Enhancement of productivity for chickpea (Cicer arietinum L.) through front line demonstration in farmer’s fields

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ABSTRACT

The front line demonstration of chickpea were conducted during the post rainy season at 60 farmer’s field to determine the production potential and economic benefit of improved technologies consisting suitable variety (JG-130, JG-16), integrated nutrient management (20:60:20 kg N:P:K /ha + Rhizobium + P.S.B. @ 5 g per kg of seed) integrated pest management - Deep ploughing + seed treatment with Trichoderma viridi + Pheromone trap 10/ha + bird percher @ 50/ha + Quinolphos @1.5 lt/ha) at Raisen district of Madhya Pradesh (India) during rabi season of 2006-07 to 2010-11. The improved technologies recorded mean yield of 14.12 q/ha, which was 30 percent higher than that obtained with farmers practices of 10.79 q/ha. The additional cost of Rs 2405 to 2900 gave additional net return, it was ranged Rs 2495 to Rs 8900 per hectare with increase benefit: cost ratio ranged from 1:1.03 to 1:3.06. The extension gap ranging between 2.45 to 4.45 q/ha. Data on technology index reduced from 35.25 percent (2006-07) to 20% (2010-11), exhibited the feasibility of technology demonstration in this region.

Key words: Chickpea, Extension gap, Front line demonstration, Technology gap.

INTRODUCTION

Chickpea (Cicer arietinum Linn) is a major pulse in India. Chickpea occupies about 38 percent of area under pulses and contribute about 50 percent of the total pulse production in India. In India, it is grown throughout the country except on high altitude of Northern and north eastern regions & costal peninsula. Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Andhra Pradesh, Karnataka, Gujarat, Chhattisgarh, Haryana, Bihar, Odissa, and West Bengal are the major chickpea producing state sharing over 95 percent area. Pulses are the important source of proteins and essential component of diet. The area, production and productivity of the pulses in the country is 25.21 million hectare, 19.78 million tones and 7.85 q/ha respectively (GOI 2014).

Chickpea is the premier food legume crop in India is covering about 9.93 Mha with production of 9.53 m, tons and productivity of 9.60 q/ha (Anonymous, 2014). Chickpea is an important pulse crop of Madhya Pradesh and grown in 3.16 million hectares of land annually, producing 3.33 million tons with average productivity of 1044 kg ha. As far as the chickpea cultivation is Raisen district of M.P. is concerned, it is grown on 0.17 lakh hectare of land annually producing 0.19 lakh tones with the average productivity of 16.29 q/ha.

In Madhya Pradesh average productivity of chickpea is very low (10.44 q/ha) as compare to genetic potential (20.00 q/ha) .This is because of low adoption of recommended production technologies and lack of knowledge of chickpea production in general and conviction about latest technologies. Major a biotic stress viz low moisture content in soil, low organic matter content, soil type, terminal drought and biotic stresses are also responsible for low yield. Among the biotic stress, the gram pod borer is a major pest occurring for75 per cent pod damage in the crop. (Krishan Kant et al 2007). To combat the causes of yield reduction and technology gap, dissemination of recommended technologies of chickpea through front line demonstration were conducted in farmer’s conditions. There is positive indication of yield improvement due to industrious efforts of KVK scientists.

MATERIALS AND METHODS

The improved technologies included improved variety (cv JG-130 during 2006-07 to 2007-08 and cv JG-16 during 2008-09 to 2010-11), integrated nutrient management (20:60:20 kg N:P:K /ha + Rhizobium + P.S.B. @ 5 g per kg of seed, integrated pest management- Deep ploughing + seed treatment with Trichoderma viridi + Pheromone trap 10/ha + bird percher @ 50/ha + Quinolphos @1.5 lt/ha) were tested under the demonstration. Deep ploughing was done during the April month. Crop was sown between 20 October to 10 November with a spacing of 30 cm X 10 cm and seed rate was 75 kg/ha. An entire dose of N...
and P through Di ammonium Phosphate through murate of potash was applied as basal before sowing.

Farmer practice constituted no deep ploughing was done during summer, old variety of JG-315 seed was used, crop was sown between 5 to 15 November, with higher seed rate 100 kg/ha, no seed treatment, no bio fertilizer and imbalance use of fertilizer (9:23:0 NPK kg/ha) were adopted.

Before conducting FLDs a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspect of cultivation. All other step like site selection, farmer selection, layout of demonstration, farmers participation etc were followed as suggested by choudhary (1999)

Total 60 farmers were associated under this programme. The total area covered in 5 year was 25 hectares for demonstration of recommended improved practices of Gram. In the demonstration one control plot was also kept where farmers practices was carried out .All the production and protection technologies other than interventions were applied in similar manner in demonstrated as well as in farmers practices .

The yield data was collected from the selected FLD farmers by random crop cutting method. The collected data were analyzed using simple tabular analysis like percentage etc. The yield data were collected from both the demonstration and farmers practices and their technology gap, extension gap, and technology index were a workout (Samui et al 2000) as given below.

\[
\text{Technology index} = \left( \frac{\text{potential yield-demonstration yield}}{\text{potential yield}} \right) \times 100
\]

RESULTS AND DISSCUSSION

The gap between the recommended practices and exiting farmer practices under chick pea FLD is presented in Table 1. Full gap was observed in case of variety, seed rate, seed treatment and partial gap was observed in fertilizer and plant protection.

\textbf{Seed yield:} The yield of chickpea obtained over the year under improved technology as well as local check are presented in Table 2. The productivity of chickpea ranged from 12.95 to 16 q/ha with mean yield of 14.12 q/ha under improved technology on farmers field as against a yield ranged from 10.20 to 11.55 q/ha with a mean of 10.79 q/ha recorded under farmers practice. The higher productivity following recommended practices as well as farmer practice was during the year 2010-11, which might be due to continuous use of IPNM (Integrated Pest and Nutrient Management) practices. The higher yield of chickpea under recommended practices was due to the use of latest high yielding variety, integrated nutrients management and pest management. Similar results have been reported by Tomar et al (1999).

\textbf{Economic:} The input and output prices of commodities prevailed during each year of demonstration were taken for calculating cost of cultivation, net return and benefit cost ratio (Table 3). The net return from recommended practices was Rs 16210 to Rs 19625 while the net return from farmer practices was Rs 12180 to Rs 14330. It means that net return from demonstration was higher than the farmer

![Table 1: Difference between recommended practices and existing farmer practices under chickpea FLD](image)

![Table 2: Productivity, Extension Gap, Technology gap and technology index of chickpea as grown under FLD and existing package of practices.](image)
practices. The additional cost of Rs 2405 to 2900 gave additional net return, it was ranged Rs2495 to Rs 8900 per hectare. The increase benefit: cost ratio was also calculated, it was ranged from 1:1.03 to 1:3.06. Thus it was clearly showed that the demonstration of chickpea with full package was better than farmers practices. Similar result has been reported by earlier by Tomar (2010).

**Extension gap:** The extension gap showed an increasing trend. The extension gap ranging between 2.45 to 4.45 q/ha during the period of study emphasizes the need to educate the farmers through various means for the adoption of improved Agriculture production to reverse the trend of wide extension gap. The trends of technology gap (ranging between 7.05 – 4.00 q/ha) reflected the farmers co-operation in carrying out such demonstration with encouraging results in sequent year. The technology group observed may be attributed to the dissimilarity in Soil fertility status and weather conditions.

### Table 3: Economic analysis of demonstration and farmers practices

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost of cultivation</th>
<th>Gross return</th>
<th>Net return</th>
<th>Additional cost</th>
<th>Additional net return</th>
<th>B:C ration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R.P.</td>
<td>F.P.</td>
<td>R.P.</td>
<td>F.P.</td>
<td>R.P.</td>
<td></td>
</tr>
<tr>
<td>2006-07</td>
<td>9555</td>
<td>7150</td>
<td>25900</td>
<td>21000</td>
<td>16345</td>
<td>13850</td>
</tr>
<tr>
<td>2007-08</td>
<td>10150</td>
<td>7570</td>
<td>27620</td>
<td>21900</td>
<td>17470</td>
<td>14330</td>
</tr>
<tr>
<td>2008-09</td>
<td>10790</td>
<td>8220</td>
<td>27000</td>
<td>20400</td>
<td>16210</td>
<td>12180</td>
</tr>
<tr>
<td>2009-10</td>
<td>11450</td>
<td>8760</td>
<td>28740</td>
<td>21500</td>
<td>17290</td>
<td>12740</td>
</tr>
<tr>
<td>2010-11</td>
<td>12375</td>
<td>9475</td>
<td>32000</td>
<td>23100</td>
<td>19625</td>
<td>13625</td>
</tr>
<tr>
<td>Mean</td>
<td>10864</td>
<td>8235</td>
<td>28252</td>
<td>21580</td>
<td>17388</td>
<td>13345</td>
</tr>
</tbody>
</table>

The technology index showed the feasibility of the evolved technology at the farmer’s field. The lower value of technology index more is the feasibility of the technology demonstrated. (Sagar and Chandra, 2004) As such reduction in technology index from 35.25% during 2006-07 to 20% during 2010-11 exhibited the feasibility of the demonstrated technology in this region. These results confirm the findings of crop technology demonstration on oilseed and pulses crops by Yadav et al (2004) and Lathwal (2010).

**CONCLUSION**

From the above findings it can be concluded that use of scientific method of chickpea cultivation can reduce the technology gap to a considerable extent this leading to increase productivity of chickpea in the district. Moreover extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better pulse production in the district.

**REFERENCES**