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Research Article

YIELD MAXIMIZATION OF RICE AND WHEAT THROUGH DEMONSTRATION OF IMPROVED METHOD OF CULTIVATION IN PATEHRA BLOCK OF MIRZAPUR DISTRICT IN *VINDHYAN* REGION

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Abstract: The Rice (*Oryza sativa*) and wheat (*Triticum aestivum*) both are important cereal crops. Data were collected under N.A.I.P. sub-project (component –III) in Patehra block of Mirzapur district in *Vindhyan* region. Total 36 farmers were selected for demonstration of improved crop production technique from 3 villages. Under improved crop production technique, short duration varieties of rice and wheat were distributed to the farmers. Rice was transplanted in 2nd week of July and harvested in 1th week of November whereas wheat was sown in the 3rd week of November and harvested in 2nd week of April. Under demonstration of improve method average yield of rice and wheat were obtained 3.68 tones /hectare and 3.50 tones /hectare, respectively. Rice grain yield and wheat grain yield under improve method were found 17.99 percent and 17.80 percent higher than the traditional method yield. Rice straw and wheat straw yield were obtained 12.69 percent and 21.31 higher than the traditional production.

Keywords: Rice, wheat, yield, improved method, traditional method, demonstration, grain and straw

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Introduction

India is an agrarian country where about 58 percent of the population is engaged in agriculture and allied activities, for their livelihood. Rice and wheat both are important cereal in India. In India most of the area under rice and wheat rotation is concentrated in the belt known as Indo-Gangetic Plains which contribute 79 percent to total food grain production. Rice is primarily, a high energy or high caloric and the most widely consumed staple food for a large part of the world's human population, especially in Asia. The role of rice crop is inevitable in the current and future global food security. The total food grain production of the country was 276 Mt in 2016-17 in which rice and wheat accounted 109.15 Mt and 97.44 Mt, respectively. Traditional method of cultivation faces various constrains, selection of low yielding variety, delay sowing, weed infestation [1], using long duration varieties *etc*. Mirzapur district in *Vindhyan* region is among 150 disadvantaged districts of the country identified by Planning Commission, Government of India. The district is on the extreme South East corner of Uttar Pradesh. Large area is rainfed with undulating topography. Mirzapur district regarded as disadvantaged district because of water scarcity for the agriculture. The average rainfall of the district is about 1100 mm but about 87% of the precipitation is received only during monsoon season (June to October). Patehra block of Mirzapur district also water scarcity block. Most of the farmers have growing long duration varieties of rice and wheat in the block. Farmers were growing long duration varieties due to lack of knowledge about recently evolved technologies in agriculture. Many times, farmers were not transplanted their seedling due to sufficient water. Late sown wheat suffers with hot blowing wind and force ripening in March-April resulted shrink grain and reduction in yield potential. The main aim of study was to motivate the farmers for the improved method of cultivation for rice and wheat.

Materials and Method

Data were collected under N.A.I.P. sub-project (component –III) in Patehra block of Mirzapur district in *Vindhyan* region. Total 36 farmers (from different size groups) were selected for demonstration of improved crop production technique from 3 villages namely Hardimishra, Devari Uttar and Rampur Thakur Dayal. These villages were denoted as T_1, T_2 and T_3, respectively. The field trial was conducted for demonstration at farmers' field during kharif and *rabi* season of 2013-2014. Selected farmers were trained about the improve method of cultivation of rice and wheat before the transplanting of seedlings and sowing of seed. All the selected farmers were used both method of cultivation namely improved and traditional. Ultimately, the yields of rice and wheat crops were compared on farmers' field. Pant -12, HUR-3022 and IDR-763 short duration varieties of rice (105-115 days) seedling at 25 days was transplanted at 20x10 cm. in 2nd week of July whereas, HUW-234 variety of wheat was sown in rows at 22.5 cm. apart, using 100 kg/ha. seed on 3rd week of November. All the improved practices were followed to raise both the crops. Rice and wheat was harvested in 1th week of November and 2nd week of April, respectively. The doses of fertilizers for rice and wheat crops were 120-60-40 kg. N- P_2O_5- K_2O/ha. The whole quantity of P_2O_5, K_2O and 1/3 N were applied as basal to both crops and for rice, remaining N was

top dressed in 2 split at 30 DAT and 60 DAT and for wheat at the time of 1st (25 DAS) and 3rd irrigation (75 DAS). Recommended amount of irrigation water applied at each critical stages of both rice and wheat crop. Weedicide Pretelachlore @1.0 litre /ha at 4 DAT and 2-4D @ 656 g/ha at 25 DAT were sprayed in rice, whereas in wheat Sulfosulfuron @30 g/ha at 25 DAS were sprayed to control weeds. For control of pest in rice, Melathion @ 25 kg/ha was dusted. The rice and wheat crops were harvested 2nd week of November and in the 2nd week of April, respectively. After harvesting the both crops grain yield and straw yield were computed.

Results and Discussion

Grain and straw yield of rice

The grain yield and straw yield of rice under demonstration of improve method were higher than the traditional method grain yield and straw yield shown in [Table-1]. The highest grain yield under both methods were achieved in village T_1, T_2 and T_3, respectively. The grain yield under demonstration of improve method were found in T_1 (3.97 t/ha.), T_2 (3.67 t/ha.) and T_3 (3.40 t/ha.) whereas under traditional method the grain yields were found T_1 (3.32 t/ha.), T_2 (3.15 t/ha.) and T_3 (2.90 t/ha.).

Table-1 Grain and straw yield (t/ha.) of rice at farmers field under demonstration of improved method and traditional method

Villages	Traditional method of cultivation		Improved method of cultivation		% improvement over traditional method	
	Grain yield (t/ha)	Straw yield(t/ha)	Grain yield(t/ha)	Straw yield(t/ha)	Grain	Straw
T_1	3.32	4.75	3.97	5.19	19.62	9.78
T_2	3.15	4.39	3.67	5.08	17.05	16.01
T_3	2.9	4.13	3.4	4.65	17.32	12.27
Total	9.37	13.27	11.04	14.92	53.99	38.06
Average	3.12	4.42	3.68	4.97	17.99	12.69

The average grain yield of rice under demonstration of improve method and traditional method were 3.68 tons/ha. and 3.12 tones / hectare respectively. The grain yield of rice under demonstration of improve method was 17.99 percent higher over the traditional method. The straw yield of rice under demonstration of improve method and traditional method were 4.97 tons/ha and 4.42 tones / hectare, respectively. The average straw yields under demonstration of improve method found 12.69 percent higher over the average of traditional method. Percent improvement of straw yield over the traditional method were found 19.62, 17.05 and 17.32 in T_1, T_2 and T_3, respectively. Improved cultivation method improved the straw yield of rice varies from 9.78 to 16.01 percent over traditional method of cultivation [2]. The grain and straw yield was better under improved cultivation method which was the result of better management practices which maximize input use efficiency *viz*., nutrients, water, light *etc*. Potential yield is the result of integrated interaction effect of genetic characteristics of variety transplanting time [3,4], climate, soil quality, Irrigation scheduling [5,6], nutrient management [7-9], weed management [10] and plant protection measure, all these input and growth factors are optimum under improved cultivation method, which maximise input use efficiency, resulted higher yield.

Grain and straw yield of wheat

The grain yield and straw yield of wheat under demonstration of improve method was also higher than the traditional method yields and presented in [Table-2]. The highest grain yield was recorded in T_3 (3.619 t./ha.) followed by T_1 (3.458 t./ha.), and T_2 (3.432 t./ha.) in improved cultivation method whereas the values in traditional method was T_3 (3.108 t./ha) followed by T_2 (2.923 t./ha.), and T_1 (2.895 t./ha.). The average grain yield of wheat under demonstration of improve method and traditional method were 3.50 tons/ha and 2.97 tones / ha, respectively. The grain yield of wheat under demonstration of improve method was 17.80 percent higher over the traditional method. The straw yield of wheat under demonstration of improve method and traditional method were 4.48 tons/ha and 3.70 tones / hectare, respectively. The average straw yields under demonstration of improve method were found 21.31 percent higher over the average of traditional method [11-14]. Percent improvements of straw yield over the traditional method were found 22.24, 22.07 and 19.63 in villages T_1, T_2 and T_3, respectively. Improved cultivation method improved the straw yield of wheat varies from 19.63 to 22.24 percent over traditional method of cultivation. Late sown wheat suffers with hot blowing wind and force ripening in March-April resulted shrinked grain with low yield potential.

Table-2 Grain and straw yield (t/ha.) of wheat at farmers field under demonstration of improved method and traditional method

Villages	Traditional method of cultivation		Improved method of cultivation		% improvement over traditional method	
	Grain yield (t/ha.)	Straw yield (t/ha.)	Grain yield (t/ha.)	Straw yield (t/ha.)	Grain	Straw
T_1	2.895	3.564	3.458	4.355	19.507	22.241
T_2	2.923	3.69	3.432	4.491	17.399	22.069
T_3	3.108	3.854	3.619	4.598	16.515	19.631
Total	8.926	11.108	10.509	13.444	53.421	63.941
Average	2.975	3.702	3.503	4.481	17.807	21.313

Conclusion

It was concluded that improved cultivation method may be recommended to improve the yield of rice and wheat and to fetch more net income per unit of land on sustainable basis. Farmers realise 17.99 percent and 17.80 percent more grain yield under improve method cultivation of rice and wheat, respectively.

Application of Research: Finding may be used by different stakeholder such as policy maker biological scientist, planner administrator for further the technological design and policy interventions.

Research Category: Crop Cultivation

Abbreviation:
DAT: days after planting
DAS: days after sowing
Ha: hectare
N.A.I.P.: National Agricultural Innovation Project

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