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Assessment of Improved Wheat Varieties (JW 3211 & JW 3288) under Semi-irrigated Condition under Rice-wheat Cropping Sequence

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Abstract: Productivity of wheat in India is in quite low and owing to partial adoption of recommended technologies and inappropriate application of critical inputs. High-yielding wheat varieties JW 3211 and JW 3288 were assessed along with scientific package of practices to increase overall wheat production and productivity under careful scientific supervision. Krishi Vigyan Kendra, Katni conducted on farm trial between 2018-19 and 2019-20 (2 years) in order to assess wheat production and gather farmer input for future research and extension initiatives. The technologies validated 31.83 and 35.32 % additional yield over farmers practice. JW 3211 & JW 3288 were shown to be significantly higher in the corresponding years over the farmer's practices of 25.05 q ha-1. The B. C. ratio of improved varieties JW 3211 & JW 3288 had 2.51 and 2.56, respectively compared to farmers' practices (1.95). The extension gap in the improved varieties JW 3211 & JW 3288 were 11.55 q ha^{-1} and 13.67 q ha^{-1}, respectively. With regards to the technology index the feasibility of demonstrated technology at farmer's field. The observed technology index of the study was 14.50% and 9.94%. The improved varieties JW 3211 & JW 3288 with scientific package of practices leads to increase productivity of wheat as well as improving the livelihood of farmers.

Keywords: Extension Gap, Farmers, Improved Production Technologies, Technology Gap)

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the second most important cereal crop in India after rice and a major contributor to the national food security. Wheat is important rabi crop in Madhya Pradesh with 205.8 thousand hectares area under cultivation, total production of 872.4 thousand tonnes and average yield of 42.40 q per hectare during 2024-25 (Anon. 2025-26). But there is still a large gap in production due to several constraints of low productivity, poor extension of improved agronomic practices is one top (Singh, 2017). Climate circumstances have caused over 50% of wheat sowing to be delayed until December or early January in recent years, which has resulted in a large loss of grain yield because the earlier crop was harvested too late. There are several factors, which are responsible for low average yield of wheat like use of old varieties, low quality seed, unawareness about seed treatment, higher seed rate, non-judicious use of fertilizers and partial adoption of package of practices. This factor created considerable gap in actual productivity and potential yield and there is scope to reach potential level with proper management practices (Malve et al. 2020). This creates a huge yield gap approximately 70 kg ha^{-1} between research farm and farmers field (Aggarwal et al. 2008; Tanwar et al. 2025).

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On Farm Trial is a new concept to assess the newly released crop varieties and production technologies in the farmer's fields by the Indian Council of Agriculture Research (ICAR) with under different agro-climatic regions. OFT and FLDs are crucial elements of agricultural extension programs (Rai et al., 2020 ; Desai et al., 2021). These are of great significance to the scientific community because it offers empirical proof of the efficacy of technology transfer. The study provides insights into the function of extension services in boosting agricultural production by measuring yield improvements and detecting gaps between potential and achieved output. While demonstrating the technologies in the farmer's fields, the scientists are required to study the factors contributing higher crop production, field constraints of production, and thus generate production data and feedback information. In addition, the study is of great significance to the scientific community because it offers empirical proof of the efficacy of technology transfer via frontline demonstrations (FLDs). The study provides insights into the function of extension services in boosting agricultural production by measuring yield improvements and detecting gaps between potential and achieved output. Additionally, especially in agriculturally intensive areas like Haryana, the results can help policymakers, researchers, and extension agents refine intervention tactics to maximize wheat yields. In light of these facts, the current study was conducted to assess new varieties JW 3211 & JW 3288 and validated wheat cultivation technology in the farmer's field with the goals of increasing farmer profitability, productivity, and closing extension yield disparities.

MATERIAL & METHODS

The present investigation was carried out by the Krishi Vigyan Kendra, Katni during rabi season 2018-19 and 2019-20 in farmers field of adopted villages of Katni district. According to district agriculture profile Katni falls under Kymore Plateau and Satpura Hill Zone (MP-4) as per agro climatic zone (NARP Zone). In general, the PH of the soil ranges in between 5.5 to 7.2. The 2 ha area was covered with the plot size 0.4 ha with the active participation of 5 selected farmers for demonstration of improved varieties JW 3211 & JW 3288 of wheat in each year. The farmers were trained with various training programme on scientific package of practices of wheat production. The improved varieties JW 3211 & JW 3288 were demonstrated with emphasizing sowing with seed drill, use of recommended seed rate, STV based fertilizer application, timely application of insecticides as well as weedicide and most important providing irrigation to the crop during its critical growth stages and then comparison has been made between improved practices and the existing practices at farmer's field. (Table 1).

The necessary step for the selection of site and farmers, lay out of demonstration, etc were followed as suggest by Chaudhary (1999). The farmer practices were maintained in case of local check. The data output were collected from both improved practices as well as farmer practices and finally the extension gap, technological gap, technological index along with the benefit-cost ratio were calculated (Samui et al., 2000).

Extension gap = Demonstration plot yield – farmers practice plot yield

Technology Gap = Potential yield-Demonstrated yield

$$\text{Technology Index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

RESULTS AND DISCUSSION

The data in table 1 shows the discrepancy between the recommended technology and farmer practices for rice in the Katni district. High-yielding varieties, seed rate and seed treatment showed full gaps, whereas fertilizer dosages and plant protection techniques exhibited partial gaps. These are the causes of not being reached to potential yield. In general, farmers were not using the seed treatment, which increased the crop's vulnerability to disease. They used more fertilizer and seed than was recommended, which increased cultivation costs and reduced productivity.

Yield attributing traits

The yield attributing traits of improved varieties JW 3211 & JW 3288 were shown to be significantly higher in the corresponding years (Table 2). In JW 3211 has an average of 36.76 q ha^{-1}, which is 31.83% more than the farmer's practices of 25.05 q ha^{-1} (Table 2). In JW 3288 has an average of 38.73 q ha^{-1}, which is 35.32% more than the farmer's practices. This result clearly indicated that higher yield in the demonstration plot observed due to adoption of scientific improved package of practices of practices over the farmer's practice (Shrivastava et al. 2021)

Effect on economics

The improved practices plots of JW 3211 & JW 3288 had the highest gross Rs. 67639 and Rs 71208, respectively. The net monetary returns of JW 3211 & JW 3288 had Rs. 40646 and Rs 43384, respectively for all consecutive years (Table 4) in comparison to farmers' practices. Additionally, improved varieties JW 3211 & JW 3288 had the higher benefit-cost ratios 2.51 and 2.56, respectively compared to farmers' practices (1.95). The results are similar with the findings of Joshi et al. (2014), Shabir et al. (2017) and Shrivastava et al. (2021)

Extension gap, technology gap and technology index

The extension gap implies what can be achieved by the transfer of existing technologies. The extension gap in the improved varieties JW 3211 & JW 3288 were 11.55 q ha^{-1} and 13.67 q ha^{-1}, respectively. This indicate to organize various extension activity i.e. demonstration, training, meeting etc. for encourage the farming community to adopt the scientific package of practice. This helps to revert the trend of wide extension gap. More and more use of latest production technology with high yielding varieties will subsequently change this alarming trend of galloping extension gap (Dhakad et al., 2018).

Technology gap imply researchable issues for realization of potential yield. The technology gap in the improved varieties JW 3211 & JW 3288 over the potential yield were 6.24 q ha^{-1} and 4.27 q ha^{-1}, respectively. The technology gap may be attributed to the dissimilarity in the soil fertility status, agricultural practices and local climatic conditiona (Mukharjee 2003; Dhakad et al., 2018).

With regards to the technology index the feasibility of demonstrated technology at farmer's field. The observed technology index of the study was 14.50% and 9.94%. The lower the value of technology index shows the more feasibility of the technology (Jeengar et al., 2006 and Singh et al., 2007).

Table 1: Gap in adoption of scientific package of practices for Wheat cultivation under On Farm Trial among farmers

S no.	*Technology*	*Improved practice*	*Farmers practice*	*Technology gap*
1.	Variety	JW 3211 & JW 3288	Local variety/ Lok 1	Full gap
2.	Seed rate	40 kg/ha	50-60 kg/ha	Full gap
3.	Sowing method	Line sowing	Broadcasting	Full gap
4.	Seed treatment	Carbendazim 3g/ kg of seed	Not followed	Full gap
5.	Fertilizer dose	STV based fertilizer application	Non judicious use of fertilizers	Partial gap
6.	Plant protection measures	IWM & IPM	Indiscriminate use of pesticides and weedicides	Partial gap

Table 2: Yield of Wheat under On Farm Trial

Year	*Area (ha)*	*No. of farmers*	*Average yield (q/ha)*			*Increase yield over farmer practices*	
			FP	*JW 3211*	*JW 3288*	*JW 3211*	*JW 3288*
2018-19	2	5	24.5	36.52	38.45	32.85	36.28
2019-20	2	5	25.6	37.00	39.00	30.81	34.35
Mean	2	5	25.05	36.76	38.73	31.83	35.32

Table 3: Technology gap, Extension gap and Technology Index in Wheat cultivation under On Farm Trial

Year	*Extension gap (q/ha)*		*Technology gap (q/ha)*		*Technology index (%)*	
	JW 3211	*JW 3288*	*JW 3211*	*JW 3288*	*JW 3211*	*JW 3288*
2018-19	11.70	13.95	6.48	4.55	15.06	10.58
2019-20	11.40	13.40	6.00	4.00	13.95	9.30
Mean	11.55	13.67	6.24	4.27	14.50	9.94

Table 4: Comparison of economics of Wheat cultivated under On Farm Trial

Year	*Cost of cultivation*			*Gross return*			*Net return*			*B:C ratio*		
	FP	*JW 3211*	*JW 3288*	*FP*	*JW 3211*	*JW 3288*	*FP*	*JW 3211*	*JW 3288*	*FP*	*JW 3211*	*JW 3288*
2018-19	23435	26835	27548	45080	67197	70656	21645	40362	43108	1.92	2.50	2.56
2019-20	23950	27150	28100	47104	68080	71760	23154	40930	43660	1.97	2.51	2.55
Mean	23693	26993	27824	46092	67639	71208	22400	40646	43384	1.95	2.51	2.56

CONCLUSIONS

Thus, it may be revealed that the yield and returns in wheat crop noticeably increased with the adoption of improved varieties JW 3211 and JW 3288 with scientific package of practices. Though, the yield level under OFTs was better than the farmer practice and yield of variety might be additionally enhanced by embracing suggested production technologies. Hence, it is prerequisite to publicize the improved wheat production technologies among the farmers with operative extension approaches such as training and field demonstrations.

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