Impact of Integrated Nutrient Management in Khandwa District of Madhya Pradesh

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ABSTRACT

Present studies for improving productivity of cotton, Integrated Nutrient management (INM) demonstrations were conducted on 200 farmer's field in Khandwa District during Kharif season of 2010-11 to 2016-17. The study findings revealed that Integrated Nutrient Management practices recorded mean yield 20.53 q/ha which is 22.37 per cent higher than obtained with farmers field (16.68 q/ha). The average extension gap, technology gap and technology index were 3.65 q/ha, 4.47 q/ha and 17.88 per cent respectively. This technology also gave higher benefit cost ratio (2.82) as compared to local check (2.53) being grown by farmers locally. For achieving the higher productivity of cotton the major constraint was found that heavy infestation of Insect and pest. Satisfaction level was also found higher while they were using improved technology under the supervision of scientist. The productivity of cotton per unit area could be increased by adopting feasible scientific approach.

Key word: *Integrated Nutrient Management; Technology gap; Technology index; Extension gap;*

Cotton is one of the most important cash, commercial and fiber crop of the country, occupy an area of about 11.872 million hectares with a production of 30.47 m tones and average productivity of 568 kg/ha (*Anon., 2016*). In Madhya Pradesh, cotton is grown over an area of 6.97 lakh ha, with a production of 24 lakh tones bales and productivity of 585 kg/ha. This may be due to low nutrient use efficiency and faulty method of applying fertilizers. In this direction Krishi Vigyan Kendra, Khandwa has introduced INM demonstration. This is the unique programme since the scientists are directly involved in conducting demonstrations. This also enables scientists to have first hand information. With a view to communicate Integrated nutrient Management technology widely & for realizing the yields of farmers, around 200cotton INM demonstrations of new technologies are laid out directly on farmers field during 2010-11 and 2016-17. The extent of adoption of improved technologies is a crucial aspect under innovation diffusion process and the most important for enhancing agricultural production at 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. Looking into the situation Krishi Vigyan Kendra, Khandwa has conducted integrated nutrient management (INM) practices through large scale demonstrations.

METHODOLOGY

The Integrated Nutrient Management demonstrations were conducted by Krishi Vigyan Kendra Khandwa Madhya Pradesh, in 200 farmer's fields during 2010-11 to 2016-17 with objective to popularize Integrated Nutrient management technologies for productivity enhancement of cotton through INM demonstrations. To diffuse cotton productivity enhancement technologies on campus and off campus trainings were conducted. INM practices like use of FYM, seed treatment with biofertilisers , balanced nutrient application (FYM 10 t/ha, 120 kg N, 75 kg P_2O_5 60 kg K_2O, 25 kg $MgSO_4$). 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. (2000)*.

Technology gap= Potential yield – Demonstration yield

Extension gap = Demonstration yield – Farmers yield

$$\text{Tech. index (\%)} = \frac{\text{Potential yield} - \text{Demo. yield}}{\text{Potential yield}} \times 100$$

The satisfaction level of participating farmers for the performance of demonstrated technology was also assessed. Total beneficiaries each year were selected to measure satisfaction level for the performance of demonstrated technology. The respondents were interviewed personally with the help of a pre-tested and well-structured interview schedule. Client satisfaction Index was calculating as below:

$$\text{Client satis. index} = \frac{\text{Individual score obtained}}{\text{Maxi. score possible}} \times 100$$

The data on yield were recorded and analyzed for interpretation of the results. The economic parameter (gross return, net return and B:C ratio) were worked out on the basis of prevailing market prices and minimum support prices of outputs.

RESULTS AND DISCUSSION

The data were subjected to analysis, technology gap, and extension gap and technology index 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 yield of cotton was 2053 kg per ha as against 1688 in farmers field. Which is 22.37 per cent higher? The higher yield of cotton in demonstration plot was mainly attributed to the adoption of improved Integrated nutrient management technologies and timely application balanced nutrient application including secondary and micronutrients, and it may be due to increased the nutrient use efficiency. Application of bioinputs enabled to mobilize nutrients from native soil nutrients and the results confirm the findings indifferent crops by *Keshavareddy et al. (2018), Meena et al. (2017), Dhruw et al. (2012)* and *Girish et al. (2011),*

Technology gap : The technology gap in the demonstration yield over potential yield was 4.47 q/ha. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather Conditions (*Singh Anuj et al., 2014, Ajrawat, et al., 2013* and *Balai et al., 2012*).

Extension gap : The extension gap of 3.65q/ha ha was noticed. This emphasized the need to educate the farmers

Table 1. Front line demonstrations on integrated nutrient management in cotton

Year	Demo.	Area (ha)	Average yield q/ha			% Incr-eased in yield	Extension gap (q/ha)	Tech. gap (q/ha)	Tech. Index (%)
			Potential yield	Demo. yield	Farmers yield				
2010-11	25	10	25	14.50	11.20	29.46	3.30	10.50	42.00
2011-12	25	10	25	17.50	13.75	27.27	3.75	7.50	30.00
2012-13	25	10	25	18.75	15.50	20.97	3.25	6.25	25.00
2013-14	50	20	25	27.06	22.14	22.22	4.92	-2.06	-8.24
2014-15	25	10	25	18.70	15.60	19.87	3.10	6.30	25.20
2015-16	25	10	25	22.70	18.40	23.37	4.30	2.30	9.20
2016-17	25	10	25	24.50	21.60	13.43	2.90	0.50	2.00
	200	80	25	20.53	16.88	22.37	3.65	4.47	17.88

Table 2. Economic impact of front line demonstration of cotton

Year	Cost of Cultivation (Rs)		Gross Return (Rs)		Net Returnn (Rs)		B:C ratio	
	Demo.	F.P.	Demo.	F.P	Demo.	F.P.	Demo.	F.P.
2010-11	16200	14150	75400	57545	59200	43395	4.59	4.07
2011-12	16400	14400	45000	35357	28600	20957	2.74	2.46
2012-13	19132	18286	65100	53816	45968	35530	3.40	2.94
2013-14	30755	27600	92988	76081	62233	48481	3.02	2.76
2014-15	33765	30272	65450	54600	31685	24328	1.94	1.80
2015-16	33362	30016	77180	62560	43818	32544	2.31	2.08
2016-17	29190	28650	83160	73317	53970	44667	2.85	2.56
Mean	25543	23339	72040	59039	46497	35700	2.82	2.53

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 extension gap *(Meena and Dudi, 2018, Bathri et al., 2014* and *Meena et al., 2013)*.

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 17.88 per cent technologies index, this indicates proper adoption of improved technologies. Similar results were also recorded by *Shalini et al. (2016) in tomato, Renbomo Ngullie* and *Pijush (2016)* in chilli.

Economic analysis : The inputs and outputs 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 cotton with improved technologies gave higher net return of Rs 46497/ha as compared to farmer's practices (Rs 35700/ha), which gave additional returns of Rs. 10897 /ha. The benefit cost ratio of cotton in INM was 2.82. This is attributed to higher yields obtained under improved technologies compared to farmers plot as local check.

Table 3. Rank of different constraints given by farmers

Constraints	%	Rank
Infestation of Insect and pests	85	I
Disease	72	II
Low technical knowledge	65	III
Low fertility level	42	IV
Weed infestation	35	V
Water management	22	VI

Constraints in Cotton production : Problems faced by the farmers in cotton production were documented during the study. Data from Table 3 indicated that Heavy infestation of insect and pest specially sucking pest which causes the virus at later stages was given the top most rank (85%) followed by crop infected by disease (72%), Low level of technical knowledge (65%), low fertility level (42%), weed infestation (35%), water management (22%) and least was variety (15%) were the major constraints to cotton cultivation. *Dhruw et al., (2012)* and *Singh et al., (2014)* have also reported similar type of constraints.

Farmer's satisfaction : Farmers satisfaction index presented in the Table 4 observed that majority of the respondent farmers expressed(72.5%) and medium (17.5%) level of satisfaction regarding the performance of FLDs,whereas,very few (10%) of respondents expressed lower level of satisfaction. Majority of responding farmers under higher and medium level of satisfaction with respect to performance of demonstrated technology indicate stronger conviction, physical and mental involvement in the demonstrations which in turn would lead to higher adoption. The similar results were also find out by *Dhaka et al (2010)* and *Singh (2018)*.

CONCLUSION

The study has shown that the INM demonstration programme was found useful in enhancing the knowledge and adoption level of farmers in various aspects of cotton production. INM practices created great awareness and motivated the other farmers to adopt appropriate cotton production technologies. The area of cotton has increased which will spread in the demonstrated block 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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