The Pharma Innovation Journal 2021; 10(6): 556-559

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(6): 556-559

www.thepharmajournal.com
Received: 25-04-2021
Accepted: 27-05-2021

Pankaj Kumar Singh
Krishi Vigyan Kendra, Masodha, ANDUA&T, Ayodhya, Uttar Pradesh, India

Shashi Kant Yadav
Krishi Vigyan Kendra, Masodha, ANDUA&T, Ayodhya, Uttar Pradesh, India

Rajiv Kumar Singh
Krishi Vigyan Kendra, Sohaon, Ballia, Uttar Pradesh, India

DK Verma
Crop Research Station, (ANDUAT) Masodha Ayodhya, Uttar Pradesh, India

Satrudhan Singh
Nandani Nager P.G. Collage, Nababganj, Gonda, Uttar Pradesh, India

Corresponding Author:
Pankaj Kumar Singh
Krishi Vigyan Kendra, Masodha, ANDUA&T, Ayodhya, Uttar Pradesh, India

Impact of front line demonstration in adoption extent and horizontal spread of Pigeonpea (*Cajanus cajan* L.) cultivation in Ballia district of Uttar Pradesh

Pankaj Kumar Singh, Shashi Kant Yadav, Rajiv Kumar Singh, DK Verma and Satrudhan Singh

Abstract
Front Line Demonstration using Integrated Crop Management (ICM) on pigeon pea (*Cajanus cajan* L.) were laid down at 63 farmer's fields to demonstrate production potential and economic benefits of improved production technologies in Ballia district of Uttar Pradesh during 2016-17 and 2017-18. The present study was undertaken to found the yield gap through FLDS on Pigeon pea crop. Pigeon pea variety Narendra Arhar 2, balanced use of fertilizer on the basis soil testing report and integrated pest and disease management, The was applied study on cost of cultivation, production, productivity, gross return and net return was carried out. The result of present study revealed that average highest yield in demonstration was recorded 17.80 q/ha in demonstrated plot over control (10.90 q/ha) with an additional yield of 6.90 q/ha. The increasing average pigeon pea productivity was 52.14 per cent. The average extension gap and technology gap was 6.90 q/ha, with the Technology index 19.3 per cent during the demonstration years. Besides this, the demonstrated plots gave higher gross return, net return with higher benefit cost ratio when compared to farmer's practice were also made to study. The impact of FLD on horizontal spread was increased 340 %, if appropriate package and practices are followed.

Keywords: lentil, fusarium, fungicides, evaluation, neem

Introduction
Archaeological records finds of pigeon pea dating to about 3400 years ago (14th century BC) at Neolithic sites in south India in Sanganakallu and its border areas Tuljapur Garhi in Maharashtra and Gopalpur in Orissa. It traveled from India to East Africa and West Africa. There, it was first encountered by Europeans, so it obtained the name Congo Pea. Pgeonpea (*Cajanus cajan* L.), a diploid legume crop species (2n = 2x = 22), is a member of the tribe Phaseoleae. Pegion pea belongs to family Leguminoseae. It is an erect shrub. Nutritional value of edible portion per 100 g of pigeon pea.

Enery (cal)	**335**
Portion (g)	22.3
Fat (g)	1.7
Ca (mg)	7.3
Fe (mg)	5.8
Thiamin (mg)	0.45
Rivoflavin (mg)	0.19
Niacin (mg)	2.9
Vit. A. value (mcg)	132

Pigeon pea is grown throughout the India excepting the regions having very low temperature. State leading centre in terms of productivity of highest is Gujarat (1059 kg/ha) followed by Uttar Pradesh 916 k/ha and Madhya Pradesh 780 kg/ha. Whenever National productivity of this crop is quite low 780 kg/ha. India has 3.90 mha (80% of world acreage) with a total production and productivity of 2.89 mt (79% of world production) and around 750 kg/ha, respectively (http://www.faostat.fao.org). In order to make the nation self sufficient in pulses productivity levels of pulses need to be increased substantially from 560kg ha-1 to 1, 200 kg ha-1 by 2020 (Ali and Kumar, 2005). In spite of many interventions, per capita nutrition supply in India among the lowest in the world (OECD, 2015, Goda *et al.* 2013) [2]. Hence, it was felt to know the impact of latest package of practices of pigeon pea and chick pea which

were demonstrated at farmers field with close supervision of scientist. (Vaghashia *et al*. 2005) [3]. Pigeon pea and chick pea growers to bring about change in their knowledge in production technologies and increase the farm productivity and what are the factors which impede in enhancing the pigeon pea and chick pea production. (Teggelli *et al*. 2015) [4]. the similar finding are supported by (Reddy and Patil 1998) [5] who revealed that the improved technology tested on farmer's fields under the project of front line demonstrations. Frontline demonstration programme was effective in changing attitude, skill and knowledge of improved practices of HYV of urd including adoption this also improved the relationship between farmers and scientist and built confidence between them. (Kirar *et al*. 2006), shows the distribution of beneficiaries according to their change of area after conducting the FLD on their field (Verma 2013) [7]. Therefore, it is very essential to conduct investigation on ICM demonstrations on pigeon pea to assess their effectiveness and efficiency towards enhancement in yield and economics. Hence a research study was planned and conducted with the aim to analyze and assess the impact of ICM practices pigeon pea on yield, economic conditions, technology and extension gap in Sohaon of Ballia district. The extent of adoption of improved agricultural technologies is a crucial aspect under innovation diffusion process and the most important for enhancing agricultural production at a faster rate. Large number of technologies evolved in the field of agriculture is not being accepted and adopted to its fullest extent by the farmers. The gap between recommendations made by the scientists and actual use by farmers is frequently encountered. Looking into the situation ICARKVK, Ballia has conducted ICM through large scale demonstrations.

Material and Methods

The present study was carried out by Krishi Vigyan Kendra Ballia, Acharya Narendra Dev University of Agriculture and Technology, Kumarganj, Ayodhya for two consecutive years from 2016-17 to 2017-18 on the farmers field at different locations through front line demonstration. Total 63 demonstrations were conducted on 63 farmer's field on 20.0 ha lands in two years. Each frontline demonstration was laid out on 0.2 ha area while adjacent 0.2 ha was considered as control for comparison (farmer's practice). The difference between the demonstration package and existing farmers practice are mentioned in Table 1, with objective to popularize improved technologies for productivity enhancement of pigeon pea through ICM. To diffuse pigeon pea productivity enhancement technologies on campus and off campus trainings were also conducted. Improved practices like use of improved seed (Narendra Arhar 2), seed treatment with bio-fertilisers Rhizobium, PSB and bio-pesticide (Trichoderma), balanced nutrient application (FYM 5 t/ha, 25 kg N, 50 kg P2O5, 25 kg K2O, 20 kg S) and integrated pest and disease management (Timely spray of pesticides). The crop was harvested at maturity stage, 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) [8] and Dayanand *et al*. (2012) [9] 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 data of adoption and horizontal spread of technologies were collected from the farmers with the interaction them. Data were subjected to suitable statistical methods. The following formulae were used to assess the impact on different parameters of pigeon pea crop.

1. Impact of yield = Yield of demonstration plot- yield of control plot/Yield of control plot X 100
2. Impact on adoption (% change) = No. of adopters after demonstration- No. of adopters before demonstration /No. of adopters before demonstration X 100
3. Impact on horizontal Spread (% change) = After area (ha) - Before area (ha)

Results and Discussion

Yield

The perusal of data (Table 2) indicate that front line demonstration on pigeon pea yield (during 2016-17 and 2017-18) recorded 17.50 q/ ha & 18.10 q/ ha in demonstration plots and from 10.60 q/ ha & 11.20 q/ ha in farmer's practice plot in two years of demonstration. An average yield of 17.80 q/ ha was obtained under demonstration plots as compared to 10.90 q /ha in farmers practice plots in same years. The results clearly indicated that the higher average yield in demonstration plots was obtained over the years compare to farmers practice due to knowledge and adoption of full package of practices i.e. use of bio fertilizer enriched FYM, recommended dose of fertilizers, preparation of raised beds, mulching, pheromone traps and timely application of plant protection measures. The average yield of pigeon pea is increased by 52.14 percent. The yield of pigeon pea could be increased over the yield obtained under farmers practices (lack of knowledge on use of bio fertilizers, no use of the balanced dose of fertilizer, no ICM practices) of pigeon pea cultivation. The above findings are in similarity with the findings of (Singh *et al*., 2011) [10] and (Balai *et al*., 2013). Similarly yield enhancement in different crops in frontline demonstrations were documented by (Hiremath *et al*., 2007) [13], (Mishra *et al*. 2009) [11]. The per cent increase in yield over farmers practice was (52.14). However variations in the yield of pigeon pea in different years might be due to the variations in soil moisture availability, rainfall, and change in the location of demonstrations every year.

Extension gap: An average extension gap under two year FLD programme was 6.90 q/ha. This emphasized the need to educate the farmers through various techniques for the adoption of improved agricultural production technologies to reverse this trend. More use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap.

Technology gap: The technology gap, the differences between potential yield and yield of demonstration plots was average 4.20 q /ha during 2016-17 and 2017-18 respectively. This may be due to the soil fertility, managerial skills of individual farmer's and climatic condition of the area. Hence, location specific recommendations are necessary to bridge these gaps. These findings are similar to (Singh *et al*. 2011) [10] and (Sharma and Sharma 2004).

Technology Index: The technology index shows the

feasibility of the demonstrated technology at the farmer's field. The technology index 19.09 (Table 3), which shows the effectiveness of technical interventions. This accelerates the adoption of demonstrated technical interventions to increase the yield performance of pigeon pea.

Economic returns: In order to find the economic feasibility of the demonstration technologies over and above the control, some economic indicators like cost of cultivation, net return and B:C ratio was worked out. The economic viability of improved demonstrated technology over farmers practice was calculated depending on prevailing price of inputs and outputs cost and represented in the term of B:C ratio (Table 4).It was found that the cost of production of pigeon pea under demonstration with an average Rs. 36225 under control. The additional cost increased in demonstration was mainly due to more cost involved in balanced fertilizer, procurement of improved hybrid seed and ICM practices. The cultivation of pigeon pea under improved technologies gave average net return of Rs. 93,450/ha which was lower Rs.57225/ha in farmer's practices. The benefit cost ratio of pigeon pea with an average of 3.30 in demonstration plots. This may be due to higher yield obtained and lower cost of cultivation under improved technologies compared to local check (farmers practice).

The result of improved technology intervention brought out that adoption of recommended new variety of pigeon pea by farmers before demonstration was negligible, which increased by 340% after demonstration. Weedcide technique was increased by 276.92 % due to intervention through FLD. The overall adoption level of pigeon pea production technology was increased by about 159 percent (Table 5).

The FLD produced a significant positive result and provided an opportunity to demonstrate the productivity potential and profitability of the latest technology (intervention) under real farming situation. Therefore the study concludes that FLDs conducted by KVK, Ballia made significant impact on horizontal spread of this technology (Table 6).

Table 1: Level of use and gap in adoption of pigeon pea technologies in Ballia

Crop operation	Recommended technologies	Existing technologies	Gap
Variety	Narendra Arhar 2	Local	Full gap
Land preparation	Ploughing and Harrowing	Ploughing and Harrowing	Nill
Pre-emergent Herbicide application	Apply Pendimethalin @ 2.5 lit. per ha	No herbicide used	Full gap
Seed rate	15 kg/ ha	25/ ha	High seed rate Full gap
Seed treatment	thiram @ 1.5 to 2 g / kg seed, 3 g thiram/kg + 3 g carbendazim/kg seed & rhizobium culture for atmospheric N fixation.	No use of fungicides for seed treatment	Full gap
Sowing method	Line sowing distance Row to Row 90 cm & Plant to Plant 60 cm	Broadcasting	Partial gap
Fertilizer dose	25 kg N + 50 kg P2O5 + 25 kg K2O + 20 kg S/ha	70 kg P2O5 Without recommendation	Partial gap
Weedicide dose	Pendimethalin @ 3-3.5 lg/ha was applied immediately after sowing.	Hand weeding/rarely used	Partial gap
Plant Protection Measure	Integrated Pest Management and First spray of Endosulphan (35 E.C.) 1.5 litre/ha and second spray of Monocrotophos (36 E.C.) 1.0 litre/ha	Nill	Full gap
Multiplex nutrient spry	@ 2.5 gm/ litter water and spray on both surface of leaves. First spray just before flowering, second spray during flowering or 25 days after first spray and third spray when fruits are bean size.	No application	Full gap

Table 2: Effect of package and practices on yield parameters of pigeon pea

Yields parameter	2016-17		2017-18		Mean		% increase
	RP	FP	RP	FP	RP	FP	
Plant Neight	225	240	232	252	228.5	246	-6.25
Days to 50% flowering	140	155	145	159	142.5	157	-9.68
Days to Maturity	178	195	182	197	180	196	-8.72
% Wilt	1.0	23.0	2.0	26.0	1.5	24.5	-95.65
Pod borer damage %	1.8	22.2	1.6	24.8	1.7	23.5	-91.89
Pods/plant	328	138	330	142	329	140	137.68
No. of grains/pod	4.2	2.5	4.4	2.6	4.3	2.55	68.00
Test wt(gm)	84	70	86	71	85	70.5	20.00
Yield q/ha.	17.50	10.60	18.10	11.20	17.80	10.90	65.09

RP-Recommended practices, FP-Farmers practices

Table 3: Effect of package and practices on extension gap and technology index

Year	Area (ha)	Potential grain yield (q/ha)	Grain Yield (q/ha)		% increase over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index
			RP	FP				
2016-17	10.00	22	17.50	10.6	59.25	6.90	4.50	20.45
2017-18	10.00	22	18.10	11.20	45.03	6.90	3.90	17.73
Mean	20.00	22	17.80	10.90	52.14	6.90	4.20	19.09

Table 4: Effect of improved variety along with package and practices demonstration on pigeon pea

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		Extra returns	Incremental Benefit: Cost ratio
		RP	FP			RP	FP	RP	FP		
2016-17	22	27300	24489	2811	5050	17.50	10.6	88375	53530	34845	3.24
2017-18	22	29410	26250	3160	5450	18.10	11.20	98645	61040	37605	3.35
Mean	22	28355	25370	2986	5250	17.80	10.90	93450	57225	36225	3.30

Table 5: Impact of Front Line Demonstration (FLDs) on adoption of pigeon pea production technology

Crop operation	Numbers of adopters Impact		Change in No. of adopter	(% Change) After demonstration
	Before demonstration	After demonstration		
Variety	23	63	40	173.91
Land preparation	50	70	20	40.00
Pre-emergent Herbicide application	17	56	39	229.41
Seed rate	21	59	38	180.95
Seed treated	23	39	16	69.57
Sowing method	27	52	25	92.59
Fertilizer dose	19	57	38	200.00
Weedicide dose	13	49	36	276.92
Plant Protection Measure	17	62	45	264.71
Multiplex nutrient spry	21	34	13	61.90
Mean	23.1	54.1	31	159.00

Table 6: Impact of Front Line Demonstration (FLDs) on horizontal spread of pigeon pea

Variety	Area (ha.)			
	Before demonstration	After demonstration	Change in area (ha)	Impact (% Change)
Narendra Arhar 2	25	110	85	340

References

1. http://www.faostat.fao.org.
2. Gowda CL, Srinivasn S, Gaur PM, Saxena KB. Enhancing productivity and productivity of pulses in India. Climate change and sustainable food security, ICAR, New Delhi 2013, 145-159.
3. Vaghasia PM, Savaii RL, Celaya GR. Front Line Demonstration on groundnut, Rachis hypogeal Evaluation of L. in Saurashtra region of Gujarat. J Oilseeds Res 2005;22(1):238-239.
4. Teggelli, Raju G, Patil DH, Ananda Naik, Zaheer Ahamed B, Patil MC. Impact of frontline demonstration on the yield and economics of Pigeonpea in Kalaburgi district of Karnataka State. International journal of Science and nature 2015;6(2):224-227.
5. Reddy PS, Patil D. Indian oilseeds: Present status and future needs. Indian J Agric. Sci 1998;68:453-459.
6. Kirar BS, Mahajan SK, Nashine R. Impact of technology practices on the productivity of soybean in FLD. Ind. Res. J Ext. Edu 2004;5(1):15-17.
7. Verma, Deependra Prakash. A study on impact of Front Line Demonstrations on pulses by Krishi Vigyan Kendra, Panna M.P. M.Sc. (Ag.) Thesis Submitted to Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 2013.
8. Dayanand VRK, Mehta SM. Boosting mustard production through front line demonstrations. Indian Res J Ext Edu 2012;12(3):121-123.
9. Samui SK, Mitra S, Roy DK, Mandel AK, Saha D. Evaluation of frunt line demonstration on groundnut., J Indian Soc. Sostal Agric. Res 2000;18(2):180-183.
10. Singh R, Soni EL, Singh V, Bugalia HL. Dissemination of improved production technologies of solanaceous vegetable in Hanswara district of Rajasthan through Frontline demonstration. Raj. J Ext. Edu 2011;19:97-100.
11. Mishra DK, Paliwal DK, Tailer RS, Deshwal AK. Impact of fronline demonstration on yield enhancement of potato. Indian Res. J Ext. Edu 2009;9(3):26-28.
12. Misra PK, Singh PN, Singh SN, Pradeep Kumar. Adoptation extent and horizontal spread of Tomato (*Lycopericon esculentum* Mill.) cultivation through frontline demonstration in eastern Uttar Pradesh of India. European journal of Biotechnology and Bioscience 2014;4:1(6):40-44.
13. Hiremath SM, Nagaraju MV, Shasidhar KK. Impact of frontline demonstration on onion productivity in farmer's field. Paaper presented In: Nation Sem Appropriate Extn Start manag Rural Resource, Univ. Agric. Dharwad 2007, 18-20, 100.