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RESEARCH PAPER

Yield gap analysis of integrated nutrient management in maize through front line demonstration

■ R.L. SOLANKI, R.S. RATHORE, S.D. DHAKAR AND Y. KANOJIA

SUMMARY

Maize (*Zea mays* L.) is a major crop of Chittorgarh district. It is the basic important stable food of the mass consumption of Mewar area of Rajasthan. One of the major constraint of traditional farming is low productivity due to non adoption of recommended fertilizer application specially integrated nutrient management. Through survey, farmers meeting and field diagnostic visit the yield gap was found. Maize is a common cropping sequence in large part of India, including Mewar of Rajasthan. However, productivity of this sequence under rainfed condition is quite low. A majority of the farmers in Rajasthan do not apply balance fertilizer of NPK in this sequence, mainly because of their ignorance about its role as well as high cost. The cereal based cropping system and application of continuous profit motivated imbalanced nutrient application is the matter of great concerned for sustainability. In spite of heavy inputs, the net result in such a system is the decline in crop productivity because of limitation of one or more nutrients. To overcome the yield gap 30 integrated nutrient management front line demonstrations of recommended package of practices involving balance fertilizer (@100 kg N_2+30 kg P_2O_5+30 kg K_2O ha^{-1}) at adopted farmers fields were laid out during *Kharif* 2008-09 to 2009-10 in two villages of two tehsils. Existing farmer's practices as control were taken for the comparison. Maize yield of demonstrated plot recorded 22.56 to 23.74 per cent higher over farmers practice. On an average, technology gap was found 8.68 qha^{-1}. Average extension gap and technology index were recorded 5.91 qha^{-1} and 21.33 per cent, respectively. The yield gap analysis emphasizes on the need to educate the farmers through various extension programs for adoption of integrated nutrient management measures to revert the trend of wide extension gap.

Key Words : INM Front line demonstration, Technology gap, Extension gap, Technology index

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Maize is the most important cereal crop and known as queen of cereal due to unparallel productivity among cereal crops. In India, maize occupies third position both in area and production after rice and wheat. In Rajasthan it is grown on 1 m ha area with production 1.1 m ton and productivity of 1,100 kg/ha. Maize is the lead staple food crop of the Chittorgarh district. It accounts about 50 to 60 per cent of *Kharif* cropped area. Maize crop is sown with the onset of monsoon particularly from end of June to mid July. Farmers generally use improved variety/hybrid seed of maize in the district but there are many other constraints for taking optimum maize production. Nutrient deficiency has been recognized as serious menace in its production. Nutrient deficiency may reduce maize yield by 20 to 30 per cent. Farmers are maintaining relatively higher plant population in early stage of the crop which invites competition between plants to plants. Besides, this crop suffers mainly lack of nutrient deficiency problem at initial stage due to uninterrupted rainfall and depends on use of balance fertilizers. It is an established fact that nutrient deficiency can be controlled effectively by use of balance fertilizers. So they do not use balance nutrient practices thus,

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
R.L. SOLANKI, Krishi Vigyan Kendra (M.P.U.A.T.), CHITTORGARH (RAJASTHAN) INDIA
Email: Solanki_rl@yahoo.com

Address of the Co-authors:
R.S. RATHORE AND S.D. DHAKAR, Krishi Vigyan Kendra (M.P.U.A.T.) CHITTORGARH (RAJASTHAN) INDIA

Y. KANOJIA, Krishi Vigyan Kendra, PRATAPGARH (RAJASTHAN) INDIA

the yield of maize crop is reduced. To overcome this problem 30 integrated nutrient management front line demonstrations were laid out in two villages of the Chittorgarh district.

MATERIAL AND METHODS

The present study was carried out by scientists of Krishi Vigyan Kendriya, during *Kharif* season from 2008-2009 to 2009-2010 in two adopted villages *viz.*, Surkhand and Abhaypur of two tehsils of district Chittorgarh (agro climatic zone IVa). During these two years of study, an area of 06 ha were covered with plot size 0.2 ha under integrated nutrient management front line demonstrations with active participation of 30 farmers in different two villages were conducted. During this period all beneficiaries were included in the sample. The area under demonstration was 0.2 ha. Farmers meeting, survey and field diagnostic visits each was targeted under taken during the cropping season. To manage the low yield problem, recommended package of practices of agro climatic zone IV a (Sub Humid Southern Plains) of Rajasthan were followed in integrated nutrient management front line demonstration programmes. The existing farmer's practices of maize cultivation were taken as control for comparison. The recommended package of practices involving use of ½ N, full dose of P_2O_5 and K_2O as basal and remaining dose of nitrogen in two splits (at 30 and 60 DOS) were taken as intervention to manage the nutrient problem. Before conduction of integrated nutrient management- front line demonstrations, trainings to the farmers of the respective villages were imparted. The necessary steps like selection of site and farmers, lay out of demonstrations were followed with standard procedure. For integrated nutrient management front line demonstration critical inputs like DAP, urea and muriate of Potash fertilizers were provided by Krishi Vigyan Kendra. Non-monetary inputs like timely sowing and fertilization through drills were performed. The beneficiary farmers were facilitated by KVK scientists in performing field operations like sowing, broad casting of urea, harvesting etc. during the course of training and visits. The yield data were collected from both the demonstrated and control plots (farmers practices) by crop cutting experiment. Technology gap, extension gap and the technology index were worked Samui *et al.* (2000) as given below:

Extension gap= Demonstration yield- Farmers yield

Technology gap=Potential yield- Demonstration yield

$$\text{Technology index} = \left\{ \frac{\text{(Potential yield – Demonstration yield)}}{\text{Potential yield}} \right\} \times 100$$

RESULTS AND DISCUSSION

The results of the present study along with relevant discussion have been presented below:

Table 1 reveals that under demonstration plots, maize yield was found substantially higher than that under control plots during all the years. Under different locations, the maize yield in demonstration plots ranged between 31.43 to 31.50 qha^{-1} over observation period, which was 22.56 to 23.74 per cent higher over farmers practice (local check). On over all basis, 23.15 per cent increase in yield was recorded. These results are in conformity with the findings of Mishra *et al*. (2007) in other crops. However, the variation of yield from location to location can be accounted for varying climatic conditions, prevailing micro climate and variation in agricultural practices followed. More or less similar reasoning was provided by other workers (Sagar and Chandra, 2004 (2004) ;Tomar *et al.*, 2003) and Dhaka *et al*. (2010).

Technology gap :

The technology gap, the difference between potential yield and demonstration yield were found 8.80 and 8.57 qha^{-1} during, 2008- 2009 and 2009- 2010, respectively. On an average technology gap during 2 years integrated nutrient management front line demonstration programmes was 8.68 qha^{-1}. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agriculture practice and local climatic conditions.

Extension gap :

Extension gap, which is difference between demonstration yield and farmers yield was observed 5.8 qha^{-1} and 6.03 qha^{-1} during, 2008-2009 and 2009- 2010, respectively. However, the average extension gap was observed 5.91qha^{-1}, which emphasized the need to evaluate the farmers about integrated nutrient management practices through various extension programmes like FLD, training to revert the trend of wide extension gap. Similar yield enhancement in different

Table 1: Productivity, technology gap, extension gap and technology index (%) in maize cv. PEHM-2

Year	Area (ha)	No. of Demonstration	Potential yield (qha^{-1})	Demonstration yield (qha^{-1})	Farmers practice yield (q ha^{-1})	Increase over farmers practices (%)	Extension gap (qha^{-1})	Technology gap (qha^{-1})	Technology index (%)
2008-09	03	15	40.0	31.50	25.70	22.56	5.80	8.80	21.25
2009-10	03	15	40.0	31.43	25.40	23.74	6.03	8.57	21.42
Total	06	30	-	-	-	-	-	-	-
Mean	03	15	40.0	31.46	25.55	23.15	5.91	8.68	21.33

crops in front line demonstration has amply been documented by Haque (2000); Tiwari and Saxena (2001); Tiwari *et al.* (2003); Hiremath *et al*. (2007) and Kumar *et al*. (2010) from the results of these scientists it is evident that the performance of imploved variety was found belter than the local check under local conditions .

Technology index :

The technology index shows the feasibility of the demonstrated technology at the farmers' field. The lower value of technology index, more is the feasibility of the technology demonstrated (Sagar and Chandra, 2004). Sawardekar *et al*. (2003) and Hiremath and Nagaraju (2009). The technology index varied from 21.25 to 21.42 per cent (Table 1). On an average 21.33 per cent during the two years of integrated nutrient management FLDs showed the good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of maize and lower down the losses meant by deficiency of nutrient in maize crop.

Conclusion:

The study of yield gap analysis of integrated nutrient management (INM) through front line demonstration revealed that the losses made by deficiency of nutrient in terms of yield 25.40 to 25.70 (qha^{-1}) was increased by 22.56 to 23.74 per cent. The technology gap ranged between 8.80 and 8.57 qha^{-1} and can be attributed to dissimilarity of the soil fertility and local climatic situations. Extension gap ranged between 5.80 and 6.03 qha^{-1}, which emphasized on the need to educate the farmer about use of chemical balance fertilizers control through various extension programmes like training and FLDs. The technology index shows the feasibility of the technology demonstrated which shows the good performance of intervention point made to reduce the yield gap in maize crop.

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