



Analysis of the Extension and Technological Gaps in Rice–Wheat Production System in Chhattisgarh Plain of Madhya Pradesh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study was conducted under rice-wheat cropping system in Chhattisgarh Plain of Madhya Pradesh to find out the extension and technological gap in technological interventions under farmers FIRST project at College of Agriculture, Balaghat. The 60 demonstrations on farmers' fields with a total of 24.0 ha area were selected under the farmer FIRST project. Prevailing farmer's practices were treated as control for comparison with recommended practices. Results of two years' data revealed that the rice crop average yield of demonstrated intervention was 41.35 q/ha over control (34.40 q/ha) with an increase of 20.19%, while in case wheat average yield was recorded 30.22 over the control 24.35 q/ha with an increase of 21.11%. The extension gap was observed

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6.95 and 6.15 q/ha, while, the technology gap were 8.65 and 13.35 q/ha in rice and wheat, respectively. The technology index was 17.30% and 32.83% in rice and wheat, respectively.

Keywords: Rice; wheat; technology gap; extension gap; technology index; cropping system.

1. INTRODUCTION

"In India, rice and wheat are the most important cereal crops of *Kharif* and *Rabi* seasons, respectively" [1,2,3]. Rice and Wheat are considered to be major staple food crops for the majority of India's population [4]. "Apart from constituting key portions of digestible energy and protein in human intake, these crops occupy a premium position among all food communities" [5]. "The rice-wheat cropping systems are the most prominent cropping systems prevailing on the Indian subcontinent and considered to be of utmost importance for food security and livelihood" [6,7,8]. "Thus, this cropping system play pivotal role in Chhattisgarh plain agro-climatic zone of Balaghat district. Technology is the prime mover of change and thus, technology fatigue and technology gap should be avoided. These challenges would necessitate revitalization of research, education and extension system. New innovative interventions dissemination among farming community defiantly improves the productivity of agricultural crops" [9]. Obianefo et al., [10] reported that "provision of new technology information to farmers on improved rice varieties, crop diversification, mixed cropping systems, and other sustainable land management strategies may help to improve productivity of cereal crops". The present study was thus carried out with the specific objectives to find out the technological gap in rice and wheat production systems.

2. MATERIALS AND METHODS

2.1 Location

The present study was conducted under the ongoing 'Farmer FIRST project' at the College of Agriculture, Balaghat, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Madhya Pradesh, India, funded by Indian Council of Agricultural Research (ICAR), New Delhi. Balaghat is one of the tribal district of Madhya Pradesh (21°34'56" N latitude and 79°47'31" E longitude) and uniquely situated in Chhattisgarh plain agro-climatic zone [11]. "Climate of the district is sub-tropical

characterized by a hot summer and general dryness except during the southwest monsoon season. The normal annual rainfall of Balaghat district is 1294.5 mm. Maximum temperature (43°C) recorded during the month of May and minimum (8° C) during the month of December" [12,13,14].

2.2 Experimental Details

The demonstrations on technological interventions were conducted during *Kharif* and *Rabi* season of 2021-2022 and 2022–2023 (two consecutive years) in the cluster of villages (Lendehari, Chillod and Koppe) of project area under Farmer FIRST project. For the present study, 20 farmers were selected from each village by using simple random sampling method. Thus, total of 60 respondents were selected for the study. The difference between the demonstration package and existing farmers practices are given in Table 1. Usual farmer's practice were treated as a control for comparison with recommended package *i.e.* use of quality seeds of improved varieties, line of sowing, seed treatment and timely weeding, necessity of pesticide as well as balanced fertilizer were also emphasized. The data on production cost and monetary returns were collected from demonstration plots for working out the economic feasibility of improved variety. The data were collected from demonstrated fields as well as from control field (farmers practices) and finally the technology gap, extension gap, technology index were calculated as formula given by Samui et al. [15] and Henderson and Tilton [16] as follows:

1. Technology gap = Potential yield (PY) – Demonstration yield (DY)
2. Extension gap = Demonstration yield (DY) – Farmers' yield (FY)
3. Technology index = Potential Yield (PY) – Demonstration Yield (DY) / Potential Yield (PY) x 100

The results were analyzed statistically using analysis of variance ($P = 0.05$) ANOVA [17].

Table 1. Comparison between technological interventions and farmers' practice under FFP demonstration in Balaghat district of Madhya Pradesh

Sr. No.	Crop	Technological component	Technology Interventions	Farmers Practice
1	Rice	Variety	JR-81	MTU 1010
		Seed rate	35 kg/ha	45 kg/ha
		Seed treatment	Carbendazium @ 3 g/kg of seed	Not applied
		<i>Azotobactor</i> culture	10g/kg seed	Not treated
		Time of sowing	30 th June	10 th July
		Weed management	Pendimethylene @ 1.5 kg/ha	Not applied
		Nutrient dose	100:60:40 Kg NPK/ha (On soil test basis)	Irrational use of nitrogenous fertilizers and non application of MoP
		Insect-pest management	Need based spray of insecticide at Economic threshold level (ETL)	Overdoses/ un recommended brands of insecticide
		2	Wheat	Variety
Seed rate	100 kg/ha			130 kg/ha
Seed treatment	Carbendazium @ 3 g/kg of seed			Not applied
<i>Azotobactor</i> culture	10g/kg seed			Not treated
Time of sowing	25-30 th November			5-15 th December
Weed management	Clodinothop @ 25 g/ha and Metsulfuron methyl @ 25 g/ha			Not applied
Nutrient dose	100:60:40 Kg NPK/ha (On soil test basis)			Irrational use of nitrogenous fertilizer and non application of potassium
Insect-pest management	Need based spray of insecticide at Economic threshold level (ETL)			Overdoses/ un recommended brands of insecticide

3.RESULTS AND DISCUSSION

3.1Rice

The data presented in Table 2 revealed that yield of rice in demonstration plots were recorded as 40.20 q/ha and 42.50 q/ha, however in farmer's practice grain yield recorded as 33.60 q/ha and 35.20q/ha in *Kharif* 2021 and 2022, respectively. Significant higher mean grain yield (41.35 q/ha) was recorded under intervention as compared to farmer practices (34.40 q/ha) with an increase of 20.19 per cent. In recommended intervention, there was increase in yield of rice that 19.65 and 20.74 % during the respective year (2021 and 2022). The result shows that mean technology gap was 8.65q/ha, extension gap was 6.95 q/ha and mean technology index was 17.30 %. According to these results, farmers need to convince for adoption of the new suggested

technology for increasing yield of the rice, which is more suitable for the study area [4,14,18].

3.2Wheat

"In case of wheat it is evident from data presented in Table 2 that demonstration plot of improved package in wheat recorded higher seed yield ranged from 28.80 to 31.65 q/ha with mean yield of 30.22 q/ha as compared with the farmers' practices (23.20 to 25.50 q/ha). The percent increase in yield with average of 24.12% during demonstration period. The above trend of successively increased in yield of wheat over the year was obtained due to adoption of improved variety of wheat JW-3288, recommended seed rate (100 kg/ha) which maintain optimum plant population and seed treatment with Carbendazium @ 3 g/kg of seed. Similar yield enhancement in different crops in demonstration plot has been documented by [19,20]. Yield of

Table 2. Technology gap, extension gap and technology index in Rice and wheat in Balaghat District of Madhya Pradesh

Parameters	Rice			Wheat		
	2021-22	2022-23	Mean	2021-22	2022-23	Mean
Area in (ha)	24	24	24	24	24	24
No of farmers	60	60	60	60	60	60
Yield in Farmers Practice (q/ha)	33.60	35.20	34.40	23.20	25.50	24.35
Yield in Technological Intervention (q/ha)	40.20	42.50	41.35	28.80	31.65	30.22
% Change over farmers practice	19.65	20.74	20.19	24.14	24.11	24.12
Potential Yield (q/ha)	50.00	50.00	50.00	45.00	45.00	45.00
Technology gap (q/ha)	9.80	7.50	8.65	16.20	13.35	14.78
Extension Gap (q/ha)	6.60	7.30	6.95	5.60	6.15	5.88
Technology index	19.60	15.00	17.30	36.00	29.66	32.83

the demonstrations and control of the different varieties of crop were compared to estimate the mean extension gap which was 5.88 q/ha” [21,22]. “The extension gap showed increasing trends in each consecutive year of study during demonstration years which emphasizes there is a need to educate the farmers through various means for adoption of improved agricultural production technologies to reverse the trend. In case of technology gap which shows the gap in the demonstration yield over potential yield and the mean technology gap was 14.78 q/ha. The observed technology gap may be attributed to dissimilarities in soil fertility and other vagaries of weather conditions in the area. Hence, to narrow down the gap between the yields of different varieties, location specific recommendation appears to be necessary. Technology index shows the feasibility of the variety at the farmer’s field” [23,24,25]. The mean technology index was 32.83% it claimed that medium value of technology index related with medium level of feasibility. Singh et al.,[9] reported the 10.35 q / ha average extension gap,15.26 q / ha technology gap was and 21.81 %technology index at Krishi Vigyan Kendra, Basuli, Mahrajanj [26].

4. CONCLUSIONS

It may be concluded that technological gap exist in adoption of recommended rice and wheat crops in the study area. The yield of rice and wheat crop was the highest under technological intervention, while, the lowest in farmers practice (Control). More efforts should be made to educate the farmers through various means for adoption of improved agricultural production

technologies to reverse the trend. This will help to bridge the extension and technology gap.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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