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Increasing Yield of Chickpea (*Cicer arietinum* Linn.) through Improved Production Technology in Kalaburagi District of Karnataka

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ABSTRACT

Chickpea (*Cicer arietinum* Linn.) is most important pulse crop in Karnataka state. The productivity of chickpea is low because of non adoption of available technologies by the farmers. Hence, Krishi Vigyan Kendra, Kalaburagi conducted 149 demonstrations at farmers' field during the last 6 years showing improved production technology. The results revealed variation in the yield obtained probably due to variation in agro-climatic parameters under rainfed condition. The highest yield of FLDs plots of chick pea achieved by adopting improved production technology was 12.87q/ha compared to farmers' practice (10.06 q/ha). Adoption of improved production technology increased yield by 27.80 per cent over farmers' practices. The average technological gap, extension gap and technological index were calculated as 7.13 q/ha, 2.81 q/ ha and 35.65 per cent, respectively. The economical parameters indicated that net profit of Rs. 33,213/- ha was recorded under FLDs plot over farmer practices Rs 24,095/-ha.

Key Words: Chick pea, Technology gap, Technology index, Extension gap, Yield, Economics.

INTRODUCTION

Chickpea (*Cicer arietinum* Linn.) is a major rabi pulse crop grown in India. Among the pulses, chickpea occupies 30 per cent of area with 38 per cent of annual production in India. In Karnataka state, occupying about an area of 4.79 lakh ha with a production of 2.81 lakh tones and productivity of 618 kg/ha. It is a good source of carbohydrates and protein and protein quality is considered to be better than other pulses. Even though many technologies for chickpea cultivation have been evolved for increasing the productivity but farmers have hardly adopted a few of them and those in a non scientific manner. Singh and Bajpai (1996) reported that fertilizer and plant protection were most critical inputs for increasing seed yield of chickpea. Keeping this in view, front line demonstrations of chickpea were conducted in order to demonstrate the productivity potential and economic benefit of improved technologies under farmers' conditions.

MATERIALS AND METHODS

The Frontline demonstrations (FLD) were organized on farmers' field to demonstrate the impact of integrated crop management technology on chickpea productivity over six years during rabi 2010 to 2016. Each FLD plot was laid out on 0.4 ha area and adjacent 0.4 ha was considered as control for comparison (farmer's practice). The integrated crop management technology comprised the improved variety, proper tillage, seed rate, pre emergent weedicide application, seed treatment, proper nutrient and pest management (Table 1). The FLD was conducted to study the technological 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

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Table1. Improved production technology and Farmers practices of chick pea under FLD.

Sr No.	Technology	Improved practices	Farmers practice	GAP (%)
1	Variety	JG 11	A 1	Full gap
2	Land preparation	Ploughing and harrowing	Ploughing and harrowing	Nil
3	Pre emergent herbicide	Pendimethalin (@ 2.5 l/ha)	No herbicide	Full gap
4	Seed rate	50 kg/ha	62 kg/ha	Higher seed rate
5	Sowing method	Line sowing	Line sowing	No gap
6	Seed treatment	Biofertilizers and Trichoderma	No seed treatment	Full gap
7	Fertilizer dose (NPK kg/ha)	5:10:0	10:20:0	Partial gap
8	Plant protection	Integrated pest management	Indiscriminate application	Full gap
9	Grading the produce	Grading followed	Not followed	Full gap

Technology gap = Potential yield – Demonstration

Yield Extension gap = Demonstration yield – Farmers yield

Technology index = ((Potential yield - Demonstration yield) / Potential yield} X 100

and technological index (Samui et al, 2000) were calculated.

RESULTS AND DISCUSSION

During the study period it was observed that the demonstration trials have increased the yield over the farmers' practices (Table 2). Full gap observed in most of production technology was the reason of not achieving potential yield. Farmers were not aware about recommended technologies.

Yield

The results revealed that due to FLD on chick pea an average yield was recorded 12.87 q/ ha under demonstrated plots as compared farmers' practice (10.06 q/ha). The highest yield in the FLD plot was 13.95 q/ha during year 2012-13 and in farmers' practice, it was 10.80 q/ha in the same year and lowest yield was recorded in the year 2015-16. The average yield of chick pea increased by 27.80 per cent. The results clearly indicated that the higher average seed yield in demonstration plots over the years compared to local check was due to knowledge and adoption of full package of practices i.e. appropriate varieties such as JG11, timely sowing, seed treatment with bio fertilizers Rhizobium spp and phosphorus solubalizing bacteria (PSB), Trichoderma @4g/kg of seed, use of balanced dose of fertilize, method and time of sowing with proper spacing, timely weed management, irrigation water management, pulse magic spray at flowering and pod development stage, need based plant protection and grading of the seeds. The above findings were in agreement with the findings of Singh et al (2014) and Tomar (2010). The higher yield of chickpea under improved technology was due to use of latest high yielding varieties, integrated nutrient management and integrated pest management.

Technology gap

The technology gap means the differences between potential yield and yield of demonstration plot. The demonstration plot yields (Table2), were 7.5, 7.2, 6.05, 6.65, 6.12, and 9.26 q/ha during 2010-11, 2011-12, 2012-13, 2013-14, 2014-15 and 2015-16, respectively. On an average technology gap under six year FLD programme was 7.13 q/ ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, crop production practices and local climatic situation.

Table 2. Performance of chick pea (JG-11) through demonstration of Integrated Crop management technologies

Year	No of Demon.	Area (Ha)	Yield (q/ha)			Percent increase in yield	Techno-logical gap (q/ha)	Extension gap (q/ ha)	Technological index (%)	Net Return (Rs/ ha)		B:C	
			Potential yield	Demon yield	Farmers practice					Demon	Farmer practice	Demon	Farmer practice
2010-11	20	8	20	12.50	10.10	23.76	7.50	2.40	37.50	24000	17240	5.00	3.50
2011-12	48	20	20	12.80	10.20	25.49	7.20	2.60	36.00	34280	24520	3.90	3.00
2012-13	24	10	20	13.95	10.80	29.17	6.05	3.15	30.25	41110	29840	4.40	3.70
2013-14	15	7	20	13.35	10.20	30.88	6.65	3.15	33.25	38390	29810	4.50	3.90
2014-15	12	5	20	13.88	10.40	33.46	6.12	3.48	30.60	24168	17652	5.10	3.60
2015-16	30	12	20	10.74	8.66	24.02	9.26	2.08	46.30	37330	25510	3.28	2.43
Average	24.83	10.33	20	12.87	10.06	27.80	7.13	2.81	35.65	33213	24095	4.36	3.36
Total	149	62	-	-	-	-	-	-	-	-	-	-	-

Extension gap

Extension gap means the differences between demonstration plot yield and farmers yield. Extension gap of 2.4, 2.6, 3.15, 3.15, 3.48 and 2.08 q/ha (Table 3) were observed during 2010-11, 2011-12, 2012-13, 2013-14, 2014-15 and 2015-16, respectively. On an average extension gap under six year FLD programme was 2.81q/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

Technology index indicates the feasibility of the evolved technology in the farmers' fields. Lower the value of technology index, higher is the feasibility of the improved technology. The technology index varied from 30.25 to 46.30 per cent (Table 2). On an average technology index was observed 35.65 per cent during the six years of FLD programme, which showed 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

Data in table 2 revealed that the cost involved in the adoption of improved technology in chick pea varied and was more profitable. The cultivation of chick pea under improved technologies gave higher net return of Rs. 24,000/-, 34,280/-, 41,110/-, 38,390/-, 24,168/- and 37,330/- ha, respectively, as compared to farmers practices (Rs 17,240/-; 24,520/-; 29,840/-; 29,810/-; 17,652/- and 25,510/- per ha in 2010-11, 2011-12, 2012-13, 2013-14, 2014-15 and 2015-16, respectively). An average net return and B: C of demonstration field was Rs. 33,213/-ha and 4.36, respectively as compared to farmers practice (Rs 24,095/- ha and 3.36). Similar findings were reported by Singh *et al* (2014). The benefit cost ratio of chick pea cultivation under improved practices has higher than farmers' practices in all the years and this may be due to higher yield obtained under improved technologies compared to local check (farmers' practice). This finding was in corroboration with the findings of Mokidue *et al* (2011) and Tomar (2010).

CONCLUSION

It is concluded from the study that there exists a wide gap between the potential and demonstration yields in wilt tolerant chick pea mainly due to technology and extension gaps and also due to the lack of awareness about new technology. The FLD produced 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. This could be circumventing some of the constraints in the existing transfer of technology system in the district, Kalaburgi of Karnataka. 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.

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