to the farmers practice (1325 kg ha^{-1}). It was evident from the yield levels recorded in demonstrations that the improved package of practices can boost the yield significantly. These results are in confirmity with the results obtained by conducting FLD trials on various pulse crops (Das and Willey, 1991).

Extension gap

Extension gap of 225, 300, 180, 287, 106, 233, 177 and 20 kg ha^{-1} were observed during 2009-10, 2010-11, 2011-12, 2012-13, 2013-14, 2014-15, 2015-16 and 2016-17, respectively. On an average, extension gap under eight year FLD programme was 191 kg ha^{-1} (Table 2). This result emphasized the need to educate the farmers through various means for adoption of improved agricultural production technologies to reduce the wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology (Table 1). This finding is in corroboration with the findings of Hiremath and Nagaraju, (2010).

Technology gap

The technology gap observed ranged from 175 kg ha^{-1} to 1396 kg ha^{-1}. The technology gap observed may be attributed to the dissimilarity in the soil fertility status, agricultural practices and local weather conditions. Hence, variety wise and location specific recommendations appear to be necessary to minimize the technology gap for yield level of different situations.

TABLE 2

Seed yield, Technology gap, Extension gap and Technology index of pigeon pea demonstrations

Year	Variety	Seed yield (kg/ha)			% increase over FP	Technology gap (kg/ha)	Extension gap (kg/ha)	Technology index (%)
		Potential	FLD	FP				
2009-10	BRG-2	1800	1600	1375	17.09	200	225	11.11
2010-11	BRG-2	1800	1625	1325	22.64	175	300	9.72
2011-12	BRG-2	1800	1415	1235	12.72	385	180	21.39
2012-13	BRG-2	1800	1265	978	29.35	535	287	29.72
2013-14	BRG-2	1800	523	417	25.41	1277	106	70.94
2014-15	BRG-5	1800	1376	1143	16.93	424	233	23.56
2015-16	BRG-5	1800	1123	946	15.75	677	177	37.61
2016-17	BRG-5	1800	404	384	5.20	1396	20	77.56
	AVG	1800	1166	975	19.50	634	191	35.20

TABLE 3

Gross expenditure, Gross return, Net return and B:C ratio of pigeon pea production under FLDs

Year	Variety	Gross expenditure (‘/ha)		Gross return (‘/ha)		Net returns (‘/ha)		B:C Ratio	
		FLD	FP	FLD	FP	FLD	FP	FLD	FP
2009-10	BRG-2	10610	11695	25500	22355	14690	10660	2.38	1.91
2010-11	BRG-2	11269	12365	26880	21870	15611	9505	2.38	1.76
2011-12	BRG-2	13600	12225	38205	29640	24605	17415	2.8	2.42
2012-13	BRG-2	16126	15890	56925	44910	40799	29020	3.53	2.82
2013-14	BRG-2	31236	28939	56876	48928	25640	19989	1.82	1.69
2014-15	BRG-5	23600	21600	54584	45594	30984	23994	2.31	2.11
2015-16	BRG-5	22693	21811	48262	411.28	25569	19317	2.14	1.89
2016-17	BRG-5	23000	23000	21617	20524	1382	2475	0.94	0.89
	AVG	19017	18441	41106	29279	22410	16547	2.29	1.94

Technology index

Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. The technology index shows the feasibility of the demonstrated technology at the farmer’s fields and lower the value of technology index, more is the feasibility of the technology demonstrated. Higher technology index reflects the inadequacy in transferring the proven technology to the farmers and insufficient extension services for transfer of technology.

Technology index was lowest (9.72%) during 2010-11 and was highest (77.56 %) during 2016-17. The average technology index observed during the four years of FLD programme was 35.20 per cent which shows the efficacy of good performance of technical interventions.

Economic analysis

The economic feasibility of improved technology over traditional farmers’ practices was calculated depending on the prevailing prices of inputs and output cost (Table 3). The cultivation of pigeon pea under improved technologies gave higher net returns of Rs.14690, Rs.15611, Rs.24605, Rs.40799, Rs.25640, Rs.30984, Rs.25569 and Rs.1382 per hectare during 2009-10, 2011-12, 2012-13, 2013-14, 2014-15, 2015-16 and 2016-17 respectively as compared to farmers’ practices. The benefit cost ratio of pigeon pea cultivation under improved cultivation practices were 2.38, 2.38, 2.8, 3.53, 1.82, 2.31, 2.14 and 0.94 as compared to 1.91, 1.76, 2.42, 2.82, 1.69, 2.11, 1.89 and 0.89 under farmer’s practices in all the years. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice).

Demonstration at field level provides an opportunity to display the productivity potential and profitability of the latest technology under the natural farming conditions. The productivity gain under FLD over existing practices of pigeon pea cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of pigeon pea in the district.

REFERENCES

ANONYMOUS, 2014-15, Annual report , Dept. of Agriculture, Govt. of Karnataka.

ANONYMOUS, 2015-16, Bangalore Rural District at a glance, Govt. of Karnataka.

DAS, P. K. AND WILLEY, R. W., 1991, A farmer's participatory approach to the development of improved sustainable technologies for the resource poor rainfed areas of the eastern plateau of India. Extension Strategies for Rainfed Agriculture. Ed. Indian Society of Extension Education, New Delhi, India : 199-205.

HIREMATH, S. M. AND NAGARAJU, M. V., 2010., Evaluation of on-farm front line demonstrations on the yield of chilli. *Karnataka Journal of Agricultural Sciences*, **23** (2) : 341 - 342.

SAGAR, R. L. AND CHANDRA GANESH, 2004, Front line demonstration on sesamum in West Bengal. *Agricultural Exten. Review*, **16** (2) : 7 - 10.

SAMUI, S. K., MAITRA, S., ROY, D. K., MONDAL, A. K. AND SAHA, D., 2000, Evaluation on front line demonstration on Groundnut (*Arachis hypogea* L.). *Journal of the Indian Society of Coastal Agricultural Research*, **18** (2) : 180 - 183.

(*Received :* April, 2018 *Accepted :* August, 2018)