ADOPTION OF SELECTED HIGH YIELDING VARIETIES OF RICE BY THE FARMERS OF RAJPAT UNION UNDER KASIANI UPAZILA IN GOPALGONJ DISTRICT

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By

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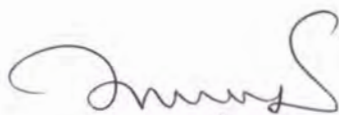In partial fulfillment of the requirements

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This is to certify that thesis entitled, "ADOPTION OF SELECTED HIGH YIELDING VARIETIES OF RICE BY THE FARMERS OF RAJPAT UNION UNDER KASIANI UPAZILA IN GOPALGONJ DISTRICT" submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka in partial fulfillmen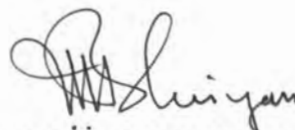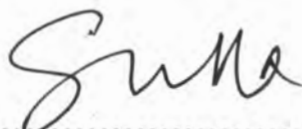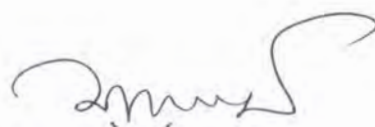t of the requirements for the degree of MASTER OF SCIENCE in AGRICULTURAL EXTENSION AND INFORMATION SYSTEM, embodies the result of a piece of bona fide research work carried out by Mr. KAMAL HOSSAIN Reg. No. 25280/00385 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that such help or source of information, as has been availed of during the course of this investigation has been duly acknowledged by him.

Dated:

Place: Dhaka, Bangladesh

(Md. Rafiquel Islam)

Supervisor

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ABSTRACT

The main purpose of the study was to determine and describe the extent of adoption of high yielding varieties (HYV) of rice by the farmers of Rajpat union under Kasiani upazila in Gopalgonj district. Attempts were also made to describe some of the selected characteristics of the HYV rice farmers and their relationship with their adoption of HYV rice. Data were obtained from 100 randomly selected farmers of two villages namely Rajpat and Shilta with the help of an interview schedule. Data were collected during 15 February to 16 March 2006. The findings revealed that majority (50%) of the HYV rice farmers had medium adoption compared to 5% having low adoption and 45% having high adoption. The selected three varieties were BR26, BRRI Dhan28, and BRRI Dhan29. Among those selected varieties BRRI Dhan-29 variety was overwhelming accepted mostly by the farmers and the adoption index was 11680.87. Correlation test was used to ascertain the relationship between the concerned variable of the study. Out of ten independent variables, farmers' age, level of education, annual income, contact with extension staff, attitude towards HYV rice and knowledge on HYV rice cultivation had significant positive relationship with their adoption of HYV rice. On the other hand family size, farm size, organizational participation and cosmopoliteness of farmers had no relationship with their adoption of selected HYV rice cultivation. Farmers indicated that there were 15 problems, which hindered the adoption of selected HYV rice. Among the problems three important problems were: High price of fertilizer, High price of HYV seeds, Requires of high amount of fertilizer in rice crops.

CHAPTER 1

INTRODUCTION

1.1. General Background

Bangladesh is mainly an agro-based country with an area of 1, 47, 570 sq. kilometers.
Agriculture is the backbone of the economy of the country. About 79.9 percent of its
population lives in rural areas and 62 percent of the country's total labour force are
engaged in Agriculture (BBS, 2003). According to the BBS report, Agriculture output
prices have been found to contribute 23.50% to the GDP in which 13.44% comes from
crops, 1.90% from forestry, 2.93% from livestock and 5.23% from fisheries (BBS,
2003). Agriculture plays a vital role through employment generation, poverty
alleviation, food securing enhance standard of living by increasing income level of
rural people.

Rice is the staple food of Bangladesh. It grows in three seasons nearly; Aus, Aman and
Boro. Nearly 76.27 percent of the total cultivated land area used for rice (Aus, Aman
and Boro) and its total production 26189000 metric tons (BBS, 2004). Among the
total rice cultivated area, 11.11 percent land was under Aus, 52.46 percent land was
under Aman and 36.43 percent land was under Boro (BBS, 2004). Currently the
average yield of rice in Bangladesh is around 1.8 t/ha (Anonymous, 1999) which is
less than the world average of 2.9 t/ha and frustratingly much below the highest
producing country average in Korea (6.1 t/ha). The average rice yields of some
countries are: USA 6.62 t/ha, South Korea 6.87 t/ha, Japan 6.41 t/ha, and China 6.32
t/ha (FAO, 2000). The acreage and production of local and HYV rice varieties in
Bangladesh 2000-2001 to 2000-2003 are shown in table 1.1

Table 1.1 The acreage and production of local and HYV rice varieties in

Bangladesh

Year	Area in '000' acres			Production in '000' M.tons		
	Local	HYV	Total	Local	HYV	Total
2000-2001	4821	16860	26681	5654	19427	25086
2001-2002	9394	17010	26337	5175	19125	24300
2002-2003	9140	17474	26614	5226	19162	25187

Source: BBS, 2004

A remarkable change in rice production has already been observed in Bangladesh after introduction of HYV varieties of rice. Bangladesh Rice Research Institute (BRRI) has developed and released 46 Modern Varieties (MVS) having potential to produce 2.0 or more times yield than those of traditional varieties.

Whenever an innovation is generated, efforts have been made to adopt the innovation. There is a grave need to increase the rice production. HYV varieties are always encouraged and emphasize given to adopt them by the farmers. To gear up the production of rice farmers are being encouraged to adopt HYV rice.

Per unit yield of various crops in Bangladesh is a miserably low due to limited adoption of modern varietal technology with their proper production, management technologies (Islam, 1996). Forty five percent rice areas are still under low yielding varieties. There is a little scope to increase its yield in Bangladesh. One of the best means to do it is adoption of HYV rice by the farmers.

Continuous scientific research in rice cultivation and other relative field have made it possible to find out certain useful technologies, which if used properly, will increase

HYV rice production to a great extent. But most of the farmers do not possess adequate knowledge about HYV rice cultivation.

Agricultural extension service therefore, needs to develop sound programmes diffusion of HYV rice. In doing so it is necessary first to have a clear understanding of the existing knowledge possessed by the farmers.

The findings of the present study can be a key in extending the adoption of selected HYV rice cultivation in the country. These will be helpful for planning adaptive research, formulating extension messages and production plans. These will help to understand the picture of HYV rice cultivation, adopted by the farmers of Rajpat Union under Kasiani Upazila in Gopalgonj district. With this end in view the author became keenly interested to investigate the characteristics of the farmers related to adoption of HYV rice at Rajpat Union under Kashiani Upazila in Gopalgonj District.

1.2. Statement of the Problem

The success of any technology depends on its dissemination among the potential users, which ultimately is measured by the level of adoption of that technology. It is to be anticipated that certain sustainable development can take place in the agriculture of Bangladesh, if the technology can be transferred properly. In other improvement can be ensured by increasing the rate of adoption. For wider adoption of HYV rice, it is necessary to have a clear understanding of the present status of adoption of selected HYV rice by the farmers. It is also necessary to have an understanding of the facts, which contributed to adoption of selected HYV rice. An understanding of the relationship of the farmer's adoption behavior with their selected characteristics as well as the problems faced by the respondents will be helpful to the planners and extension workers.

In view of the foregoing discussion, the investigator under took a piece of study entitled, "adoption of selected high yielding varieties of rice by the farmers of Rajpat Union under Kasiani Upazila in Gopalgonj district".

The purpose of this study was to have answers to the following research questions

1. What is the extent of selected HYV rice have been adopted by the farmers?

2. What are the selected characteristics of the farmers having relationship with the adoption of selected HYV rice by the farmers?

3. What are the problems faced by the farmers in adoption of selected HYV rice?

1.3. Specific Objectives

1. To determine and describe the extent of adoption of high yielding varieties of rice by the farmers, the selected varieties are (a) BR26 (b) BRRI Dhan28 and (c) BRRI Dhan29.

2. To identify the problems faced by the farmers related to the adoption of high yielding varieties of rice.

3. To determine and describe some selected characteristics of the farmers. The selected characteristics are

    a) Age
    b) Level of education
    c) Family size
    d) Farm size
    e) Annual Income
    f) Contact with extension staff
    g) Organizational participation
    h) Cosmoploiteness
    i) Attitude towards HYV rice
    j) Knowledge on HYV rice.

4. To explore the relationship between the selected characteristics of the farmers and their adoption of high yielding varieties of rice.

1.4. Justification of the Study

The major focus of the study was to assess farmer's adoption of HYV rice. The findings of the study will be especially applicable to Gopalgonj district (the locale of the study). However, the findings will also have implications for other areas of the country having relevance to the social cultural contexts of the study area.

It is obviously true that farmers are the key elements of adoption of HYV rice. At present there is a lack of adequate information to influence their adoption of HYV rice. This fact indicates the need for an investigation to ascertain the relationship of the characteristics of the farmers with their adoption of HYV rice. Findings of this study, therefore, be helpful to the planners and extension workers in planning and execution of programmes for enhancing the yield as production of rice.

In, Bangladesh the deficit of food grains is a chronic problem as the pressure of population is massive, so, to ensure adequate food supply, it is necessary to give thrust to increase food production by adoption HYV rice.

1.5. Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Good and Hatt, 1952). That means the assumption is taken as a fact or belief to be true. While undertaking this research the researcher possessed the following assumptions in mind:

1. The respondents included in the sample were competent to furnish proper responses to the items included in the interview schedule.

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2. The researcher was well adapted with the study area and their social activities. The researcher collected data with utmost care and can be treated as reliable.

3. The questions included in the interview schedule were reasonably adequate to measure the adoption of HYV rice.

4. The responses furnished by the respondents were accurate, valid and they expressed their opinion on adoption of HYV rice.

5. The sample size was representative of the whole population of the study area.

6. The adoption of HYV rice was linearly related with selected characteristics of the farmers.

7. The findings of the study will have general application to other parts of the country with similar socio-economic and cultural characteristics of the farmers of the study area.

1.6. Limitations of the Study

In order to keep the study under manageable limit, the following limitations were recognized:

1. The research was cramped to a block of two villages of Kasiani Upazila under Gopalgonj district.

2. The major area of investigation was mostly confined to farmer's adoption of HYV rice.

3. Only three HYV rice varieties were selected to examine the extent of adoption among the farmers of Rajpat Union.

4. The investigator depended on the data furnished by the selected farmers during their interview.

5. There are many attributes or characteristics of the farmers, which are always varies but only ten (10) were selected for investigation in this study as stated in the objectives. This was done to complete the study within limited resources and time.

6. Reluctance of the farmers to provide information was overcame by establishing rapport.

However, the findings of the research will particularly be applicable to the block of Rajpat Union under Kasiani Upazila in Gopalgonj District. The findings may also be suitable where the situation is similar to the study area.

1.7. Definition of Terms

A number of key terms have been used throughout the study are defined below to avoid confusion and misunderstanding.

Adoption

Adoption is the implementation of a decision to continue the full use of an innovation. According to Rogers, (1995), "Adoption is a decision to make full use of an innovation as the best course of action available". When an individual takes up a new idea as the best course of action and practices it, then phenomenon is known as adoption (Ray, 1991).

Age

It means the age of a farmer that refers to the period of time from his birth to the time of investigation.

Level of education

Level of education of an individual farmer was defined as the formal education received up to certain level from an educational institute (Eg. School, College and University) at the time of interview.

Family size

It refers to the total number of members including the respondent himself, his wife, children and other permanent dependents, which lived and ate together as a family unit.

Farm size

It refers to the total area on which a farmer's family carry out farming operation. The area was estimated in terms of full benefit of the farmer's family.

Annual income

Annual income referred to the total annual earnings of all the family members of a respondent from agriculture, livestock, fisheries and other accessible sources (business, service, daily working etc) during a year.

Contact with Extension Staff

It refers to an individual's exposure to or contact with extension staff for dissemination of new technologies among the farmers.

Organizational participation

Organizational participation of an individual refers to his direct contact with various organizations within a specific period of time. An individual could take part in various activities of organization as ordinary member, executive committee member or officer (president, secretary etc.). All these forms of participation were considered to operationalize the variable.

Cosmopoliteness

It referred to the orientation or exposure or involvement of an individual respondent which are external to his own social system.

Attitude towards HYV rice

The term attitude towards HYV rice cultivation of an individual was used to refer to his feelings, beliefs and action tendencies towards the various aspects of HYV rice cultivation. i.e Knowledge+beliefs+action=attitude.

Knowledge on HYV rice

It is the extent of basic understanding of the farmers in HYV rice. It also includes the basic understanding of the use of different agricultural inputs and practices.

HYV rice

HYV rice is one kind of rice variety which gives high yield in comparison to local varieties, which is capable to resist disease and insects, it is an improved variety.

Farmers

It referred to those who cultivate high yielding varieties of various crops.

Problem

Problem referred to a difficult about which something to be done. Problem faced by the farmers in this study was defined as the extent of difficulties faced by growers in the way of adoption of sleeted HYV rice.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this Chapter is to review of literature having relevance to the present study. The researcher made an elaborate search of available literature for the above purpose. The research or attempted to search the literatures on a number of studies have been conducted on the adoption of innovations by the farmers. Therefore, the finding of such studies related to the extent of adoption of selected HYV rice by the farmers and other partial studies have been reviewed in this Chapter.

This chapter is divided into three major sections, the first section deals with the review of literature on general context of adoption, the second section deals with the relationship between farmer's characteristics and their adoption of HYV rice and the third section deals with the conceptual framework of the study.

2.1. Review of Literature on General Context of Adoption

Razzaque (1977) studied on the extent of adoption of HYV rice in three villages of Bangladesh Agricultural University Extension Project area. He observed that among the respondent growers, 6.6 percent of the farmers had high adoption of HYV rice, 33.3 percent medium adoption and 40 percent low adoption.

Hossain (1983) studied the extent adoption of HYV rice as transplanted Aman and other related aspect in Bhabakhali of Mymensingh district. He observed that among the respondent farmers, 54 percent had high adoption of HYV rice and 46 percent had medium adoption of HYV rice as transplanted Aman.

Rahman (1986) conducted a study on the extent of adoption of four improved practices which were, use of fertilizers, line sowing, irrigation and use of insecticides in transplanted Aman rice cultivation in two village of Mymensingh district. It

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revealed that 22 percent of the farmers adopted all the four practices compared to 49 percent three practices, 22 percent adoption two practices, 5 percent adopted one practices and only 2 percent adopted of the four practices.

Rahman (1999) studied the adoption of balanced fertilizer by the Boro rice farmers of Ishwarganj thana. He found that the extent of use of balanced nitrogenous fertilizer, 48.57 percent of the farmers had optimum adoption and above optimum respectively. In respect of extent of use of balanced phosphoric fertilizer, 79.05 percent of the farmers had below optimum adoption compared to 20.95 percent having optimum adoption. Regarding the extent of use of balanced Potassic fertilizer, 80.95 percent of the farmers had below optimum adoption compare to 18.10 and 0.95 percent having optimum and above optimum adoption, respectively.

Haider *et al.* (2001) studied the adoption level of improved package for T. Aman rice cultivation in Gouripur upazila of Mymenshing district. He found that the adoption level of farmers categories were 5 percent non adoption, 62 percent low adoption, 24.5 percent medium adopter and 8.5 percent high adopter. Vast majority (95 percent) of the farmer's adopted MV programmer of T. Aman rice.

Rahman (2003) revealed that about half (47 percent) of the growers had medium adoption 44 percent had low and 1 percent had high adoption of year round homestead fruit cultivation practices.

Hossain (2003) found that majority (67 percent) of the Boro rice farmers had medium adoption, 17 percent had low adoption and 16 percent high adoption of modern Boro rice cultivation practices.

2.2. Relationship between Farmers Characteristics and the Adoption of Technologies

2.2.1. Age and adoption of technologies

Islam (1993) observed that there was no relationship between the age of potato growers and their adoption of improved practices in potato cultivation. Similar results were observed by Karim and Mahaboob (1986), Rahman (1986), Singh (1982), Kher (1992), Pathak *et al.* (1992) Kashem (1991) observed that there was positive and significant relationship between the age of the marginal farmers and their adoption of jute technologies. Similar results were found by Ali *et al.* (1986), Singh and Rajendra (1990), Okoro *et al.* (1992), Narwal *et al.* (1991) and Hossain *et al.* (1991).

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that age of the farmers had no significant relationship with their adoption regarding Aalok 6201 hybrid rice.

Sardar (2002) found that the age of the farmers had positive significant negative correlation with their adoption of IPM practices.

Hossain (2003) revealed that age of the farmers had a insignificant and positive relationship with their adoption of modern Boro rice cultivation practices.

2.2.2. Level of Education and adoption of technologies

Mustafi *et al.*(1987) reported that education did not have any significant effect on the adoption of modern varieties of rice in Bangladesh.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that academic qualifications of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern Boro rice cultivation practices.

2.2.3. Family size and adoption of technologies

Hossain (1983) in his study in Bhabakhali union of Mymensingh district observed that family size of the farmers had no relationship with their adoption of HYV rice as transplanted aman. Though the relationship was not statistically significant, the chisquare value for the relationship was quite large and approaching the level of significance. There was an appreciable trend of adoption of small family category, being much lower than that in the medium family and the big family categories.

Mustafi *et al.* (1987) in their study found that the no. of family members had no significant effect on the adoption of modern varieties of rice in Bangladesh.

Alam (1997) is his study found that family size of the farmers had positive and significant relationship with their use of farm practices in rice cultivation.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar unazila of Mymensingh district. He found that family size of the farmers had a no significant relationship with their adoption regarding Aalok 6201 hybrid rice.

2.2.4. Farm size and adoption of technologies

Hosssain (1983) fond that size of the farm of transplanted Aman farmers in Bhabakhali union of Mymensingh district had a negative relationship with their adoption of HYV T-Aman rice.

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that the farm size had a significant relationship with their use of improved farm practices in rice cultivation.

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Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that farm size of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

2.2.5. Annual income and adoption of technologies

Hossain (1983) made an investigation in Mymensingh district and found that annual income of the farmers had a negative relationship with their adoption of HYV rice as transplanted aman.

Sarker (1997) found that family income of potato growers had significant positive relations with their adoption of improved potato cultivation practices. Similar results were observed by Hossain (1999), Rahman (1986), Kashem (1991), Pal (1995), Islam (1993) and Khan (1993), Islam (1996) found a significant negative relationship between the annual income of the farmers and their extent of use of ITK.. Hossain (1983) and Hoque (1993) found similar results.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that annual income of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Hossain (2003) revealed that annual income of the farmers had a significant relationship with their adoption at modern Boro rice cultivation practices.

2.2.6. Contact with Extension staff and adoption of technologies

Osunloogun et al. (1986) studied adoption of improved agril. Practices by co-operative farmers in Nigeria. The findings of the study indicated a positive relationship between extension contact and adoption of improved practices.

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Heong (1990) observed that the lack of adoption of IPM technologies in rice was frequently attributed to lack of sufficient extension.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that extension contact of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Sardar (2002) concluded that the extension contact had positively significant relationship with their adoption of IPM practices.

Haque (2003) concluded that extension contact of the farmers had a significant positive relationship with their adoption of modern maize cultivation technologies.

2.2.7. Organizational participation and adoption of technologies

Hossain (1983) in his study found that organizational participation of transplanted aman growers had no relationship with their adoption of HYV rice.

Rahman (1995) in his study found that organizational participation of potato growers had no relationship with their knowledge regarding improved practices of potato cultivation.

2.2.8. Cosmopoliteness and adoption of technologies

Islam (1993) found a significant relationship between cosmopoliteness of the farmers and their adoption of recommended doses of fertilizer and plant protection measures in potato cultivation.

Chowdhury (1997) found that there was no significant relationship between the farmer's cosmopoliteness and their adoption of selected BINA technologies. Similar results were observed by Hossain (1991), Mohammad (1974), Sobhan (1975) and Islam (1996).

Hussen (2001) found that the cosmopoliteness had positive significant relationship with their adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that cosmopoliteness of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Hossain (2003) revealed that cosmopoliteness of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation practices.

2.2.9. Attitude towards HYV rice and adoption of technologies

Hossain (1981) conducted a study on relationships of selected characteristics of the Jute growers with their adoption of improved practices of Jute cultivation. He found that there is no relationship between attitude towards intensive Jute cultivations scheme of the Jute growers and their adoption of improved practices of jute cultivation.

Hasan (1996) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that there was strong positive relationship between attitude towards development and perceived adoption of selected technologies.

Podder (1999) conducted a study on the adoption of Mehersagar Banana by the farmers of Gazaria union Sakhipur Thana of Tangail district. He found that there was no relationship between attitude towards technology of the growers and their adoption of modern agricultural technologies.

2.2.10. Knowledge on HYV rice and adoption of technologies

Koch (1985) conducted a study in the North western organize free state, South Africa concerning perception of agricultural innovations aspiration, knowledge and

innovation adoption. He observed that three was a strong positive relationship between knowledge and practice adoption. This finding is very much in agreement with that of Rogers and Shoemaker (1971).

Reddy *et al.* (1987) found that the significant association between knowledge and use of improved package of practices in paddy production by participant and non-participant farmers.

Haque (2003) concluded that knowledge in maize cultivation of the farmers had a significant positive relationship with their adoption of modern maize cultivation technologies.

2.3. The Conceptual Framework of the study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly contains at least two important elements i.e. "a dependent variable" and "an independent variable". An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. In view of prime findings of review literature, the researcher constructed a conceptual framework of the study, which is self-explanatory and is presented in Fig.2.1.

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┌─────────────────┐                    ┌─────────────────┐
│   Independent   │                    │    Dependent    │
│    Variables    │                    │    Variable     │
└─────────────────┘                    └─────────────────┘
         │                                      │
         │                                      │
         ▼                                      │
┌──────────────────────────────┐               │
│ Selected Characteristics      │               │
│                               │               ▼
│  — Age                        │    ┌─────────────────────────┐
│  — Level of Education         │    │ Adoption of selected    │
│  — Family size                │    │ HYV rice                │
│  — Farm size                  ├───▶│                         │
│  — Annual income              │    └─────────────────────────┘
│  — Contact with extension staff│
│  — Organizational participation│
│  — Cosmopoliteness            │
│  — Attitude towards HYV rice  │
│  — Knowledge on HYV rice      │
│                               │
└──────────────────────────────┘
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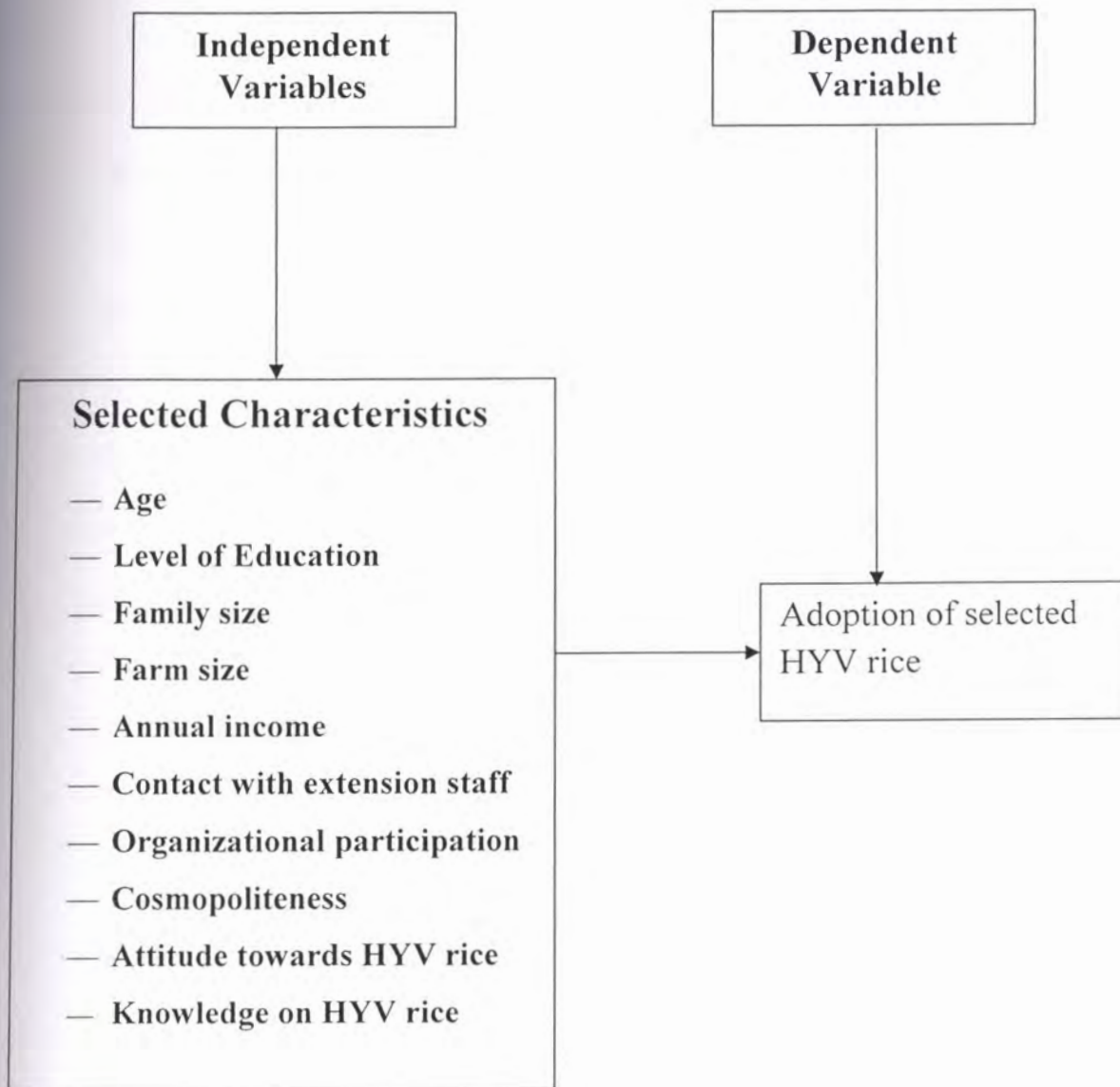
Figure 2.1. Conceptual Framework of the study

CHAPTER 3

METHODOLOGY

Methods and procedures followed in conducting the study have been discussed in this Chapter. Further, the chapter includes the operational format and comparative reflection of some variables used in the study. Also statistical methods and their use have been mentioned in the section of this Chapter.

3.1. Locale of the study

Kasiani upazila under Gopalgonj district was purposefully selected as locale of the study. This upazila has 14 Unions out of them Rajpat Union was selected randomly. Rajpat Union consists of six villages. Again out of six villages two village namely Rajpat and Shilta were randomly selected. Map of Kasiani Upazilla showing the study area is presented in figure 3.1.

3.2. Population and Sampling Design

An up to date list of all farm family heads of the selected villages were prepared with the help of Sub-Assistant Agriculture Officer. The list comprised a total of 503 farmers in the study area. These farmers constituted the population of this study. There were 283 farmers in Rajpat and 220 farmers in shilta. Twenty (20) percent of the population of each village was randomly selected as representative sample by using random number (kerlinger, 1973). Thus, the sample size for Rajpat was 56 and that of shilta was 44 making the total sample size of 100 farmers. In addition to that, 2 pereent of the population was selected randomly and proportionately from each of selected villages. Thus, the additional sample, so drawn stood 10 farmers, which were included in the reserve list. In case, the individuals included in the original samples were not available or not found suitable at the time of data collection, the farmers of

the reserve list were used for the purpose. The distribution of the farmers included in the population, sample and those in the reserve list appears in Table 3.1.

Table 3.1. Distribution of population and sample of respondents in two selected villages of Kasiani upazila including reserve list

Sl. No.	Name of village	Total number of farmers (Only technology users)	Sample size	Number of farmers in the reserve list
1	Rajpat	283	56	6
2	Shilta	220	44	4
Total		503	100	10

Legend
* Study Area

Fig 3.1. A Map of Kasiani Upazilla Showing Rajpat Union of the Study Area

3.3. Measurement of Variables

A variable is any characteristic, which can be assumed varying different values in successive individual cases (Ezekiel and Fox, 1969). A well organized piece of research usually contains at least two important variables, viz. an independent and a dependent variable. An independent variable is that factor which is maintained by the researcher in his/her attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953).

3.3.1. Measurement of independent variables

The independent variables of this study were ten (10) selected characteristics of the HYV rice farmers. These were: age, level of education, family size, farm size, annual income, contact with extension staff, organizational participation, cosmopoliteness, attitude towards HYV rice and knowledge on HYV rice. The procedures followed in measuring the independent variables are briefly discussed below:

3.3.1.1 Age

The age of a respondent was measured in terms of actual years from his birth to the time of interview on the basis of his response. A score of one (1) was assigned for each year of age.

3.3.1.2. Level of Education

Education of a respondent was measured by the number of years of schooling he completed in formal and non-formal educational institutions. A score of one (1) was assigned for each year of schooling. For example, if a respondent did not know how to read and write, he was given a score of zero (0) and one (1) for each year of schooling completed. A score of half (0.5) was assigned to those respondents who could sign only.

3.3.1.3. Family size

Family size of a respondent was determined in terms of actual number of members in his family including himself. His wife, sons, daughters, brothers, sisters, parents and any other person who jointly live and eat together at the time of interview. The scoring was done by the actual number mentioned by the respondent. For example, if a respondent had six members in his family then the family size score would be six (6).

3.3.1.4. Farm size

Farm size measured as the size of his farm (including HYV rice and other crops) on which he continued his farming operations during the period of study. It included the area of farm owned by him as well as those obtained from others as sharecropping, lease or mortgage. The area was being estimated in terms of full benefit to the growers in term of hectare. The farm size of a respondent was measured by using the following formula:

$$Fs = A_1 + A_2 + \frac{1}{2}(A_3 + A_4) + A_5$$

Where, F_s = Farm size

A_1 = Homestead area (with pond)

A_2 = Own land under own cultivation

A_3 = Own land given to others on *borga*

A_4 = Land taken from others on *borga*

A_5 = Land taken from others on lease

3.3.1.5. Annual income

Family income of a respondent was measured on the basis of total yearly earning from agriculture and other sources (service, business, daily labor etc.) by the respondent

himself and other family members. The value of all the agricultural products encompassing crops, livestock, fisheries, fruits, vegetables etc. were taken into consideration. For calculation of income score, one (1) score was assigned for one thousand taka income.

3.3.1.6. Contact with extension staff

Extension staff contact score was obtained by adding the weights assigned against all three sources listed in the instrument. Extension contact score could be ranged from 0 to 9; 0 indicated no extension contact and 9 indicated very high extension contact.

Information sources	Extent of use	Weight assigned
1. Sub-Assistant Agriculture Officer	Not even once	0
	1-3 times per three months	1
	4-7 times per three months	2
	8 or more times per three months	3
2.Agricultural Extension Officer (AEO)	Not even once	0
	1 time per six months	1
	2-3 times per six months	2
	4 or more times per six months	3
3. Upazila Agriculture Officer (UAO)	Not even once	0
	1 time per year	1
	2-3 times per year	2
	4 or more times per year	3

3.3.1.7. Organizational participation

Organizational participation on the basis of participation by the respondent in different organizations during last seven years. This was multiplied by its duration i.e., number of years. Scores were assigned for participation of a respondent in an organization in the following manner.

Nature of participation	Score
No participation	0
Participation as general member	1
Member of the Executive committee	2
Participation in executive committee as president or secretary	3

Organization participation (OP) score of respondent was computed by using following formula:

$$OP = P_{OM}\, XY + 2P_{EM}\, XY + 3\, P_{PS}\, XY$$

Where,

OP = Organizational participation

P_{OM} = Participation as general member

P_{EM} = Participation as executive member

P_{PS} = Participation as president or secretary of executive committee

Y = Duration of participation in year

Organization participation score of a respondent was determined by summing the participation score in all the organizations. Thus organizational participation score of a respondent could ranged from 0 to 126, while 0 indicating 0 organizational participation and 126 indicating very high organizational participation.

3.3.1.8. Cosmopoliteness

Cosmopoliteness of a respondent was measured in terms of his nature of visits to the nine different places external to his own social system. The scale was used for computing the cosmopoliteness scores is presented below:

Place of visit	Nature of visit	Score assigned
1.Visit to other village	Not even once	0
	1-2 times per months	1
	3-4 times per months	2
	5 or more times per months	3
2.Own thana head quarter	Not even once	0
	1-2 times per year	1
	3-4 times per year	2
	5 or more times per year	3
3.City or town	Not even once	0
	1 time in life	1
	2 times in life	2
	3 or more times in life	3
4.Relativ'es house	Not even once	0
	1-2 times per months	1
	3-5 times per months	2
	10 or more times per months	3
5.Agricultural fair, rally, exhibition	Not even once	0
	1 time per 5 year	1
	2 times per year	2
	3 or more times per year	3
6.NGO office	Not even once	0
	1-2 times per month	1
	3-4 times per month	2
	5 or more times per month	3
7.Special day	Not even once	0
	1-2 times per year	1
	3-4 times per year	2
	5 or more times per year	3
9.Other district	Not even once	0
	1 time per year	1
	2 times per year	2
	3 or more times per year	3
9.Village development meeting	Not even once	0
	1-2 times per month	1
	2-3 times per month	2
	3 or more times per month	3

The cosmopoliteness score of a respondent was determined by adding the scores obtained for his visits to each of the nine types of places as shown in the interview schedule. The cosmopoliteness scores of a individuals could range from 0 to 27 where 0 indicated no cosmopoliteness and 27 indicated very high cosmopoliteness.

3.3.1.9. Attitude of rice growers towards HYV rice

An attitude may be defined as predisposition to act towards an object in a certain manner. Attitude of farmers towards HYV rice was used to refer to his belief, feelings and action towards the various aspects of modern agricultural technologies. It was measured by constituting 10 statements (five positive and five negative). A statement was considered positive if it possessed an idea favorable towards HYV rice cultivation. On the other hand, a statement was considered negative if it was unfavorable towards HYV rice cultivation. The respondents were asked to express their opinion in the form of "strongly agreed" "agreed" "undecided" "disagreed" and "strongly disagreed". A score of 4 was given to "strongly agreed", 3 to "agreed", 2 to "undecided", 1 to "disagreed" and 0 to "strongly disagreed", if the statement was positive. A reverse scoring method was followed in case of statements considered negative. Attitude score of a respondent was determined by summing up the scores obtained by himself for all the items in the scale. The scores of attitude towards HYV rice of the respondents could range from 0 to 40 where '0' indicating very unfavorable and '40' for very favorable attitude towards HYV rice cultivation.

3.3.1.10. Knowledge on HYV rice

In order of measure the knowledge of a respondent about HYV rice cultivation practices, a 20-item scale was constituted and included in the interview schedule. Each respondent was asked to answer all the 20 questions. The summation of obtained scores against 20 questions represented the knowledge about HYV rice of a

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respondent. Knowledge was measured by the total knowledge score about HYV rice cultivation. The total assigned score was 50. But the score of each question was not equal, it was determined according to the extent of difficult. Full score was assigned for each full correct answer, partial scores for partially correct answer and zero (0) for the wrong answer. However, for correct responses to all questions, a respondent could get a total score of 50, while wrong responses to al questions, he could get 0 (zero), (0) zero indicated very low knowledge and '50' indicated very high knowledge.

3.3.2. Measurement of dependent variable

3.3.2.1. Adoption of HYV rice varieties

Adoption has been measured in a number of ways in India (Ray, 1991). The simplest amongst them are preparation of indexes. Bose and Saxena (1965) developed an adoption index by asking the farmers as how many improved practices recommended by the extension service they had adopted and for how many years. The summation of the number of years and the selected practices will make the index. A more rigorous and widely used method of measuring adoption by the formula of adoption quotient which was developed by Chattapadhya (1963).

According to him the adoption quotient is the ratio scale designed to quantify the adoption behavior of an individual. The method of adoption quotient is more accurate as it involves all the related concepts like potentially, extent, time consistency and weightage.

However, adoption score of the selected HYV rice cultivation practices in this study was computed by using the following formula:

$$\text{Adoption of HYV rice} = D \times \frac{\sum E_a}{P_a} \times 100$$

Where

$\sum =$ Summation

$E_a =$ Cultivated area used for a particular variety of high yielding rice

$P_a =$ Cultivable area for HYV rice cultivation

$D =$ Duration of HYV rice cultivation

Period of adoption	Assigned score
Use up to 2yrs	1
Use above 2 to 4yrs	2
Use above 4yrs	3

Thus score of adoption of HYV rice of a farmer could range from zero (0) to 300, where, zero (0) indicated no adoption and 300 indicated very high adoption.

3.4. Problems Faced by the Farmers

Farmers in the study area might have faced various types of problems in the way of adopting high yielding varieties of rice cultivation. But the investigator gained an experience through personal contact regarding common problems faced by the respondents before collection of data. Besides, the researcher gained experience through consultation with experts, pre-testing experience and reviewing previous research findings. Finally, he prepared a list of fifteen possible problems in this regard. A scale was prepared to indicate the extent of problem to each of the fifteen problems applicable in the case of a respondent. The responses were obtained through a 4-point scale: "severe", "moderate", "low" and "not at all" and weights were assigned to these responses as 3, 2, 1 and 0 respectively.

In order to determine the comparative importance of the fifteen problems, a problem faced index (PFI) was computed for each of the fifteen problems by summing up the weights of responses of all the respondents. The problem faced index for each of the 15 problems were measured by the following formula:

$$PFI = 3 \times f_3 + 2 \times f_2 + 1 \times f_1 + 0 \times f_0$$

Were,

f_3 = No. of respondents faced severe problem

f_2 = No. of respondents faced moderate problem

f_1 = No. of respondents faced low problem

f_0 = No. of respondents faced not at all problem.

Thus the PFI of a particular problem could range from 0-300, which 0 indicating no problem and 300 indicating very high problem.

3.5. Statement of the Hypothesis

As defined by Goode and Hatt (1952) "A hypothesis, which can be put to a test to determine its validity. It may see contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test." In studying the relationship between variables, research hypotheses are formulated which state the anticipated relationship between the variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the variables. If a null hypothesis is rejected on the basis of a statistical test, it is assumed that there is a relationship between the concerned variables.

The null hypothesis formulated for this study as:

There is no relationship between the farmers selected characteristics with their adoption of selected HYV rice. The characteristics were: age, level of education, family size, farm size, annual income, contact with extension staff, organizational participation, cosmopoliteness, attitude towards HYV rice and knowledge on HYV rice.

3.6. Data collection

Data were collected personally by the researcher himself by interviewing the sample of 100 HYV rice growers with the help of an interview schedule. The researcher made all possible efforts to explain the purpose of the study to the farmers. Rapport was established with the farmers prior to interview and the objectives were clearly explanted by using local language as far as possible. As a result, the respondents did not hesitate to furnish proper responses to the questions and statements, which were collected during the period from February15 to March 16, 2006. The researcher sought the help from the local leaders and Sub-Assistant Agriculture Officers for this purpose. Excellent co-operation was obtained from the respondents, the concerned local leaders and the Sub-Assistant Agriculture Officers.

3.7. Data Coding and Tabulation

A detail coding plan was prepared. Data were coded into a coding sheet. These were then compiled, analyzed in accordance with the objectives of the study by using computer system. Qualitative data were converted into quantitative from by means of suitable scoring techniques for the purpose of analysis.

3.8. Statistical Analysis

The statistical measures such as number and percentage distribution, mean, standard deviation, rank order were used for describing the variables of the study. In order to

explore the relationships between the adoption of HYV rice with the selected characteristics of the farmers, the Pearson Product Moment Correlation (r) was computed. Correlation matrix was also computed to determine the interrelationships among the variables. Five percent (0.05) level of significance was used as the basis of rejection acceptance of any null hypothesis. If the computed value of co-efficient of correlation 'r' was equal to or greater than table value at designated level of significance for the relevant degrees of freedom, the null hypothesis was rejected and it was concluded that there was significant relationship between the concerned variables. However, when the computed value of co-efficient of correlation (r) was found to be smaller than the tabulated value at the designated level of significant for the relevant degrees of freedom, it was concluded that the null hypothesis could not be rejected and hence there was no relationship between the concerned variables.

CHAPTER 4

FINDINGS AND DISCUSSION

The findings of the study and interpretations of the results have been presented in this Chapter. The first section deals with the selected characteristics of the respondents, while the second section deals with the adoption of selected HYV rice. In the third section, the relationships between the extent of adoption of selected HYV rice and the selected characteristics of farmers have been discussed. The final section deals with the problems faced by the farmers in adopting of selected HYV rice.

4.1. Selected Characteristics of the Farmers (independent variables)

Ten characteristics of the farmers were selected to find out their relationships with the adoption of selected HYV rice. The selected characteristics included age, level of education, family size, farm size, annual income, contact with extension staff, organizational participation, cosmopoliteness, attitude towards HYV rice, knowledge on HYV rice. These characteristics of the farmers are described in this section. The findings on the selected characteristics of the presented in Table 4.1.

Table 4.1 Salient features of the respondents with their characteristics

Characteristics	Measuring unit	Range		Categories	Farmers		Mean	SD
		Possible	Observed		Number (N=100)	Percent (%)		
Age	Actual Years	Unknown	25-70	Young aged (up to 35)	26	26	43.44	10.28
				Middle aged (36-50)	54	54		
				Old (>51)	20	20		
Level of Education	Year of schooling	Unknown	0-16	No education (0)	28	28	4.62	4.70
				Can sign only (0.5)	20	20		
				Primary (1-5)	11	11		
				Secondary (6-10)	33	33		
				Above secondary (>11)	8	8		
Family size	Rated score	Unknown	3-12	Small family (up to 4)	13	13	6.75	1.91
				Medium l family (5-6)	33	33		
				Large family (7 and above	54	54		
Farm size	Actual (in ha)	Unknown	0.24-9.03	Small (up to 0.99)	27	27	1.62	1.28
				Medium (1-2.99)	63	63		
				Large (3.00 and above)	10	10		
Annual income	Computesd Scores	Unknown	30-780	Low income, < 72.26	34	34	127.25	109.9
				Medium income ,72.26-199.51	55	55		
				High income , >199.51	11	11		
Contact with extension staff	Computed Scores	0-9	0-4	No extension contact(0)	18	18	1.32	0.95
				Low extension contact (up to 1)	45	45		
				Medium extension contact(above 1 to 2)	27	27		
				High extension contact (above 2)	10	10		
Organizational participation	Computed score	0-126	0-20	No participation (0)	24	24	5.98	5.13
				Low participation (1-3)	14	14		
				Medium participation (4-9)	40	240		
				High participation (>9)	46	46		
Cosmoploiteness	Scores	0-27	6-18	Low (up to 8)	27	27	10.11	2.55
				Medium (9-12)	58	58		
				High (13 and above)	15	15		
Attitude towards HYV rice	Scores	0-40	8-27	Slightly favourable (upto15)	31	31	17.37	3.99
				Moderately favourable (16-19)	45	45		
				Highly favourable (20 and above)	24	24		
Knowledge on HYV rice	Scores	0-50	15-47	Low (up to 24)	11	11	30.27	6.42
				Medium (25-36)	75	75		
				High(37 and above)	14	14		

4.1.1. Age

Age of the respondents ranged from 25 to 70 years, the average being 43.44 years and the standard deviation was 10.28. On the basis of age, the farmers were classified into three categories: Young aged (up to 35), middle aged (36-50) and old aged (>51). Table 4.1 contains the distribution of the respondents according to their age.

Data presented in Table 4.1 indicated that the highest proportion (54 percent) of the respondents fell in the middle aged category compared to 26 percent young and 20 percent old aged category. It may also be revealed that 80 percent of the respondents under study area comprised of the younger to middle-aged categories. Bashar (1993) and Hussen (2001) also found the similar findings in their study.

The findings indicate that a large proportion of 54 percent of the farmers were middle aged. Young people are generally receptive to new ideas and things. They have a favourable attitude towards new ideas. However, the older farmers because of their longer farm experience might have valuable opinions in regard to adoption of selected HYV rice cultivation. The extension agents can make using of these views and opinions in designing their extension activities.

4.1.2. Level of Education

Education of a respondent was measured by the level of his formal education i.e. highest grade (class) passed by him. The education score of the respondents ranged from 0 to 16, the average being 4.62 and the standard deviation was 4.70. Based on their level of education, the respondents were grouped into five categories: no education (0), can sign only (0.5), primary education (1-5), Secondary education (6-10), and above secondary education (>11). Data presented in Table 4.1 indicate that a large proportion (33 percent) of the respondents fell under category of secondary education compared to 28 percent no education, 20 percent can sign only, 11 percent having primary education and 8 percent having above secondary education. As

education can enlighten a family, it may contribute to the adoption of selected HYV rice. In fact there is no much difference between no education and can sign only. So in the study area illiteracy percentage is more than national average. Literacy percentage must be increased in the study area for the shake of adoption of agricultural innovations. The findings indicate that education of an individual is likely to be more receptive to the modern facts and ideas, they have much mental strength in deciding on a matter related to problem solving or adoption of technologies in their daily life. Thus, farming community in the area may be well considered as a suitable ground for the adoption of technologies, or execution of change programme whatever needed.

4.1.3. Family size

The family size of the farmers ranged from 3 to 12 in numbers with an average 6.75 and standard deviation 1.91. On the basis of their family size, the farmers were classified into three categories, Small Family (up to 4), Medium Family (5-6) and Large (7 and above) family.

Data presented in Table 4.1 reveal that the highest proportion (54 percent) of the farmers under the large family categories compared to 33 percent and 13 percent having medium and small family categories respectively. These findings indicate that more than 67 percent of the respondents had either large or small family size.

4.1.4. Farm size

Farm size of the respondents varied from 0.24 to 9.03 hectares. The average farm size was 1.62 hectares with a standard deviation of 1.28. The respondents were classified into three categories based on their farm size as followed by DAE (DAE, 1995): small farm size (up to 0.99 ha) medium farm size (1-2.99 ha) and large farm size (3.00 ha and above). The distribution of the respondents according to their farm size is shown in Table 4.1.

Data presented in the Table 4.1 show that the highest proportion (63 percent) of the farmers had medium farm compared to 27 percent had small farm and 10 percent having large farm.

4.1.5. Annual income

Annual income score of the respondents ranged from 30 to 780 with a mean of 127.25 and standard deviation 109.99. Based on their annual income, the respondents were classified into three categories: low income (up to 72.26), medium income (>72.26-199.51), high income (>199.51). The distribution of the respondents according to their family income is shown in Table 4.1.

Data shown in Table 4.1 revealed that highest proportion (55 percent) of the respondents had medium annul income compare to 34 percent under low income group and 11 percent under high income group. Thus, the overwhelming majority (100 percent) of the respondents had low to medium family income indicating that HYV rice cultivation technologies are usually practices by the farmers having comparatively higher economic standard.

The average income of the farmers of the study area is much higher. This might be due to the fact that the farmers of the study area were not only engaged in agriculture. They also earn from other sources such as service, business etc. Farmers with the low income generally hesitate to adopt innovations in their own farms because of their lower risk bearing ability and their inability to make necessary financial investment. It is therefore, likely that a considerable proportion of the respondents/farmers might face difficulties in adopting HYV rice.

4.1.6. Contact with extension staff

The computed extension media contact scores of the respondents ranged from 0 to 4 with an average 1.32 and standard deviation of 0 .95 against the possible range of 0 to 9. On the basis of contact with Extension staff scores, the respondents were classified into four categories: No extension contact (0), low extension contact (up to 1), medium extension contact (above 1 to 2) and high extension contact (above 2). The distribution of the respondents according to their contact with extension staff is shown in Table 4.1.

Data presented in Table 4.1 indicate that the highest proportion (45 percent) of the farmers of the study area had low extension contact, while 27 percent had medium extension contact and 18 percent had no extension contact. The proportion of respondents having high extension contact was 10 percent. The findings of the study indicated that most of the respondents had medium and low extension contact for getting necessary agricultural information. Bashar (1993), pal (1995) and Hussen (2001) observed almost similar findings regarding media contact for getting agricultural information.

4.1.7. Organizational participation

The observed organizational participation scores of the farmers ranged from 0 to 20 against the possible range 0-126 with an average 5.98 and standard deviation 5.13. Depending on the organizational participation scores, the farmers were classified into four categories namely; No participation (0), Low participation (1-3), Medium participation (4-9) and High participation (>9).

Data contained in Table 4.1 revealed that the highest proportion (46 percent) of the farmers had high organizational participation as compared to 24 percent having no participation, 14 percent low and 40 percent had medium organizational participation.

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4.1.8. Cosmopoliteness

Cosmopoliteness scores of the respondents ranged from 6 to 18 against the possible range of 0 to 27 with an average of 10.11 and the standard deviation of 2.55. On the basis of their cosmopoliteness into three categories: low cosmopolite (up to 8), medium cosmopolite (9-12) and high cosmopolite (13 and above). The distribution of the respondents according to their cosmopoliteness is shown in Table 4.1.

Data contained in Table 4.1 indicated that the majority (58 percent) of the respondents were medium cosmopoliteness compared to 27 percent of them being low cosmopoliteness and only 15 percent highly cosmopolite. Data also revealed that majority (85 percent) of the respondents had medium to low cosmoliteness.

4.1.9. Attitude towards HYV rice

Attitude towards selected HYV rice of the respondents were quantified by computing scores for their attitude towards selected HYV rice. The attitude towards HYV rice scores ranged from 8 to 27 against the possible scores 0 to 40 with an average of 17.37 and a standard deviation of 3.99. Based on the observed attitude towards the HYV rice scores, the respondents were classified into three categories: "slightly favorable" (up to 15), "moderately favorable" (16-19) and "highly favorable" (20 and above). The distribution of the respondents according to their attitude towards selected HYV rice is shown in Table 4.1.

Data presented in Table 4.1 show that the highest proportion (45 percent) of the farmers belonged to moderate favorable attitude towards HYV rice as compared to 31 percent had slightly favorable attitude and 24 percent had highly favorable attitude. This indicates that 76 percent of the respondent farmers had slightly to moderately favorable attitude towards HYV rice. Chowdhury (2003), Sarker (2002), Islam (1996)

and Sadat (2002) also were more or less in conformity with the finding of the present study.

4.1.10. Knowledge on HYV rice

Knowledge on HYV rice scores of the respondents raged from 15-47 with an average of 30.27 and standard deviation of 6.42 against the possible range 0 to 50. On the basis of knowledge on HYV rice scores, the respondents were classified into three categories, low knowledge (up to 24), medium knowledge (25 to 36) and high knowledge (37 and above). The distribution of the respondents according to their knowledge on HYV rice is shown in Table 4.1.

Data contained in Table 4.1 indicate that the majority (75 percent) of the farmers had medium knowledge compared to 11 percent fell in low knowledge and 14 percent possesses high knowledge. It reveals that the majority 86 percent of the farmers in the study area were under high knowledge to medium knowledge categories.

4.2. Adoption of HYV rice

The adoption of HYV rice of the respondents ranged from 22 to 300 against the possible range 0 to 300. The average adoption was 207.32 with a standard deviation of 56.02. Based on the adoption scores the respondents were classified into three categories. Low adoption (0 to 100), medium adoption (>100-200) and high adoption(>200-300). The distribution of respondents according to their adoption of HYV rice has been shown in Table 4.2.

Table 4.2. Distribution of the respondents according to their adoption:

Characteristics	Measuring unit	Range		Categories	Farmers		Mean	SD
		Possible	Observed		Number (N=100)	Percent (%)		
Adoption	Computed	0-300	22-300	Low adoption (0-100)	5	5	207.32	56.02
				Medium adoption (>100-200)	50	50		
				High adoption (>200-300)	45	45		

Data contained in Table 4.2 revealed that the highest proportion (50 percent) of farmers fell under the medium adoption category, while (45 percent) had high adoption and (5 percent) had low adoption. Thus an overwhelming majority of the farmers had medium to high adoption. It is a good signal for HYV rice cultivation. For clarity of understanding a bar diagram has been presented in Figure 4.1.
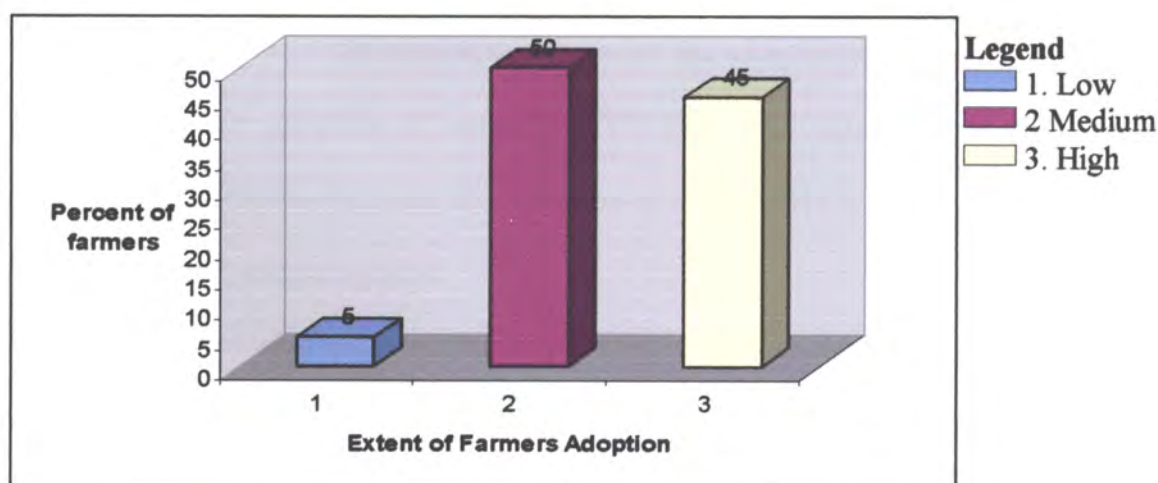
Fig. 4.1. Extent of Adoption of Selected HYV rice Cultivation by the Farmers

The researcher studied with three HYV rice varieties i.e. BR26, BRRI 28, and BRRI 29. In case of varieties BR26 it was found that 41% farmers cultivated this variety and their adoption index was 2664.35 in case of BRRI Dhan-28 it was found that 78% farmers cultivated this variety and their adoption index was 6490.86. In case of BRRI Dhan-29 it was found that 96% farmers cultivated this variety and their adoption index 11680.87.

Form the above discussion it was found most of the farmers (96 percent) adopted the variety BRRI Dhan-29.

Table 4.3 The rank order of these varieties according to there adoption index.

Variety	Adoption index	Rank order
BR26	2664.35	3
BRRI Dhan-28	6490.86	2
BRRI Dhan-29	11680.87	1

4.3. Relationships between the Selected Characteristics of the Farmers and their Adoption of Selected HYV rice

This section deals with the relationship between the selected characteristics of the farmers and their adoption of selected HYV rice. The selected characteristics constituted independent variables and adoption of selected HYV rice by the farmers constituted the dependent variable.

Pearson's product moment correlation co-efficient 'r' has been used to test the hypothesis concerning the relationships between two variables. Five percent level of significance was used as the basis for acceptance or rejection of a hypothesis. The summary of the results of the correlation co-efficient between the selected

characteristics of the respondent farmers and their adoption of selected HYV rice is shown in Table 4.4.

Table 4.4. Co-efficient of correlation between the selected characteristics of the respondents with their adoption of selected HYV rice

Dependent variable	Independent variables	Computed value of 'r'	Table value of 'r' of 98 degrees of freedom	
			at 0.05 level	at 0.01 level
Adoption of HYV rice	Age	0.235*	0.196	0.254
	Level of education	0.364**		
	Family size	0.167^{NS}		
	Farm size	0.079^{NS}		
	Annual income	0.286**		
	Contact with extension staff	0.533**		
	Organizational participation	0.021^{NS}		
	Cosmopoliteness	0.081^{NS}		
	Attitude towards HYV rice	0.741**		
	knowledge on HYV rice	0.579**		

^{NS}←Not significant

* ← Significant at 0.05 level of probability

** ←Significant at 0.01 level of probability

4.3.1. Relationship between age of the farmers and their adoption of selected HYV rice

The relationship between age of the farmers and their adoption of selected HYV rice was examined by testing the following null hypothesis:

"There is no relationship between age of the farmers and their adoption of selected HYV rice."

As show in the Table 4.4 the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.235 which led to the following observation.

- Firstly, the relationship showed a positive trend.

- Secondly, the computed value of 'r' (0.235) was greater than the table value (r = 0.196) with 98 degrees of freedom at 0.05 level of probability.

- Hence, the concerned null hypothesis was rejected.

The findings imply that the age of the farmers had significant relationship with their adoption of selected HYV rice.

It might be concluded that the age of the farmers was an important factor for adoption of selected HYV rice, The modern technology has enough potential to increase farm productivity but it should be properly used in the farm. The age of the farmers is a factor for making favorable decision towards the adoption of HYV rice. Usually the middle aged farmers are more interested to adopt HYV rice because they have more risk taking ability than the old aged farmers. The present findings although indicated a significant relationship between age and adoption of selected HYV rice but in real situation the middle aged farmers are more receptive of HYV rice than those of the old farmers.

4.3.2. Relationship between the education of the farmers and their adoption of selected HYV rice

The relationship between the education of the farmers and their adoption of selected HYV rice was examined by testing the following null hypothesis:

"There is no relationship between education of the farmers and their adoption of selected HYV rice."

The co-efficient of correlation between the concerned variables was found to be 'r' = 0.364 as shown in Table 4.4. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a tendency in the positive direction between the concern variables.

- The computed value of 'r' (0.364) was greater then the table value (r = 0.256) with 98 degrees of freedom at 0.01 level of probability.

- The concerned null hypothesis was rejected.

The findings indicate that the education of the farmers had a significant and positive relationship with their adoption of selected HYV rice. Similar findings were also observed by Hamid (1995), Khan (1993) and Hoque (1993).

Education enables individuals to gain knowledge and thus increases their power of understandings. Consequently, their outlook is broadened and horizon of knowledge is expanded. Thus adoption of selected HYV rice may be higher among those farmers who had higher education.

4.3.3. Relationship between family size of the farmers and their adoption selected HYV rice

The relationship between family size of the farmers and their adoption of HYV rice was examined by testing the following null hypothesis.

"There is no relationship between the family size of the farmers and their adoption of selected HYV rice."

The co-efficient of correlation between the concerned variables was found to be 'r'= (0.167) as shown in Table 4.4. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.

- The computer value of 'r' (0.167) was smaller than the tabulated value (r=0.196) with 98 degrees of freedom even at 0.05 level of probability.

On the basis of above findings, the null hypothesis could not be rejected. Hence, the researcher concluded that family size of the farmers had insignificant relationship with their adoption HYV rice.

4.3.4. Relationship between farm size of the farmers and their adoption of selected HYV rice

The relationship between farm size of the farmers and their adoption of selected HYV rice was examined by testing the following null hypothesis:

"There is no relationship between farm size of the farmers and their adoption of selected HYV rice."

Computed value of the co-efficient of correlation between farm size of the farmers and their adoption of selected HYV rice was found to be 'r' = 0.079 as shown in Table 4.4. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

- The relationship showed a tendency in the positive direction between the concerned variables.

- The computed value of 'r' (0.079) was found to be smaller than the table value (r = 0.196) with 98 degrees of freedom even at 0.05 level of probability.

- The concerned null hypothesis could not be rejected.

The findings imply that the farm size of the farmers had a insignificant relationship with their adoption of selected HYV rice.

4.3.5. Relationship between annual income of the farmers and their adoption of selected HYV rice

The relationship between annual income of the farmers and their adoption of selected HYV rice was examined by testing the following null hypothesis:

"There is no relationship between annual income of the farmers and their adoption of selected HYV rice."

Computed value of the co-efficient of correlation between annual income of the farmers and their adoption of selected HYV rice was found to be 'r' = 0.286 as shown in Table 4.4. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a tendency in the positive direction between the concerned variables.
- The computed value of 'r' (0.286) was found to be greater than the table value (r = 0.256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.

The researcher concluded that annual income of the farmers had a positive significant relationship with their adoption of selected HYV rice.

The findings are quite logical because HYV rice cultivation was costly. It needs more improved seed, fertilizer, insecticides, irrigation and more adoption of various intercultural practices for a long duration. Thus availability of found or cash is essential to solve those financial issues for cultivation by the farmers to a considerable extent. Hussen (2001), found that the annual income of the cane growers had a positive significant relationship with their adoption of modern sugarcane cultivation practices. Khan (1993), Pal (1995) and Chowdhury (1997) also found the similar findings.

4.3.6. Relationship between contact with extension staff of the farmers and their adoption of selected HYV rice

The relationship between contact with extension staff of the farmers and their adoption of selected HYV rice was examined to the following null hypothesis:

"There is no relationship between extension media contact of the farmers and their adoption of selected HYV rice."

The co-efficient of correlation between the concerned variables was found to be 'r' = 0.553 as shown in Table 4.4. This led to the following observations were recorded regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.

- The computed value of 'r' (0.553) was greater then the table value (r = 0.256) with 98 degrees of freedom at 0.01 level of probability.

- The concerned null hypothesis was rejected.

Thus, the researcher concluded that the contact with extension staff of the farmers had positive significant relationship with their adoption of selected HYV rice.

The contact with extension staff strengthened the base of their knowledge. The knowledge definitely acts as motivator towards adoption of new technologies. Hussen (2001) found that extension contact of the growers had significant relationship with their adoption of modern sugarcane cultivation practices. Kashem *et al.* (1990), Bashar(1993), Sarker (1997), Pal (1995), Chowdhury (1997) also found the similar findings.

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4.3.7. Relationship between organizational participation of the farmers and their adoption of selected HYV rice

The relationship between organizational participation of the farmers and adoption of HYV rice was examined by testing the following null hypothesis

"There is no relationship between organizational participation and their adoption of selected HYV rice"

Co-efficient of correlation between the concerned variables was found to be 'r'=(0.021) as shown in Table 4.4. This led to the following observations regarding the relation between the two variables under consideration:

- The relationship showed a positive trend.

- The computed value of 'r' (0.021) was smaller than the tabulated value (r=0.196) with 98 degrees of freedom even at 0.05 level of probability.

On the basis of above findings, the null hypothesis could not be rejected. Hence, the researcher concluded that organizational participation of the farmers had no significant relationship with their adoption of HYV rice.

Hossain (1983), Amin (1983), Balasubramanian and Kaul (1985) and Alam (1997) also observed similar relationship between the concerned variables.

4.3.8. Relationship between cosmopoliteness of the farmers and their adoption of selected HYV rice

The relationship between cosmopoliteness of the farmers and their adoption of selected HYV rice was examined to the following null hypothesis:

"There is no relationship between cosmopoliteness of the farmers and their adoption of selected HYV rice."

The co-efficient of correlation between the concerned variables was found to be 'r' = 0.081 as shown in Table 4.4. This led to the following observations regarding the relationship between the two variables under consideration.

- The relationship showed a positive trend.

- The computed value 'r' (0.081) was smaller than the table value (r = 0.196) with 98 degrees of freedom even at 0.05 level of probability.

- Hence, the concerned null hypothesis could not be rejected.

The researcher concluded that cosmopoliteness of the farmers had no relationship with their adoption of selected HYV rice.

Thus, findings indicated that the cosmopoliteness does not influence significantly to adopt selected HYV rice, because most of the surrounding farmers had awareness regarding year-round HYV rice yield production concept. Alam (1997) found that cosmopoliteness had no significant relationship with their use of improved farm practices in HYV rice cultivation. Hossain (1991) had also similar findings.

4.3.9. Relationship between attitude of the farmers towards HYV rice and their adoption of selected HYV rice

The relationship between attitude towards HYV rice and their adoption of selected HYV rice was examined to the following null hypothesis:

"There is no relationship between attitude towards HYV rice and their adoption of selected HYV rice."

Computed value of the co-efficient of correlation between attitude towards HYV rice and their adoption of selected HYV rice was found to be 'r' = (0.741) as shown in Table 4.4. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

- The relationship showed a positive trend.

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- The computed value of 'r' (0.741) was found to be greater than the table value (r = 0.256) with 98 degrees of freedom at 0.01 level of probability.

- Hence, the concerned null hypothesis was rejected.

The researcher thus concluded that the attitude towards selected HYV rice of the farmers had positive significant relationship with their adoption of selected HYV rice. It could influence directly to adopt new technologies. Hence, extension workers who are strongly contributed to be created need awareness, consciousness and activeness of them to adopt selected HYV rice.

4.3.10. Relationship between knowledge on HYV rice of the farmers and their adoption of selected HYV rice

The relationship between knowledge on HYV rice of the farmers and their adoption of selected HYV rice was examined by testing the following null hypothesis

"There is no relationship between knowledge on HYV rice of the farmers and their adoption of selected HYV rice."

Computed value of the co-efficient of correlation between knowledge on HYV rice of the farmers and their adoption of selected HYV rice was found to be 'r' = 0.579 as shown in Table 4.4. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

- The relationship showed a positive trend.

- The computed value of 'r' (0.579) was found to be greater than the table value (r = 0.256) with 98 degrees of freedom at 0.01 level of probability.

- The concerned null hypothesis was rejected.

The researcher concluded that the knowledge on HYV rice of the farmers had a positive significant relationship with their adoption of selected HYV rice cultivation. Hoffer and Stangland (1958), Moulik *et al.* (1966); Ernest, (1973); Ramachandran, (1974); Somasundaram and Singh (1978); Bezbora, (1980); Grewal (1980); Ali and

Chowdhury, (1983); Ali *et al.* (1986); Reddy, *et al.* (1987); Ali (1993) and Bashar (1993) found the similar findings.

4.4. Problems Faced by the farmers in Adoption of Selected HYV rice

The purpose of this section was to have an understanding on the problem faced by the farmers in adoption selected HYV rice. For clear understanding of problems of the farmers a problem faced index (PFI) for each item along with rank order was computed by using the formula mentioned in Methodology Chapter.

Distribution of the farmers according to their problem faced in each of the 15 items have been show in Table 4.5 along with problem facing indices (PFI) and rank order of each problem. Problem Facing index (PFI) of the farmers at the 15 items in adopting selected HYV rice ranged from 158 to 295 against a possible range of 0 to 300. According to the rank order the fifteen problems are described below.

Table 4.5. Rank order of the problems faced by the farmers in adopting selected HYV rice

Sl. No.	Problem	Farmers N = 100				Problem facing index	Rank order
		High (3)	Medium (2)	Low (1)	Not at all (0)		
1.	High price of HYV seeds	86	14	0	0	286	2
2.	Non-availability of HYV seed in the market	27	58	15	0	212	14
3.	Lack of technical information	62	25	13	0	249	8
4.	Inadequate knowledge about HYV rice cultivation	58	35	7	0	251	7
5.	Lack of government loan for HYV rice cultivation	36	47	17	0	219	13
6.	Requires of high amount of fertilizer in HYV rice crops	88	8	4	0	284	3
7.	High price of fertilizer	95	5	0	0	295	1
8.	Scarcity of fertilizer supply in time	70	25	5	0	265	6
9.	Lack of Integrated Pest Management (IPM) knowledge	74	20	6	0	268	5
10.	Inadequate irrigation in dry season	46	51	3	0	243	9
11.	High price of irrigation cost	82	16	2	0	280	4
12.	Arsenic problem due to deep tube well irrigation	8	42	50	0	158	15
13.	Lack of agricultural machineries and tools for HYV rice cultivation	42	40	18	0	224	12
14.	Lack of training in adoption of HYV rice cultivation	50	30	15	0	240	10
15.	Non-availability of printed materials about the cultivation of HYV rice	50	25	25	0	225	11

Data contained in Table 4.5 indicate that rank "High price of fertilizer"ranked 1st with PFI value of 295. It is the crucial problem of the farmers. During HYV rice cultivation in the field the market price of fertilizer is usually increased rapidly. This has become an usual and normal event of fertilizer distribution and management programme of the country. Probably that is why farmers perceived this problem as topmost one.

The 2nd cited problem of the farmers was "High price of HYV seeds" with the PFI of 286. Now a days the HYV seed are costly, the farmers due to the economic hardship can not effort HYV seeds of all crops. They normally used to produce seed by their own capacity. Use of local varieties of seeds led to the low production. Probably due to this reason farmers faced problem in this respect.

The 3rd cited problem of the farmers was "High amount of fertilizer requires in HYV rice crops" with the PFI 284. Farmers usually cultivate traditional variety, requires low amount of the fertilizer but whenever adopting modern variety requires high amount of fertilizers. Probably due to the reason farmers found problem in this respect.

The 4th cited problem of the farmers was "High price of irrigation water" with the PFI at 280. The irrigation cost is high because the fuel oil cost is high. In addition management of DTW (Deep Tube Well) and STW (Shallow Tube Well) is also high. So, it is a problem for the farmers hindering the adoption of HYV rice cultivation. Furthermore, the farmers in selling their goods do not get reasonable price. Probably due to this reason farmers faced problem in this respect.

The 5th cited problem of the farmers was "Lack of Integrated Pest Management (IPM) knowledge" with the PFI of 268. Farmers did not understand and realize about IPM. Probably due to this reason farmers faced problem in this respect.

The 6th cited problem was "Scarcity of fertilizers supply in time" with the PFI of 265. The farmers do not get fertilizer in time when they go for cultivation of HYV rice.

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Fertilizer was not available at the village market due to lack of transport facilities. Probably due to the reason farmers faced problem in this respect.

The 7th problem of the farmers was "Inadequate knowledge about HYV rice cultivation" with the PFI of 251. This problem arise due to their lack of illiteracy and unavailable training facilities.

The 8th problem of the farmers was "Lack of technical information" with the PFI of 249. Extension worker and development workers do not provide technical support or advice to the farmers.

The 9th Problem of the farmers was "inadequate irrigation in dry season" with the PFI 243. Cultivation of HYV rice requires adequate water supply specially in dry season. For scarcity of irrigation, farmers could not produce better yield. There were also not sufficient deep tube wells and available water in the river during dry season in the study area for supply of irrigation water to the field. Probably due to this reason farmers faced problem in this respect.

The 10th problem of the farmers was "Lack of training in adoption of HYV rice cultivation" with the PFI of 240. There were no facilities for training and they could not know how to cultivate HYV rice through modern method. Probably due to this reason rural farmers faced problem in this respect.

The 11th cited problem of the farmers was "non availability of printed materials about the cultivation of rice" with the PFI of 225. Farmers did not understand the technique of HYV rice cultivation due to lack of available printed materials. Probably due to this reason farmers faced problem in this respect.

The 12th problem of the farmers was "Lack of agricultural machineries and tools for HYV rice cultivation" with the PFI of 224. The farmers of the study area did not get

agricultural machineries and tool timely. Probably due to this reason faced problem in this respect.

The 13th problem of the farmers was "Lack of Government loan for HYV rice cultivation" by using modern rice cultivation technologies with PFI of 219. The socio-economic conditions of the rice farmers were not good. They require incentives in adopting HYV rice cultivation. In absence of government loan, the farmers face difficulties in adopting such cultivation.

The 14th problem of the farmers was "Non-availability of HYV seed in the market" with the PFI 212. The farmers of the study area do not get HYV seed during peak period of HYV rice season. Probably due to this reason farmers faced problem in this respect.

The 15thproblem of the farmers was "Arsenic problem due to deep tube-well irrigation" with the PFI 158. Water table of the study area was deeper that is why farmers faced Arsenic problem to the irrigation. Probably due to lack of sufficient water from other sources created this problem.

Problem faced by the farmers in adopting selected HYV rice has been diagrammatically shown in Fig.4.2.
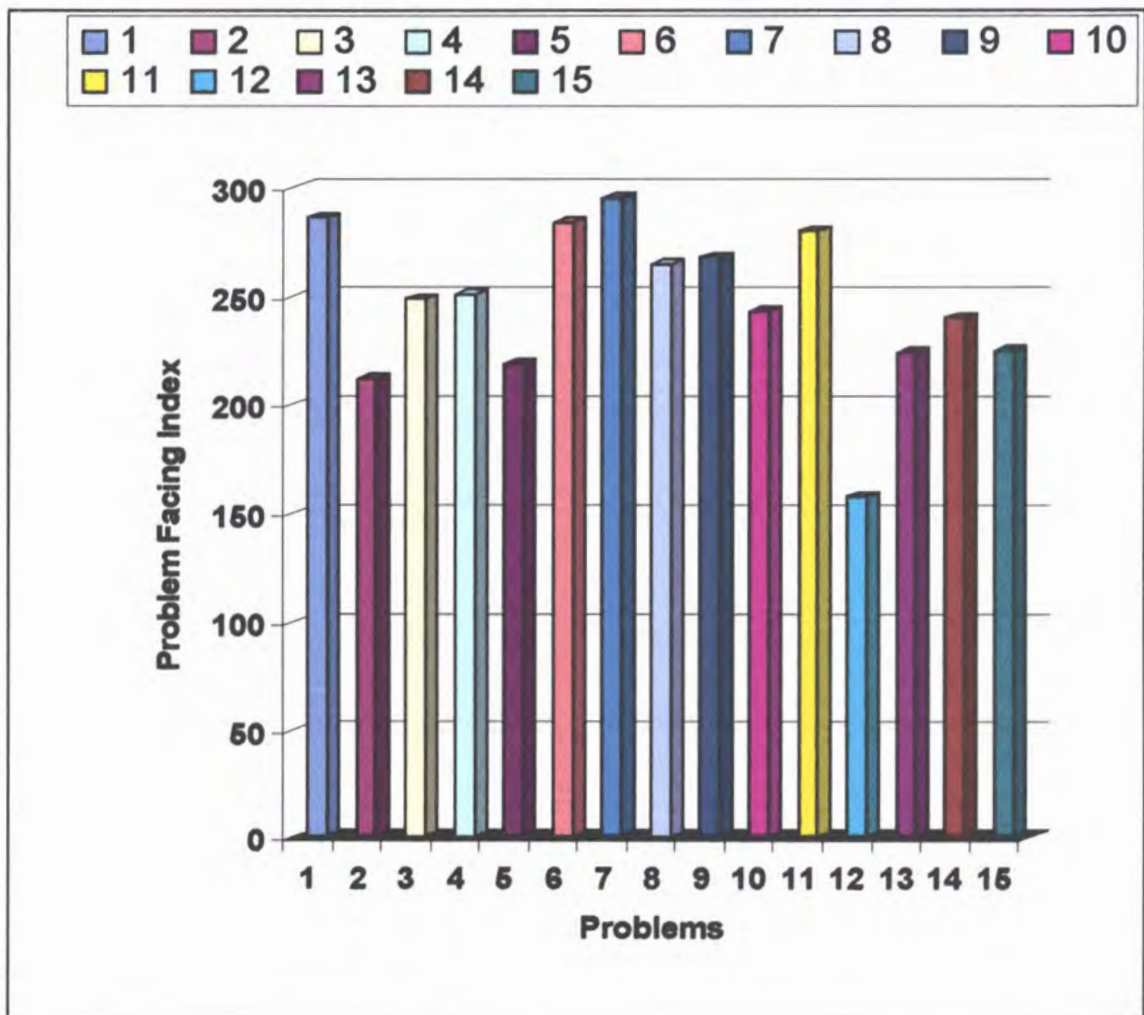
Fig. 4.2 Bar graph showing the extent of problems faced by the farmers in adopting of

selected HYV rice

1 = High price of HYV seeds; 2 = Non availability of HYV seeds in the market; 3 = Lack of technical information; 4 = Inadequate knowledge about HYV rice cultivation; 5 = Lack of government loan for HYV rice cultivation; 6 = Requires of high amount of fertilizer in rice crops; 7 = High price of fertilizer; 8 = Scarcity of fertilizer supply in time; 9 = Lack of IPM knowledge; 10 = Inadequate irrigation in dry season; 11 = high price of irrigation water; 12 = Arsenic problem due to deep tube well irrigation; 13 = Lack of agricultural machineries and tools for HYV rice cultivation; 14 = Lack of training in adoption of HYV rice cultivation; 15 = Non-availability of printed materials about the cultivation of rice.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This Chapter presents the summary of the findings, conclusion and recommendations of the study.

5.1. Summary of the findings

The major findings of the study are summarized below:

5.1.1. Selected characteristics of the HYV rice farmers

Age

Age of the farmers ranged from 25-70 years. The average 43.44 years with a standard deviation 10.28. The highest proportion (54 percent) of the farmers was middle aged, while 26 percent were young and 20 percent old.

Level of Education

Education of the farmers ranged from 0 to 16 years of schooling. The average score being 4.62 and the standard deviation was 4.70. Large proportion (33 percent) of the farmers having secondary education (scores 6-10) compared to 28 percent having no education (score 0), 20 percent having can sign only (scores, 0.5), 11 percent having primary education scores (1-5) and 8 percent were above secondary education (scores >10).

Family size

The family size of the farmers ranges from 3-12 with an average of 6.75 of and the standard deviation was 1.91. The highest proportion (54 percent) were found to have large family compared to 13 percent small family and 33 percent medium family size categories.

Farm size

Farm size of the farmers ranges from 0.24-9.03 hectares with an average 1.62 and standard deviation 1.28. The highest proportion (63 percent) of the farmers belonged to medium farm size compared to 27 and 10 percent with small farm size and large farm size respectively.

Annual income

Annual income scores of the farmers range from 30-780 with an average of 127.25 and the standard deviation 109.99. The highest proportion 55 percent the farms having had medium annual income compared to 34 percent under low annual income and 11 percent having high annual income.

Contact with extension staff

Contact with extension staff of the farmers ranged from 0 to 4 the average score being 1.32 with the standard deviation was 0.95. The highest proportion 45 percent of the respondents had low contact compared to 18 percent no extension contact, 27 percent medium extension contact and 10 percent high extension contact.

Organizational participation

Organizational participation of the farmers ranged from 0-20. The average score being 5.98 with the standard deviation 5.13. The highest proportion (46 percent) of the farmers have high organizational participation compared to 24 percent no participation 14 percent low participation and 40 percent medium participation.

Cosmopoliteness

Cosmoploiteness scores of the farmers ranged from 6-18. The average cosmoploiteness was 10.11 with the standard deviation 2.55. The highest proportion (58 percent) of the farmers had medium cosmopoliteness compared to 27 percent low cosmopoliteness and 15 percent high cosmopoliteness

Attitude towards HYV rice

Attitude scores of the farmers ranges from 8-27 against the possible score 0-40. The average attitude score was to be 17.37 with standard deviation of 3.99. The highest proportion (45 percent) of the farmers had moderately favorable attitude compared to 31 percent slightly favorable attitude and 24 percent having highly favorable attitude.

Knowledge on HYV Rice

Knowledge on HYV rice scores of the farmers ranged from 15-47 against the possible range 0-50. The highest proportion (75 percent) of the farmers had medium knowledge compared to 21 percent had low knowledge and 14 percent had high knowledge.

5.1.2. Adoption of HYV rice

Adoption scores of the farmers ranged from 22-300 against the possible range 0-300. The average adoption score was found to be 207.32 with a stand and deviation of 56.02. The highest proportion 55 percent had medium adoption and 45 percent high adoption and 5 percent had low adoption.

The researcher researched with three HYV rice varieties i.e BR26, BRRI Dhan-28and BRRI Dhan-29. In case of varieties BR-26 it was found that 41% farmers cultivated this variety and their adoption index was 2664.35 in case of BRRI Dhan-28 it was found that 78% farmers cultivated this variety and their adoption index was 6490.86. In case of BRRI Dhan-29 we found that 96% farmers cultivated this variety and their adoption index 11680.87.

5.1.3. Relationship between the selected characteristics of the farmers and with their adoption selected HYV Rice.

To explore the relationship of the ten selected characteristics of the farmers with their adoption of selected HYV rice. Pearson's product moment co-efficient of correlation (r) was computed.

Correlation analysis indicate that age, level of education, annual income, contact with extension staff, attitude towards HYV rice and knowledge on HYV rice of the farmer were found to have positive significant relationship with their adoption of selected HYV rice, where as family size, farm size, organizational participation and cosmopoliteness were found to have insignificant relationship with their adoption of selected HYV rice.

5.1.4. Problem faced by the farmers adopting selected HYV rice

The farmers express some problems as for effective dissemination of HYV rice cultivation. An attempt was made to identify the problems faced by the farmers in adopting HYV rice. As many as 15 problems were mentioned by the farmers and ranked based on problem facing index. The problems were as follows according to rank order.

1. High price of fertilizer
2. High price of HYV seeds
3. Requires of high amount of fertilizer in rice crops
4. High price of irrigation water
5. Lack of IPM knowledge
6. Scarcity of fertilizer supply in time
7. Inadequate knowledge about HYV rice cultivation

8. Lack of technical information

9. Inadequate irrigation in dry season

10. Lack of training in adoption of HYV

11. Non availability of printed materials about the cultivation of rice

12. Lack of agricultural machineries and tools for HYV rice cultivation

13. Lack of government of HYV seeds in the market

14. Non availability of HYV seeds in the market

15. Arsenic problem due to deep tube-well irrigation.

5.2. CONCLUSION

Findings of the study and the logical interpretations of their meaning in light of other relevant facts prompted the researcher to draw the following conclusions:

1. The adoption of selected HYV rice of the farmers was moderate, as nearly 75 percent of the farmers had medium to high adoption. However, to meet the ever demand of food shortage, there is a need to further enhance the rate and extent of adoption of selected HYV rice among the farmers. Particularly, both the Government Organization (GO) and Non-Government Organization (NGO) workers should provide appropriate technical and management related information to the farmers through continued extension and other support services. It may be concluded that the adoption of selected HYV rice was moderate and needs further improvement.

2. Most of the HYV rice farmers were middle aged. Age of the HYV rice farmers showed positive and significant relationship with their adoption.

3. Findings of the study showed a significant relationship between education and adoption of HYV rice. Education is a contributory factor of gaining

knowledge and skill and has creating positive attitude in an individual. There is a need to enhance the educational level of the farmers. It may, therefore, be concluded that enhancement of adult learning centres formal education among the farmers may contribute positively towards the formation of favorable opinion towards the selected HYV rice and subsequently their increased adoption by the farmers.

4. The annual income of the farmers had significant positive relationship with their adoption of HYV rice. It leads to the recommendation that extension service should provide adequate farm management advice to the farmers for increasing their farm income. It is real fact that if income be increased, farmer's receptive capacity to adopt improved technologies will be increased and thereby production will be increased. Ultimately it will create a vicious circle of improvement for the clientele.

5. Contact with extension staff of the farmers had a positive significant relation with their adoption of selected HYV rice. It can be concluded that any attempt to increase the contact with extension staff of the farmers would be helpful to increase the level of adoption of HYV rice.

6. Attitude towards HYV rice of the farmers had a significant positive relationship with their adoption of HYV rice. The respondents having highly favorable attitude, they are able to adopt selected HYV rice. It can be concluded that attitude is a valuable factors for adoption of selected HYV rice.

7. Knowledge on HYV rice of the farmers had a significant positive relationship with their adoption of HYV rice. Having more knowledge an individual farmer becomes aware of the recent information on the various aspects of

HYV rice. So, it can be concluded that knowledge is an important factor for higher adoption of selected HYV rice by the farmers.

5.3. RECOMMENDATIONS

5.3.1. Recommendation for policy Implication

Based on the findings and the conclusions of the study the following recommendations are made

1. An increased rate and extent of adoption of selected HYV rice cultivation are vitally important for increasing the HYV rice production. But a considerable portion (74 percent) of the farmers had either medium on low adoption of the HYV rice cultivation. It is, therefore, recommended that an effective step should be taken by the Department Agricultural Extension (DAE) and Non-Government Organizations (NGOS), and other extension providers for strengthening extension services in order to change adoption behavior of the HYV rice growers.

2. Age of the HYV rice farmers had positive significant relationship with their adoption of HYV rice. It is recommended that the extension workers should work with the farmers of all age groups to promote cultivation of HYV rice. However, they will have to work more with comparatively larger member of middle aged farmers as majority of the farmers belonged to this group.

3. Education of the HYV rice farmers had highly significant relationship with their adoption of HYV rice. It indicates the importance of education of the HYV rice growers for rapid adoption of HYV rice. The findings also indicate that 28 percent of the farmers have no education under the above situation; it may be recommended that arrangements should be made for increasing the

literacy level of the HYV rice farmers by the concerned authorities through the establishment of night school, adult learning centres and other extension methods.

4. Contact with extension staff of the farmers in the study area has been found to be quite low such contact is very necessary for high adoption of HYV rice. The findings of the study, showed that contact with extension staff of the HYV rice farmers had highly significant positive correlation with the adoption of HYV rice Hence the concerned authorities should take cognizance of these facts and should take necessary steps to increase the contact with extension staff of the farmers that means the extension workers should maintain a close link with the farmers.

5. Attitude of the farmers had significant and positive correlation with the adoption HYV rice. To improve the attitude of the farmers towards HYV rice effective policy is needed. Hence, relevant authorities should be taken, an appropriate policy, to motivate of the farmers to make favourable attitude towards the adoption of HYV rice. So, concern authorities should take necessary steps to improve attitude towards HYV rice cultivation.

6. Knowledge on HYV rice was significant and positive correlation to the adopting of HYV rice. This indicates an urgent need for an effective educational training programme to increase the knowledge for developing knowledge of the farmers on the adoption of HYV rice. Hence, it may be recommended that arrangements should be made by the relevant authorities to increase the knowledge on HYV rice of the farmers through increased extension contact, training programme and so on.

7. Farmers faced considerable problems in connection with adoption of selected HYV rice cultivation. It is, therefore, recommended that concerned authorities should give attention to the solution of the problems as much as possible. Subsequently the authorities should try to remove those problems and should try to reduce the problems.

5.3.2. RECOMMENDATIONS FOR FURTHER STUDY

A small piece of study as has been conducted can not provide all information for the proper understanding of the farmers towards the HYV rice cultivation. Therefore, the following recommendations were made for further study.

1. The present study was conducted at Rajpat Union under Kasiani Upazila in Gopalgonj district. It is recommended that similar studies should be conducted in other areas of Bangladesh.

2. This study investigated the relationship between ten characteristics of the farmer with their adoption of HYV rice. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers.

3. The present study was concerned only with the extent of adoption of selected HYV rice. It is therefore, suggested that future studies should include attributes in relation to adoption stages and adopter categories.

4. An exhaustive study on problems faced by the farmers in the adoption of selected HYV rice also be undertaken.

5. Research should also be undertaken to identify the factors causing hindrance to the high adoption of HYV rice.

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AN INTERVIEW SCHEDULE
On

Adoption of Selected High Yielding Varieties of Rice by the Farmers of Rajpat Union under Kasiani Upazila in Gopalgonj District

Name of the farmer ....

Village ....   P.O. ....

Dist. ....

(Please answer the following questions)

1. **Age**

   How old are you? .... years .

2. **Level of Education**

   What is your level of education?

   I. Can not read and write, but can sign only.....
   II. Can't read and write ....
   III. Read up to class ....

3. **Family size**

   Please mention the number of your family............

4. **Farm size (in ha):** Give a description of your land ownership and land.

Sl. No.	Types of ownership	Area (ha)
1	Homestead (Including pond)	
2	Own land under own cultivation	
3	Own land given to others on borga	
4	Land taken from others on borga	
5	Land taken from others on lease	
6	Own land given to others on lease	
7	Others	

5. Annual Income (in taka)
A. Income from agricultural crops

Sl. No.	Name of crops	Production (Kg or Mound)	Value / Kg or Mound	Total value (Tk)
1	Aus			
2	Aman			
3	Boro			
4	Wheat			
5	Jute			
6	Pulse			
7	Oil crops			
8	Spices			
9	Vegetables			
10	Fruits			
11	Others			
12	Sugarcane			
13	Others (specify)			
	Sub-total (A)			

B. Income from domestic animals and Fisheries:

Sl. No.	Source of income	Total production (Kg/Mounds)	Value/ Kg or Mound	Total value (Tk)
1	Livestock			
2	Poultry			
3	Fisheries			
	Sub-total (B)			

C. Income from non-agricultural sources:

Sl. No.	Sources of income	Total value (Tk)
1	Service	
2	Business	
3	Day labor	
4	Other family members	
5	Others (if any)	
	Sub-total (C)	

6. Contact with extension staff

Sl. No.	Communication media	Extent of communication media			
		Regularly	Occasionally	Rarely	No association
1	Sub-Assistant Agriculture Officer	8 or more times per three month	4-7 times per three month	1-3times per three month	
2	Agricultural Extension oFficer (AEO)	4 or more times per six month	2-3 times per six month	1 times per six month	
3	Upazilla Agricultural Officer (UAO)	4 or more times per year	2-3 times per year	1 times per year	

7. Organizational participation

Please mention duration of participation in the following Organizations that you are associated with:

Name of the organization	No association	Duration (Year)		
		General member with duration	Executive member with duration	President/ Secretary of the committee with duration
a. Union council				
b. Cooperative Society				
c. NGO (specify the name)				
d. School Committee				
e. Madrasa Committee				
f. Bazar Committee				

8. Cosmopoliteness

How often do you visit the place outside your village for various purposes

Place of visit	Frequency of visit			
	Frequently	Occasionally	Rarely	Never
Visit outside your village	5 or more times per month	3 to 4 times per month	1 to 2 times per month	
Visit to Upazila Headquarter	5 or more times per year	3 to 4 times per year	1 to 2 times per year	
Visit to City town	5 or more times in life	3 to 4 times in life	1 to 2 times in life	
Visit to relative's house	10 or more times per month	3 or 5 times per month	1 or 2 times in a month	
Visit to agricultural fair, rally exhibition	One or more times in a year	One time in two years	One time in five years	
Visit to other districts	3 or more times in a year	2 times per year	One time per year	
NGO Office	5 or more times per month	3 to 4 times per month	1 to 2 times per month	
Special day	5 or more times per year	3 to 4 times per year	1 to 2 times per year	
Attending Village development meeting	3 or more times per month	2 to 3 times per month	1 to 2 times per month	

9. Attitude of rice growers towards HYV rice production

Sl. No.	Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1 (-)	HYV seeds is costly					
2 (+)	Less insect infestation					
3 (-)	There is no significant yield difference between the HYV & LIV rice					
4 (+)	Higher tiller in HYV rice cultivation					
5 (-)	Use of pesticide is a must					
6 (+)	Integrated Pest Management (IPM) is Better than Other Management					
7 (+)	HYV rice is more disease resistant					
8 (-)	More fertilizer consuming					
9 (+)	Comparatively less production period					
10 (-)	HYV cultivation needs more irrigation					

10. Knowledge on HYV rice cultivation

Please answer the following questions

Sl. No.	Questions	Score Weighted	Obtained
1.	Name four rice varieties?	4	
2.	How many seedlings do you transplant per hill in rice?	2	
3.	Mention two major function of urea on rice	2	
4.	What is the required rate of fertilizer (like urea, TSP and MP) per hectare?	4	
5.	When the first top dressing of urea is done after transplanting?	2	
6.	Name four common fertilizers available at your local market	4	
7.	Mention the name of two organic manures	2	
8.	Mention three important disease of rice	4	
9.	Mention two major harmful insects of rice	2	
10.	What are the deficiency symptoms of TSP fertilizer?	2	
11.	Name two beneficial pests	2	
12.	Name two green manuring crops	2	
13.	Name three insecticides available in your local market	2	
14.	What is IPM?	4	
15.	How would you use IPM in field?	2	
16.	Name two predator insects	2	
17.	What do you mean by balanced fertilizer?	2	
18.	Do you have any idea of split fertilizer application?	2	
19.	What are the characteristics of good seed?	2	
20.	How would you improve of your soil?	2	

11. Adoptions of HYV rice varieties

Recommended Variety	Years of adoption	Cultivated Area (ha)	Cultivable Area (ha)
a. BR 26			
b. BRRI Dhan28			
c. BRRI Dhan29			

12. Problems

Please mention the extent of problems that you faced during use of HYV rice cultivation

Sl. No.	Problems	Extent of problem			
		Severe	moderate	low	Not at all
1.	High price of HYV seeds.				
2.	Non availability of HYV seeds in the market				
3.	Lack of technical information.				
4.	Inadequate knowledge about HYV rice cultivation.				
5.	Lack of Government loan for HYV rice cultivation.				
6.	Requires of high amount of fertilizers in rice crops.				
7.	High price of fertilizer.				
8.	Scarcity of fertilizer supply in time.				
9.	Lack of IPM knowledge.				
10.	Inadequate irrigation in dry season.				
11.	High price of irrigation water.				
12.	Arsenic problem due to deep tube well irrigation				
13.	Lack of agricultural machineries and tools for HYV cultivation.				
14.	Lack of training in adoption of HYV rice cultivation.				
15.	Non availability of printed materials about the cultivation of rice.				

Thank you for your kind cooperation and help

Interviewed by-

Name:

_____

Signature with date

APPENDIX –B

Correlation Matrix of the dependent and independent variables (N = 100)

Variables code	A	B	C	D	E	F	G	H	I	J	K
A	1.000	-	-	-	-	-	-	-	-	-	-
B	-1.43	1.000	-	-	-	-	-	-	-	-	-
C	0.261**	-0.082	1.000	-	-	-	-	-	-	-	-
D	0.215*	0.061	0.215*	1.000	-	-	-	-	-	-	-
E	0.273**	0.137	0.331**	0.807**	1.000	-	-	-	-	-	-
F	-0.017	0.312**	0.100	0.086	0.259**	1.000	-	-	-	-	-
G	-0.006	0.258**	0.127	0.199*	0.216*	0.053	1.000	-	-	-	-
H	0.020	0.355**	0.151	0.286**	0.251*	0.194	0.630**	1.000	-	-	-
I	0.100	0.373**	-0.032	-0.076	0.017	0.530**	0.050	0.196	1.000	-	-
J	0.216*	0.431**	0.160	0.288**	0.424**	0.454**	0.360**	0.399**	0.480**	1.000	-
K	0.235*	0.364**	0.167	0.079	0.286**	0.553**	0.021	0.081	0.741**	0.579**	1.000

*Correlation is significant at 0.05 level of probability
** Correlation is significant at 0.01 level of probability

A= Age

B= Level of Education

C= Family Size

D= Farm Size

E= Annual Income

F= Contact with Extension Staff

G= Organizational Participation

H= Cosmoploiteness

I= Attitude Towards HYV rice

J= Knowledge on HYV rice

K= Adoption