Determinants of farmers' decisions in adopting hybrid rice in Bangladesh

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Introduction

Rice is a major source of livelihood in terms of providing food, income and employment in Bangladesh. It covers 77.07 percent of the total cropped area in the country, providing food for 142.3 million people (BBS, 2011). Even though Bangladesh has achieved significant progress in rice production and yields, the demand for rice still outstrips domestic production. As such the country remains a net importer of rice. Assuming a constant price, the annual increase in per capita rice demand in Bangladesh is in the range of 0.85 to 1.2 kg across the alternative income scenarios (Ganesh-Kumar, Prasad, & Pullabhotla, 2012). Research leaders and policy makers in Bangladesh have considered hybrid rice, an innovative technology, as a viable option for sustaining growth in rice production in the face of upcoming food security challenges. In the hopes of having this effect, hybrid rice was introduced in 1998-1999 boro season in Bangladesh without a clear deployment strategy (Hossain, Janaiah, & Husain, 2003) and its cultivation continues today.

Purpose and objectives

The purpose of the study was to understand the farmers' response to this innovation over the last decade. To achieve this, we used the "diffusion of innovation" model as developed by (Rogers, 1995). The specific objective guiding the study was to: i) assess the extent of adoption of hybrid rice in Bangladesh, ii) investigate the influence of selected characteristics in influencing farmers' decisions on adopting hybrid rice, ii) identify the problems faced by farmers in cultivating hybrid rice.

Method and data source

A concurrent embedded design using a cross sectional survey was employed (Creswell, 2009). The study was conducted in five regions of Bangladesh approved through the gazette notification of the Government of Bangladesh for the evaluation and registration of every single variety of hybrid rice (GoB, 2003). The population of this study consisted of rice growers of the boro season who were responsible for farming decisions. A multistage stratified random sampling design as proposed by Babbie (1990) was employed in drawing the sample of 440 farmers following sample size suggestions as proposed by Israel (2009), Dillman (2007) and

Corbetta (2003). Three categories, namely, non-adopters, de-adopters and continuing adopters of hybrid rice were sampled. Data was collected through face–to–face interview of the sampled farmers using a pre-tested and back translated questionnaire. Through gleaning knowledge from various sources, we designed an 8-page questionnaire comprising 183 items in a series of 21 questions sequencing from general to specific. The questionnaire was formatted with both open and closed ended question items for securing quantitative and qualitative data. The internal reliability of the multiple item scale variables was calculated using Cronbach's alpha, which was found satisfactory. For data collection the first named investigator spent 120 working days travelling different places of the selected research site during the tenure of March 2 to 30 June 30, 2012.

Measuring extent of adoption

The extent of adoption was measured as the percentage of the total potential area belonging to an individual farmer brought under cultivation of hybrid rice. If farmers continued cultivating hybrid rice for successive years, the average of both actual area and potential area was calculated to find the extent adoption of a given time period using the following formula.

$$\textbf{\textit{E}}\text{xtent of adoption of hybrid rice }(\%) = \frac{\text{Average of acreage planted to hybrid rice}}{\text{Average of total of potential acreage for hybrid rice}} \times 100$$

Statistical analysis

In order to compare the groups of non-adopters, de-adopters and continuing adopters, Analysis of Variance (ANOVA) was performed. Logistic regression analysis was performed to assess the significant contribution of the independent variables to farmers' decisions on adopting hybrid rice.

Results and conclusions

Data confirmed that the overall extent of adoption of hybrid rice during the period of 2001-2011 boro seasons was relatively low in the sample areas. Logistic regression results after fitting the full model of 11 selected predictive variables on farmers' decisions in adopting hybrid rice showed that education, annual family income, communication exposure, and attitude towards hybrid rice made significant contributions to farmers' decisions in adopting hybrid rice. Farmers faced some problems in cultivating hybrid rice. The key problems were its unsuitability for domestic use, lower market price, higher input cost, and a lack of pure seeds.

Recommendations

With the knowledge gained in this study about the current status of hybrid rice, the Government of Bangladesh may address the following five areas. Firstly, we recommend establishing a functional coordination of public sector extension organizations (such as Department of Agricultural Extension), and private sector organization such as seed companies under the tutelage of the ministry of agriculture to monitor and supervise the cultivation procedures of hybrid rice on a regular basis. Secondly, we recommend giving preference for targeting farmers from high-income category for accelerating the rate of adoption. Thirdly, we recommend undertaking research on how to suit the taste and preference of consumers. Fourthly, Government should regulate the market price to help farmers achieve a fair price and to deliver required complementary inputs at subsidized rates. Lastly, the field level extension staff should guide farmers to obtain quality seed on time.

Implications

There is an enormous potential for improving the level of adoption of hybrid rice. This study might help the concerned authority to recommend productive varieties and launch promotional activities for further expansion of hybrid rice. Getting informed about the current status of hybrid rice, the Government of Bangladesh may refine policy guidelines to maximize advantages of this promising technology in the days to come.

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