



Production Potential of Chickpea (*Cicer arietinum* L.) Under Integrated Crop Management (ICM) in North Eastern Dry Zone of Karnataka

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ABSTRACT

With an objective of improving productivity of chickpea, Integrated Crop Management (ICM) were conducted in 25 farmers' fields in Jawargi and Chittapur taluk of Kalaburagi district in Karnataka state during Rabi season during 2016-17. The study findings revealed that ICM practices recorded a mean yield of 1050 kg/ha which is 28.05 per cent higher than obtained with farmer's practice (820 kg/ha). The average extension gap, technology gap and technology index were 150kg/ha, 230 kg/ha and 12.50 per cent, respectively. The improved production technologies gave higher benefit cost ratio (2.17) compared to local check (1.69) being grown by farmers under locality. The productivity of chickpea per unit area could be increased by adopting feasible scientific and sustainable management practices with a suitable variety. Considering the above facts, ICM were carried out in a systematic and scientific manner on farmer's field to show the worth of improved practices and convincing farming community about potentialities of improved production management technologies of chickpea for further adoption by the farming community.

Key words: ICM, Chickpea, Technology, Production.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is grown in many tropical, sub-tropical and temperate regions of the world and one of the most important pulse crop of India due to its multiple functions in the traditional farming system. Besides helping in the management of soil fertility, particularly in the dryland, it is an important source of human food and animal feed. In India, it is cultivated on about 1372000 ha with a production of 7169000 tonnes. However, its average productivity has

remained strikingly low at about 859 kg/ha. In Karnataka, it is grown over an area of 1372000 ha with a production of 897000 tonnes and productivity of 321 kg/ha¹. There are several biophysical, technical and socioeconomic constraints, which limit the productivity of chickpea in India. In order to mitigate these limitations, it is essential to assess the production potential of the environment in relation to achievable and current levels of production as well as the availability of the natural resources.

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Therefore, the study was undertaken to find out the possible reasons and ways to reduce these yield gaps. Integrated Crop Management (ICM) practices have been used as a useful extension tool to demonstrate HYV along with production, protection and management practices in the farmer's field under different agro-climatic regions and farming situations. The improved cultivation practices followed in the national demonstrations have already shown high yield potentials. But knowledge behaviour of general farmers towards these practices is not known and hardly any systematic research has done to explore these areas. Therefore, it is very essential to conduct investigation on ICM demonstrations on chickpea 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 chickpea on yield, economics conditions and technology and extension gap in Jewargi and Chattapur taluk of Kalaburagi 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.

MATERIALS AND METHODS

The ICM were conducted at ICAR- KVK, Raddewadagi, Jewargi and Chittapur taluk of Kalaburagi district in Karnataka state in ten farmer's fields during 2016-17 with objective to popularize improved technologies for productivity enhancement of chickpea through ICM demonstrations. To diffuse chickpea productivity enhancement technologies on campus and off campus trainings were conducted. Improved practices like use of improved seed (JG-11), seed treatment with bio-fertilisers *Rhizobium*, PSB and bio-

pesticide (*Trichoderma*), balanced nutrient application (10 kg N, 25 kg P₂O₅) and integrated pest and disease management (Timely spray of pesticides). The crop was harvested at maturity stage. For the study, technology gap, extension gap and technology index were calculated as suggested by Samui *et al.*¹⁵.

Technology gap = Potential yield – Demonstration yield

Extension gap = Demonstration yield – Farmers yield

Technology index (%) = (Potential yield – Demonstration yield/Potential yield) * 100

RESULTS AND DISCUSSION

The data were subjected to analyze, technology gap, extension gap and technology index were calculated as per the formula and economic analysis was done as per procedure and data were presented in the table 1 and 2.

Yield analysis

The average grain yield of chickpea was 1050 kg per ha. as against 820 in farmer's field which is 28.05 per cent higher. The higher grain yield of chickpea in demonstration plot was mainly attributed to the adoption of improved technologies like improved variety JG-11, seed treatment with *Rhizobium*, PSB and *Trichoderma*, balanced nutrient application including secondary and micronutrients, integrated pest and disease management, nipping. Application of bio-inputs enabled to mobilise nutrients from native soil nutrients and *Trichoderma* helped the crop to resist against diseases. The results confirm the findings by Keshavareddy *et al.*¹⁰, Dhruw *et al.*⁸, Girish *et al.*⁹, Dayanand *et al.*⁶ and Lathwal¹¹ and Dhaka *et al.*⁷.

Technology gap

The technology gap in the demonstration yield over potential yield was 150 kg/ha. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions^{2,4,3}.

Extension gap

The extension gap of 230 kg/ha was noticed. This emphasized the need to educate the farmers through various means for the

adoption of improved agricultural technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap Meena and Dudi¹², Bhatra *et al.*⁵ and Meena and Singh¹³.

Technology index (%)

The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology. The technology index shows the feasibility of the evolved technology at the farmer's fields and lower value of technology index more is the feasibility of the technology. In this demonstration noticed 12.50 per cent technologies index, this indicates proper adoption of improved technologies. Similar

results were also recorded by Shalini *et al.*¹⁶ in tomato, Renbomo Nguillie and Pijush¹⁴ in chilli.

Economic analysis

The inputs and output prices of commodities prevailed during the study demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit cost ratio (Table 2). The cultivation of chickpea with improved technologies gave higher net return of Rs 29400/ha as compared to farmer's practices (Rs 17440/ha), which gave additional returns of Rs 11960/ha. The benefit cost ratio of chickpea in ICM was 2.17. This is attributed to higher yields obtained under improved technologies compared to farmers plot as local check.

Table 1: Grain yield of chickpea, technology gap extension gap and technology index as influenced by improved practices

Year	Grain yield (Kg/ha.)		% increase in yield in ICM over FP	Technology gap (kg/ha.)	Extension gap (kg/ha)	Technology index (%)
	ICM	FP				
2016-17	1050	820	28.05	150	230	12.50

Table 2: Economic analysis of chickpea demonstration

Year	Net returns (Rs/ha.)		Additional returns (Rs /ha.)	B:C ratio	
	ICM	FP		ICM	FP
2016-17	29400	17440	11960	2.17	1.69

CONCLUSION

The study has shown that the ICM demonstration programme was found useful in enhancing the knowledge and adoption level of farmers in various aspects of chickpea production technologies. ICM practices created great awareness and motivated the other farmers to adopt appropriate chickpea production technologies. The area of high yielding seedling material of chickpea has increased which will spread in the taluk including the adjoining area. The selection of critical input and participatory approach in planning and conducting the demonstration definitely help in the transfer of technology to the farmers.

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