Yield Potential in Wheat by Application of Improved Production Technology : A Case of Harda District, Madhya Pradesh

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ABSTRACT

The rapid growing population of India will need 35-37 million metric tonnes more food production by 2020. India produced 264.38 million tonnes of food grains during 2013-14. This is more than 7 million tonnes higher than the production last year. Present study was conducted in Harda district of Madhya Pradesh during 2013-14. Madhya Pradesh is the third largest wheat producing state in the country after Punjab and UP with a record-break production of 14.5 million tonnes of wheat in the fiscal year 2011-12 and 16.5 million tonnes in 2012-13. The total food grain production of Madhya Pradesh is 276.20 lakh MT, which comprised 10 per cent of the India's food grain production at present time. To achieve this projected target, the adoption of latest production technologies is must, particularly in major crop i.e. wheat. KVKs are being established with the mandate of technology assessment, refinement and to disseminate on farm tested-proven technologies with appropriate modulations in location specific problems and concerns on the prevailing natural and socio-economic conditions, needs and priorities. In present study, extents of adoption of eight selected improved wheat production technologies were measured. To measure the extent of adoption and to compare the impact of training on extent of adoption, 150 farmers who had received training randomly selected and the same number of farmers was selected from surrounding area that had not been trained. Study was conducted in three different ways- firstly; all farmers were interviewed and categorized in to three groups of high, medium and low category of farmers for adoption of improved wheat production technologies. Secondly, overall adoption for both categories of farmers was measured and finally difference between the adoptions of both categories of farmers was considered in terms of adoption of different practices of wheat production. High level of adoption was seen in adopting high yielding varieties seed of wheat (62.00 per cent in trained groups) and medium level (58.67 per cent in untrained groups), whereas overall adoption of improved wheat production technology by farmers was under medium adopters category in Harda district of Madhya Pradesh.

Key words : *Adoption, KVK, Technology, Wheat, Yield Potential.*

India produced 264.38 million tonnes of food grains during 2013-14 compared to 257.13 million tonnes last year. This is more than 7 million tonnes higher than the production last year. And Madhya Pradesh is the third largest wheat producing state in the country after Punjab and UP with a record-break production of 14.5 million tonnes of wheat in the fiscal year 2011-12 and 16.5 million tonnes in 2012-13. The total food grain production of Madhya Pradesh is 276.20 lakh MT, which comprised 10 per cent of the India's food grain production at present. For this achievement state was rewarded at national level by prestigious ''Krishi Karman Award'' for years 2011-12, 2012-13 and 2013-14 continually.

The Krishi Vigyan Kendra (Farm Science Center) is district level agricultural extension center working with mandate of technologies assessment, refinement and transfer to farmers fields. Simultaneously it provide training to unemployed rural youth, extension workers of district, in-service training, breeder seed productions presently also harnessing the indigenous technologies and maintain records of ITKs at district level. There are 641KVKs working in 8 zones of the country.

KVKs provide training in major fields that are, agronomy, horticulture, animal husbandry, plant protection, home science and agricultural extension. KVKs also play an important role in connecting the rural community to outside world for exchange of information. The ultimate progress can only take place when people know new technology, understand it and work upon it. This requires access to reliable source of information (Rathore and Karki, 2010). In case of comparison between the respondents who had personally contacted through telephonic communication for agricultural related services, it was observed that personal contact was more effective.

. The agricultural development is backbone of rural development that is possible through strong interventions of transfer of agricultural technologies imparting both extension personnel and farmers as well. Keeping this view in mind present study ''Realizing Yield Potential in Wheat by Application of Improved Production Technology: A Case of Harda District, Madhya Pradesh'' was proposed to know the extent of use and implementation of wheat technologies disseminated by KVK in the Harda District of Madhya Pradesh for enhancing the wheat yield potential.

METHODOLOGY

Present study was conducted in Harda district of MP during 2013-14. The data were collected through multistage stratified random sampling method. Harda district was purposively selected for the present study because it has got highest productivity (3958 kg/ha)

during 2013-14 of wheat and beat Punjab state. Harda district comprises 3 blocks namely Harda, Timarani and Khirkiya. Out of these three blocks total 15 villages were selected randomly as 5 villages from each block. Thereafter, another 15 villages were again selected randomly from the remaining villages of three blocks where KVK has not given any training. Farmers from these villages were selected as untrained group. Thus, a total number of 30 villages selected as sample for this study. In this way 10 farmers from each village were taken for making a sample of 300 farmers (150 trained +150 untrained). The training received farmers were interviewed twice firstly, before starting the training and after receiving the training programme, the both responses were noted, analyzed and compared to see their knowledge improvement on improved wheat production technology and they treated under trained category. The second group treated as untrained because they were not given any training. Only direct responses through interview schedule and observation was taken from them to know their knowledge about improved wheat production technology. The trained and un-trained two categories of farmers were undertaken to find out the knowledge gap regarding improved production technology of wheat in Harda district.

The farmers were interviewed personally to get first hand information about improved wheat production technology, through direct field observations and record checking. The received responses were coded, processed and tabulated. The statistical analysis of the data were made by using tools like frequency, percentage, rank, arithmetic mean (X), standard deviation (SD), t-test and correlation coefficient (r).

RESULTS AND DISCUSSION

Table 1
Wheat production scenario of past 10 years in India

S. No.	Market Year	Production	Unit of Measure	Growth Rate
1	2005	68640	(1000 MT)	-4.86 %
2	2006	69350	(1000 MT)	1.03 %
3	2007	75810	(1000 MT)	9.32 %
4	2008	78570	(1000 MT)	3.64 %
5	2009	80680	(1000 MT)	2.69 %
6	2010	80800	(1000 MT)	0.15 %
7	2011	86870	(1000 MT)	7.51 %
8	2012	94880	(1000 MT)	9.22 %
9	2013	93510	(1000 MT)	-1.44 %
10	2014	95910	(1000 MT)	2.57 %

It can be confirmed from the data in Table-1 the huge change being noticed in growth rate of wheat production of India in the last ten years to fulfill the food requirement of mounting population. The wheat production of India for the year 2014 was noticed 95910 thousand MT with 39.73 per cent growth rate over the total wheat production in the year 2005 was 68640 thousand MT in the country. The average wheat production at national level according to last ten years data was calculated as 82502 thousand MT/year. So, to maintain such pace of wheat production even farmers would need to adopt improved wheat production technology at faster rate in the country.

The Table-2 showed the wheat production scenario of state Madhya Pradesh and district Harda during past ten

Table 2
Comparative wheat production scenario of Madhya Pradesh and district Harda

Year	Area: 1000 ha, Production: 1000 Tones, Productivity: Kg/ha.							
	Madhya Pradesh				Harda District			
	Area	Production	Productivity	Growth Rate (%)	Area	Production	Productivity	Growth Rate (%)
2005-06	3785	6200	1710	-	85.1	1330	1629	-
2006-07	4275	7848	1916	+12.04	93.8	1450	1610	-1.17
2007-08	4101	6737	1714	-10.54	99.1	1534	1613	+0.19
2008-09	4010	7280	1895	+10.56	105.4	1680	1661	+2.98
2009-10	4276	8410	2053	+8.34	116.7	1816	1621	-2.41
2010-11	4645	9227	2073	+0.97	141.5	5607	4127	+154.6
2011-12	4901	12703	2705	+30.48	151.0	6944	4599	+11.43
2012-13	4950	13415	2710	+1.85	142.1	5565	3916	-14.85
2013-14	5459	16125	2953	+8.97	142.8	5653	3958	+1.07

Source: Commissioner, Land Records, M.P., Ministry of Agriculture, GOI

years of journey, the production of wheat in Madhya Pradesh during 2005-06 was 6200 thousand tones, which reached 5459 thousand tones in the year 2013-14. Thus wheat production was 1674 thousand tones more than the production received ten years back in year 2005-06 with the growth rate of 44.22 per cent. This shows the good performance of state and its contribution in national GDP is remarkable. In case of wheat production in Harda district of Madhya Pradesh it received very high growth rate during past ten years. The production of wheat in the year 2005-06 was 1330 thousand tones and now it has reached 5653 thousand tones during 2013-14, which is 4323 thousand tones more than that of year 2005-06 with growth rate of 325.03 per cent showing the outstanding performance and wheat production shift due to adoption of improved wheat technologies by the farmers of district Harda. Somehow the credit also goes to Krishi Vigyan Kendra because KVK was established in the year 2005 in Harda district. Ultimately farmers used to get technical support, guidance, training and demonstration that bring the remarkable change in wheat production per unit area through high yielding varieties expansion and crop management practices.

It is evident from Table 3 that majority 62.00 per cent (rank I) of the farmers from trained category had high use of high yielding wheat varieties, while 30.67 per cent (rank II) had medium and 7.33 per cent (rank III) had low use of high yielding varieties of wheat. This finding was found opposite as earlier revealed by Sahu et al. 2010 in Unnao district of UP where they found that majority tarmers under medium category; it means district Harda of MP is better in using HYVs of wheat. Under the untrained category, majority 58.67 per cent (rank I) of the farmers had medium use of HYVs of wheat, while 26.00 per cent (rank II) had low use of improved wheat varieties and 15.53 per cent (rank III) had high use of HYVs of wheat. Thus, it can be inferred that the farmers from trained category showed higher extent of adoption of HYVs of wheat production compared to the farmers from untrained category.

Table 3

Farmers distribution according to their adoption of improved wheat production technology

S. No	Wheat production technologies	Adoption categories	Frequency distribution of farmers under study			
			Trained	Rank	Untrained	Rank
1	Use of HYVs of wheat	Low	11 (7.33)	III	39 (26.00)	II
		Medium	46 (30.67)	II	88 (58.67)	I
		high	93 (62.00)	I	23 (15.33)	II
2	Recommended dose of Seed	Low	15 (10.00)	III	19 (12.67)	III
		Medium	55 (36.67)	II	60 (40.00)	II
		high	80 (53.33)	I	71 (47.33)	I
3	Use of nitrogenous fertilizers	Low	23 (15.33)	III	45 (30.00)	II
		Medium	85 (56.67)	I	79 (52.67)	I
		high	42 (28.00)	II	26 (17.33)	III
4	Use of phosphatic fertilizers	Low	35 (23.33)	II	40 (26.67)	II
		Medium	90 (60.00)	I	95 (63.33)	I
		high	25 (16.67)	III	20 (13.33)	III
5	Use of potassic fertilizers	Low	92 (61.33)	I	94 (62.67)	I
		Medium	43 (28.67)	II	51 (34.00)	II
		high	15 (10.00)	III	05 (3.33)	III
6	Seed treatment before sowing	Low	55 (36.67)	II	87 (58.00)	I
		Medium	72 (48.00)	I	48 (32.00)	II
		high	23 (15.33)	III	15 (10.00)	III
7	Use of weedicide	Low	45 (30.00)	II	61 (40.67)	II
		Medium	79 (52.67)	I	71 (47.33)	I
		high	26 (17.33)	III	18 (12.00)	III
8	Use of insecticides/pesticides	Low	35 (23.33)	II	55 (36.67)	II
		Medium	81 (54.00)	I	66 (44.00)	I
		high	34 (22.67)	III	29 (19.33)	III

Figures in parentheses indicate percentages

In case of recommended seed rate it is evident from Table 3 that majority of trained and untrained farmers were using appropriate seed rate. As such, 53.33 per cent (rank I) of trained and 47.33 per cent (rank I) of untrained farmers was found in high category. As far as, the use of nitrogenous fertilizers was concerned, majority 56.67 per cent (rank I) of the farmers from trained category had medium application of nitrogenous fertilizers, while 28.00 per cent (rank II) had the high use of nitrogenous fertilizers and 15.33 per cent (rank III) had low use of nitrogenous fertilizers. Under the

untrained category majority 52.67 per cent (rank I) of the farmers had medium use of nitrogenous fertilizers, while 17.33 per cent had high (rank III) and 30.00 per cent (rank II) had low use of nitrogenous fertilizers. Thus, it can be concluded that farmers from the trained group showed higher extent of adoption of improved wheat cultivation technologies on use of nitrogenous fertilizers as compared to the farmers from the untrained category. Same type of adoption was seen in case of phosphate fertilizers in both categories of farmers. But in case of use of potassic fertilizer use was low by 61.33 per cent (rank I) farmers under trained category and 62.67 per cent (rank I) under untrained category of the farmers it shows that very few farmers were using the potassic fertilizers in their field so they need to make aware of importance of its use in wheat crop. It is evident from the Table that the majority 48.00 per cent (rank I) of the farmers from trained category had medium seed treatment before sowing, while 15.33 per cent (rank III) had high seed treatment and 36.67 per cent(rank II) had low seed treatment before sowing the wheat seed. In the untrained category 58.00 per cent (rank I) of the farmers had low seed treatment, while 32.00 per cent (rank II) were having medium seed treatment and 10.00 per cent (rank III) had high seed treatment. Thus, it can be inferred that the farmers from trained category showed higher extent of adoption of improved wheat cultivation technologies on seed treatment as compared to the farmers from untrained category. Majority 52.67 per cent (rank I) of the farmers from trained category had medium use of widicide; while 30.00 per cent (rank II) had low use and 17.33 per cent (rank III) had high level of widicide use. Under the untrained category, majority 47.33 per cent (rank I) of the farmers had medium use of widicide use, while 40.67 per cent (rank II) having low level and 12.00 per cent (rank I) had high level of widicide. Thus, it can be concluded that farmers from the trained category showed higher extent of adoption of improved wheat production technologies on widicide as compared to the farmers from the untrained category. In case of use of insecticide/pesticide use majority 54.00 per cent (rank I) had medium level, 23.33 per cent (rank II) low level and 22.67 per cent (rank III) high level of insecticide/pesticide use, whereas under untrained category majority 44.00 per cent (rank I) had medium level, 36.67 per cent (rank II) low level and 19.33 per cent (rank III) high level of insecticide/pesticide use. Therefore, it can be inferred that farmers are good enough in using the insecticide/pesticide for crop protection. The findings of this study are also in line study made by Bekle and Pillai, 2011.

Table 4

Farmers distribution according to their overall extent of adoption of improved wheat production Technologies (N=150)

S. No.	Adoption categories	Frequency distribution of farmers			
		Trained	Rank	Untrained	Rank
1	Low	23 (15.33)	III	44 (29.33)	III
2	Medium	85 (56.67)	I	76 (50.67)	I
3	High	42 (28.00)	II	30 (20.00)	II

Figures in parentheses indicate percentages

It is evident from Table 4 that overall adoption of improved wheat production technology by farmers measured as, majority 56.67 per cent (rank I) of the farmers had medium level of adoption and 28.00 per cent (rank II) as well as 15.33 per cent (rank III) were found in high and low category, respectively in respect of trained groups. From the above results, it can be concluded that the farmers of the trained category showed higher extent of adoption of improved wheat production technologies pertaining to all eight wheat practices than those of the untrained category. Thus, the trained farmers showed an increasing trend in the use of improved wheat production technologies and achieving more production from per unit area as compared to untrained one.

Table 5 reflects that total eight independent variables put together explained adoption of improved wheat production technologies among the farmers. Thus, the result implied that the eight selected variables would account for a significant amount of variation in the adoption of improved wheat production technologies. From the observation of 't' values for the test of significance in the Table 5, it was found that the t-values were significant for all the variables at 0.01 level of probability. This indicates that these variables were most important for expecting the adoption of improved wheat production technologies by practicing farmers of

Table 5

Difference in adoption of improved wheat production technologies between the trained and untrained Farmers

S No	Wheat production technologies	Mean Scores		't' value of mean difference
		Trained	Untrained	
1	Use of HYVs of wheat	88.92	74.31	8.59**
2	Recommended seed rate	121.60	110.10	7.44**
3	Use of nitrogenous fertilizers	93.77	78.04	9.24**
4	Use of phosphates' fertilizers	95.60	81.87	8.07**
5	Use of potassic fertilizers	84.83	70.15	8.63**
6	Seed treatment before sowing	80.95	61.65	11.34**
7	Use of Weedicides	83.89	66.76	10.07**
8	Use of insecticides/pesticides	86.23	73.92	7.24**
9	Overall extent of adoption	91.97	77.26	8.82**

***Significant at 0.01 level of probability, df = 147*

Harda district in MP. Finding of this study also being supported by Daya et al. 2010 and Chaudhary, 2011.

CONCLUSION

The eight variables (use of HYVs of wheat, recommended seed rate, nitrogenous fertilizers, phosphates fertilizers, potassic fertilizers, seed treatment before sowing, use of weedicide and insecticides/pesticides) under study were found significantly and positively related to the improved wheat production technologies to fetch expecting production and productivity by practicing farmers in the district. The farmers of the trained category showed higher extent of adoption of improved wheat production technologies pertaining to all eight wheat practices than those of the untrained category. Overall adoption of improved wheat production technology by farmers was under medium adopter's category in Harda district of Madhya Pradesh, which depict to consistent increase in wheat production per unit area in the district during past ten years. Finally it was realized that farmers through proper application of improved production technology can achieve higher yield potential in Wheat production and boost their farm income as well to sustain their livelihood and social progress.

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