



Research Article

IMPACT ASSESSMENT OF PIGEON PEA VARIETY NA-2 THROUGH FLDS IN GHAZIPUR DISTRICT OF EASTERN UTTAR PRADESH

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Abstract- Pigeon pea is one of the major *kharif* crop grown in district. Farm Science Center known as Krishi Vigyan Kendra laid down Front Line Demonstration in the year 2009-10 to 2012-13 introducing new and high yielding variety "NA-2" and applying scientific practices in their cultivation. The FLDS were carried out in different villages of Ghazipur district. The productivity and economic returns of pigeon pea in improved technologies were calculated and compared with the corresponding farmer's practices (local check). Improved practices recorded higher yield as compared to farmer's practices. The improved technology recorded higher yield of 18.06 over farmers practice 12.14 q/ha. In spite of increase in yield of pigeon pea, technology gap, extension gap and technology index existed. The improved technology gave higher gross return (49313 Rs./ha), net return (32293 Rs./ha) with higher benefit cost ratio (2.97) as compared to farmer's practices. The variation in per cent increase in the yield was found due to the lack of knowledge, and poor socio economic condition. It is concluded that the FLDS programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of pigeon pea adoption.

Keywords- Pigeon Pea, FLDS, Economic impact, Adoption, B:C ratio.

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Introduction

Pigeon pea (*Cajanus cajan* (L.) Millsp.) is an important rain fed legume crop for millions of smallholder farmers in India and in many other countries of the tropical and subtropical regions of the world. Because of its capacity to tolerate drought and ability to utilize the residual moisture during dry season, it finds an important place in the rain fed farming system adopted by millions of smallholder farmers in many developing countries. The fast growing, deep extensive root system allows plants to grow and produce grain in very arid conditions and in drought years when no other crop can survive. Also, the slow above ground growth of pigeon pea plant during its early phase offers very little competition to other crops and allows productive intercropping with virtually any crop. Pigeon pea is used for food, feed and fuel. It has more diverse uses than any other pulse crop. As a dhal (dry, dehulled, split seed used for cooking), it is the principal source of dietary protein for more than a billion people, most of whom are vegetarian and poor. Its seed contains about 21% protein and is also rich in essential amino acids, carbohydrates, minerals and vitamin A and C [1]. Its green seeds are used for vegetable, crushed dry seeds as animal feed, green leaves as fodder, stems as fuel wood and to make huts and baskets and the plants are also used to culture the lac producing insects. In India, it is cultivated in about 3.4 M ha and contributes about 20% to the total pulses production of the country. However, its average productivity has remained strikingly low at about 0.5 to 0.7 t ha⁻¹. To work out a suitable strategy to improve the productivity of pigeon pea, it is imperative to assess the potential yield in the region of interest and gap between the potential and actual yield obtained by the average farmers. This analysis in turn also helps to know the major factors associated with these yield gaps for a given location or a

region. Selection of proper variety and agronomic practices can play a vital role in increasing productivity.

Krishi Vigyan Kendra an innovative science based institution plays an important role in bringing the research scientists face to face with farmers. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different micro farming situation at district [2]. Front line demonstration is a long term educational activity conducted in a systematic manner in farmer's field to worth of new practices/ technology. Farmers in India are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. As a result of these, they often fail to achieve the desired potential yield of various crops and new varieties. The baseline survey was conducted by Krishi Vigyan Kendra and it was found that farmers were using old varieties without proper use of chemical fertilizers, herbicides and pesticides. Keeping in view the constraint, Krishi Vigyan Kendra, Sidhi conducted front line demonstration on pigeon pea variety NA-2 with crop management practices under rain fed condition.

Materials and Methods

Front line demonstration (FLDS) on pigeon pea variety NA-2 was conducted by Krishi Vigyan Kendra, Ghazipur (U.P.) during the period from 2009-10 to 2012-13 in different village's of district Ghazipur. The total 72 number of demonstration was

conducted in these villages. In general soil of the area under study was sandy loam with low to medium fertility status. The gap in farmers practices and recommended practices was observed as per adoption level of scientific recommended package and practices for cultivation of crop by farmers. The component demonstration of front line technology in pigeon pea was comprised i.e. improved variety NA-2, proper tillage, proper seed rate and sowing method, balance dose of fertilizer (20:60:30 kg/ha NPK), use of PSB @ of 5g/kg of seed as seed treatment, weed management and protection measure [Table-1]. Totally 19 ha of area was covered in four consecutive years. In the demonstration, one control plot was also kept where farmers practices was carried out. The FLDs were 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 both the demonstration and farmers practice by random crop cutting method and analyzed by using simple statistical tools. The technology gap, extension gap and technological index [3] were calculated by using following formula as given below-

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

$$\begin{aligned} \text{Technology gap} &= \text{Potential yield} - \text{Demonstrated yield} \\ \text{Extension gap} &= \text{Demonstrated yield} - \text{Yield under existing practice} \end{aligned}$$

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

Results and Discussion

The gap between the existing and recommended technologies of pigeon pea in district Ghazipur was presented in [Table-1 & 3]. Full gap was observed in most of the farmers practices except time of sowing and seed rate where partial gap was observed, which definitely resulted the reduction in potential yield. Farmers were not aware about recommended technologies. Farmers in general used degenerated seeds of local varieties instead of the recommended high yielding resistant varieties (wilt and sterility mosaic). Unavailability of seed in time and lack of awareness were the main reasons. Farmers followed broadcast method of sowing against the recommended line sowing with proper spacing and because of this, they applied higher seed rate than the recommended.

Table-1 Differences between technological intervention and farmers practices under FLDs in pigeon pea.

S. No.	Particulars	Technological intervention	Existing practices	Gap
1	Farming situation	Rainfed	Rainfed	Full gap
2	Variety	NA-2	Local variety	Full gap
3	Time of sowing	1 st week of July	1 st week of August	Partial Gap
4	Method of sowing	Line Sowing	Broadcast	Full gap
5	Seed treatment	Carbendazim & Trichoderma @ 5 g/kg seed	No seed treatment	Full gap
6	Seed rate	20 kg/ha	30 kg/ha	Partial Gap
7	Fertilizer dose	N:P:K=20:60:30 kg/ha	Imbalance	Full gap
8	Plant Protection	Trizophos + Cypermethrin @ 2.0 ml/l water	No plant protection	Full gap
9	Weed management	Imazathaper@150 g/ha	No weed management	Full gap

Yield

During four years of frontier technologies results obtained are presented in [Table-2]. The results revealed that the FLDs on pigeon pea an average yield was recorded 18.06 q/ha under demonstrated plots as compare to farmers practice 12.14 q/ha. The highest yield in the FLDs plot was 20.0 q/ha during 2010-11 & 2011-12 and in farmers practice 15.25 q/ha during 2012-13. This results clearly indicated that the higher average grain yield in demonstration plots over the years compare to local check due to knowledge and adoption of full package of practices i.e. appropriate varieties such as NA-2, timely sowing, proper spacing, seed treatment with PSB @ 5g/kg of seed, use of balanced dose of fertilizer, method and time of sowing, timely weed management and need based plant protection. The average yield of pigeon pea increased 50.26 per cent. The yield of

pigeon pea could be increased over the yield obtained under farmers practices (use of non-descriptive local variety, no use of the balanced dose of fertilizer, untimely sowing and no control measure adopted for pest management) of pigeon pea cultivation [4].

Technology gap

The technology gap, the differences between potential yield and yield of demonstration plots were 11.35, 5.00, 5.00 and 6.42 q/ha during 2009-10, 2010-11, 2011-12 and 2012-13 respectively. On an average technology gap under four year FLDs programme was 6.94 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation.

Table-2 Yield, technology gap, extension gap and technological index of pigeon pea variety NA-2 under FLDs.

Year	Trial No.	Area (ha)	Average yield (q/ha)		Per cent increase	Technology gap (q/ha)	Extension gap (q/ha)	Technological index (%)
			Trial	Farmers practice				
2009-10	17	05	13.65	9.80	39.28	11.35	3.85	45.4
2010-11	20	04	20.00	12.00	66.00	5.00	8.00	20.0
2011-12	15	05	20.00	11.50	73.90	5.00	7.50	20.0
2012-13	20	05	18.58	15.25	21.84	6.42	3.30	25.7
Total/Average	72	19	18.06	12.14	50.26	6.94	5.66	27.8

Extension gap

Extension gap of 3.85, 8.00, 7.50 and 3.30 q/ha was observed during 2009-10, 2010-11, 2011-12 and 2012-13 respectively. On an average extension gap was observed 5.66 q/ha which emphasized the need to educate the farmers through various extension means i.e. front line demonstration for adoption of improved production and protection technologies, to revert the 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.

Technology index

The technology index shows the feasibility of the demonstrated technology at the

farmers field. The technology index varied from 20.00 to 45.40 per cent (Table-3). On an average technology index was observed 27.80 per cent, which shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of pigeon pea.

Economic return

The inputs and outputs prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio [Table-4]. The cultivation of pigeon pea under improved technologies gave higher net return Rs. 24622, 29500, 31000 and 44050 per ha over to farmer's practice Rs.

16740, 15400, 14000 and 35920 during 2009-10, 2010-11, 2011-12 and 2012-13 respectively [5]. The benefit: cost ratio of pigeon pea cultivation under improved cultivation practices were 2.83, 3.14, 2.70 and 3.22 as compared to 2.56, 2.40,

1.94 and 3.06 under farmer's practice. This may be due to higher yield obtained under improved technologies compared to farmer's practice [6].

Table-4 Economic Impact of pigeon pea variety NA-2 under FLDs.

Year	Trial No.	Area (ha)	Gross Income (Rs./ha)		Net Return (Rs./ha)		B:C Ratio	
			Trial	Farmers practice	Trial	Farmer's Practice	Trial	Farmer's Practice
2009-10	17	05	38222	24720	24622	16740	2.83	2.56
2010-11	20	04	44000	30000	29500	15400	3.14	2.40
2011-12	15	05	50000	31500	31000	14000	2.70	1.94
2012-13	20	05	65030	44850	44050	35920	3.22	3.06
Total/Average	72	19	49313	32768	32293	20515	2.97	2.49

Conclusion:

The FLDs produces a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. The productivity gain under FLDs 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. Therefore, for enhancing the production & productivity of pigeon pea crop, strategy should be made for getting the more and more recommended technologies adopted by the farmers.

Conflict of Interest: None declared

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