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## Opportunities and agricultural interventions in coastal Bangladesh: Farmers’ aspirations and production strategies

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### Abstract

Despite progress in enhancing food security, persistent challenges remain in coastal regions of southern Bangladesh. Farmers’ perceptions, decision-making processes, and adoption strategies for crop production under changing coastal environments directly influence their contributions to food security. Therefore, gaining insights into farmers’ aims and needs is essential for developing effective agricultural interventions and support mechanisms. To address the key needs and aspirations of farmers, we developed a framework centred on three major farmer aspirations: increasing productivity, reducing hardship, and alleviating risk through various production strategies. We conducted a diachronic analysis of production practices and yield attributes across 240 farm households, distinguishing between marginal and favourable sites in southern Bangladesh and compared between the years 2021 and 2011. Our findings revealed a significant ( $p \leq 0.05$ ) increase (more in favourable site) in the adoption of intensification practices over the study period. The majority of farmers adopted modern genotypes (87– 93%), mineral fertilisers (73 – 80%), and pesticides (70%) to enhance productivity, resulting in significant ( $p \leq 0.05$ ) positive yield differences compared to non-adopters across all sites. Mechanisation, including tillage and threshing, also increased significantly ( $p \leq 0.05$ ), although mechanical harvesters were not adopted in favourable sites. Nearly all adopters used machines to reduce physical labour, reflecting a shift towards labor-saving technologies like organic amendments and herbicides. Dry-season rice demonstrated more substantial yield increases and higher yield variability than wet-season rice. Despite minimal changes in rice diversification, correlation analyses identified significant relationships between intensification practices and grain yield. Multiple regression analysis highlighted the primary influence of mineral nitrogen (N) fertiliser application followed by modern genotype adoption on grain yield. Furthermore, household characteristics such as family labour per hectare, education level, and farming experience significantly influenced mineral nitrogen (N) use and adoption of production strategies. In conclusion, farmers’ aim to increase grain yield is mainly driven by mineral nitrogen (N) use and modern genotype adoption, with household attributes playing a key role in adoption strategy. These insights have broader implications beyond southern Bangladesh, offering valuable lessons for regions facing similar agricultural constraints and challenges.

**Keywords:** Diversification, grain yield, intensification, *Oryza sativa*, *Vigna radiata*