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Abstract of Doctoral Dissertation

Adoption of Modern Technology in Agriculture : A Micro Level Study in West Bengal*

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THE HIGH YIELDING varieties (HYV) technology was first introduced in Indian agriculture in the mid-sixties. More than two decades have elapsed since the time of introduction. But during this period, only forty nine percent of the total area under foodgrains in India could be brought under this new technology. The factors generally identified as the major constraints to rapid adoption of this technology are lack of credit, lack of irrigation, illiteracy, lack of knowledge about the technology, and inadequate farm size. The present study investigates empirically to what extent and under what conditions, these factors are really acting as hindrances to the extensive use of this technology in Indian agriculture. It makes a micro level research on the degree of adoption of the HYV technology in paddy cultivation in West Bengal (an eastern state of India).

This empirical research is based on a theoretically sound and intutively plausible framework. The analytical framework of this study considers a static optimisation model under uncertainty. In the model the farmer maximises this expected income by making an optimal allocation of land to modern cultivation subject to the given constraints. The theoretical model of Feder (1980) has been used in this study to formulate hypotheses for empirical test. The data on which the present study is based, are farm level cross-section data, collected by a primary survey in some villages of West Bengal in the year 1989-90.

Risk and uncertainty in production are important elements in the decision-making of the extent of use of the HYV technology. The stochastic specifications of input-output relationship are examined in many ways. If the production function is estimated by using the generalised stochastic formulation (GSF) as developed by Just and Pope (1978), the effects of inputs on mean and

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variance of output will be independent. The estimates of the production functions for HYV paddy using the GSF, show that the inputs like seed, fertiliser, pesticide and labour increase mean production, but they do not necessarily increase risk in production. In most cases, the marginal effects of these inputs on variance of output are either zero or negative.

The study explains the 'proportion of land allocated to HYV' by a number of explanatory variables both in the dry and in the rainy seasons. The empirical results indicate that there is an inverse relationship between the 'proportion of land allocated to HYV' and farm size. The absence of fixed cost for adoption, the government involvement in irrigation, credit and extension services, and the limited use of labour-substituting machineries explain such a relation. The 'proportion of land under irrigation' has appeared to be the most important factor in explaining the 'proportion of land allocated to HYV' in the dry season. But since HYVs are less adaptable in the rainy season due to adverse agro-climatic conditions, irrigation fails to make any significant impact on the degree of adoption in the rainy season.

Is is also revealed that short term credit supply has significant impact on the rate of adoption of the technology in the dry season, but the effect is insignificant in the rainy season. In a country like India where the farmers are lacking sufficient resources for modern cultivation, credit supply has, in general, a favourable effect on the rate of adoption. But in the rainy season, as HYV paddy is less adaptable due to the reasons mentioned above, credit supply fails to make any significant impact on the rate of adoption. The HYV technology has been in use in the area of this study for a long time and endowed with a long experience, the farmers might have accumulated sufficient knowledge about the technology. So, quite expectedly, education has been found to have no significant impact on adoption in this cross-section study.