



Enhancing Productivity of Pulses for doubling Farmers' Incomes

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ABSTRACT

To fulfill the growing demand and save precious foreign currency, pulses production needs to be increased from level of 17.33 mt (2015-16) to 26.5 mt by 2020. In this backdrop the study was conducted in Saraikela-Kharsawan district of Jharkhand where Cluster Frontline Demonstration (CFLD) conducted in 70 ha of land on Pigeon Pea, Black Gram, chickpea and Green Gram with the objective of demonstrating production potential of improved pulse production technology including improved variety, application of Rhizobium for seed treatment, application of sulphur and pesticides of neem origin and identifying various reasons and constraints that lead to yield gaps between research station, and farmer's fields.

The study was conducted with sample size of 150 farmers in eight purposively selected villages where CFLD was conducted CFLD recorded higher yield in comparison of farmers' variety and farmer's practices. Increase in the yields to the tune of 150 percent, 100 percent and 80 percent respectively was recorded for chickpea, black gram and pigeon pea. Profitability of demonstrated technology also observed to be more and increasing on farmers practices with B:C ratios ranging between Rs 8 to 10. Yield difference with reference to district, state and National average depicted technology gap as well as extension gap over farmers' practices in pulse production.

KEYWORD

CFLD on Pulse, yield, profitability and technology Gap

INTRODUCTION

India is a leading producer of pulse, which is producing approximately 17-18 mt. It is also a leading consumer and importer of pulses. But even though there has been increase in pulse production over the years, it has not been able to keep pace with the ever-growing demand for pulses. To fulfill growing demand and save precious foreign currency, pulses production need to be increased from present level of 17.33 mt (2015-16) to 26.5 mt by 2020. This is possible with the convergence of potential of technology available, policy support for research and development to create enabling environment for farming community to grow more pulses with adequate amount of farm inputs.

The total pulses production showed impressive growth after 2009-10 (14.66 m t) and pulses production (19.78 m t) attained its peak in 2013-14 by adding more than 5 m t to the pulses basket Due to unfavorable weather and untimely heavy rains during crop season pulses production reduced to 17.20 mt (2014-15) The net availability of pulses has come down from 60 g/day/capita in 1951 to 41.6 g/day/capita in 2012-13 due to stagnant production and rapid increase in population.

Pulses are generally grown under rained, highly unstable and complex production environments, substantial variability in soil and environmental factors, high year to year output variability, and variation in soil moisture. Pulses generally grown as mixed crop in Jharkhand and also it's not a preferred crop. Pulses are also not a common food habit among tribal's. Most of the pulses are grown in low fertility and problematic soils. The climatic aberration also affected its area and production. Generally pulses treated as secondary crop to staple cereals like paddy, maize and cash crops like vegetables.

It is, therefore, imperative to emphasize the need for identifying and quantifying level of adoption and its determinants across agro climatic regions. Identifying various reasons and constraints to yield loss that leads to yield gaps between research station, on-farm demonstration and farmer's fields is essential to harness the production potentials of pulses. Swaminathan (1993) emphasized on the need for 'scientific skill, political will and farmer's participation' in enhancing pulses production to achieve 'zero hunger'. Keeping high price in market pulses could be a powerful vehicle in India's aim to double farmers' incomes.

Realizing gleaming situations government has taken initiatives to boost production of pulses and all 638 districts and 29 states have been included under National Food Security Mission to support pulses, cereals and millets. Cluster Frontline Demonstrations on pulses arranged through KVK across country with the objective to demonstrate full potentials of pulses crop to farmers so that they get convinced to adopt pulses on their field. In this backdrop study was conducted with objective to find out yield gap technological gap and profitability in application of recommended technology of pulse production.

MATERIALS AND METHODS

The study was conducted in purposely selected cluster of villages where CFLD on chick pea, black gram, pigeon pea, and green gram had been conducted. For this

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study, both primary and secondary level data were collected and analyzed. The primary level data were aimed at eliciting information from farmers whereas, secondary level data were collected to obtain state and district statistics related to pulse production. Fifty respondents were selected randomly in all four clusters. Thus total two hundred CFLD farmers were selected on whose field CFLD were conducted.

The data were collected by personally interviewing the respondents through a structured schedule. Apart from the use of schedule, detailed information were collected through informal discussion with the respondents and by critically scrutinizing the practices followed for pulse production. Use of PRA tool, field observation and non-participant observation techniques were thoroughly used. "Focused Group discussion" of PRA was also followed to gather data on the opinion of respondent's towards the demonstrated technology.

After collection, the data were systematically arranged and tabulated for analysis and interpretation. The improved technology included modern varieties, seed treatment, use of neembicides to control pod borer and recommended seed rate. The sowing was done during July-August in Pigeon pea and black gram, and in Oct.-Nov. in Chickpea. The spacing was 90 x 20 cm, 45 x 15 cm, and 45x 15 cm in pigeon pea, chick pea, black gram and respectively. The seed rate of pigeon pea, chick pea, black gram and green gram were 20 kg/ha, 80 kg/ha, and 20 kg/ha respectively. The fertilizers were given as per

improved practices as basal dose.

The Soils of the area under study were sandy loam with medium to low fertility status. The average rainfall of this area was 1350 mm. In demonstration plots, critical inputs in the form of new variety quality seed and biopesticides and biofertilizers were provided by KVK.

For the study, technology gap, extension gap and technology index were calculated following the formula suggested by Samui, *et al.* (2000).

Technology gap = Potential yield - Demonstration yield
 Extension gap = Demonstration yield - Farmers yield
 Technology index (%) = Technology gap / Potential yield x 100

RESULT AND DISCUSSION

Productivity

The average yield (in q/ha) of pigeon pea, black gram and chick obtained in FLDs were 13.6, 5.72 and 20.87 respectively and percent increase over farmers field were 102, 78.75 and 166.19 respectively for pigeon pea, black gram and chick pea (Table 1). The result obtained indicates that there is considerable increase in yield in application of improved technology of pulses over farmers practice. It also observed that farmers were keen to apply the improved technology on their field and much convinced regarding yield obtained.

Table 1: Productivity, Technology gap, Extension gap and Technology Index of pulses under CFLDs

Crop	Yield (q/ha)			% increase of FLD over Control	Gap		
	control	CFLDS	Potential		Extension Gap(q/ha)	Technology Gap(q/ha)	Technology gap index (%)
Pigeon pea	4.5	13.6	15.66	102	9.1	2.06	13.15
Black Gram	3.2	5.72	10	78.75	2.52	4.28	42.8
Chick Pea	7.84	20.87	30	166.19	13.03	9.13	10.14

Technology Gap

The technology gap in obtaining potential yield over demonstration yield (in q/ha) were 2.06, 4.28 and 9.13 respectively for Pigeon pea, Black gram and Chick pea. The technological gap obtained was maximum among all three pulse crops. The difference in weather condition and production factors at field was associated with difference in yield and so in application of technology. Mukherjee (2003) reported the weather attributes in difference in yield of FLDs and control.

Extension Gap

The highest extension gap (13.3q/ha) obtained were in chick pea followed by pigeon pea (9.1q/ha) and Black gram

(2.52q/ha). It clearly emphasized the need of extension mythologies and mode to make aware the farmers in adopting new improved technology. The continuous use of improved technology along with application of high yielding variety will narrow the gap between technology generation and technology application especially in the pulses crop. Pulses are still the less favored crop of farmers Jharkhand. The food habits of tribals also degrade it in their cropping system. This finding is in corroboration with the findings of Hiremath and Nagaraju (2010).

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 index was 13.15, 42.8 and 10.1 respectively for Pigeon pea, Black gram and Chick pea. (Table 1) The technology index were minimum in chick pea i.e. the technology applied were found more feasible than pigeon pea and Black Gram.

Economic return

The inputs and outputs prices of commodities prevailed during the study of demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit: cost

Table 2: Return and Profit technology under CFLDs

Crop	FLDs				Control			
	Gross cost	Gross return	Net return	B:C	Gross cost	Gross return	Net return	B:C
Pigeon pea	7500	54400	46900	6.25	5800	19000	12200	2.10
Black Gram	7100	28600	21500	3.02	6500	16000	9500	1.4
Chick Pea	8500	52175	43675	5.13	5200	19600	14400	1.02

It was observed that In general farmers' access to inputs is limited, both because of low purchasing power and accessibility to markets to sell the excess produce of pulses. Because of this situation, the farmers give first priority to staple cereals the second priority to pulses. As a result, pulses continue to be grown on poor soils with low inputs. In addition, there is lack of policy support and post-harvest innovations related to pulse crops. Availability of quality seed of improved varieties and other inputs is one of the major constraints in increasing the production of grain legumes.

While conducting CFLD various incites and observations emerged and for enhancing productivity and profitability of pulse the study suggests following.

- To Establish 'Seed Villages' and 'Pulse Panchayats' to address concerns related to quality seed production and availability.
- Value chain management from farm level production to post-harvest process, packaging, transportation and marketing to improve incomes of smallholders.
- Encourage inter-cropping, relay cropping and mixed cropping for pulses and short-duration, photo- and thermo insensitive varieties to improve productivity and yield.
- Diversify rice-wheat cropping systems with high-yielding pulse varieties as early *kharif* or summer crop in rice fallows.
- Harvest rainwater and adopt effective water management strategies since pulses suffer from long, dry spells in their growth.
- Impart knowledge on thematic and inert gas storage systems to reduce losses from stored grain pests in pulses.
- Adequate knowledge and skill empowerment in cultivation. Establish 'Pulse Farm Schools' to

ratio (Table 2). The cultivation of pigeon pea, black gram and chickpea under improved technologies gave higher net return of Rs. 46900, 21500 and 43 675 respectively as compared to farmers practices. The benefit cost ratio of pigeon pea, black gram and chickpea, respectively were 6.25, 3.2 and 5.13 under improved technologies and they were more as compared to control. This may be due to higher yields obtained under improved technologies compared to check (farmers practice). This finding is in corroboration with the findings of Mokidue *et al.* (2011).

encourage farmer to farmer and farmer to processor interaction and learning.

- Establish farmer-led institutions such Famer Producer Organizations to manage pulses cultivation, from seed to market, for full benefit of technology and market price, including by-products of pulse processing industries.
- Promotion of PP model in quality seed production, technology transfer, processing, value-addition, capacity building and supply of critical inputs.
- Encourage farmers to adopt pulse cultivation and bridge the demand-supply gap; link minimum support price to market prices with procurement similar to rice and wheat.
- Build capacities of farmers with use of information communication technologies and mobile applications through educated youth, men and women.
- Increase public awareness of health and nutritional benefits of pulses; deploy on-farm, participatory adaptive research and developmental approaches for technology adoption.
- Improved agronomic practices awareness to bridge yield gap, minimize pre- and post-harvest losses and enhance income of smallholders who mostly cultivate pulses.

CONCLUSION

India needs around 32 million tons of pulses by 2030, to feed the estimated population of about 1.68 billion. A concerted effort by farmers, researchers, development agencies, and government are needed to ensure that India becomes self-sufficient in pulses in the next 5-10 years. The recent efforts and programs initiated by the government are bearing fruits and a technological oriented approach in sociological frame needed to met out the gap in production and profit of pulse production

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