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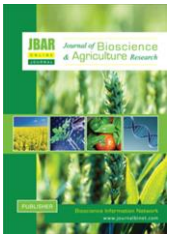

Participatory evaluation of wheat genotypes under different tillage practice in Dinajpur, Bangladesh

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ABSTRACT

This study was conducted on a farmer field in Dinajpur district to facilitate farmer selecting their suitable wheat genotypes. It is needed for doing well in resource conserving tillage and also to find out the interaction between genotype and tillage in Rice-Wheat cropping system. The highest farmer score at post evaluation was obtained by BAW 1006 than other genotypes under studied mainly due to higher yield and good quality grain. Results demonstrated that BAW 1006 performed better in most of the tillage system, BAW 1008 in bed system and Shatabdi in strip. Data of percentage Diseased Leaf Area indicated that BAW 1006 was more infected by pests and diseases at conventional and power tiller operated seeder tillage system while more tolerant at bed planting spikes per square meter yield. The highest yield was recorded in conventional system followed by power tiller operated seeder, bed and the lowest at strip tillage. On the other hand, the highest yield was produced by BAW 1008 followed by BAW 1004, BAW 1006, Shatabdi, BAW 966 and Kanchan. BAW 1008 performed better in conventional bed and strip tillage where BAW 1006 and Shatabdi performed better in power tiller operated seeder system.

Key Words: *Participatory evaluation, Wheat genotypes and Tillage systems.*

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I. Introduction

Wheat is one of the important winter cereal crop and considered as second most important grain crop after rice in Bangladesh (Hossain and Teixeira, 2013). It occupies about 4% of the total cropped area

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and 11% of the area cropped in rabi (winter crops starting from November to February) and contributes 7% to the total output of food cereals (Anonymous, 2008). Current requirement of wheat in the country is 3.0-3.5 million tons. But wheat area and production is reducing every year due to completions with height yielding bore rice, maize, potato and vegetable crops. Yield is also decreasing in day by day. Therefore, to avoid delay in planting and reduce the cost of production, farmers have started adopting resource conserving technologies such as zero tillage and surface seeding in wheat production (Gupta and Seth, 2007). Savings in input cost, fuel consumption and irrigation water-use have been reported due to adoption of zero tillage in wheat cultivation (Malik et al., 2003). Tillage practices in Bangladesh are mostly traditional. Tillage operation varies according to water availability, soil texture, topography, level of resources available to the farmer and farmer' reference for a particular type of culture (Sarker, 1987). Wheat sowing period is very limited in Bangladesh. After harvesting of Transplanting Aman farmers do not have enough time for land reparation with traditional bullock driven plough. On the other hand, the availability of animal draft power is decreasing day by day. Hence the farmers are becoming more dependent of mechanical power. Now-a-days power tillers are available all over the country. Surveys results showed that 11%, 17% and 55% of wheat growers used power tillers for cultivating wheat in 1991, 1992 and 1994 respectively (Saunders, 1991; Meisner, 1996). Strip tillage system produced crop residue on the soil surface helps to preserve moisture and resist growing weeds. Strip tillage cultivation is possible with the same power tiller operated seeder along with full till sowing (Hossain et al., 2005). Resource conserving tillage (RCT) practices have been proved profitable in main experiments. But in research station, varietal screening and selection is usually done at well till condition. So, varieties developed in the condition, may not perform better in RCTs. Testing varieties in R-W cropping system at farmers' fields in different resource conserving tillage system may find genotypes that do well in those tillage practices. Therefore, the main objectives of the study were, to find out genotype x tie interaction at rice-wheat cropping system at farmers' field and demonstrate the effect to the farmers and to find out suitable genotypes for doing well in resource conserving tillage, i.e., minimum tillage, bed planting, strip tillage etc. at rice-wheat cropping system.

II. Materials and Methods

The experimental site was in greater Dinajpur district of Bangladesh. This is major wheat growing district and covering about 21% wheat area of the country. Moreover, foggy weather sometimes continuously prevails for more than 15 days that limits sunlight during a thesis to grain filling stages of the crop and enhance spike sterility. Overall, the area is not very favorable for high yields. Every year four tillage practices viz, conventional, bed, strip and power tiller operated seeder (STOS) was placed in main plots and six (6) genotypes namely Kanchan, Shatabdi, BAW 1004, BAW 1006, BAW 1008. BAW 1035 were placed in sub plots in the tow growing seasons 2002 – 03 and 2003 – 04. But growing season 2004 – 05 only four genotypes viz. Shatabdhi, BAW 1006, BAW 1008 and BAW 1035 were placed in the sub plots. The plot size of the experiments was 2.4m x 10m. In bed planting there were four paired rows. Recommended seed rate of 120 kg ha^{-1} and farmer's fertilizers dose was used. Other management practices used were farmers' practices. The whole plot was harvested to record yield. Researchers and farmers evaluated the experiment at pre harvest and post harvest stages. Data were taken on yield, *Bi Polaris leaf blight (BPLB)* incidence and other agronomic characters. Data were analyzed by split plot design. Besides, three years data with 3 genotypes and two years data with 6 genotypes of the experiment were complied and analyzed over the years.

III. Results and Discussion

The main effect of genotype on the yield and yield components presented in Table 01 indicated that all the characters of the genotypes differed significantly except yield. The highest farmers score at post-harvest evaluation was obtained by BAW 1006 and that score was significantly higher than the scores of any other genotypes. The scores in this stage for other 3 genotypes were statistically similar. But at pre harvest stage the highest score was obtained by BAW 1008 followed by statistically similar score of BAW 1006. The tolerance against BPLB was significantly higher in BAW 1035, BAW 1006 and BAW 1008 had the same level of tolerance. Though, insignificant, numerically the highest yield was recorded for the genotype BAW 1006 followed by Shatabdi, BAW 1035 and BAW 1008. The highest choice for BAW 1006 at postharvest evaluation was mainly due to its higher yield and healthy grain.

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The highest grain yield of BAW 1006 was the cumulative effect of spikes per square meter, grains per spike and 1000-grain weight. Though, BAW 1008 had the highest grain weight and the highest number of grains per spike, its spikes per square meter was the lowest, therefore its yield was low.

Table 01. Interacting effect of tillage system and genotypes on the yield and yield contributing characters of wheat during 2004 – 05 in Dinajpur

Genotypes	Heading	Maturity	Spk m-2	Grs spk-2	TGW	Yield	DLA (%)	FSPM	FSPH
Shatabdi	70	107	321	43.0	46.9	3952	19.93	2.75	2.68
Baw 1006	67	106	344	47.8	52.2	4180	23.92	3.00	3.70
Baw 1008	69	106	268	51.0	55.7	3835	23.14	3.60	2.85
Baw 1035	71	108	351	49.0	50.8	3867	20.56	2.75	2.68
CV	*1.26*	*0.72*	*7.14*	*5.57*	*3.46*	*10.96*	*21.72*	*12.05*	*14.39*
F test	**	**	**	**	**	**	**	**	**
LSD (0.05)	*0.96*	*0.84*	*25.0*	*2.7*	*1.9*	*472*	*1.2*	*0.74*	*0.56*

TGW- Thousand Grain Weight,DLA- Diseased Leaf Area,FSPM- Farmer Scores for Pre-harvest Maturity; harvest Maturity and FSPH- Farmer Scores for Post.

Although, the interacting effect for yield was not significant but there was some numerical difference was observed among the treatments (Table 02). In conventional tillage system genotype BAW 106 performed better than other genotypes, however, in bed system BAW 1008 produced higher yield than any other genotypes. In Strip tillage system Shatabdi produced remarkably higher yield than all other genotypes. Similarly BAW 1006 produced higher yield in PTOS also. The results also demonstrated that BAW 1006 performed better in most of the tillage systems and BAW 1008 in bed system and Shatabdi in strip. The data of percentage DLA indicated that BAW 1006 was more infected at conventional tillage method and more tolerant at bed planting. Shatabdi was more tolerant at bed planting system. The results also demonstrated that BAW 1006 performed better in most of the tillage systems and BAW 1008 in bed system and Shatabdi in strip. The data of percentage DLA indicated that BAW 1006 was more infected at conventional tillage method and more tolerant at bed planting. Shatabdi was more tolerant at bed planting system. In PTOS tillage system BAW 1006 was more infected and BAW 1008 was more tolerant.

Table 02. Interaction affects of tillage methods and genotypes on Yield and DLA (%) what during 2004 – 05 in Dinajpur

Tillage Method	Yield					DLA (%)				
	Shatabdi	BAW 1006	BAW 1008	BAW 1035	Mean	Shatabdi	BAW 1006	BAW 1008	BAW 1035	Mean
Conventional	3672	3985	3516	3724	3724	19.75	27.78	24.69	18.52	22.68
Bed	4011	3854	4297	4010	4043	18.52	18.52	24.69	18.52	21.6
Strip	4480	4479	3492	3829	4070	21.72	24.69	24.69	24.69	23.95
PTOS	3646	4401	4037	3906	3997	19.75	24.69	18.52	18.52	20.37
Mean	*3952*	*4180*	*3835*	*3867*	*3959*	*19.93*	*23.92*	*23.14*	*20.06*	*21.72*
F- test	*NS*				*NS*					*NS*
LSD (0.05)	--					*2.38*				

The main effects of tillage system, genotypes and their interactions on yield of wheatare presented in Table 04. It was found that tillage systems had significant effect on yield, however, genotypes and interaction of genotype and tillage system was not significant. The highest yield was recorded in conventional system followed by PTOS. Bed and the lowest at strip tillage. Though insignificant, numerically the highest yield was produced by the genotype BAW 1008 followed by BAW 1004, BAW 1006, Shatabdi, BAW 966 and Kanchan. Interaction effect indicated that genotype BAW 1008 performed better in conventional, bed and strip tillage. However, BAW 1006 and Shatabdi performed better in PTOS system. Effect of tillage system was not significant for percent DLA. However, the effect of genotype and interaction of tillage system and genotype was significant. The highest DLA (%) was

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recorded in Kanchan followed by BAW 1008 and BAW 1004. Shatabdi was more tolerant to the BPLB (*Bi Polaris Leaf Blight*) disease followed by the genotype BAW 966. Kanchan was more susceptible than any other genotypes in all tillage systems. Genotype BAW 1008 and BAW 1006 were more susceptible in strip tillage system. BAW 1004 in bed and PTOS, BAW 966 in conventional and Shatabdi in PTOS system.

Table 03. Mean squares for combined analysis over 2 years with 6 genotypes of wheat during 2004 – 05 in Dinajpur

SV	df	Spikes m^2	Yield	DLA (%)	FOS
Year (Y)	1	265861.5 **	16027089.9 **	0.375 ns	0.135 **
R (Y)	2	4476.3 **	247810.3 **	1.45 ns	0.369 **
Till Method (T)	3	19883.9 **	362101.6 **	54.9 ns	0.145 **
Y × T	3	40937.9 **	142582.7 **	57.4 ns	0.059 **
ERROR (1)	6	234.4	12640.9	22.8	0.001
Genotype (G)	5	5875.9 **	137697.7 ns	537.9 **	1.748 **
Y × G	5	1912.8 **	179890.4 *	61.9 **	0.569 **
G × T	15	789.8 *	82448.8 ns	28.3 **	0.329 **
Y × G × T	15	2028.6 **	93624.4 ns	8.98 ns	0.218 **
Error (2)	*40*	*339.7*	*64927.3*	*10.6*	*0.002*
CV (%)		*6.13*	*9.45*	*14.28*	*1.36*

Table 04. Effect of genotype, tillage system and their interactions on yield and % DLA of wheat over two years in Dinajpur

Till. Method	Yield							DLA (%)						
	Kan	Shat	Baw 966	Baw 1004	Baw 1006	Baw 1008	Mean	Kan	Shat	Baw 966	Baw 1004	Baw 1006	Baw 1008	Mean
Conv.	2784	2840	2804	3054	2587	2973	2837	33.3	12	20.4	17.6	17.30	22.2	20.5
Bed	2419	2569	2572	2690	2809	2841	2650	27.5	11.1	16.9	20.7	17.60	18.6	18.7
Strip	2508	2557	2299	2618	2568	2768	2553	35.8	13.9	16.9	19.1	19.80	25.3	21.8
PTOS	2555	2861	2764	2700	2951	2655	2747	25.3	15.7	17.6	20.7	14.80	17.9	18.7
Mean	2566	2703	2609	2766	2729	2809		30.50	13.20	17.90	19.50	17.40	20.9	
F test	*NS for both G and G × T*						**	*** for both G and × T*						*NS*
LSD (.05)							*171*	*2.32 for G and 4.63 for G × T*						*3.37*

IV. Conclusion

Wheat genotype BAW 1008 had the highest grain weight and the highest number of grains per spike, its spikes per square meter was the lowest, therefore its yield was low. However, the effect of genotype and interaction of tillage system and genotype was significant. Resource Conserving Tillage (RCT) practices have been proved profitable in main experiments. But in research station, varietal screening and selection is usually done at well tilled condition. So, varieties developed in the condition, may not perform better in RCTs.

V. References

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