

Title: Study on Yield Gap and Farm Specific Efficiency in Boro Rice Cultivation in North-Western Region of Bangladesh

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ABSTRACT

Meeting the increasing demand for food grains requires almost a parallel growth in food grain production, either by increasing the utilization of inputs or by effectively organizing the management of production. Like other food grains, rice output could be raised by proper utilization of productive inputs and by organizing the management of production so as to use these inputs efficiently. The main objective of the present study was to identify and analyze the possibilities for improving productivity of rice by increasing the productive efficiency of rice farmers of Bangladesh. The study employed mainly farm level cross sectional data collected from 298 farm households in three districts of Bangladesh. In empirical estimation belongs to this study, the Cobb-Douglas form of yield function has been used for analyzing the effect of some selected factors on the variability of MV Boro yield in the sample farms. Again, the stochastic frontier production function has also been employed to measure the efficiency and to identify the cause of inefficiency in the production processes.

Potential rice yield was estimated by categorizing the farms according to yield quartile groups in order to estimate yield gap I and yield gap II. The difference between research station and farmers' potential yield (yield gap I) was estimated at 1846 kg/ha, 1619 kg/ha and 1918 kg/ha in Rajshahi, Rangpur and Dinajpur respectively. The magnitude of yield gap II was almost parallel in three production environments. Estimates of yield functions revealed that, the use of human labor has the largest positive coefficient compared to other inputs. Both NPK and pesticide application positively influenced the yield of MV Boro rice of all the areas. Among the biophysical factors, land type, soil type and the selection of rice variety influenced the yield significantly. Among the management factors, both seedling number and seedling age appeared to be the important determinants of yield. Similarly, cropping intensity appeared also to be an important determinant of yield which negatively influenced MV Boro yield in all the areas implying that, increase in cropping intensity on the same parcel of land put negative pressure on soil fertility leading to lower yield for the crop in the specific season. Among the

socioeconomic factors, farmers' contact with the extension worker had the positive and significant influence on yield implying that, rice yield could be increased significantly by increasing farmers' contact with the extension worker. The coefficient of plot tenancy dummy had negative sign for all areas implying that, rice yield in the rented plots were lower compared to that of own plots.

Labor cost accounted the highest share of the total production costs (almost 30 percent) in all areas followed by irrigation cost. Operating surplus for both the owner and tenants were higher in case of flood prone area than that of flood free area. The rate of profit was also substantially higher for the farms in Dinajpur than that of Rangpur and Rajshahi. The share of returns from modern Boro output for different factors of production did not differ that much. Use of power tiller was dominant in Rajshahi than Rangpur and Dinajpur area. The residual (or operator's surplus) was positive in the cultivation of MV Boro in all the areas. The estimates of the technical inefficiency model showed that, seedling number dummy, extension contact, farmer's education, seedling age and gap filling are the important determinants of technical inefficiency of rice farmers under Rangpur and Dinajpur areas. On the other hand, education, off-farm income, seedling age, farmers' occupation and farming experiences are the important determinants of technical inefficiency of the MV Boro producing farms under Rajshahi area. The γ parameter associated with the variances in the stochastic frontier is highly significant indicating that, there are inefficiency effects in the production of MV Boro in the sample farms and the random component of the inefficiency effects does make significant contribution in the analysis of modern rice cultivation and productivity. The estimated average technical efficiency was 0.81, 0.80 and 0.78 for the farms under Rangpur, Dinajpur and Rajshahi respectively. Higher proportion of farms falls in the efficiency level of above 0.80 in all the areas. Several biophysical, management and socioeconomic factors were found responsible for reducing efficiency at the farm level. So, by taking necessary steps from both the Government and private sectors will enhance the substantial scope for improving technical efficiency of the rice growing farms.