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# Impact of Frontline Demonstration on Productivity Enhancement in Chickpea

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## ABSTRACT

Chickpea, (Cicer arietinum L.), is a drought tolerant leguminous crop grown in a large area in Madhya Pradesh covering approximately 38 percent area of the country. There is a large gap between the yield achieved in various experimental trials and that of under the farmers' fields in the state. The major constraints responsible for this untapped yield potential are adverse weather condition and inappropriate production practices. There is a considerable scope for enhancement in crop productivity by adopting region specific suitable production technologies. 733 frontline demonstrations were conducted by KVKs in the state during 2010-11 on integrated crop management, integrated disease management, integrated nutrient management, integrated pest management and on use of improved varieties at real farm situations. Prevailing farmers' practices were compared with these recommended practices and an average yield enhancement of 38.07, 21.9, 30.52, 27.94, and 25.99 was recorded over the yield under farmers' practices respectively with favorable economic indicators like gross and net monetary returns and benefit: cost ratio. Farmers were also found eager to adopt the demonstrated technologies.

India is the largest producer and consumer of pulses in the world. However, pulses production has been stagnant at between 11 and 14 million tones over the last two decades. Per capita pulses consumption over the years has come down from 61g/day in 1951 to 30 g/day in 2008 (Reddy, 2009). Among the various pulse crops, chickpea occupies 30 percent of area with 38 percent production in India. It is the most important crop in India with an area of more than six million ha. Chickpea is the pre dominant crop of the state of Madhya Pradesh, occupying 279 thousand ha area with 258 thousand tones of production occupying 38 and 44 percent of the national chickpea area and production respectively (Tomar, 2010). Chickpea predominantly cultivated in rainfed situation under various cropping systems like soybean – chickpea, maize – chickpea, Sorghum – chickpea. Chickpea is mainly grown on receding soil moisture regime during post rainy season as a rainfed crop. Despite its long history of cultivation and being an important crop for small and marginal farmers, its productivity has remained very low and more or less stagnated to about 800 kg/ha (Bhatia et al., 2006). Among the various reasons behind its low productivity, the main reason is moisture stress responsible for great uncertainty involved in chickpea production in a rainfed environment. As a post rainy season crop, chickpea receives scarce rainfall and it is grown on residual moisture, the availability of soil moisture to chickpea is influenced by both the quantum and distribution of rains in the rainy season as well as in the post rainy season.

Among the biotic factors, diseases such as *Fusarium* wilt and *Aschochyta* blight are widespread and insects such as pod borer (*Helicoverpa armigera* Hübner) and *Spodoptera litura* are the major insect causing a severe yield losses of chickpea in the state. Weeds are another biotic factor, which limit the productivity of chickpea in India. Many of management factors like use of low yielding and non-responsive varieties, improper pest and disease management, lack of proper water management practices, lack of improved soil and crop management practices are some other factor

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responsible for the yield decline. Lack of adoption of improved technology, low input, use of marginal lands, unfavorable market fluctuations, inadequate procurement mechanism, lack of appropriate institutional support and lack of credit are some of the socioeconomic factors which also limit the productivity of chickpea in the country. Chickpea is a valuable source of protein for poor population and a source of livelihood for the small and marginal farmers in India and other developing countries and, therefore, its low production is a cause of concern and requires urgent attention.

There are several technologies available for improvement in productivity of the crop, but the available technological option does not fulfill its purpose till it reaches and adopted by its ultimate users, the farmers. The technology dissemination refers to the spread of new ideas from originating sources to the end users. So, the constraints limiting chickpea productivity across the state were identified through PRA, surveys, farmers' meetings, field diagnostic visits during the crop growing period and the suitable recommended technologies were assessed through on farm testings at farmers' field and these technologies were demonstrated to the farmers for dissemination at large scale to improve the productivity through front line demonstration programme. This paper analyzes the impact of frontline demonstration on productivity and economics of chickpea in Madhya Pradesh.

## METHODOLOGY

To improve the productivity of the crop, it is very necessary to adopt a suitable strategy, it is imperative to assess the potential yield in the region of interest and gap between the potential and actual yield obtained by average farmers. Several location specific technologies were assessed and refined through on farm testing and the training programmes were imparted to the farmers for acquainted them with the scientific production technologies. These technologies were demonstrated at the farmers' fields under the front line demonstration (FLDs) programme so that the farmers can easily understand and adopt the technologies. Then these demonstrations were organized to demonstrate the efficacy of newly released production technologies on farmers' field to explore their maximum potential in given farming situation. The detail of implementation of front line demonstrations is given in Table 1.

**Table 1. Implementation of frontline demonstration on chickpea in Madhya Pradesh during 2010-11**

| Thematic Area | No. of Farmers | Area (ha) |
|---|---|---|
| Integrated crop management | 242 | 103.6 |
| Integrated disease management | 74 | 30.2 |
| Integrated plant nutrient management | 92 | 45 |
| Integrated pest management | 79 | 32 |
| Use of improved varieties | 246 | 101.2 |

These demonstrations were conducted in different districts of Madhya Pradesh on improved varieties, integrated disease management, integrated pest management, integrated nutrient management and integrated crop management through Krishi Vigyan Kendras (KVKs) in their operational areas. The integrated crop management practices in chickpea involved proper water management, sowing technologies, sowing implements and land configurations etc.

For speedy transfer of technologies, the extension activities like farmers' fairs, field days, farmers' meetings etc. were organized. These activities have established and fostered close liaison, mutual trust and participation of farming communities in the programmes of the KVK. To manage the assessed problem, improved and recommended technologies or practices were followed as interventions during the course of frontline demonstration programme. In case of recommended practices, the interventions were taken as suggested by state agricultural universities, while in case of local check (farmers' practices), the existing farmers practice were used i.e. imbalanced use of fertilizers, growing of local varieties, no seed treatment, use of chemical pesticides only for pest control and no proper measure for disease control and no proper water management. Before conducting envisaged technological intervention, all the other steps like site selection, farmers' selection, layout of demonstrations, farmers' participation were followed as suggested by Choudhary, 1999. These demonstrations were conducted under close supervision of concerning scientists. Yield data were collected from farmers

practices and demonstration plots and converted to the yield per ha. Similarly cost of cultivation, net monetary returns, gross returns and cost: benefit ratio were computed and analyzed.

## RESULTS AND DISCUSSION

The yield performance of demonstration conducted in Madhya Pradesh during 2010-11 is given in Table 2. The data reveals that under the demonstration plots the crop productivity was recorded higher than that of under the farmers' practices under all the technological interventions.

**Table 2 – Yield performance of the demonstrations on chickpea during the years 2010-11**

| Thematic Area | Average Yield (q/ha) | | Increase in yield |
|---|---|---|---|
| | Demonstration plots | farmers'practices | farmers practice (%) |
| Integrated crop management | 16.79 | 12.16 | 38.07 |
| Integrated disease management | 15.15 | 12.42 | 21.90 |
| Integrated plant nutrient management | 15.79 | 12.10 | 30.52 |
| Integrated pest management | 17.80 | 10.22 | 27.94 |
| Use of improved varieties | 16.14 | 12.81 | 25.99 |

The average crop yield under demonstration was recorded as 16.79, 15.15, 15.79, 17.80 and 16.14 q/ha when the demonstration were given on integrated crop management, integrated disease management, integrated nutrient management, integrated pest management and improved varieties, respectively. The yield enhancement due to technological interventions was recorded to the tune of 38.07, 21.901, 30.52, 27.94 and 25.99 percent respectively. The maximum increase in yield was recorded under the demonstrations on integrated crop management (38.05 percent), while it was recorded lowest under integrated disease management (21.90 percent) over farmers' practices.

The economics of the demonstrations and farmers practices is given in Table 3. The cost of cultivation was calculated on the basis of prevailing social, economical and prevailing micro climatic condition of that particular area.

**Table 3. Economics analysis of the demonstration and farmers practices**

| Thematic Area | Economics of demonstration | | | | Economics of check | | | |
|---|---|---|---|---|---|---|---|---|
| | Gross Cost (Rs/ha) | Gross Return (Rs/ha) | Net Return (Rs/ha) | Benefit : Cost Ratio | Gross Cost (Rs/ha) | Gross Return (Rs/ha) | Net Return (Rs/ha) | Benefit: Cost Ratio |
| Integrated crop management | 9729 | 35816 | 26087 | 3.681 | 8494 | 25904 | 17410 | 3.050 |
| Integrated disease management | 11875 | 31917 | 20042 | 2.688 | 11390 | 25947 | 14557 | 2.278 |
| Integrated plant nutrient management | 13195 | 35277 | 22082 | 2.673 | 11892 | 27199 | 15307 | 2.287 |
| Integrated pest management | 11544 | 31720 | 20176 | 2.748 | 10857 | 24810 | 13953 | 2.285 |
| Use of improved varieties | 10760 | 30403 | 19643 | 2.826 | 9337 | 23868 | 14530 | 2.556 |

These economic indicators viz. gross and net monetary returns and B:C ratio were recorded higher under demonstration as compared to that of under farmers' practices under all the major thrust areas. The average net returns of Rs 26087, 20047, 22082, 20176 and 19643 per ha was recorded under recommended practices (demonstration) in case of integrated crop management, integrated disease management, integrated nutrient management, integrated pest management and improved varieties respectively and the same was recorded Rs 17410, 14557, 15307, 13953 and 14530 per ha respectively under the same technological interventions. The economic analysis showed that the farmers received an additional income of Rs 8677, 5485, 6775, 6223 and 5113 per ha with an additional invest of Rs 1235, 485, 1303, 687 and 1423 per ha under the interventions viz. integrated crop management, integrated disease management, integrated nutrient management, integrated pest management and improved varieties respectively. The favorable economic indicators proved the economic

variability of the interventions made under demonstration and convinced the farmers on the utility of interventions. Similar were the findings reported by Singh et al., 2007 in soybean and Mishra et al., 2009 in potato.

## CONCLUSION

There have been overwhelming responses of farmers to adopt the innovations highlighted in the demonstrations. The results of these frontline demonstrations convincingly brought out that the yield of chickpea yield was increased by 21 to 38 percent by different technological interventions in different district of Madhya Pradesh. The results clearly established the facts that the adoption of improved technology improves the chickpea productivity and profitability. In the vicinity of the KVK, farmers in large number adopt and followed recommended practices under demonstration and got benefitted with higher production.

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