ASSESSMENT OF TECHNOLOGY GAP AND PRODUCTIVITY GAIN THROUGH FRONT LINE DEMONSTRATION IN RAINFED PIGEONPEA

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Abstract

Kalaburagi is called as "Pulse bowl of Karnataka" and pigeonpea is one of the most important pulse crop grown in this region and it occupies an unique position in every cropping system of this zone. But the yield of pigeonpea is declining due to many reason in this changing climatic scenario and one of the important and major reason is flower drop and poor pod setting. So, to minimize this problem and to enhance the pigeonpea productivity Krishi Vigyan Kendra (KVK), Kalaburagi has carried out Front Line Demonstrations (FLDs) in Aland taluka of kalaburagi District and the majority of farmers were growing TS3-R variety. The result due to front line demonstrations indicated that; technology gap, extension Gap and technology index was 4.1 q/acre, 1.08 q/acre and 22.4 %, respectively. Further, due to demonstration there was higher yield (5.90 q/acre) as compared to farmers practice (4.82 q/acre). Consequently, there was lower gross returns (Rs. 28920/acre) in farmers practice as compared to demonstrations (Rs. 35400/acre). This higher net increment in demonstration will generate higher income and also improves the livelihood of the farming community.

Key words: Extension Gap, Front line demonstration, Gross Returns, Seed Yield, Technology Gap and Technology index

Introduction:

Historically India is the largest producer, consumer and importer of pulses. Pulses are a good and chief source of protein for a majority of the population in India. Pulses contribute 11% of the total intake of proteins in India (Reddy, 2010). Pulses play a major role in providing a balanced protein component in the diet of the people. Further, crop enriches the soil fertility and health in terms of addition of nitrogen and organic matter. Pulses are also drought resistant and prevent soil erosion due to their deep root system and good coverage, because of these good characters pulses are called as "Marvel of Nature" (Basavarajappa *et al.,* 2013). Consumption of pulses on a regular basis has been associated with lower risks for the development of type 2 diabetes, coronary heart disease and some forms of cancer (Chibbar *et al.,* 2010).

Among the pulses, pigeonpea (*Cajanus cajan* L.) is most important pulse crop of India that performs well in poor soils and regions where moisture availability is inadequate. Excessive vegetative growth, indeterminate growth habit, lack of moisture stress tolerance, poor source-sink relationship, poor harvest index and poor biomass production are some of the major physiological factors responsible for low productivity of pigeonpea (Chudasama and Thaker 2007). In pigeonpea most of the flowers are abscised (75-96%) before forming pods or pods are abscised before maturation. So the actual yield of pigeonpea is quite low as compared to its yield potential (Tekale *et al.,* 2009). Abscission of developing pods is either due to lack of supply of photosynthates or due to the overlapping of reproductive and vegetative growth resulting in strong competition for current photosynthates between vegetative and reproductive parts in indeterminate pulse crops (Karamanos and Gimenez, 1991). As it is normally cultivated under rainfed condition even application of fertilizer at the time of sowing and at right quantity may not give desired results due to soil moisture deficiency. When availability of moisture becomes scarce, application of fertilizers through foliar spray resulted in efficient absorption. Though, foliar spray is not a substitute to soil application of fertilizers but it certainly be considered as a supplement to soil application (Upadhyay *et al.,* 1992). Further, it is also been well established that fertilizer elements which are absorbed through roots can also be absorbed with equal efficiency through foliage (Garcia and Hanway, 1986) and can help to maintain a nutrient balance within the plant, which may not occur strictly with soil uptake (Meena *et al.,* 2007).

Looking to the major constraints in pigeonpea production, a technology is developed by University of Agricultural Sciences, Raichur known as Pulse magic (consists of nutrients and Plant growth regulators) to minimize flower drop and increase the production in major pulse crops. Further, several technologies generated and varieties developed by ICAR institutes, SAUs in various crops are lying in the sink due to poor transfer of technology to the end user lead to a sizable gap between development and utilization. Hence, concentrate efforts on scientific cultivation of pigeonpea are necessary to achieve higher productivity and production of quality produce. Front line Demonstrations (FLD) on farmers field may be helpful to establish the technology at farming community (Dayanad *et al.,* 2014). Looking to the potentiality of above technology in minimising flower drop and thus increasing the production and to popularise the above technology a front line demonstration (FLD) was conducted by Krishi Vigyan Kendra (KVK), Kalaburagi, Karnataka.

Material and Method:

Participatory Rural Appraisal (PRA) method and focused group discussions with identified progressive farmers were held by the team of scientists to identify the various problems faced by farmers in getting potential yield of important pulse crops. The problem noticed are about use of local varieties, nutrient supply, flower drop and pod setting at the field level apart from pest and diseases. 100 Front line demonstration on usage of pulse magic were conducted at farmer's fields of Aland taluka in kalaburagi district during *Kharif* 2017-18 under National Food Security Mission (NFSM) and the majority of farmers were growing TS3-R variety. There were two treatments *viz.,* recommended practices with pulse magic spray (Demo) and another with check i.e., Farmers practice (No use of pulse magic *i.e.,* Only recommended practices). The pulse magic contains 10 % of nitrogen, 40 % of phosphorus, 3 % of micro nutrients and 20 ppm PGR. 10 g of nutrient mixture and 0.5 ml of plant growth regulator (PGR) mixed in one liter water sprayed two times *viz.,* first spray during 50 % flowering stage and second spray during 15 days after first spray. Each demonstration was conducted in an area of 0.4 ha adjacent to the plots of check. Data were collected from demonstrated field and Farmers Field. The generated data were utilized for calculating the technology gap, extension gap and technology index using the following formulae given by Samui *et al.,* (2000).

Technology gap = Potential yield – Demonstration yield
Extension gap = Demonstration yield – Farmers practice yield
Effective gain = Additional Return – Additional cost
Additional return = Dem. return – Farmers practice return

$$\text{Technology index (\%)} = \frac{\text{Technology Gap}}{\text{Potential Yield}} \times 100$$

Along with above parameters percent increase in yield was calculated with the help of formulae:

$$\text{Percent increase in Yield} = \frac{\text{Grain yield under FLD} - \text{Grain yield under farmers practice}}{\text{Grain yield under farmers practice}} \times 100$$

Results and Discussion:

The Detailed results obtained during demonstration are presented in Table 1 and Table 2. It is evident from the results that under the demonstrations plot yield (5.90 q/acre) was higher, as compared to farmers practice (4.82 q/ha) and the increment was to the extent of 22% compared to farmers practice. Similar results of Increase in pigeonpea yield due to foliar application of Pulse Magic was revealed by Teggelli *et al.* (2016) in pigeonpea.

Technology gap: The technology gap means the differences between potential yield and yield of demonstration plot. On an average technology gap under FLD programme was 4.1 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, crop production practices and local climatic situation (Mukharjee, 2003).

Extension Gap: The extension gap under this demonstration is 1.08 q/acre. This emphasized the need to educate the farmers through various means for the adoption of this improved agricultural production technology to reverse this trend of wide extension gap. More and more use of this latest production technology will change this alarming trend of galloping extension gap. This finding is in corroboration with the findings of Hiremath and Nagaraju (2010) in chilli.

Technology index: The technology index shows the feasibility of the evolved technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology (Jeengar *et al.,* 2006). The technology gap under this demonstrations is 22.4%

Economic Analysis: Detailed information about economics of pigeonpea is presented in Table 2. On an average Rs.1200/acre additional investment was made as compared to farmers practice and this additional cost is due to adaptation of new technology. Economic returns as a function of grain yield and MSP sale price (as declared by Govt. of India), higher economic returns (Rs.35400/acre) was obtained in demonstrations as compared to farmers practice (Rs.28920/acre). The higher additional returns and effective gain obtained under demonstrations could be due to improved technology adaptation, which ultimately has increase the produce.

Conclusion:

Front line demonstration program was effective in changing attitude, skill and knowledge of new technology of Pigeonpea cultivation including adoption in future days to come. This also improved the relationship between farmers and scientists and built confidence between them. The demonstration farmers acted also as primary source of information. The concept of Front line demonstrations may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the technology to other members of the farming community.

In economic view, an additional cost mainly for technology adaptation was increased slightly in FLDs over farmers practice. However, it was recovered by increasing gross and net return substantially and resulted in more benefits cost ratio than the farmer practice. This will subsequently increase the income as well as the livelihood of the farming community.

Table 1. Grain yield and gap analysis of front line demonstrations on Rainfed Pigeonpea at farmers field

Year	**2017-18**	
Number of Demonstrations	100	
Potential yield (q/Acre)	10	
Average yield (q/Acre)	**Demonstrations**	**Farmers Practice**
	5.90	4.82
% increase	22	
Extension Gap (q/acre)	1.08	
Technology Gap (q/Acre)	4.1	
Technology Index (%)	22.4	

Table 2. Economic analysis of front line demonstrations on Rainfed Pigeonpea at farmers field

Year	**2017-18**	
Number of Demonstrations	100	
	Demonstrations	**Farmers Practice**
Cost of Cultivation (Rs./Acre)	9320	8120
Additional Cost in Demo	1200	
Minimum Support price (MSP) of grains (Rs./quintal)	6000	
Gross Return (Rs./Acre)	**Demonstrations**	**Farmers Practice**
	35400	28920
Additional return in Demo (Rs./Acre)	6480	
Effective Gain (Rs./Acre)	5280	
B:C ratio	**Demonstrations**	**Farmers Practice**
	3.79	3.56

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