



Comparative performance of some rice hybrids with few elite rice inbreds in respect of their yield and yield attributing characters during *boro* season at new alluvial zone of West Bengal

*S. DEBNATH, S. GUPTA AND R. DAS

Rice Research Station, Chinsurah, Hooghly-712102, West Bengal, India

Received : 08.12.2022 ; Revised : 14.01.2023 ; Accepted : 14.02.2023

DOI: <https://doi.org/10.22271/09746315.2023.v19.i1.1678>

ABSTRACT

Five rice hybrids viz., Arize 6129 Gold, Arize 6444 Gold, Arize Tej, PAN 2423 and PAN 802 were evaluated along with two inbred varieties viz., IET4786 (Shatabdi) and IET 22066(Ajit) in consecutive two *boro* seasons of 2019-20 and 2020-21 at Rice Research Station, Chinsurah, Hooghly. Highest magnitude for average number of panicle m^{-2} was noticed in Arize 6444 Gold followed by Arize 6129 Gold, Arize Tej, PAN 802 and PAN 2423 among the rice hybrids. Test weight of grains was found statistically significant among the hybrids as well as in between hybrids and HYVs. The productivity was of highest magnitude for Arize 6444 Gold in *boro* 2020-21 and also in pooled data followed by Arize 6129 Gold, while it was reverse during *boro* 2019-20.

Keywords: Hybrids, inbred, rice, test weight, yield

Rice (*Oryza sativa*. L) is cultivated as one of the main staple cereal crops which provide food for more than half of the world population. But in high-productivity areas in India, rice yields have started plateauing since last eighties. Among various technological options for breaching the yield stalemate, exploitation of hybrid vigour is considered as a readily practicable means. Thus, the commercial exploitation of that hybrid vigour is being one of the most important applications of genetics in agriculture which contribute to the food security (Duvick, 1999) of the whole world.

Currently hybrid rice provides on an average 20-25 % (1-1.5 t ha^{-1}) higher yields than the inbred HYVs, thereby, contributing higher on farm productivity (Virmani, 2002). At present, hybrid rice covers around 3.0 mha in India that has 6.8% of total rice area. In case of hybrid rice, high magnitude of variability in a population provides the opportunity for selection to evolve genotypes having desirable characters.

MATERIALS AND METHODS

The experiment was conducted in *boro* 2019-20 and also in *boro* 2020-21 at Rice Research Station, Chinsurah, Hooghly. Five rice hybrids viz., Arize 6129 Gold, Arize 6444 Gold, ArizeTej, PAN 2423 and PAN 802 were evaluated along with two inbred varieties viz., IET4786 (Shatabdi) and IET 22066 (Ajit). Randomized block design was followed with three replications in this experiment. Plot size and spacing were maintained at 10 sqm and 15 cm x 15cm,

respectively. Normal cultural practices were followed. The fertilizer was applied @ 150: 75: 75:of N: P: K (kg ha^{-1}) according to the recommended time and doses. Data on days to 50% flowering, plant height (cm), effective tillers m^{-2} , panicle length (cm), test weight (gm) and yield (tonnes ha^{-1}) were recorded.

RESULTS AND DISCUSSION

All the rice hybrids exhibited higher magnitude of days to 50 % flowering (DFF) over the inbreds, though a meager response with environmental changes were noticed with the year of cultivation. In the present study PAN 802 was identified as the tallest genotypes over the year, while Ajit was the most dwarf type. Rest of the genotypes showing almost equal plant types with slight changes to different weather conditions prevailing in the growing seasons.

Average number of panicles per square meter of seven different genotypes ranged between 182-336 in the field; negligible variation in this parameter for the majority of the genotypes could be noticed over the years indicates that, it is a qualitative character of the concerned genotypes.

Almost similar magnitude of panicle length over the year exhibited its distinctness of concerned genotypes. Statistically significant test weights of the seeds were recorded among the hybrids as well as in between hybrids and HYVs. Akram *et al.* (2007) also reported that hybrids produced higher weight of 1000 grain than HYVs. PAN 802 recorded the highest test weight over

Email: sumandebnath.agri@gmail.com

How to cite : Debnath, S., Gupta, S. and DAS, R. 2023. Comparative performance of some rice hybrids with few elite rice inbreds in respect of their yield and yield attributing characters during *boro* season at new alluvial zone of West Bengal. *J. Crop and Weed*, 19 (1): 191-193.

Table 1: Performance of different rice hybrids and inbreds for days to 50% flowering and plant height (cm)

Sl No.	Name of the variety	Days to 50 % flowering (Days)			Plant height (cm)		
		<i>Boro</i>	<i>Boro</i>	Pooled	<i>Boro</i>	<i>Boro</i>	Pooled
		2019-20	2020-21		2019-20	2020-21	
1	Arize 6129 Gold	121	115	118	93.7	98.7	96.2
2	Arize 6444 Gold	131	114	122	106.7	105.0	105.8
3	ArizeTej	125	111	118	99.3	96.7	98.0
4	PAN 2423	124	112	118	99.3	101.0	100.2
5	PAN 802	124	120	122	121.7	123.7	122.7
6	Ajit	106	108	107	93.7	94.3	94.0
7	Shatabdi	109	111	110	102.7	100.0	101.3
	SEm(±)	0.94	0.80	0.72	1.95	2.56	1.87
	LSD (0.05)	2.78	2.37	2.12	5.75	7.56	5.51

Table 2: Performance of different rice hybrids and inbreds for panicle per square meter and panicle length (cm)

Sl No.	Name of the variety	Panicle m ⁻² (number)			Panicle length (cm)		
		<i>Boro</i>	<i>Boro</i>	Pooled	<i>Boro</i>	<i>Boro</i>	Pooled
		2019-20	2020-21		2019-20	2020-21	
1	Arize 6129 Gold	352	297	324.5	23.50	23.93	23.72
2	Arize 6444 Gold	308	363	335.5	25.67	25.70	25.68
3	ArizeTej	286	286	286	23.63	24.97	24.30
4	PAN 2423	253	275	264	24.67	24.93	24.80
5	PAN 802	275	297	286	28.67	26.93	27.80
6	Ajit	187	176	181.5	23.23	23.17	23.20
7	Shatabdi	198	187	192.5	23.50	23.37	23.43
	SEm(±)	17.06	50.32	11.32	0.76	0.32	0.43
	LSD (0.05)	50.32	52.99	33.40	2.24	0.95	1.26

Table 3: Performance of different rice hybrids and inbreds for test weight (gm) and yield (t ha⁻¹)

Sl No.	Name of the variety	Test weight (gm)			Yield (t ha ⁻¹)		
		<i>Boro</i>	<i>Boro</i>	Pooled	<i>Boro</i>	<i>Boro</i>	Pooled
		2019-20	2020-21		2019-20	2020-21	
1	Arize 6129 Gold	23.88	22.82	23.35	7.32	7.20	7.26
2	Arize 6444 Gold	23.19	23.69	23.44	7.19	7.60	7.40
3	ArizeTej	22.59	22.49	22.54	6.81	7.10	6.96
4	PAN 2423	22.22	22.06	22.14	6.63	6.90	6.77
5	PAN 802	24.72	24.15	24.43	6.75	7.10	6.93
6	Ajit	19.71	19.62	19.66	5.49	5.40	5.45
7	Shatabdi	18.13	18.36	18.25	5.25	5.50	5.38
	SEm(±)	0.25	0.18	0.14	0.28	0.25	0.18
	LSD (0.05)	0.74	0.53	0.42	0.82	0.75	0.54

the years and in pooled condition followed by Arize 6129 Gold and Arize 6444 Gold in *boro* -2019-20, whereas during *boro*-2020-21 and in pooled data more test weight was obtained from Arize 6444 Gold than that of Arize 6129 Gold. Among the hybrids the lowest test weight was observed in PAN 2423.

The highest yield was observed for rice hybrid Arize 6444 Gold during *boro* 2020-21 and in pooled condition, followed by Arize 6129 Gold, while it was reverse in *boro* 2019-20, maybe due to genotypic preference of the individual hybrids towards changed climatic conditions over the years; and yield of all rice hybrids

could be noticed as remarkably higher than that of inbred varieties included in the study (Table 3). The advantage of yield of rice hybrids as compared to inbred varieties has already been reported by several researchers Malabanan (2007), Akram et al. (2007), Sreedhar et al. (2011), Haque et al. (2015) and Xu et al. (2021).

CONCLUSION

Differences were observed in the performance between the rice hybrids and inbreds significantly in this present experiment. Significantly highest number of panicle m^{-2} was observed in Arize 6444 Gold followed by Arize 6129 Gold, ArizeTej, PAN 802, PAN 2423, Shatabdi and Ajit in *boro*-2020-21 and also in pooled condition. Arize 6129 Gold and Arize 6444 Gold just inter changed their place for this parameter during *boro*-2019-20. Almost similar pattern was observed for the parameter yield ha^{-1} also, i.e., Arize 6444 Gold > Arize 6129 Gold > ArizeTej = PAN 802 > PAN 2423 > Ajit > Shatabdi in *boro*-2020-21 and in pooled condition whereas Arize 6129 Gold > Arize 6444 Gold > ArizeTej > PAN 802 > PAN 2423 > Ajit > Shatabdi during *boro* 2019-20, which indicates that all hybrids out yielded the inbreds and also supports the existence of strong correlation between yield and number of effective tiller m^{-2} . Not only significant higher grain yield, but other yield attributing traits like panicle m^{-2} , test weight etc. also were in higher magnitude for all the rice hybrids over inbreds. Contribution of these parameters for higher yield of the concerned hybrids should also to be noted; and yield of all the rice hybrids could be noticed as remarkably higher than that of other HYV included in the present research work.

REFERENCES

- Akram, M., Rehman, A., Ahmad, M. and Cheema, A.A. 2007. Evaluation of rice hybrids for yield and yield components in three different environments. *J. Animal Plant Sci.*, **17**: 3-4
- Duvick, D.N. 1999. Heterosis: Feeding people and protecting natural resources, In: *Genetics and Exploitation of Heterosis in Crops*, American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science of America, Inc., Madison, Wisconsin, USA
- Haque, Md. M., Pramanik, H.R., Biswas, J.K., Iftekharuddaula, K.M. and Mirza, H. 2015. Comparative performance of hybrid and elite inbred rice varieties with respect to their source-sink relationship. *Scientific World Journal*, Article ID 326802, 11 pages. <http://dx.doi.org/10.1155/2015/326802>
- Malabanan, M. 2007. Hybrid rice commercialization in the Philippines. *Asian Seed*, **14** (1): 4-6.
- Sreedhar, S., Reddy, D.T. and Ramesha, M.S. 2011. Genotype X Environment interaction and stability for yield and yield components in hybrid rice cultivars (*Oryza sativa* L.) *Int. J. Plant Breed. Genet.*, **5** (3): 194-208.
- Virmani, S.S. 2002. Hybrid rice development plan aims to trademark Vietnames varieties, A four days international Symposium entitled, hybrid vigour in rice food security, poverty alleviation, and environmental protection, May 16, 2002
- Xu, L., Yuan, S., Wang, X., Yu, X. and Peng, S. 2021. High yields of hybrid rice do not require more nitrogen fertilizer than inbred rice: A meta-analysis. *Food and Energy Security*, **10**:e276. <https://doi.org/10.1002/fes3.276>