Extension and Technological Gap Analysis in Rice–Wheat Production System in Chhattisgarh Plain of Madhya Pradesh

ABSTRACT

The present study was undertaken to find out the yield gap through technological interventions under farmers FIRST project on rice-wheat cropping system. College of Agriculture Balaghta has conducted 60 demonstrations on farmers' field with a total 24.0 ha area selected underthe farmer FIRST project. Prevailing farmer's practices were treated as control for comparison with recommended practices. Resultsof two years, the data revealed that the rice crop average yield of demonstrated interventionwas 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. The extension gap was observed 6.95 and 6.15 q/ha while in case of technology gap it was 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]. Both the crops are considered as major staple food of larger part of India's population and contributing a key portion of digestible energy and protein in human intake and occupying a premium position among all food communities [4, 5].The rice-wheat cropping system is one of 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]. They also play pivotal role in cropping system of 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. This will be a call for revitalization of research, education and extension system. New innovative interventions dissemination among farming community defiantly improve the productivity of agricultural crops [9]. Obianefo *et al.*, [10] reported that the providing new technology information include improved rice varieties, crop diversification, mixed cropping systems, and other sustainable land management strategiesmay 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 system.

2. MATERIALS AND METHODS

The present study was conducted under the ongoing ICAR funded ‘Farmer FIRST project’at College of Agriculture, Balaghat,Jawaharlal Nehru KrishiVishwaVidyalaya, Madhya Pradesh, India. Balaghat is one of the tribal district of Madhya Pradesh (21º34'56" N latitude and 79º47'31" E longitude) and uniquely situated in Chhattisgarh plain agro-climatic zone[11]. Climate of thedistrict is sub-tropical characterized by a hot summer andgeneral 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 ofMay and minimum (8° C) during the month of December[11,12, 13, 14]. The demonstrations on technological interventions were conducted during *Kharif* and *Rabi* season of 2021-22 and 2022–2023(two consecutive year) in the cluster of villages (Lendejhari, Chillod and Koppe) of project area under Farmer FIRST project running through College of Agriculture, Balaghat, Madhya Pradesh. From each village, 20 farmers were selected by usingsimple 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].

3. RESULTS AND DISCUSSION

Technology interventions undertaken in demonstration fields and practices adopted by farmers in control are presented in Table 1, and revealed that the farmers were not adopting recommended practice properly in rice wheat production system although it is considered as major crop by the farmers.

Rice

The data presented in table 2 revealed that yield of rice in demonstration plots were recorded as40.20 q/ha and 42.50 q/hahowever in farmer's practice grain yield recorded as 33.60 q/ha and35.20q/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). In recommended intervention, there was increase in yield ofricethat 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/haand 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 [9, 14, 18].

Wheat

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 Carbendzaium @ 3 g/kg of seed. Similar yield enhancement in different crops in demonstration plot has been documented by [19, 20].Yield of the demonstrations and control of the different varieties of crop were compared to estimate the mean extension gap which was 5.88 q/ha. 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 meantechnology gapwas 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. 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 / hatechnologygap was and 21.81 %technology index at KrishiVigyan Kendra, Basuli,Mahrajganj.

4. CONCLUSIONS

It may be concluded that technological gap exist in adoption of recommended rice and wheat crops in thestudy area. 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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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	Carbendzaium @ 3 g/kg of seed	Not applied
		Azotobactor culture	10g/kg seed	Not treated
		Time of sowing	30th June	10th 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	JW3288	Local
		Seed rate	100 kg/ha	130 kg/ha
		Seed treatment	Carbendzaium @ 3 g/kg of seed	Not applied
		Azotobactor culture	10g/kg seed	Not treated
		Time of sowing	25-30th November	5-15th December
		Weed management	Clodinofop @ 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 fertilizers and non application of potassium
		Insect-pest management	Need based spray of insecticide at Economic threshold level (ETL)	Overdoses/ un recommended brands of insecticide

Table 2. Technology gap, extension gap and technology index in Rice and wheat in Balaghat District of Madhya Pradesh (n=60)

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