A COMPARISON BETWEEN HIGH YIELDING AND LOW YIELDING FARMERS WITH REFERENCE TO SUMMER PADDY CULTIVATION IN WEST BENGAL, INDIA: A CASE STUDY

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Abstract

This paper attempts to focus and identify the distinct characteristics between high-yielding & low-yielding farmers growing summer paddy. The study is based on empirical evidence referring to an agriculturally advanced region in West Bengal, India. The study addresses the objectives using Linear Discriminant Analysis. Our study found that high-yielding farmers are best practitioners as well as relatively high adopters of technology and they realize greater average yields. This class of farmers is ahead of low-yielding groups in managerial practices in terms of land preparation, soil-health care & intercultural operations. The significant factors discriminating between the groups have been identified. This study concludes that technology adoption does not depend on the holding size and income level of the growers rather than on know-how practices and skills of the farmers. At the end the authors made suggestions to change the status of low-yielding farmers incorporating interventions.

Key words: High yielding farmers, low-yielding farmers, Linear Discriminant Analysis, Farm managerial practices, Adoption index.

This exercise oversees variation on farm management practices and outputs between High Yielding and Low Yielding Farmers at micro-level in India. The chief objective of the paper is to focus & identify the distinct characteristics of the two contrast groups affecting crop-production. Our study is based on production & input-data of sample farmers from selected villages in West Bengal- a relatively fertile part of the country, by survey.

In this paper we refer to high-yielding farmers as those who realize expected yield at least to eighty percent or more of the average yield of the last three years of the locality. In contrast, low yielding farmers realize below eighty percent of the expected average yield. It is normally assumed that high yielding farmers are relatively more aggressive compared to low yielding farmers in employing best practices as well as the quantum of resource used.

This present study addresses North 24 Parganas district of West Bengal State in India -one of the agriculturally advanced districts of the State as the focal region under study. Out of 22 Blocks of the district, 4 Blocks; namely Barasat – I, Habra-I, Amdanga and Deganga were selected on the basis of Simple Random Sampling Without Replacement (SRSWOR). These blocks cover 329 Mouzas (village units) of which 70 Mouzas were selected by SRSWOR. Finally, three hundred sample farms representing the ultimate sampling units were chosen by the SRSWOR method.

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We have used Linear Discriminant Analysis (LDA) to classify cases into two groups by a prediction equation. To identify the factors discriminating the cases between two groups; viz.; 0(high yielding farmers) &1 (low yielding farmers) the following equation has been employed.

$Z= \sum \lambda_i x_i$ where, x_i represents i^{th} factor and λ_i is determinant co-efficient of the i^{th} factor.

We have limited our study in this exercise on examining the characteristics of high yielding and low yielding groups referring to summer paddy cultivation.

Out of 300 sample farm-operators 168 have harvested summer paddy-locally known as Boro Paddy. Examining their performance we found 91 of them belong to low yielding category and rest to high yielding group. Further, we saw that 54.47% of area is operated by the former group. Mean yield per hectare of the low yielding group was 4.6 tons in contrast to 5.36 tons accrued to high yielding group.

Table-1 exhibits comparison of socio-economic characteristics between the two contrast groups.

Table 1.Test of Equality of Group-means of Selected Socio-economic Characteristics of Summer paddy Growers.

Socio-Economic Characteristics	Wilks' Lamda	F- Statistic (1,166)
Land size	0.987	1.412
Area under crop	0.981	4.156*
Land-man ratio	0.982	3.087
Total income	0.994	0.625
% of farm income to total income	0.976	4.124*
Education level	0.984	1.926

Figures in the parenthesis indicate the degrees of freedom.
*Significant at 5% probability level

The table shows that land-holding size of each group is not statistically different from other. However, high yielding groups have more area under summer paddy. It is obvious that high yielding farmers are not hesitant to put more acreage under Boro-rice which requires high-expenditure and bears biotic (biological) and a-biotic (other than biological like socio-economic, markets etc.) risk and uncertainty. We observed no significant difference in terms of income between the groups. However, farm-income to total income has been more in case of high yielding group comparing to low yielding group. Thus, we see that asset position (land), income and education level-the three major socio-economic characteristics are in no way related with the production capacity of the farmers. High yielding farmers have in-built attitudes or mind-set to take challenges involving costs which make them aggressive in employing inputs or technology. Difference in the level of inputs use or managerial practices between the groups could be seen from the Table-2.

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Table 2. Test of Equality of Group-means of Farm inputs uses by Summer paddy Growers.

Farm inputs	Wilks' lambda	F- statistic (1,166)
Seed	0.978	2.431
FYM	0.945	6.396*
Nitrogen	0.953	4.043*
Phosphorus	0.772	24.245**
Potash	0.788	22.127**
Plant protection measures (value)	0.998	0.197
Fertilizer (value)	0.954	4.009*
Irrigation (value)	0.984	1.754

Figures in the parenthesis indicate the degrees of freedom.
*Significant at 5% probability level
** Significant at 1% probability level

High yielding farmers differ from the low yielding group in terms of using fertilizer and organic manure. On the contrary, low yielding groups maintain low profile in purchased inputs for cultivation. In other words, low yielding groups follow low order of technology in summer rice cultivation. In the case of irrigation, differences between the two categories is not significant in terms of irrigation-cost though irrigation represents one of the major parameters of yield potential. However, significant difference is observed between them in terms of frequency of irrigation as shown in Table-3. The reasons for such variation could be substantiated with the fact that summer paddy in the sample area is grown depending on the irrigation facility of deep tube wells installed by the government and the cost of irrigation per hectare is fixed irrespective of frequency of application. High yielding growers are relatively proficient comparing to low yielding growers in using irrigation in split –doses in frequent intervals.

Managerial practices are different between the two groups and could be read from Table-3

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Table 3. Test of Equality of Group-means of Managerial practices by the Summer-paddy Growers.

Practices	Wilks' lambda	F- statistic (1,166)
Number of ploughing	0.890	13.139**
1st top dressing (DAS)	0.912	10.267**
2nd top dressing(DAS)	0.856	13.811**
Intercultural operation	0.953	5.464*
Number of irrigation	0.929	8.431**

Figures in the parenthesis indicate the degrees of freedom.
*Significant at 5% probability level
** Significant at 1% probability level

High yielding farmers are ahead of low yielding group in terms of land preparation & land-health care. They employ more ploughs in their field, they follow more intercultural operations including weeding, top dressing, nurturing crops and frequently irrigating field compared to the low yielding group. This again reinforces that high yielding farmers are the best practitioners of the technology. Table-4 shows the high level of correlation between the adoption index of technology and nature of the farmers. We found that the high yielding farmers are good adopters of technology.

Table 4. Correlation Matrix between Adoption Index & Realization Index of Summer-paddy Growers.

Groups	r-value	t-value
High Yielding	0.1616	2.10888*
Low Yielding	0.09537	0.73592

*Significant at 5% probability level

Note: *Adoption Index = [P/R (seed rate) + P/R (nitrogen) + P/R (phosphorus) + P/R (potassium) +P/R(irrigation)]/5*

Where, P = practiced level and R = recommended level.

The estimated discriminant function separating farmers between high yielding and low yielding groups can be observed from Table-5. Analyzing the means of significant factors between the groups it can be concluded that high yielding farmers pay more attention to the adoption of scarce farm inputs and practices at their farm level.

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Table-5. Group Means of Significant Factors Discriminating the farmers between High Yielding and Low Yielding groups.

Factors	Canonical Co-efficient	Quantity Used	
		High yielding	Low yielding
FYM (Q./Ha.)	-562.87	6.000	0.862
Nitrogen (Kg./Ha.)	-8030.20	45.195	39.651
Phosphate (Kg../Ha.)	-65.67	27.302	21.341
Potash (Kg./Ha.)	4231.48	18.285	13.644
Value of fertilizer (Rs./Ha.)	-24.00	713.94	559.72
Number of ploughing	-1.79	4.96	3.84
1^{st} top-dressing (DAS)	-13.69	17.88	14.26
2^{nd} top-dressing (DAS)	17.25	37.83	30.92
Intercultural operation (No.)	1031.53	2.64	1.70
Number of irrigation	-4413.44	17.66	13.04

In conclusion, this study reveals that technology adoption in agriculture, specifically for the rice-crop is not equally spread across the farmers. The level of technology adoption does not depend on the holding size or income level of the farmers. It depends on the know-how practices borrowed from the adoption behavioural processes. Thus, remedies lie on efforts of government, rural institutions and policy makers to focus on augmenting technology adoptive capacity of farmers.
This requires imparting farm-knowledge to the farming community to combat disease, pests or taking right action in a changing bio-environment. To achieve the millennium goal of eradicating rural poverty we need dissemination of agricultural technology and more and more numbers of good crop-practitioners.

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