



Opportunities and Agricultural Interventions in Coastal Bangladesh: Farmers' Aspirations and Production Strategies

Md. Amirul Islam^{1,2*}, Shyam Pariyar^{1*}, Mathias Becker¹, Timothy J. Krupnik²

¹ University of Bonn, Germany, and ² International Maize and Wheat Improvement Center (CIMMYT), Bangladesh



ma.islam@uni-bonn.de

Background

Coastal regions of Bangladesh are facing persistent crop production risks and food insecurity. To overcome these challenges, understanding the crucial factors that influence crop productivity is essential. Previous studies reported that farmers' decision-making, risk perception, and adoption of production strategies influence food security. Gaining insights into farmers' aims and needs is essential for developing effective agricultural interventions and to support mechanisms that are responsive to the specific challenges and opportunities in coastal regions. Thus, we addressed the following objectives:

- Develop a framework for agricultural interventions based on farmers' aspirations.
- Understand farmers' aims, focusing on productivity, hardship reduction, and risk alleviation.



(a)



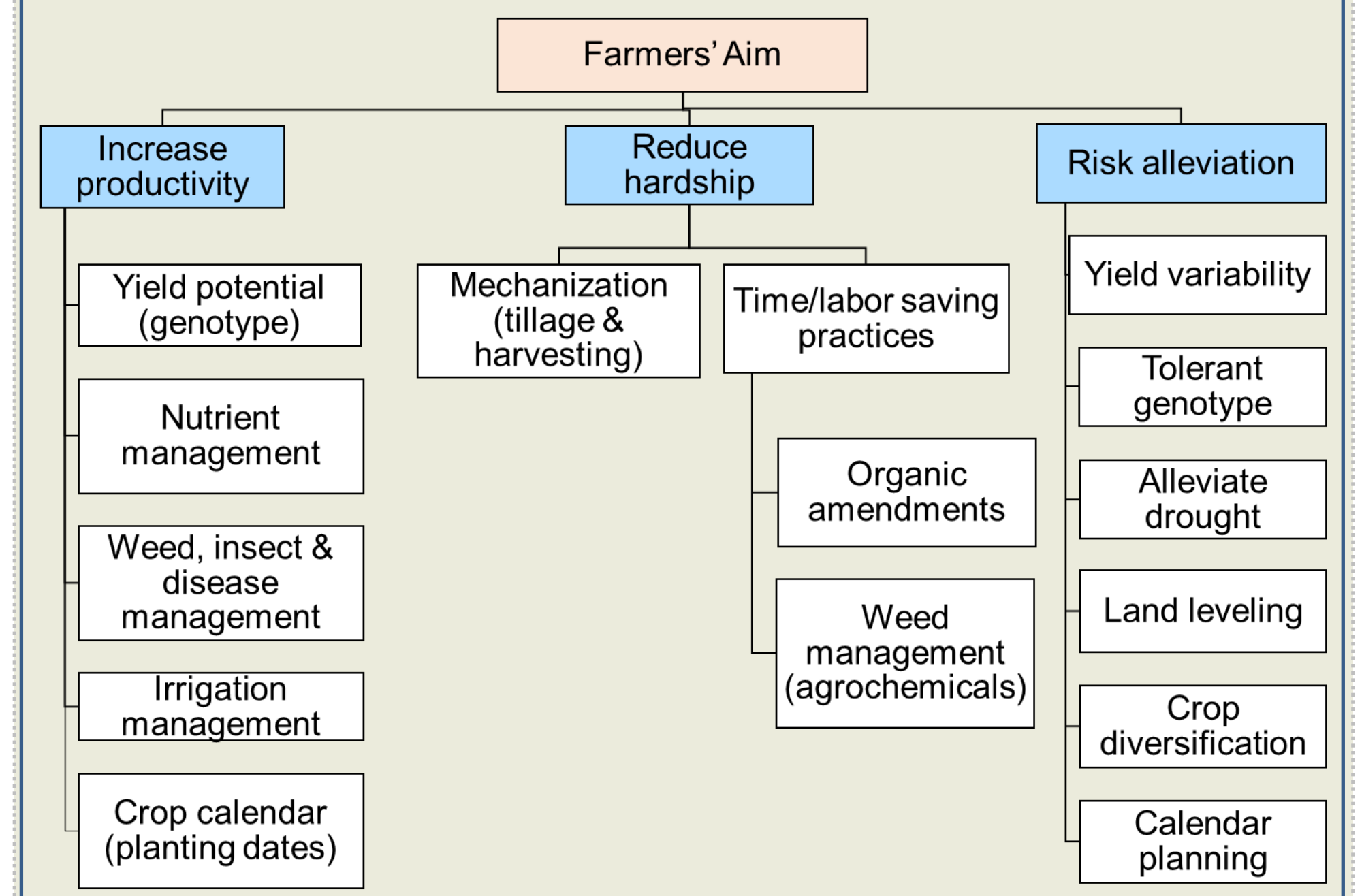
(b)

Coastal zone of Bangladesh; a) Dry fallow ; b) Wet rice.

Materials and methods

Study Sites: Two distinct coastal districts i.e., Barishal (favorable) and Patuakhali (marginal). **Data Collection:** Diachronic survey (240) of farm households on farming practices and yield outcomes over a ten-year period (2011 vs 2021). **Data Analysis:** Descriptive statistics, Tukey's test, ANOVA, Bonferroni, Pearson correlation analysis, Multiple regression analysis.

Conceptual framework of farmers' aims and desire in the coastal Bangladesh



Change in intensification practices

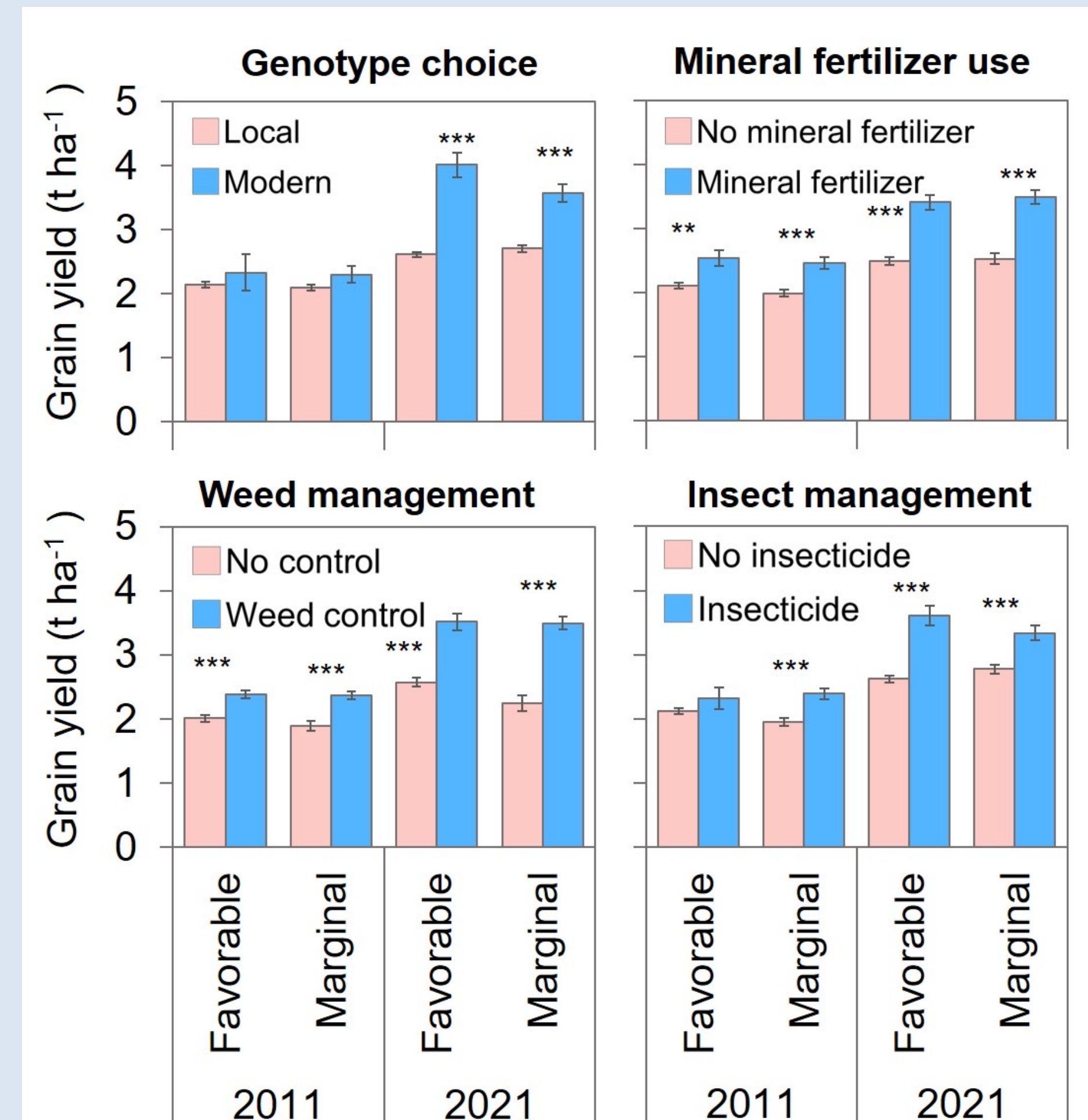
Practices	Favorable			Marginal		
	2011	2021	Sig	2011	2021	Sig
Modern genotype adoption	0.02	0.38	***	0.30	0.56	***
Machine tillage	0.39	1.00	***	0.82	1.00	***
Machine harvest	0.00	0.00		0.00	0.23	***
Organic amendment	0.00	0.01	NS	0.04	0.09	*
Mineral N fertilizer use	0.09	0.70	***	0.34	0.69	***
Recommended mineral N use	0.03	0.20	***	0.02	0.30	***
N-splitting	0.02	0.20	***	0.3	0.56	***
Mineral non-N use	0.03	0.51	***	0.26	0.66	***
Herbicide use	0.00	0.04	*	0.00	0.32	***
Insecticide use	0.08	0.52	***	0.46	0.74	***
Fungicide use	0.01	0.06	*	0.09	0.35	***

Descriptive statistics of intensification related management practices adoption at both past (year 2011) and present (year 2021) in coastal Bangladesh. Significant test was performed by Chi Square test. * and *** indicate significance at the 10% and 1% levels. NS: Not significant

Conclusions

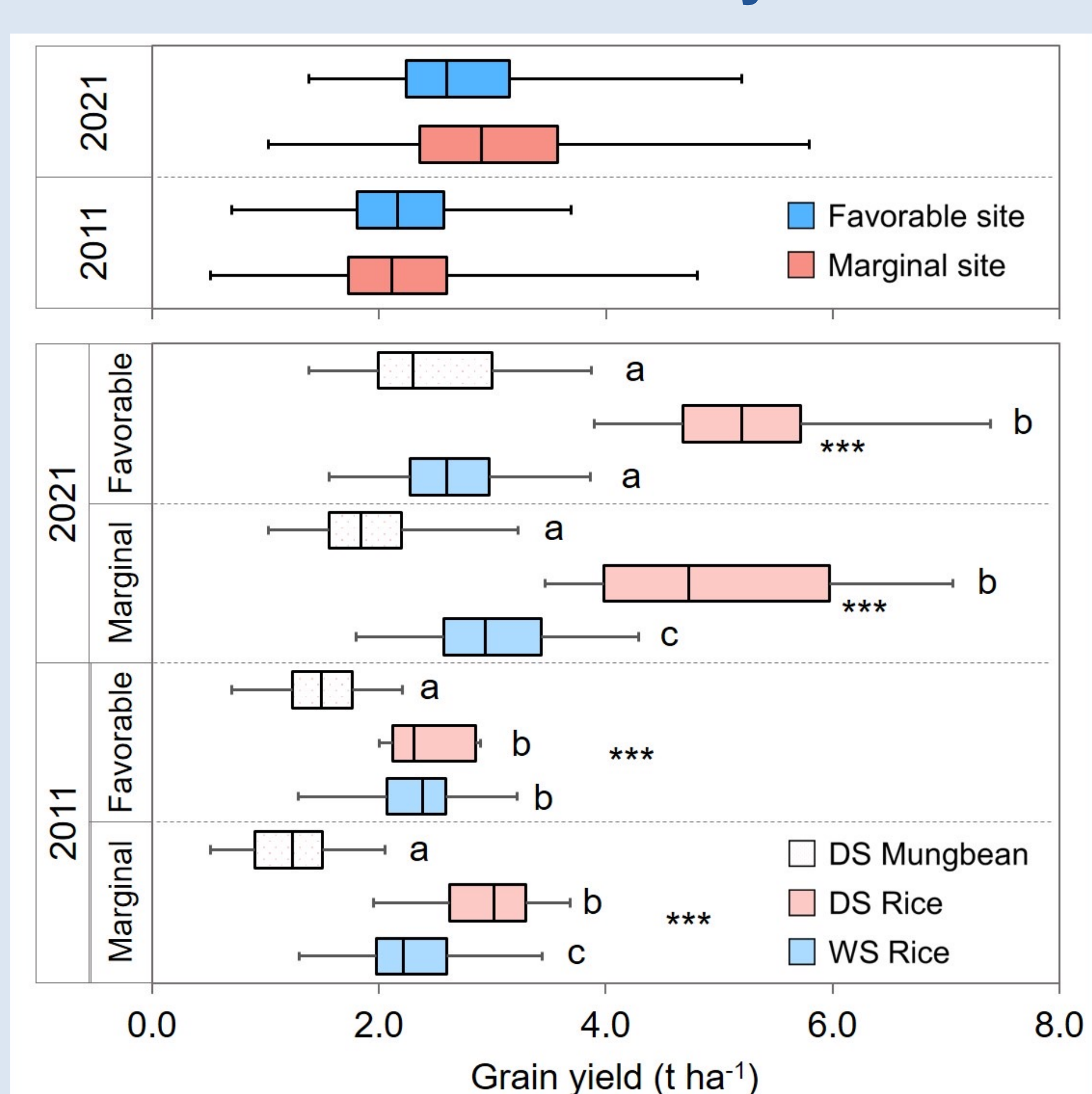
- Crop intensification more at favorable than at marginal sites
- Yield increases higher, but also more variable, in dry than in wet seasons
- High adoption of productivity-enhancing and labor-saving practices, irrespective of sites
- Increased grain yield achieved by mineral N, adoption of modern genotypes, and pesticide use

Increase productivity



Different management practice options and their impacts of grain yield i.e., rice equivalent. Vertical bars represent standard errors of the mean. Tukey's test was performed to find the significance. ** and *** indicate significance at the 5% and 1% levels.

Yield variability



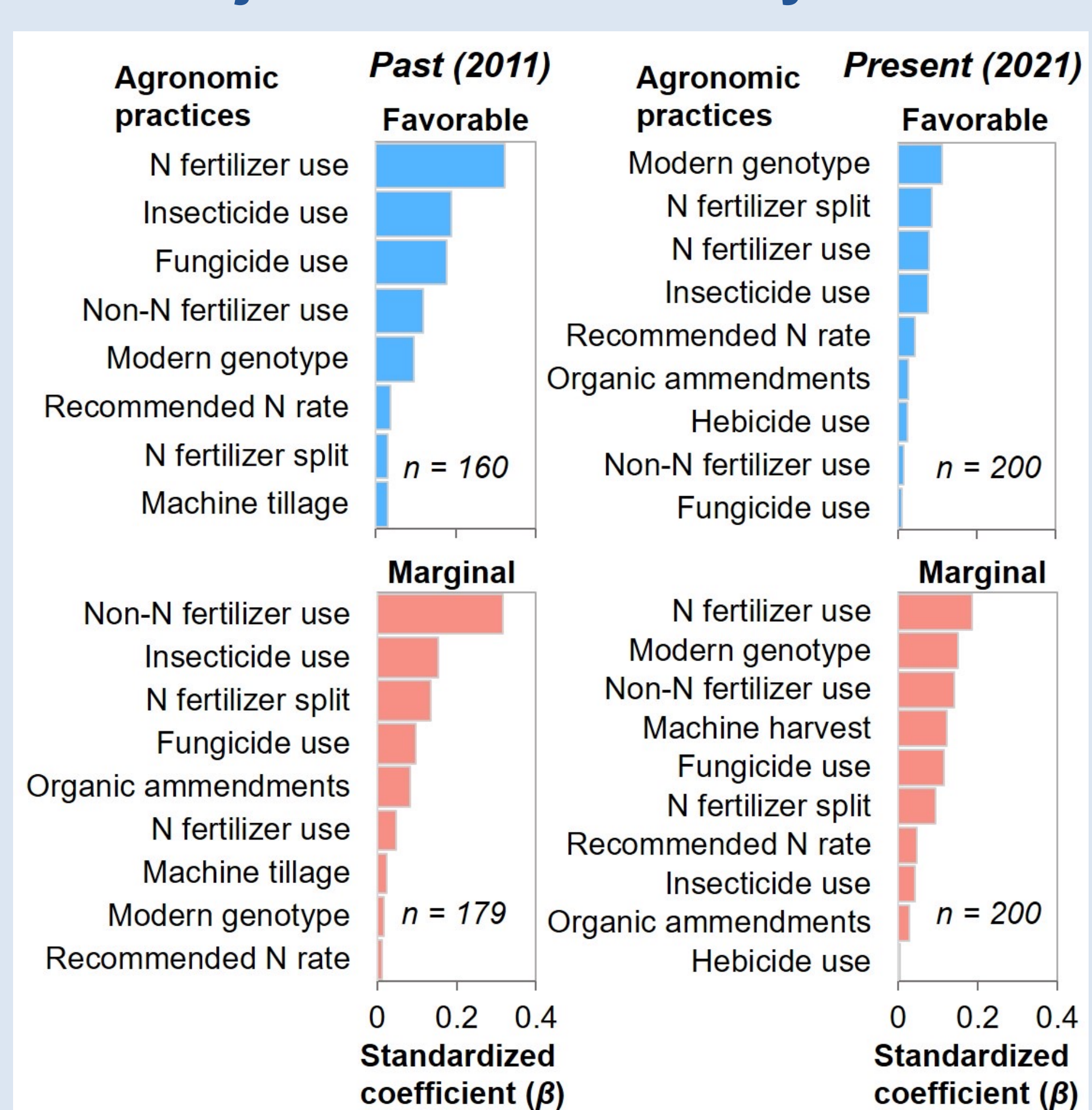
Grain yield variability in individual crops in both past (year 2011) and present (year 2021) in the both marginal and favorable sites. *** indicate significance at the 1% levels. ANOVA followed by Bonferroni post hoc test was used for the multiple comparison. Identical letters denote groups with no significant differences.

Effect of agronomic practices on yield

Agron. practices	Grain yield			
	Favorable		Marginal	
	2011	2021	2011	2021
Modern genotype	0.05	0.53**	0.14	0.35**
Machine tillage	0.03	NA	0.18*	NA
Machine harvest	NA	NA	NA	0.10
Organic amendment	NA	0.10	0.07	0.28**
Mineral N fertilizer use	0.22**	0.33**	0.32**	0.37**
Recommended mineral N use	0.08	-0.15*	0.04	-0.13
N-splitting	0.07	0.84**	0.30**	0.46**
Mineral non-N use	0.06	0.44**	0.39**	0.35**
Herbicide use	NA	0.38**	NA	0.35**
Insecticide use	0.09	0.39**	0.32**	0.20**
Fungicide use	-0.13	0.21**	0.35**	0.40**

Intensification related agronomic practices affecting grain yield (Pearson Correlation) in past (2011) and present (2021) in coastal Bangladesh. * and ** indicate significance at the 10% and 5% levels. NA: Correlation cannot be computed because at least one of the variables is constant.

Major contributors to yield



Ranking of intensification related management practices affecting grain yield by multiple regression analysis at both favorable and marginal site in both past (2011) and present (year 2021) in the coastal Bangladesh.