

**USE OF BARI RECOMMENDED BANANA CULTIVATION  
PRACTICES BY THE FARMERS**

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### CERTIFICATE

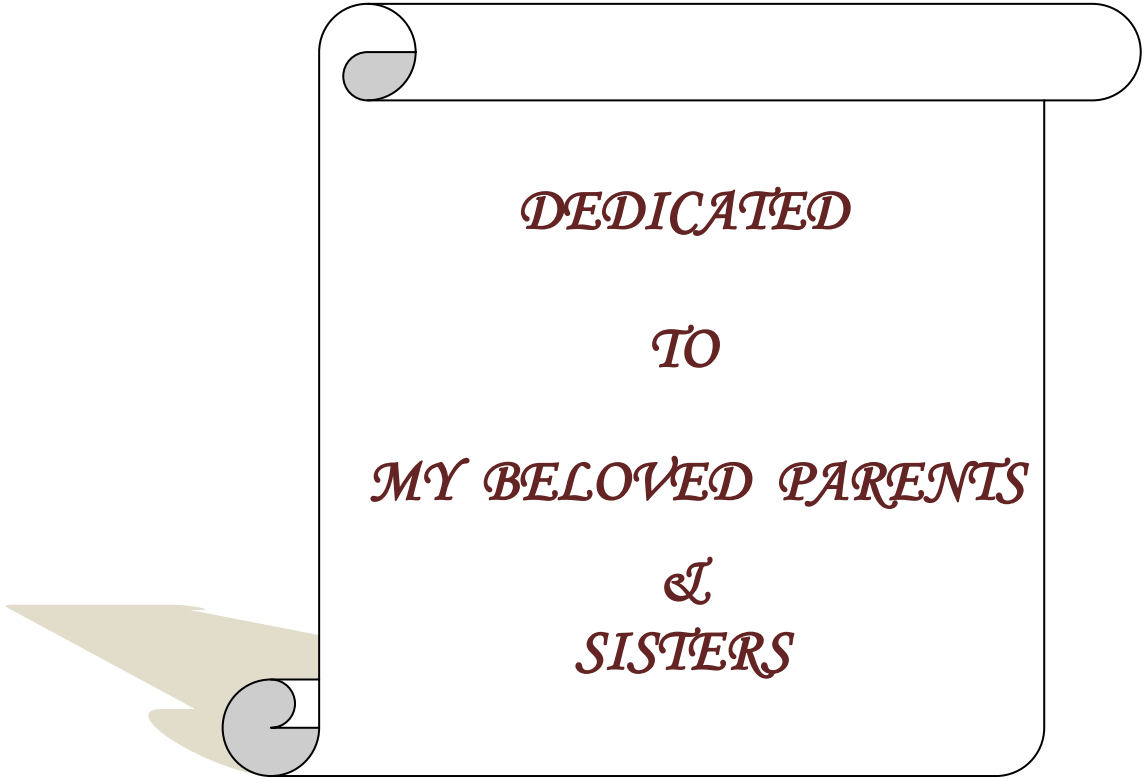
This is to certify that the thesis entitled '**USE OF BARI RECOMMENDED BANANA CULTIVATION PRACTICES BY THE FARMERS**' submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension & Information system**, embodies the result of a piece of *bonafide* research work carried out by **MUHAMMAD ZUNAID HABIB**, Registration No.: **10-03870** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this investigation has duly been acknowledged.

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## ACRONYMS AND ABBREVIATIONS

BAU = Bangladesh Agricultural University

BBS = Bangladesh Bureau of Statistics

BARI = Bangladesh Agricultural Research Institute

DAE = Department of Agricultural Extension

GoB = Government of Bangladesh

*et al.* = All others

FAO = Food and Agriculture Organization of The United Nations

HSTU = Hajee Mohammad Danesh Science and Technology University

PFI = Problem Faced Index

SAU = Sher-E-Bangla Agricultural University

SAAO = Sub-Assistant Agriculture Officer

UAO = Upazilla Agricultural Officer

NACA=Not Available for Cultivation Area

CWL = Cultivable Waste Land

CFA = Current Fallow Land

SCA = Single Cropped Area

DCA = Double Cropped Area

TCA = Triple Cropped Area

QCA= Quadruple Cropped Area

NCA= Net Cropped Area

GCA = Gross Cropped Area

## **USE OF BARI RECOMMENDED BANANA CULTIVATION PRACTICES BY THE FARMERS**

### **ABSTRACT**

Use of BARI recommended cultivation practices on various crops by the farmers can bring significant changes in per unit area production and can ensure food supply and food safety. However, use of BARI recommended banana cultivation practices are not well focused. The study was undertaken mainly to determine the use of BARI recommended banana cultivation practices by the banana farmers and to explore the contribution of the selected characteristics to their use of BARI recommended banana cultivation practices. Data were collected from the banana farmers of 11 blocks of different unions of Sadar upazilla under Kushtia district by using a pretested interview schedule during the period from December 01, 2016 to December 30, 2016. The sample size of the study was 115 banana farmers which was drawn from a population of 375 using proportionate random sampling technique. It was found that 88.6 percent of the farmers had medium use of banana cultivation practices while 7.0 percent had low use and 4.4 percent had high use of banana cultivation practices. Step wise multiple regressions were done to explore the contribution of selected characteristics of banana cultivation practices which showed that out of 9 independent variables only 3 independent variables namely extension media contact, innovativeness and annual income from banana cultivation had significant contribution on the use of BARI recommended banana cultivation practices. These three variables combined explained 43 percent of the total variation in use of BARI recommended banana cultivation practices while extension media contact contributed 29.80 percent, innovativeness contributed 10.70 percent and annual income from banana cultivation contributed 2.50 percent. So, it is imperative that necessary steps be taken to expand and strengthen the existing activities of knowledge and skill development for better use of cultivation practices to increase banana production for ensuring food security in Bangladesh.

# CHAPTER I

## INTRODUCTION

### 1.1 General Background

Banana (*Musa sapientum* L.) is one of the important tropical fruits, with a global annual production of about 102 million metric tons in which Asia contributes to 63 million tons (FAO, 2010). Bangladesh produces 4.22 million tons of fruits annually from 0.15 million hectares of land. Mango, banana, jackfruit, pineapple, papaya, litchi and guava are the major fruits among these fruits. Banana ranks first in terms of area coverage (0.06 million hectare) and second in terms of production (0.82 million tons) in Bangladesh (BBS, 2010).

The United Nations Food and Agriculture Organization rank bananas as the world's fourth most important crop after the major cereals (FAO, 2004). Bangladesh ranks 14th among the top 20 banana producing countries in the world (Assani *et al.*2001). The total per capita consumption in Bangladesh is about 4.7 kg. This is very much lower than that consumed by Europe especially Belgium (26.7 kg), Sweden (16.7 kg) and Germany (14.5 kg) while USA consumed 13.1 kg and UK at 10.5 kg (Siti, 1998).Banana can solve this nutritional gap easily. Banana is one of the most important food and cash crop in Bangladesh and grown as year round fruit. In addition, banana stood first position among the fruits produced in the country and supplies 42% of the total fruit requirements in the country and also its financial return as a crop is higher compared to other fruits and field crops (Haque,1988). A number of dessert banana varieties generally grow in Bangladesh, but their performance is not equally well in all regions due to difference in varietal adaptability and microclimatic variation (Ahmad *et al*, 1974).

In Bangladesh banana is the only fruit crop which is available throughout the year and consumption rate is also higher than any other fruits (Mukul & Rahman, 2013). We get 89 kcal energy from 100g banana and in 100 gm banana it contains good amount of Manganese (13%), Potassium (8%) and Iron (2%) (Wiki, 2017). So we need to consume banana every day and for this production of banana is needed to be increased.

Major districts where banana is cultivated are Gazipur, Rangpur, Kushtia, Bogra, Natore, Pabna, Noakhali, Narsingdi, Faridpur, Khulna etc. in our country. Wild grown banana are found in the districts like Sylhet, Moulvibazar, Netrokona, Rangamati, Khagrachhari, Bandarban. Generally banana plants are found throughout the country in most of the rural homesteads. There are a number of banana cultivars in Bangladesh. Among them, commercial cultivars are BARI Kola-1, BARI Kola-2, Amritsagar, Sabri, Champa and Kabri. The other cultivars are Mehersagar, Dudsagar, Agniswar, Genasundari, Kanaibanshi, Basrai, Binisuta, etc. In Bangladesh, total estimated production of banana was 770203 metric tons and cultivated area is 114469 acres in 2013-14 (BBS, 2014). Rangpur is the highest banana produced district whereas Kushtia is the second highest production area in Bangladesh according to Yearbook of Agricultural Statistics – 2014.

The annual production of banana in our country of different fiscal years has been shown below:

**Table 1.1 Area & production of banana by top 5 districts of Bangladesh (2011-12 to 2013-14)**

(Area in acres & production in metric tons)

Regions	2011-12		2012-13		2013-14	
	Area	Prod.	Area	Prod.	Area	Prod.
Rangpur	7747	71389	8094	132993	7754	99860
<b>Kushtia</b>	<b>8023</b>	<b>99402</b>	<b>7963</b>	<b>94880</b>	<b>8347</b>	<b>99751</b>
Tangail	12464	96954	11635	92139	11635	92897
Jessore	11625	60949	11646	61839	8634	52289
Rangamati	9033	42183	8633	37064	9715	44902
Mymensing	5454	20572	5501	22090	5270	21921
<b>Bangladesh</b>	<b>121718</b>	<b>745927</b>	119325	774286	<b>11449</b>	<b>770203</b>

Source: Yearbook of Agricultural Statistics – 2014

Among all banana producing countries India ranks first and it is followed by China, Philippine, Brazil and Ecuador for total yield production scenario (Worldatlas, 2016). For comparative study a table has been created on area, yield rate and production of banana in India, China, Philippine and Bangladesh based on sources respectively (DES, 2011; Farquhar, 2012; DA, 2011 and BBS, 2014) is given below :

**Table 1.2 Area, yield rate & production of banana of different countries (2011-12)**

Countries	Area '000' acre	Per acre yield(tons)	Production '000'tons
India	804	34318	27592
China	1020	11838	12075
Philippine	1112	8239	9165
Bangladesh	122	6126	746

In the year of 2011-12 India produced 34318 tons of bananas per acre yield whereas Bangladesh produced only 6126 tons of bananas per acre yield though environmental conditions are quite same. There are huge gaps in yield as well as in production.

Banana production can be enhanced if appropriate technologies are used by the farmers who are in the primary unit for adoption of improved practices. Information source play an important role to transfer the message of using agricultural technologies from source to the crop growers. DAE has been trying to enhance crop production in the field as well as homestead garden especially through cultivation of crops. BARI (Bangladesh Agricultural Research Institute) also trying to enhance crop production. Progress in production of crops like banana of our country is not up to the expectation. Hence, one may assume that the message of use of banana cultivation technologies has not yet been properly informed to the farmers and that the rate of diffusion of new knowledge is inadequate. A sound system of communication for the effective flow of scientific information from its source to the ultimate users has become a burning question (Rogers, 1995). To enhance the agricultural production the use of agricultural technology is important. In addition the immediacy and effectiveness of technology diffusion are greatly demanded. The flow of information should be well interpreted, understandable, accepted and liked by the banana farmers keeping these things in mind the researcher has decided to undertake the present study entitled “Use of BARI Recommended Banana Cultivation Practices by the Farmers”

## **1.2 Statement of the problem**

Low productivity of agriculture is the economic problem of agriculture in Bangladesh which leads to low income and less use of the agricultural upgraded managements (BBS, 2014). Due to low income and insufficient knowledge, necessary steps cannot be made for improving productivity and procurement of improved quality crops and practices (Mandal, 2015). The use of BARI recommended practice could increase the yield of crops drastically. Likewise banana production can be improved by using proper practices. It is necessary to



have a clear understanding of the use of banana production technologies for profitable production. However, use of BARI recommended banana cultivation practices are not well focused. An endeavor was made to undertake the research in view of the overall discussion entitled “Use of BARI recommended banana cultivation practices by the farmers” as there were very few researches related to use of banana cultivation practices to measure the condition of practices using by the farmers . The main purpose of the study was to determine the use of BARI recommended banana cultivation practices by the farmers and to explore the contribution of the selected characteristics of the banana farmers to their use of BARI recommended banana cultivation practices. To spread the cultivation of banana in other parts of the country, the knowledge on the present situation of banana cultivation practices in this region will be significantly contributory to design appropriate programs for its widespread profitable cultivation. The study aimed at providing information regarding the following queries:

1. What is the extent of use of BARI recommended banana cultivation practices?
2. What are the characteristics of the farmers who cultivate banana?
3. Is there any contribution of the farmers’ selected characteristics to their use of BARI recommended banana cultivation practices?

### **1.3 Specific Objectives**

The following specific objectives were formulated in order to give proper direction to the study:

1. To assess the following selected characteristics of the banana farmers
  - i. Age

- ii. Education
  - iii. Family size
  - iv. Annual Income from banana cultivation
  - v. Experience in banana cultivation
  - vi. Knowledge on banana cultivation
  - vii. Innovativeness
  - viii. Extension media contact and
  - ix. Problem faced by the banana farmers;
2. To determine and describe the use of BARI recommended banana cultivation practices by the farmers;
  3. To explore the contribution of the selected characteristics of the banana farmers to their use of BARI recommended banana cultivation practices

#### **1.4 Justification of the study**

Bangladesh is an agricultural country. About 45.1 percent of the people are engaged in agriculture (BER, 2016). Many farmers are closely involved with banana cultivation. But they have no sufficient knowledge on the use of banana cultivation technologies. In other side, banana cultivation technologies increase yield and production. The farmers are the ultimate users of modern technologies such as fertilizers, agro-chemicals and irrigation water, crop rotation, porous polythene technology etc. The present study was dealing with the farmers to know the use of BARI recommended practice in banana cultivation (Sep, 2014 Handbook). This study was a modest attempt to find out the suitable banana cultivation technologies such as maintaining the spacing for pit method of sowing (60x60x60 cm), retaining pit for one month, using planting time, using 50-60 cm sword sucker, applying recommended doses of manure & fertilizer, using IPM methods, irrigation interval, pesticide and bagging technologies etc.

and the extent of use of farmers in those activities. The findings from the study may be helpful to the researcher for further studies of similar nature and to the extension personnel who are directly involved in different agricultural development programmers and to the planners for making effective plans. The study will also aid extension workers to learn the production problems of the banana and therefore they will be able to give suggestions to the farmers related to various aspects of vegetable cultivation.

### **1.5. Limitations and Scope of the study**

The respondents of the study were purposively selected from Kushtia district. But the findings may be applicable in other areas of Bangladesh where the physical, cultural and socio-economic conditions are alike with those of the study places. Thus, the result of the study will be helpful to the planners and extension workers for preparation of programmers for rapid diffusion of banana cultivation practices in banana cultivation among the farmers. At last, it is assumed that the recommendation of the study will be helpful in formulating extension policy makers to improve their technique and strategy of action. It would also be helpful to the rural people to generate rural employment and to improve environmental condition and the rural economy. However, in order to conduct the research in a manageable and meaningful way it becomes necessary to impose certain limitations in regard to certain aspects of the study, considering the time, money and necessary resources available to the researcher. The study was conducted with the following limitations:

- The study was confined to Sadar upazilla under Kushtia district.
- Population for the present study were kept confined within the heads of farm families in the study area.
- There were many characteristics of the farmers in the study area but only nine of them were selected for investigation.

- For information about the study, the researcher depended on the data furnished by the selected respondents during their interview with them.
- Facts and figures collected by the researcher applied to the situation prevailing during the year 2015-2016.
- Reluctance of the farmers to provide information was overcome by establishing rapport.

### **1.6. Assumptions of the Study**

An assumption has been defined as the supposition that an apparent fact or principle is true in the light of the available evidence (Goode and Hatt, 1952). That means the assumption is taken as a fact or belief to be true. The researcher had the following assumptions in mind while undertaking this study:

- The respondents, included in the sample were capable of satisfying proper responses to the questions included in the interview schedule.
- Respondent responses were reliable.
- Views and opinions furnished by the respondents were the representative views and opinion of the whole population of the study.
- The researcher who acted as interviewer was adjusted to social and environmental condition of the study area. Hence the data collected by him and the respondent are free from bias.
- The findings of the study will have general applications to other parts of the country similar personal, socio-economic and cultural conditions.

### **1.7. Definition of Terms**

For clarify of understanding certain terms frequently used in the study are defined and interpreted as follows.

**Respondents:** Respondents are randomly selected people considered to be representable of the population. They are the people from whom a social

research worker usually gets most data required for his research. In this study the respondents were the village level banana farmers.

**Age:** Age of a respondent is defined as the span of his life and was operationally measured by the number of years from his birth to the time of interview.

**Education:** Education referred to the ability of the respondents to read and write or having formal education received up to a certain standard. Education was measured on the basis of class a farmer had passed from formal education institution.

**Farm Size:** Farm size refers to the total area on which a farmer's family carries on farming operations, the area being estimated in terms of full benefit to the farmers' family. It was measured in hectare.

**Annual Income:** In this research annual income of farmers was only measured for banana cultivation purpose. But the term annual income refers to the total earning of the respondent himself from agriculture, livestock, fisheries and other accessible sources (business, service, daily labor etc.) during a year. It was expressed in Taka.

**Farming Experience:** It means the experience which one gains from farming activities directly. Farming experience of banana farmers was measured in years which he gained from involvement in farming activities.

**Innovativeness:** Degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system is called Innovativeness (Rogers, 1995). It was measured on the basis of time dimension.

**Extension Media Contact:** Contact by the farmers with AEO (Agricultural Extension Officer), SAAO (Sub Assistant Agricultural Officer), NGO worker,

Model Farmer, by participating in group discussion, listening agricultural program in Radio, watching agricultural program on TV, reading poster- leaflet etc. as media for seeking any information related to cultivation procedure.

**Problem faced:** Problem referred to a difficult situation about which something to be done. It referred to the extent of problems faced by a respondent in banana cultivation in terms of ecological, social, technical, economical, marketing and psychological problems.

**Practice:** The customary, habitual, expected procedure or way of doing of something.

**Use of Banana cultivation practice:** Use means how any system is adopted. In this research use has been measured in three categories like fully use, partially use and no use.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

This Chapter deals with the review of past research works that relates to this investigation directly or indirectly. The reviews are based on the major objectives of the study. The aim of this study was to have an understanding on the uses of BARI recommended banana cultivation practices by the farmers and to explore the contribution of the selected characteristics of the farmers on their use of cultivation practices. The researcher attempted to search the literatures on a number of studies have been conducted on the use of banana cultivation practices by the farmers. The researcher came across with some expert opinions and has tried his best to collect needful information through searching relevant studies, journals, periodicals, bulletins, leaflets, internet etc. These are the researcher's knowledge for better and clear understanding of the present study.

Unfortunately no previous literature was found related to relationship between use of BARI recommended banana cultivation practices and their characteristics, hence related crop cultivation practices are presented below in these sections.

Section 1: General findings on the use of BARI recommended banana cultivation practices.

Section 2: Discussion on the findings of research studies exploring relationships between the selected characteristics of the farmers and use of cultivation practices.

Section 3: The Development of Conceptual Framework of the Study.

## **2.1 Review of Literature on General Context on Use of Cultivation Practices**

Haider *et al.* (2001) showed from his experiment that one-third (37%) of the farmers fell in low adopter category compared to 32.5 percent in optimum adopter, 23.5 percent above optimum adopter and only 7 percent had non-adopter on Nitrogenous fertilizer. In respect of extent of phosphoric fertilizer two thirds (68%) of the farmers belonged to no adopter category compared to 23 percent having above optimum adopter, 5 percent optimum adopter and only 4 percent had below optimum adopter of phosphoric (P) fertilizer. For the extent of potash (K) fertilizer three quarters categories compared to 10 percent falling below optimum adopter, 8 percent optimum adopter and only 3 percent above optimum adopter of potassic (K) fertilizer.

Aurangojeb (2002) observed that the extent of adoption of integrated farming technology by the rural women in RDRS. He opined that the highest proportion of rural women (64%) used high level, (28%) of the women used medium level and only 8% used low level integrated homestead farming technologies.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. 69 percent of the farmers had medium adoption while 13 percent had low adoption and 18 percent had high adoption of modern agricultural technologies are showed by the study.

Hasan (2003) showed that majority (60%) of the farmers had medium adoption while 33 percent had low adoption and only seven percent had high adoption of recommended potato cultivation practices.

Rahman (2003) showed that 2-4 intercrops viz. Zinger, turmeric, sweet ground and aroid in pineapple cultivation were adopted by 90 percent of pineapple growers.



Hasan (2006) observed that about three-fifths (63%) of the growers had medium adoption while 17 percent had low adoption and 20 percent had high adoption of improved practices in litchi cultivation.

Yadav and Kumar (2006) opined that majority (78.75%) of the farmers had medium adoption while 12.50 percent had low adoption and only 8.75 percent had high adoption of scientific wheat cultivation technologies.

Singh (2010) found that majority (58%) of the farmers had medium adoption while 24 percent had low adoption and 18 percent had high adoption of recommended potato cultivation practices.

Prasad and Ram (2010) observed that majority (50.00%) of the farmers had medium adoption while 16.37 percent had low adoption and 33.63 percent had high adoption of improved wheat cultivation technologies.

Singh and Priyadarshi (2010) observed that majority (59.5%) of the farmers had medium adoption while 28 percent had low adoption and 12.5 percent had high adoption of improved mango production practices.

Baruah and Singha (2011) found that 58.00 percent of the farmers had medium adoption while 31.11 percent had low adoption and 24.44 percent had high adoption of recommended rice cultivation practices.

Singh and Barman (2011) opined that majority (48%) of the farmers had medium adoption while 25 percent had low adoption and 27 percent had high adoption of recommended tomato and cauliflower cultivation technologies.

Kumbhare and Singh (2011) opined that majority (53.75%) of the farmers had high adoption while 14.5 percent had low adoption and 31.75 percent had medium adoption of improved wheat and paddy production technology.

Mehta and Sonawane (2012) reported that 73 percent of the farmers had medium adoption while 10 percent had low adoption and 17 percent had high adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) conducted a research and found that majority (74.16%) of the farmers had medium adoption while 12.50 percent had low adoption and 13.34 percent had high adoption of improved sugarcane cultivation practices.

Rao and Singh (2014) found that majority (65.33%) of the farmers had medium adoption while 10 percent had low adoption and 24.67 percent had high adoption of recommended pineapple cultivation practices.

Deshmukh and Bariya (2014) reported that majority (65.83%) of the farmers had medium adoption while 19.17 percent had low adoption and 15.00 percent had high adoption of recommended Kharif groundnut practices.

## **2.2 Relationship between Farmers Selected Characteristics and Use of Banana Cultivation Practices**

### **2.2.1 Age and use of cultivation practices in various crops**

Ali (2004) found that there was no relationship between age of the farmers and adoption of aquaculture technology by them.

Hasan (2006) found that age of the growers did not show any significant relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) opined that age of the farmers show negative and significant relationship with their adoption of potato cultivation practices.

Mehta and Sonawane (2012) observed that age of the farmers show negative relationship with their adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) found that age of the farmers show significant relationship with their adoption of improved sugarcane cultivation practices.

Devi (2013) observed that age of the farmers did not show any significant relationship with their adoption of dairy farming technologies.

Rao and Singh (2014) found that age of the farmers show negative and significant relationship with their adoption of pineapple cultivation practices.

Mandal (2015) observed that age of the farmers did not reveal any significant relationship with uses of brinjal production technologies.

### **2.2.2 Education and use of cultivation practices of various crops**

Aurangozeb (2002) after conducted a study on adoption of integrated farming technologies by the rural women in RDRS, found that there was a positive relationship between education and their adoption of integrated farming technologies.

Islam (2003) after conducted a study on adoption of organic manures, found that there was a positive and significant positive relationship between education of the farmers and their adoption of organic manures.

Hasan (2006) observed that education of the growers showed significant and positive relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) reported that education of the farmers showed significant and positive relationship with their adoption of potato cultivation practices.

Mehta and Sonawane (2012) reported that education of the farmers showed significant relationship with their adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) showed that education of the farmers show significant relationship with their adoption of improved sugarcane cultivation practices.

Rao and Singh (2014) observed that education of the farmers showed significant and positive relationship with their adoption of pineapple cultivation practices.

Mandal (2015) observed that education of the farmers did not reveal any significant and positive relationship with uses of brinjal production technologies.

### **2.2.3 Family sizes and use of cultivation practices of various crops**

Hasan (2006) reported that family size of the growers showed significant and negative relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) reported that family size of the farmers showed positive relationship with their adoption of potato cultivation practices.

Singh and Priyadarshi (2010) found that family size of the farmers showed negative significant relationship with their adoption of improved mango production practices.

Mehta and Sonawane (2012) observed that family size of the farmers showed negative relationship with their adoption of recommended mango cultivation practices.

Yadaw and Sharma (2012) found that family size of the farmers did not show any significant relationship with their adoption of recommended goat rearing practices.

Chouhan and Singh (2013) found that family size of the farmers did not show any significant relationship with their adoption of improved sugarcane cultivation practices.

Rao and Singh (2014) found that family size of the farmers did not show any significant relationship with their adoption of pineapple cultivation practices.

Mandal (2015) observed that family size of the farmers did not reveal any significant relationship with uses of brinjal production technologies.

#### **2.2.4 Annual income from banana cultivation and use of cultivation practices of various crops**

Hasan (2006) showed that annual income of the growers showed significant and positive relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) showed that annual income of the farmers showed significant relationship with their adoption of potato cultivation practices.

Mehta and Sonawane (2012) revealed that annual income of the farmers showed positive and highly significant relationship with their adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) revealed that annual income of the farmers showed significant relationship with their adoption of improved sugarcane cultivation practices.

Rao and Singh (2014) observed that annual income of the farmers had positive and significant relationship with their adoption of pineapple cultivation practices.

Mandal (2015) observed that annual income of the farmers revealed positive significant relationship with uses of brinjal production technologies.

### **2.2.5 Experience in banana cultivation and use of banana cultivation practices**

Hoque (1993) in his study showed that farming experience had negative significant relationship with their adoption of improved practices in sugarcane cultivation.

Sarkar (1995) in his study showed that farming experience had no relationship with their use of communication media for receiving agricultural information.

Alam (1996) in his study found that there was no relationship between the farming experience of the farmers and their awareness regarding homestead deforestation.

Chowdhury (1996) conducted a study in Nowabgonj, Dhaka on the factor affecting adoption behavior of Boro rice growers. He reported that farming experience significantly influenced farmers in accepting production technology.

Sarkar (1997) observed that farming experience of potato growers had no significant relationship with their adoption of improved potato cultivation practices.

Mandal (2015) observed that experience of the farmers revealed positive significant relationship with uses of brinjal production technologies.

### **2.2.6 Knowledge on banana cultivation and use of cultivation practices of various crops**

Hasan (2006) showed that knowledge of the growers showed significant and positive relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) observed that knowledge of the farmers showed positive and significant relationship with their adoption of potato cultivation practices.

Singh and Barman (2011) found that knowledge of the farmers showed significant relationship with their adoption of tomato and cauliflower cultivation technologies.

Mehta and Sonawane (2012) observed that knowledge of the farmers show positive and highly significant relationship with their adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) revealed that knowledge of the farmers showed significant relationship with their adoption of improved sugarcane cultivation practices.

Mandal (2015) observed that knowledge on brinjal cultivation of the farmers revealed positive significant relationship with uses of brinjal production technologies.

### **2.2.7 Innovativeness and uses of cultivation practices of various crops**

Moullick *et al.* (1996) found that among the farmers innovation proneness significantly influenced the adoption of nitrogenous fertilizers. They reported that it was in simple term that the more a cultivator exhibited a general tendency towards accepting innovations, the higher would be his adoption score.

Rahman (1974) observed a positive relationship between modernism and adoption of farm practices. He identified modernism as leading for a new experience or opener to innovation. So, modernism as used by him as synonymous with the innovation proneness of present study.

Verma and Devi (1989) found higher average innovativeness among contact farmers than the non-contact farmers. They also reported that contact farmers adoption of innovations differed significantly with their variation in innovativeness.

Islam (2002) observed a research study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that innovativeness of the farmers had significant and positive relationship with their adoption of modern agricultural technologies.

Rahman (2005) revealed that the innovativeness of the farmers had no significant relationship with their adoption of modern rice varieties.

### **2.2.8 Extension media contact and use of cultivation practices of various crops**

Hasan (2006) found that extension contact of the growers showed significant relationship with their adoption of improved practices in litchi cultivation.

Singh (2010) showed that extension contact of the farmers showed positive relationship with their adoption of potato cultivation practices.

Singh and Barman (2011) opined that extension contact of the farmers showed significant relationship with their adoption of tomato and cauliflower cultivation technologies.

Mehta and Sonawane (2012) reported that extension contact of the farmers showed positive and highly significant relationship with their adoption of recommended mango cultivation practices.

Chouhan and Singh (2013) revealed that extension contact of the farmers showed significant relationship with their adoption of improved sugarcane cultivation practices.

Rao and Singh (2014) observed that extension contact of the farmers showed positive and significant relationship with their adoption of pineapple cultivation practices.



Mandal (2015) observed that extension media contact of the farmers revealed positive significant relationship with uses of brinjal production technologies.

### **2.2.9 Problem faced and use of cultivation practices of various crops**

Muhammad (1974), after studied adoption of insect control measures, indicated a positive relationship between community problem awareness and adoption of insect control measures.

Hossain (1983) indicated adoption of HYV rice by the rice farmers in Bhabakhali union under Mymensingh district. The findings indicated no relationship between community problem awareness and adoption of HYV rice.

Kashem and Hossaion (1992) observed adoption and revealed a positive relationship between adoptions of sugarcane farmers and behavior of sugarcane farmers. The community problem is awareness and adoption of sugarcane farmers.

Rahman (1995) in his study identified constraints faced by farmers' in cotton cultivation. Non-availability of quality seed in time, lack of operating capital, unfavorable and high cost of fertilizer and insecticides, not getting fair weight and reasonable price according to grade, affects of cattle in cotton field, lack of technical knowledge, lack of storage facility, stealing from field at maturity stage, and late buying of raw cotton by Cotton Development Board were identified as major problems of cotton farmers in Mymensingh district.

Islam (2003) in his study identified problems in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: i) low production due to limited use of fertilizer (ii) lack of organic matter in soil, (iii) lack of Govt. support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming

practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

### **2.3 The Conceptual model of the study**

The representation of the study variables is conceptual framework. Properly constructed hypothesis of any research generally contain at least two variables namely, “dependent variable” and “independent variable”. A dependent variable is that which disappears, appears or varies as the researcher introduces, remove or varies the independent variables. In making structural arrangements for the dependent and independent variables conceptual framework of Rosenberg and Hovland (1960) was remembered. Factor which is manipulated by the researcher in his attempts to ascertain its relationship to an observed phenomenon is called independent variable. In view of the theme of the study, the researcher constructed a conceptual framework which is self-explanatory and is presented in Figure 2.3. It was expected that the selected independent variables would be interlinked and interrelated with the dependent variable of the study.

(P.T.O.)

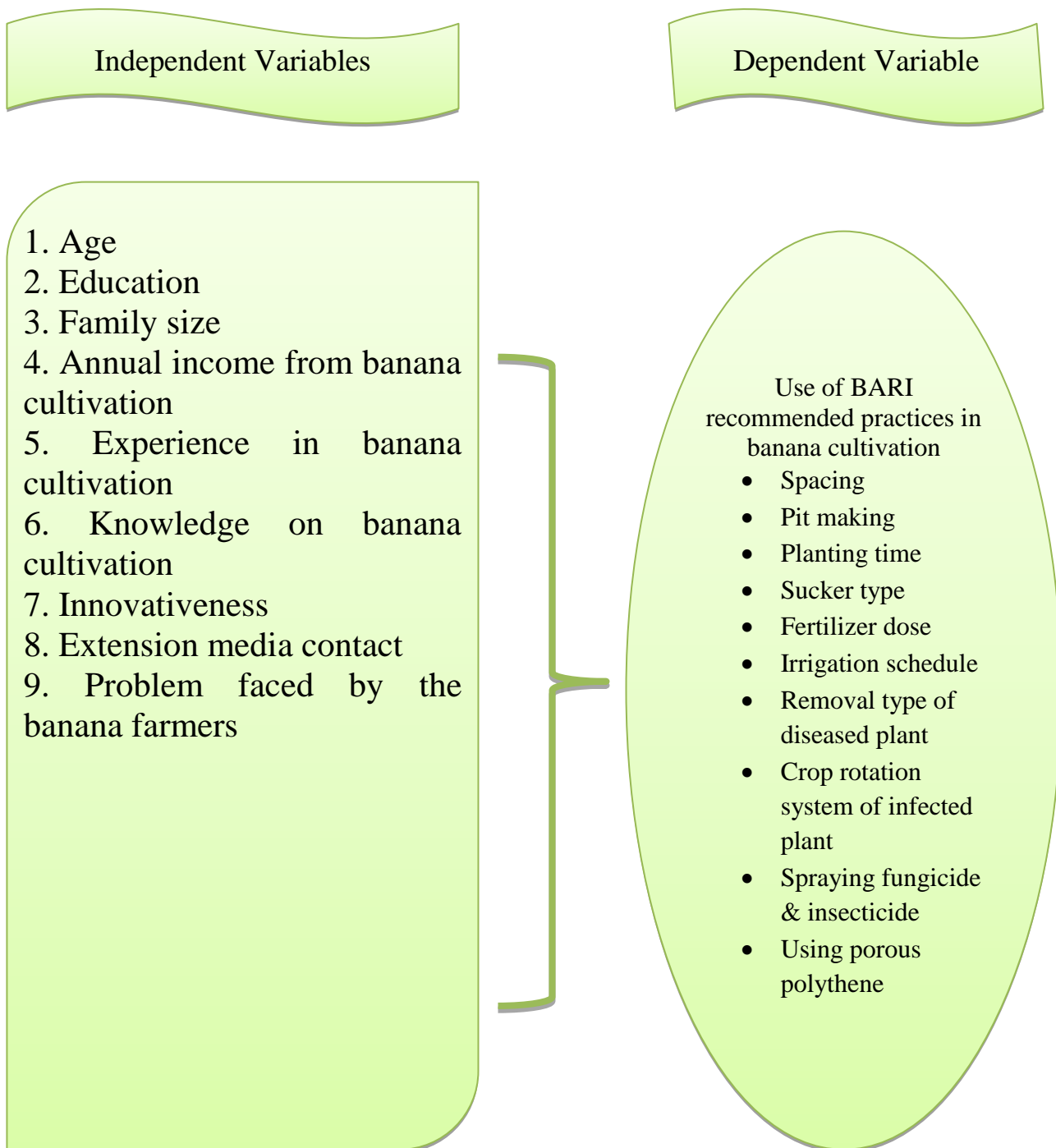


Fig. 2.3 : Conceptual model of the study

## **CHAPTER III**

### **METHODOLOGY**

In conducting a research, methods and process are the prime factors. Generally in order to reach valid and trustful decision, appropriate methodology used in research helps a lot. This Chapter delimits the locale of the study followed by source of data, research design, variables of the study, measurement of variables, categorization and statistical treatment.

#### **3.1 Locale of the Study**

Rangpur, Kushtia, Tangail, Jessore, Rangamati, Mymensingh, Narsingdhi, Bogra, Faridpur are major banana cultivating areas of Bangladesh. Kushtia is the second highest banana producing district of Bangladesh (Table 1.1). Kushtia district was selected due to investigator's familiarity of the area, language and culture of the people. Among 6 upazillas of this district, Sadar upazilla is renowned for banana cultivation and marketing for last three decades. A significant number of people of this upazilla are banana farmers. Sadar upazilla consists of 14 unions. Among these 8 unions were selected purposively. These 8 unions consist of 24 blocks on which 11 blocks were purposively selected due to presence of large number of banana farmers. Thus 11 blocks of Sadar upazilla of Kushtia district constituted the locale of the study. A map of Kushtia district showing Sadar upazilla and another map showing study unions within Sadar upazilla are presented in Figures 3.1 and 3.2 respectively.



**Figure 3.1** Map of Kushtia district showing Sadar upazilla





Study area : 

Figure 3.2 Map of Kushtia Sadar upazila showing selected unions.

### 3.2 Population and Sampling Design

The researcher himself with the help of Sub Assistant Agricultural Officers (SAAO) of concerned 11 blocks prepared an updated list of banana farmers of selected 11 blocks .Proportionate random sampling procedure was followed for sampling in this study. 11 Blocks of Sadar upazila were Berbaradi, Lokkhipur, Hatsh Horipur, Bollovpur, Alampur, Barkhada, Baradi, Jugia, Monohordia, Kondopdia and Khejurtola. These 11 blocks contain 375 banana cultivating farmers which constitutes the population of the study. According to Yamane's (1967) formula, sample size was determined by calculating sample size 10% precision level, 50% degree of variability and value of  $Z= 2.57$  at 99% confidence level were chosen for following formula :

$$n = \frac{Z^2 P(1-P)N}{Z^2 P(1-P) + Ne^2}$$

Where;

n = Sample size

N = Population size

e = The level of precision

P = The proportion or degree of variability

Z = The value of the standard normal variable at the chosen confidence level

Thus the sample size was calculated as 115. A reserve list of 12 farmers (about 10 percent of the sample) was prepared so that these farmers could be used for interview in case of unavailability of any farmer included in the original sample in spite of utmost effort during collection of data.

**Table 3.1** Distribution of the population and sample including reserve list

<b>Union</b>	<b>Block name</b>	<b>Population size</b>	<b>Sample</b>	<b>Reserve</b>
Horinarayonpur	Berbaradi	43	13	1
Abdalpur	Lokkhipur	80	24	2
Hatsh Horipur	Hatsh Horipur	28	10	1
Ailchara	Bollovpur	19	5	1
Alampur	Alampur	22	7	1
Barkhada	Barkhada	30	9	1
Barkhada	Baradi	42	13	1
Barkhada	Jugia	26	9	1
Monohordia	Monohordia	44	13	1
Monohordia	Kondopdia	14	4	1
Patikapari	Khejurtola	27	10	1
<b>Total</b>		<b>375</b>	<b>115</b>	<b>12</b>

### 3.3 Research Instrument

An interview schedule was prepared mostly with closed form questions. Simple and related questions and statements were included in the schedule to obtain information regarding the research topic. Scales were developed for suitable scores in use of banana production technologies and also characteristics of the farmers namely age, education, family size, annual income from banana cultivation, experience in banana cultivation, knowledge in banana cultivation, innovation, extension media contact and problem faced by banana farmers. The schedule was translated in Bengali for clarification to the respondents during rapport establishment. The schedules were pre-tested in actual field situation before using the same for final collection of data among 10 respondents of the study area. On the basis of the results of pre-test , necessary correction, additions and alternations were created in the interview schedule. The questions



were clearly explained wherever the respondent felt any difficulty in understanding properly.

### **3.4 Variables and their Measurement Techniques**

A well-organized piece of research usually remains at least two important elements independent variables and dependent variable. Generally in any scientific research, the selection and measurement of variables constitutes a significant task. A variable is any characteristic which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). In these connections the researcher reviewed the literature to widen his understanding about the nature and scope of the variables relevant to this piece of research. The selected 9 characteristics of the farmers namely age, education, family size, annual income from banana cultivation, experience in banana cultivation, knowledge in banana cultivation, innovativeness, extension media contact and problem faced by banana farmers were considered as independent variables. On the other hand, use of BARI recommended practices in banana cultivation was selected as dependent variable of the present study. A dependent variable varies as the experiment introduce, removes or varies the independent variables (Townsend, 1953).

#### **3.4.1 Measurement of independent variables**

The procedure followed in measuring the independent variables have been discussed in the following sections.

##### **3.4.1.1 Age**

The age of the respondents was assumed in terms of years from his/her birth to the day of interviewing. A unit score was assigned for each year of one's age. It was assumed in a complete year on the basis of responses of the respondents. The variable appears in item No. 1 in the interview schedule (Appendix-A).

### **3.4.1.2 Education**

Level of education was determined in terms of one's year of schooling. If a respondent did not know how to read and write, his score was given as zero (0). A score of 0.5 was assigned to that respondent who could sign his/her name only. Besides this, a respondent was given a score of one for every year of successful schooling i.e. 1 for class I, 2 for class II and so on. The variable appears in item No. 2 in the interview schedule (Appendix-A).

### **3.4.1.3 Family size**

The family size of the respondent was obtained on the basis of the number of family members including her/himself, his wife/husband, children and other dependents living in the same family. For example, if a respondent had five members in his/her family the score of the family members was taken as 5. The variable appears in item No. 3 in the interview schedule (Appendix-A).

### **3.4.1.4 Annual income from banana cultivation**

The annual income from banana cultivation of a farmer was obtained on the basis of yearly earnings of his/her family from only banana cultivation. In measuring the variable, total earning in Taka of a respondent was converted into unit score. A score of one (1) was assigned for each '1000' Taka of the annual income of a respondent. The variable appears in item No. 4 in the interview schedule (Appendix-A).

### **3.4.1.5 Experience in banana cultivation**

Banana cultivation experience was determined by total number of years since a farmer engaged in banana cultivation. The variable appears in item No. 5 in the interview schedule (Appendix-A).

### 3.4.1.6 Knowledge on banana cultivation

Banana cultivation knowledge of a respondent was measured by asking 13 questions on different aspects of banana cultivation. Score 1 was assigned for each of the six and score 2 was assigned for each of the seven questions. Full or partial score was given to the respondents for correct or partial answer and zero (0) was given for wrong or no answer. The scores assigned against all the 13 questions were added together to obtain the total banana cultivation knowledge score. Thus the banana cultivation knowledge score ranged from 0 to 20 where 0 indicated very low knowledge and 20 indicated highest knowledge on banana cultivation. The variable appears in the item No. 6 in the interview schedule (Appendix-A).

### 3.4.1.7 Innovativeness

According to Rogers (1995), innovativeness is the degree of adoption of a new technology to which an individual or other unit of adoption is relatively earlier than the other member of the social system. Innovativeness of a respondent was measured by computing a innovativeness score on the basis of period of 12 selected modern agricultural practices. Scores were assigned on the basis of time dimension in the following manner.

<b>Period of Adoption</b>	<b>Assigned Score</b>
Adoption within one year of hearing	4
Adoption within two years of hearing	3
Adoption within three years of hearing	2
Adoption after three years of hearing	1
Do not adopted	0

Innovativeness score of a respondent was measured by adding his/her score for all the items. Therefore, the possible innovativeness score of the respondents

could range from 0 to 48, 0 indicating no innovativeness and 48 indicating very high innovativeness.

### **3.4.1.8 Extension media contact**

The extension media contact score was computed for each respondent on the basis of his/her extent of contact with 9 selected extension media. Following scores were assigned for each of 9 media:

Extent of contact	Assigned score
Regularly	4
Frequently	3
Occasionally	2
Rarely	1
Never	0

Thus, the extension media exposure contact of a respondent could range from 0 to 36 where '0' indicated no contact and '36' indicated very high extension media contact.

### **3.4.1.9 Problem faced by the banana farmers**

Problem faced in banana cultivation by the respondent farmers was measured on the basis of the extent of problem that they faced in banana cultivation . 12 items of problems were asked to the respondents with the following five alternative responses with the following assigned scores:

Extent of the problem	Assigned score
Very severe	4
Severe	3
Moderate	2
Low	1
Not at all	0

Score of problem faced in banana cultivation by a respondent was be computed by adding all the scores obtained by those responses from all the twelve problem items. Thus, the problem faced scores in banana cultivation by the banana farmers could be range from 0 to 48 where ‘0’ indicates no problem and ‘48’ indicates highest problem in banana cultivation.

The Problem Faced Index (PFI) will be computed by using the following formula:

$$\text{PFI} = (\text{Pvs} \times 4) + (\text{Ps} \times 3) + (\text{Pm} \times 2) + (\text{Pl} \times 1) + (\text{P}_0 \times 0)$$

Where, PFI =Problem Faced Index, P<sub>0</sub>=Number of farmers who did not faced any problem at all, P<sub>1</sub>= Number of farmers who faced low problem, P<sub>m</sub>= Number of farmers who faced moderate problem, P<sub>s</sub>= Number of farmers who faced severe problem, P<sub>vs</sub>= Number of farmers who faced very severe problem. Thus PFI of a particular problem could range from 0-460.

### **3.4.2 Measurement of dependent variable**

Use of BARI recommended banana cultivation practices by the farmers was the dependent variable of the study. The farmers were asked to give their opinion on 16 selected banana cultivation practices adopted from Agricultural Technology Handbook, BARI (2014). The practices included maintaining the spacing for pit method of sowing (60x60x60 cm), retaining pit for one month, using planting time, using 50-60 cm sword sucker, applying recommended doses of manure & fertilizer, using IPM methods, irrigation interval, managment of diseased plant, crop rotation, pesticide and bagging technologies etc . The rigorous process involved in the selection of use of banana cultivation practices by the farmers can be seen in item number No. 10 in Appendix A. Use of banana cultivation practices was measured by a three point rating scale which is shown below:

Extent of use	Assigned score
Fully use	2
Partially use	1
No use	0

Thus, the possible score of the respondents for 16 practices could range from 0 to 32, where 0 indicating no use of practices while 32 indicating highest use.

To compare among use of 16 selected banana cultivation practices, a Banana Cultivation Practice Use Index (BCPUI) was calculated. BCPUI of each practices was calculated by adopting the following formula:

$$\text{BCPUI} = P_n \times 0 + P_p \times 1 + P_f \times 2$$

Where, BCPUI = Banana Cultivation Practice Use Index,  $P_n$  = Percentage of farmers used not at all,  $P_p$  = Percentage of farmers used partially,  $P_f$  = Percentage of farmers used fully.

Thus, the possible value of BCPUI could range from 0 to 200, where 0 indicated no use of any practice and 200 indicated highest use of a banana cultivation practice.

### 3.5 Statement of the Hypotheses

Accordingly Goode and Hatt (1952) a hypothesis is a proposition which can be put to test to determine its validity. It may seem 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.

#### 3.5.1 Research hypotheses

In the light of the objectives of the study and variables selected, the following research hypotheses were formulated to test them in. The research hypotheses were stated in positive form, the hypotheses were as follows:

“Each of the selected characteristics of the farmers had contribution to the uses of BARI recommended practices in banana cultivation .”

### **3.5.2 Null hypotheses**

In order to conduct statistical tests, the research hypotheses were converted to null form. Hence, the null hypotheses were as follows:

“Each of the selected characteristics of the farmers had no contribution to the uses of BARI recommended practices in banana cultivation.” The selected characteristics were age, education, family size, annual income in banana cultivation, experience in banana cultivation, knowledge on banana cultivation, innovativeness, extension media contact and problem faced by the banana farmers.

## **3.6 Method and Process of Data Collection**

Data for this research were collected by the researcher himself from the sample respondents through personal interviewing. Before data collection Upazilla Agricultural Officer (UAO) and related Sub Assistant Agriculture Officers’ (SAAOs’) of the Sadar upazilla under Kushtia district extended necessary help and cooperation in connection with data collection to finish the procedure in moderately short time. To build rapport and motivation in the interview situations, the researcher endeavored to provide conditions that maximum trust maintained with each respondent’s interest and minimized status difference. Data were collected during 1 December 2016 to 30 December 2016.

## **3.7 Data Processing and Analysis**

### **3.7.1 Compilation of data**

After completion of field survey, data were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this process, all the

responses in the interview schedule were assumed numerical coded value. Local units were converted into standard units and qualitative data were converted into quantitative ones by means of suitable scoring whenever necessary. The responses to the questions in the interview schedules were conveyed to a excel sheet to facilitate tabulation.

### **3.7.2 Categorization of data**

For describing different characteristics, the respondents were classified into several categories. These categories were developed by considering the nature of distribution of data, general understanding prevailing in the social system and possible scores system. The procedure for categorization of data in respect of different variables is elaborately discussed while describing those variables in Chapter 4.

### **3.7.3 Statistical technique**

The analysis was performed by using Statistical Package for Social Science (SPSS) computer package. Descriptive analysis such as range, number, percentage, mean, standard deviation and rank order were used whenever necessary. For clarity of understanding tables were also used for presenting the data. Pearson's Product Moment Correlation Co-efficient ( $r$ ) was initially used to observe the relationships between each of the selected characteristics of the farmers with their banana cultivation practices. Stepwise multiple regressions was used to find out the contribution of the independent variables on the dependent variable. At least 5 percent ( $P=0.05$ ) level of probability was used as a basis for rejection of the null-hypotheses throughout the study.



## **CHAPTER IV**

### **RESULTS AND DISCUSSION**

The findings of the study and their explanation have been presented in this Chapter. These are presented in three sections in relation to the objective of the study. The first section deals with the selected features of the farmers. The second section deals with the use of BARI recommended banana cultivation practices by the farmers. The third and last section deals with contribution of the selected characteristics of the farmers to their use of BARI recommended banana cultivation practices.

#### **4.1 Selective characteristics of the banana farmers**

Performance of an individual is determined to a large extent by his personal characteristics. There were various characteristics of the banana farmers that might have significance to the use of BARI recommended banana cultivation practices by them. But in this study, only nine characteristics of them were selected as independent variables, which included their i) age ii) education iii) farm size iv) annual income from banana cultivation v) experience in banana cultivation vi) knowledge on banana cultivation vii) innovativeness viii) extension media contact and ix) problem faced by the banana farmers. Measuring unit, range, mean, standard deviations of those characteristics were briefly presented in Table 4.1 and evidently and elaborately discussed under the subsequent sub-headings:

Sl. No	Selected characteristics	Scoring system	Range		Basis	Categories	Farmers (n = 115)		Mean	Standard Deviation (SD)
			Possible	Observed			No.	%		
1	Age	Actual years		20 - 60	MoYS, 2012	Young (up to 35) Middle (36-50) Old (>50)	18 77 20	15.6 67 17.4	44.47	8.32
2	Education	Years of schooling		0 - 16	Educational score	No education (0-0.5) Primary (1-5) Secondary (6-10) Higher secondary (>10)	9 39 53 14	7.7 34.2 46 12.1	7.09	3.18
3	Family size	No. of members		2 - 8		Small (up to 4) Medium (5-6) Large (>6)	39 73 3	34 63.5 2.5	4.82	0.90
4	Annual income from banana cultivation	'000'Tk		20 - 675	Mean $\pm$ 1/2 SD	Low ( $\leq$ 60) Medium (60-180) High (>180)	36 63 16	31.3 54.7 14	120.01	119.93
5	Experience in banana cultivation	Years of cultivation		2 - 20	Mean $\pm$ SD	Low (0-3) Medium (4-9) High (>9)	9 94 12	7.8 81.7 10.5	6.0348	3.49
6	Knowledge on banana cultivation	Scale score	0-20	12 - 19	Mean $\pm$ SD	Medium ( $\leq$ 15) High (>15)	68 47	59 41	14.51	1.47
7	Innovativeness	Scale score	0-48	10 - 40	Possible score	Low (0 - 16) Medium (17- 32) High (33-48)	13 100 2	11.3 86.9 1.7	20.46	4.13
8	Extension media contact	Scale score	0-36	5 - 27	Possible score	Low (0 - 12) Medium (13-24) High (27-36)	71 43 1	62 37 1	11.86	4.71
9	Problems faced by the banana farmers	Scale score	0-48	15 - 25	Possible score	Low (0 - 16) Medium (17- 32) High (33-48)	1 114 0	1 99	21.45	2.01
10	Use of BARI recommended practices in banana cultivation	Scale score	0-32	12 - 30	Mean $\pm$ SD	Low (0 - 13) Medium (14-19) High (>19)	8 102 5	7 88.6 4.4	15.96	2.77

**Table 4.1 Salient features of the selected characteristics of the banana farmer**

### 4.1.1 Age

Age of the respondent farmers was found to range from 20 to 60 years. The average age was 44.47 years with the standard deviation of 8.32. Based on their age, the farmers were classified into three categories according to MoYS, 2012 as shown in Table 4.1.1.

**Table 4.1.1 Distribution of the banana farmers according to their age**

Categories	Farmers		Mean	Standard deviation
	Number	Percentage		
Young (up to 35)	18	15.60	44.47	8.32
Middle (36-50)	77	67.00		
Old (> 50)	20	17.40		
<b>Total</b>	115	100.00		

Data contained in Table 4.1.1 divulges that almost two third (67.00%) of the respondents were middle aged compared to 15.6 percent of them were young aged and 17.4 percent were young to old aged. These findings indicate that the bulk of the farmers were young to middle aged (82.60 %). Young and middle aged peoples are generally become more inventive, active and can take any decision easily. They have broader outlook and might have much social contribution as well as communication regarding practices.

### 4.1.2 Education

The education score of the respondents ranged from 0 to 16 with the average of 7.09 and standard deviation of 3.17. Based on their score, the farmers were classified into four categories on the basis of educational score as shown in Table 4.1.2. The data indicate that the majority (46.00%) of the farmers had secondary level of education while 34.2 percent farmers had primary level of education, 12.1 percent had above secondary level of education and 7.7 percent had no education. Education changes mental and psychological ability of

average person to realize, choose and accept new practices and ideas. Hence, it is expected that education is one of the vital factors in conquering the experiment to use BARI recommended practices more fruitfully.

**Table 4.1.2 Distribution of the banana farmers according to their level of education**

Category		Farmers		Mean	Standard deviation
		Number	Percentage		
No education	(0-0.5)	9	7.70	7.09	3.17
Primary level	(1-5)	39	34.20		
Secondary level	(6-10)	53	46.00		
Higher Secondary level (>10)		14	12.10		
<b>Total</b>		<b>115</b>	<b>100.00</b>		

The study also revealed that the literacy rate of the banana farmers was 92.3 percent which is above the national literacy rate (62.3 %) of Bangladesh (BER, 2016).

#### 4.1.3 Family size

The family size of the respondents ranged from 2 to 8 with an average of 4.82 and standard deviation of 0.90. Based on their family size, banana farmers were classified into three categories as shown in Table 4.1.3.

**Table 4.1.3 Distribution of the banana farmers according to their family size**

Categories	Farmers		Mean	Standard deviation
	Number	Percentage		
Small (upto 4)	39	34.00	4.82	0.90
Medium (5-6)	73	63.50		
Large (> 6)	3	2.50		
<b>Total</b>	<b>115</b>	<b>100.00</b>		

The data in Table 4.1.3 indicate that majority of the respondents fell into medium (63.5 %) family category, while 34.00 and 2.50 percent had small and

large family size respectively. However, 97.50 percent of the respondents had small to medium family size. Almost similar result was found in the study of Muhammad (2014) and Mandal (2015).

#### 4.1.4 Annual family income from banana cultivation

The annual family income from banana cultivation scores (taka in thousands) of the farmers ranged from 20 to 675 with a mean of 120.01 and standard deviation of 119.93. Based on the annual family income the farmers were classified into three categories on the basis of Mean  $\pm$  ½ SD as shown in Table 4.1.4.

**Table 4.1.4 Distribution of the banana farmers according to their annual income from banana cultivation**

Categories	Farmers		Mean	Standard deviation
	Number	Percentage		
Low income ( $\leq 60$ )	36	31.30	120.01	119.93
Medium income (60-180)	63	54.70		
High income ( $>180$ )	16	14.00		
<b>Total</b>	115	100.00		

Majority of the farmers were middle in income group (54.7 %) followed by 31.3 percent of low income and 14.00 percent of high income group. Banana is a horticultural crop. So it is labor intensive work. But due to several problems like storm and disease, income decreases prominently. For example : Abdul Awal of Abdalpur Union got 80000 taka from 1 bigha of land from banana only and Md. Ibrahim of Monohordia got 35000 taka from same area of land due to crop loss for severe hailstorm. But maintaining proper cultivation method and proper sowing time for harvesting prior to special occasion like Arabic Romadan month when it has plenty of demand , can increase the annual income.

#### 4.1.5 Experience in banana cultivation

The banana cultivation experience scores (number of years) of the farmers ranged from 2 to 20 with the mean and standard deviation of 6.03 and 3.49

respectively. On the basis of the scores of banana cultivation experience, the respondents were classified into three categories by Mean  $\pm$  SD as shown in Table 4.1.5.

**Table 4.1.5 Distribution of the banana farmers according to their banana cultivation experience:**

Categories	Farmers		Mean	Standard deviation
	Number	Percentages		
Low experience ( $\leq 3$ )	9	7.80	6.03	3.49
Medium experience (4-9)	94	81.70		
High experience ( $>9$ )	12	10.50		
<b>Total</b>	115	100.00		

Data obtained from Table 4.1.5 indicate that majority (81.7 %) of the farmers had medium banana cultivation experience, 7.8 percent had low and 10.5 percent had high banana cultivation experience. The findings of the study revealed that vast majority (92.2 %) of the farmers had medium to high experience. Therefore, the experience of the farmers was reasonable in the study area. It is expected that vast experience of the farmers might be helpful to improve their outlook towards use of BARI recommended banana cultivation practices.

#### **4.1.6 Knowledge on banana cultivation**

The banana cultivation knowledge scores of the respondents ranged from 12 to 19 against a possible range of 0 to 20 with a mean and standard deviation of 14.51 and 1.47 respectively. Based on banana cultivation knowledge scores, the respondents were classified into two categories by Mean  $\pm$  SD as shown in Table 4.1.6 where majority (59.00 %) of the farmers had medium knowledge on banana cultivation.

**Table 4.1.6 Distribution of the banana farmers according to their banana cultivation knowledge**

Categories	Farmers		Mean	Standard. deviation
	Number	Percentage		
Medium knowledge (< 15)	68	59.00	14.51	1.47
High knowledge (> 15)	47	41.00		
<b>Total</b>	115	100.00		

Such findings are quite reasonable because of the fact that respondents are closely attached with farming activities and these experiences increase their knowledge. Besides, people especially in rural areas gather knowledge from their forefather and surrounding environment where they live. The banana cultivation knowledge has been considered to be one of the key inputs to improve farming as well as getting better yield. It is considered as a main factor of decision making. So, possession of banana cultivation knowledge by an individual is a crucial factor for decision making process on various aspects of farming activities. It can be supposed that the banana cultivation knowledge may have an influence to use banana cultivation practices.

#### **4.1.7 Innovativeness**

The observed innovativeness scores of the respondents ranged from 10 to 40 against the possible range of 0 to 48. The mean and standard deviation were 20.46 and 4.13 respectively. Based on possible innovativeness scores, respondents were classified into three categories as shown in Table 4.1.7.

**Table 4.1.7 Distribution of the banana farmers according to innovativeness in banana cultivation**

Categories	Farmers		Mean	Standard deviation
	Number	Percentage		
Low (0-16)	13	11.30	20.46	4.13
Medium (17-32)	100	86.90		
High (32-48)	2	1.71		
<b>Total</b>	115	100.00		

Data presented in Table 4.1.7 indicate that more than three fourth (86.9 %) of the respondents had medium innovativeness as compared to 11.3 percent low and 1.71 percent high innovativeness. Data also revealed that overwhelming majority (98.2%) of the respondents were under low to medium innovativeness categories. The innovativeness also refers to proneness of an individual to adopt new ideas and practices for better yield and income as well as profit.

#### 4.1.8 Extension media contact

Extension media contact states an individual's contact with different extension communication media for receiving modern agricultural information. Extension media contact scores of the farmers ranged from 5 to 27, against the possible score of 0 to 36. The mean and standard deviation were 11.86 and 4.71 respectively. The respondents were classified into three categories based on their extension media contact possible score as shown in Table 4.1.8.

**Table 4.1.8 Distribution of the banana farmers according to their extension media contact**

Categories	Farmers		Mean	Standard deviation
	Number	Percentage		
Low (0-12)	71	62.00	11.8	4.71
Medium (13-24)	43	37.00		
High (25-36)	1	1.00		
<b>Total</b>	115	100.00		



Table 4.1.8 indicates that the farmers belonged to low contact category constituted the highest proportion (62.00%) while 37.00 percent had medium contact and 1.00% had high contact. The results also indicate that overwhelming majority (99.00%) of the farmers had low to medium extension media contact. This result has been come out due to farmers' less contact with extension officers and NGO workers. But they were found practicing interpersonal contact with model farmers and input dealers. They also used electronic and print media frequently for their enrichment of knowledge about agricultural practices.

#### 4.1.9 Problem faced by the banana farmers

Farmers may encounter several problems that impede smooth cultivation of banana. The problem faced scores of the farmers ranged from 15 to 25, against the possible score of 0 to 48. The mean and standard deviation were 21.45 and 2.00 respectively. The respondents were classified into three categories based on their problem faced as shown in Table 4.1.9.

**Table 4.1.9 Distribution of the banana farmers according to their problem faced in the banana cultivation**

Categories	Farmers		Mean	Standard Deviation
	Number	Percentage		
Low (0-16)	1	1.00		
Medium (17-32)	114	99.00	21.45	2.0
High (33-48)	0	0.00		
<b>Total</b>	115	100.00		

Data contained in Table 4.1.9 express that among the respondents, the highest proportion (99.00%) of the farmers belong to the group of medium problem while 1.00% of them had low problem and none of them found high problem. Therefore, it was found that an absolute majority of the respondent farmers had medium problem.

To compare among 12 selected problems faced by the banana farmers, Problem Faced Index (PFI) was calculated. The observed PFI for each problem ranged from 99 to 366 against the possible range of 0 to 460. The selected problems faced by the respondents are arranged in rank order according to their descending order of PFI as shown in table 4.1.10.

**Table 4.1.10 Rank order of 12 selected problems faced by the farmers in banana cultivation**

Problems	Extent of problem					PFI	Rank order
	Very severe (4)	Severe (3)	Mod- erate (2)	Low (1)	Not at all (0)		
Stormy weather	67	25	0	23	0	366	1
Severe disease infestation	2	93	20	0	0	327	2
Labor crisis	0	54	37	20	0	256	3
Severe insect attack	0	19	93	3	0	246	4
Lack of fair price	0	7	104	4	0	233	5
High production cost	0	0	115	0	0	230	6
Inadequate training facilities	0	16	72	27	0	219	7
Poor communication system	0	0	27	88	0	142	8
Unavailability of farm input like seeds, fertilizer, pesticide etc.	0	0	11	100	4	122	9
Water standing condition at root zone	0	0	5	110	0	120	10
Poor irrigation facilities	0	0	26	48	41	100	11
Poor drainage facilities	0	0	26	47	42	99	12

On the basis of PFI, stormy weather ranked first and severe disease infestation ranked second among other problems. The researcher has learnt about miserable experiences of the farmers especially for (Super / Very large) hailstorms

occurred in 2016 and for this problem, many farmers' banana fields were destroyed voraciously within a night. They had to fall in tremendous economic crisis. Some of them are still in huge debt. Another massive problem was disease problem. Sigatoka is a common disease and farmers took that problem easily because that problem did not harm yield significantly. But farmers were in deep crisis for PANAMA disease.

## 4.2 Dependent Variable

### 4.2.1 Use of BARI recommended banana cultivation practices

The use of banana cultivation practices was tested by computing the use scores. The use of banana cultivation practice scores of the farmers ranged from 12 to 30 against the possible range of 0 to 32. The mean and standard deviation were 15.96 and 2.77 respectively. The farmers were categorized into three categories namely 'low use' (up to 13), 'medium use' (14 to 19) and 'high use' (above 19) on the basis of their use of BARI recommended banana cultivation practice scores (Table 4.2.1).

**Table 4.2.1 Distribution of the banana farmers according to their use of BARI recommended banana cultivation practices**

Categories	Farmers		Mean	Standard Deviation
	Number	Percentage		
Low use (0-13)	8	7.00	15.96	2.77
Medium use (14-19)	102	88.60		
High use (>19)	5	4.40		
<b>Total</b>	115	100.00		

The findings indicate that 88.6 percent of the farmers had medium use of banana cultivation practices, while 7 percent had low use and 4.4 percent had high use of banana cultivation practices. The findings expresses that overwhelming majority of the farmers (95.60%) had low to medium use of BARI recommended banana cultivation practices. This was happened due to

their partial use of most of the BARI recommended banana cultivation practices. None of the practice was found fully used by all of the farmers.

To compare among use of BARI recommended sixteen practices in banana cultivation by the farmers, practice use index (PUI) was calculated. An individual PUI for each of the practices ranged from 2.60-184.30 against the possible range of 0-200. On the basis of their PUI, sixteen practices have arranged in rank order in Table 4.2.2.

**Table 4.2.2 Rank order of the use of BARI recommended banana cultivation practices based on their PUI**

Practices	Extent of use						BCPUI	Rank order
	Fully use		Partially use		No use			
	No.	%	No.	%	No.	%		
Using of recommended planting time	97	84.3	18	15.7	0	0	184.3	1
Maintaining the spacing for pit method of sowing (60 x 60 x 60 cm)	52	45.2	62	53.9	1	0.9	144.3	2
Using of 50-60 cm sword sucker of 3 month for planting in main field	47	40.9	68	59.1	0	0	140.9	3
Applying recommended doses of manure & fertilizer (15-20 kg manure, Urea: TSP: MOP= 500 gm: 400 gm: 600 gm)	31	27.0	84	73.0	0	0	127	4
Burning of Panama/Sigatoka/Bunchy Top diseased plant from root	32	27.8	79	68.7	4	3.5	124.3	5
Spraying Sevin 85 WP to control Thrips & Beetle insect	11	9.6	100	87.0	4	3.5	106.2	6
After flower emerging applying 100 gm MOP & 150 gm Urea/ pit	7	6.1	107	93.0	1	0.9	105.2	7
Using 50% Cow dung, TSP, Gypsum during land preparation	3	2.6	112	97.4	0	0	102.6	8
Using rest 50% o cowdung, TSP, Gypsum & 25% MOP during pit preparation	5	4.3	108	93.9	2	1.7	102.5	9
Using 25% Urea & MOP after 2 months of planting	6	5.2	108	93.9	1	0.9	104.3	10
Applying irrigation after 15-20 days interval in dry season	2	1.7	113	98.3	0	0	101.7	11

Spraying Tilt 250 EC (0.5 ml/litre) or Bavistin (1 gm/litre) for controlling Sigatoka disease at 15 days intervals immediately on appearance of the disease	2	1.7	109	94.8	4	3.5	98.2	12
Following crop rotation in insect & diseased infesting areas	8	7.0	82	71.3	25	21.7	85.3	13
Making pit ready & retaining it for one month	13	11.3	18	15.7	84	73.0	38.3	14
Using Porous polythene for emerging bunch of banana to control beetle insect	6	5.2	9	7.8	100	87.0	18.2	15
Using IPM method for controlling pest and disease	0	0	3	2.6	112	97.4	2.6	16

Data obtained in Table 4.2.2 exposes that the highest proportion of farmers use practices named ‘Using of recommended planting time’ (BCPUI=184.3) 84.3 % randomly selected farmers fully used this practice . Farmers of Sadar upazila of Kushtia cultivate BARI-3 and BARI-4 generally, for this reason they maintained the time schedule quite properly. The second highest using practice was ‘Maintaining the spacing for pit method of sowing (60 x 60 x 60 cm)’(BCPUI-144.3) whereas 53.9% farmers partially used this practice.

The lowest BCPUI- 2.6 was found for ‘Using IPM method for controlling pest and disease’. Farmers of Kushtia Sadar upazila region had many IPM clubs but they used this IPM method for other field crops like rice, wheat, tomato etc. rather than using it in banana field. ‘Using Porous polythene for emerging bunch of banana to control beetle insect’ scored 2<sup>nd</sup> lowest uses (BCPUI- 18.2) as it was the new technology for that area and only some farmers of Lokkhipur block which area was renowned for banana cultivation in whole Kushtia district were using this technological practices. Innovator farmers were ahead in this practice.

‘Making pit ready & retaining it for one month’ ranked 3<sup>rd</sup> from the lowest using point of view (BCPUI-38.3). Kushtia is highly agricultural developed area in

Bangladesh and its land utilization is quite high (Table 4.2.3). Cropping intensity of this district is high. For this reason farmers did not get enough time for ‘Turned Around Time’ (TAT = Gap from one crop harvesting to another crop sowing). So they were unable to retaining their field useless for 30 days. Maximum of them made pit and within two/ three days they filled it up with sucker.

**Table 4.2.3 Land Utilization Statistics of Kushtia 2010-11 to 2013-14:**

Year	Total Area	NACA	CWL	CFA	SCA	DCA	TCA	QCA	NCA	GCA
2010-11	861	307	1	1	2	241	308	1	552	1412
2011-12	861	307	1	0	1	161	390	1	553	1497
2012-13	861	308	1	13	1	166	371	1	539	1450
2013-14	398	134	1	5	1	114	142	1	258	659

(Source: Yearbook of Agricultural Statistics -2014)

(NACA=Not Available for Cultivation Area, CWL = Cultivable Waste Land, CFA = Current Fallow Land, SCA = Single Cropped Area, DCA = Double Cropped Area, TCA = Triple Cropped Area, QCA= Quadruple Cropped Area, NCA= Net Cropped Area, GCA = Gross Cropped Area.)

From Table 4.2.2, ‘Using of recommended planting time’ practice was highly used whereas ‘Maintaining the spacing for pit method of sowing (60 x 60 x 60 cm)’ and ‘Using of 50-60 cm sword sucker of 3 month for planting in main field’ practices were used quite equally.

But ‘Using 50% Cow dung, TSP, Gypsum during land preparation’, ‘Using rest 50% of cow dung, TSP, Gypsum & 25% MOP during pit preparation’, ‘Using 25% Urea & MOP after 2 months of planting’, ‘After flower emerging applying 100 gm MOP & 150 gm Urea/ pit’, ‘Applying recommended doses of manure & fertilizer (15-20 kg manure, Urea: TSP: MOP= 500 gm: 400 gm: 600 gm’, ‘Applying irrigation after 15-20 days interval in dry season’, ‘Burning of

Panama/Sigatoka/Bunchy Top diseased plant from root’, ‘Following crop rotation in insect & diseased infesting areas’, ‘Spraying Sevin 85 WP to control Thrips & Beetle insect’ and ‘Spraying Tilt 250 EC (0.5 ml/litre) or Bavistin (1 gm/litre) for controlling Sigatoka disease at 15 days intervals immediately on appearance of the disease’ practices were highly used as partially by the farmers.

‘Using IPM method for controlling pest and disease’, ‘Using Porous polythene for emerging bunch of banana to control beetle insect’ and ‘Making pit ready & retaining it for one month’ practices were not used properly by majority of farmers.

#### **4.3 Contribution of the Selected Characteristics of the Banana Farmers to their Use of BARI Recommended Banana Cultivation Practices**

For this study, nine characteristics of the respondents were selected and each of the characteristics was treated as independent variable. The selected characteristics were age (X1), education (X2), family size (X3), annual income from banana cultivation (X4), experience in banana cultivation (X5), knowledge on banana cultivation (X6), innovativeness (X7), extension media contact (X8), problem faced(X9). Use of BARI recommended banana cultivation practices was the dependent variable (Y) of the study.

To find out the relationship between each of the selected characteristics of the farmers and their use of BARI recommended banana cultivation practices, Pearson product moment correlation was initially done. It was observed that among the variables annual income from banana cultivation, knowledge on banana cultivation, innovativeness and extension media contact of the farmers showed positive significant relationship with their use of BARI recommended banana cultivation practices while age and problem faced in banana cultivation showed negative significant relationship with use of banana cultivation

practices. Other variable like education, family size and experience in banana cultivation had no significant relationship with the use of BARI recommended banana cultivation practices. The result has been shown in appendix B.

Full model regression analysis was run with the 9 independent variables at first. The method of step-wise multiple regressions was administrated and 3 independent variables were fitted together in step-wise multiple regression analysis. Table 4.3 shows the summarized results of step- wise multiple regression analysis with 9 independent variables on use of banana cultivation practices where full result shows in appendix C. It was observed that out of 9 variables only 3 independent variables namely extension media contact, innovativeness and annual income from banana cultivation were entered into the regression equation. The other six variables were not entered into regression equation. The regression equation so obtained is presented below:

$$Y = 8.615 + 0.233 X8 + 0.196 X7 + 0.005 X4$$

**Table 4.3 Summary of stepwise multiple regression analysis showing the contribution of selected characteristics of the respondents to their use of BARI recommended banana cultivation practices**

Variable entered	Unstandardized Coefficient (B)	Value of 't' (with probability level)	Adjusted R <sup>2</sup>	Increase in R <sup>2</sup>	Variation explained in percent
Extension media contact (X8)	0.233	4.892 (0.000)	0.298	0.298	29.8
Innovativeness (X7)	0.196	3.914 (0.000)	0.405	0.107	10.7
Annual income from banana cultivation (X4)	0.005	2.453 (0.016)	0.430	0.025	2.5
<b>Total</b>				0.43	<b>43</b>



Constant = 8.615  
Multiple R= 0.667  
R-square = 0.445  
Adjusted R-square = 0.430  
F-ratio = 29.697  
Standard error of estimate = 2.096

The multiple R and  $R^2$  values were found 0.667 and 0.445 respectively and the corresponding F-ratio was 29.697 which were significant at 0.000 levels. For determining unique contribution of each of the three variables the increase in  $R^2$  value was determined on use of BARI recommended banana cultivation practices. These three variables combined explained **43 percent** of the total variation in use of BARI recommended banana cultivation practices. Extension media contact alone contribute 29.8 percent of the variation followed by innovativeness (10.7%) and annual income from banana cultivation (2.5%) variation in use of BARI recommended banana cultivation practices by the farmers.

#### **4.3.1 Contribution of extension media contact of the banana farmers to their use of BARI recommended cultivation practices**

The contribution of extension media contact on using of BARI recommended banana cultivation by the farmers was measured by testing the following null hypothesis; “There is no contribution of extension media contact on using of BARI recommended banana cultivation by the farmers”.

The adjusted  $R^2$  and increase in  $R^2$  values of extension media contact from stepwise multiple regressions were presented in Table 4.3. The increase in  $R^2$  value of the concerned variable was found 0.298. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. *The contribution of the extension media contact was **29.80 percent**.*
- b. *It had the first highest contribution on using of BARI recommended banana cultivation practices by the farmers.*
- c. *The null hypothesis could be rejected.*
- d. *It is also showed that extension media contact of the farmers had significant positive relationship with use of BARI recommended banana cultivation practices (Appendix-B).*

Based on the above finding, the statistical exploration suggests that with the increase of extension media contact of the farmers, the use of BARI recommended cultivation practices is also increased. Farmers with more contact with extension media have more opportunity to gain clear understanding and more agricultural knowledge about latest technologies which might have influenced to properly use of BARI recommended cultivation practices. Extension personnel sometimes arrange several types of trainings and workshops for the improvement of skills of farmers. So if farmers attend on workshops, they can upgrade themselves and ultimately be profitable.

#### **4.3.2 Contribution of innovativeness to the banana farmers to their use of BARI recommended banana cultivation practices by the farmers**

The contribution of innovativeness on using by BARI recommended banana cultivation practices by the farmer was measured by testing the following null hypothesis; “There is no contribution of innovativeness on using of BARI recommended banana cultivation practices by the farmers”.

The adjusted  $R^2$  and increase in  $R^2$  values of innovativeness from stepwise multiple regressions were presented in Table 4.3. The increase in  $R^2$  value of the

concerned variable was found 0.107. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

*a. The contribution of the innovativeness was **10.70 percent**.*

*b. It had the second contribution on using of BARI recommended banana cultivation practices by the farmers.*

*c. The null hypothesis could be rejected.*

*d. It is also showed that innovativeness of the farmers had significant positive relationship with use of BARI recommended banana cultivation practices (Appendix-B).*

Based on the above findings it was concluded that respondents who had more level of innovativeness, increase their willingness of adopting more technologies. Innovativeness enhances courage and leadership of the respondents at a short time than others which transformed them to maximize the use of BARI recommended banana cultivation practices by the farmers. An innovative farmer sustains the capabilities to use new practices. After displaying method and result demonstration, they can fruitfully influence other farmers to use modern technologies to produce more yields and thus revolutionary changes occur in socio-economic spheres.

#### **4.3.3 Contribution of annual income from banana cultivation of the farmers to their use of BARI recommended cultivation practices**

The contribution of annual income from banana cultivation by the banana farmers on their use of BARI recommended cultivation practices was measured by testing the following null hypothesis; “There is no contribution of annual income from banana cultivation by the farmers on their using BARI recommended banana cultivation practices”.

The adjusted  $R^2$  and increase  $R^2$  values of annual income from banana cultivation from stepwise multiple regressions were presented in Table 4.3. The increase in  $R^2$  value of the concerned variable was found 0.025. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

*a. The contribution of annual income from banana cultivation by the farmers on using BARI recommended cultivation practices was **2.50 percent**.*

*b. It had third contribution on using BARI recommended banana cultivation practices.*

*c. The null hypothesis could be rejected.*

*d. Correlation matrix also showed that annual income from banana cultivation had significant positive relationship with use of BARI recommended banana cultivation practices. (Appendix- B).*

Based on the above findings, it was concluded that a respondent who had more annual income from banana cultivation increased his/her capabilities to buy different modern agricultural inputs for using in banana field and might use more banana cultivation practices. Financial solvency makes farmers more innovative which ultimately facilitate to adopt new practices.

## **CHAPTER V**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

This Chapter summarizes the significant experimental results of the selected characteristics of the farmers to determine the use of BARI recommended banana cultivation practices and to explore the contribution of the selected characteristics of the farmers to their use of BARI recommended banana cultivation practices. It also draws some conclusions and recommendations for policy actions as further steps to improve the existing curricula and dimensions for the use of banana cultivation practices. This Chapter finally recommends probable research endeavors that can be carried out in future:

#### **5.1 Summary of the Findings**

Explanation of the results and the findings of the study have been presented elaborately in Chapter 4. The summarized findings of the study are now described below:

##### **5.1.1 Selected characteristics of the farmers**

###### **Age**

Age of the respondent farmers was found to range from 20 to 60 years. The average age was 44.47 years with the standard deviation 8.32. About sixty seventh (67%) of the respondents were middle aged compared to 15.6 percent of the respondents belonged to the young aged categories and 17.4 percent were in the old aged category.

## **Education**

The education score of the respondents ranged from 0 to 16 with the average of 7.09 and standard deviation 3.17. The majority (46.0 percent) of the farmers had secondary level of education while 34.2 percent farmers had primary level of education, 12.1 percent higher level of education and 7.7 percent had no education.

## **Family Size**

The family size of the respondents ranged from 2 to 8 with an average of 4.82 and standard deviation 0.90. Majority of the respondents fell into medium (63.5%) family category, while 34.0 and 2.5 percent had small and large family size respectively. However, 97.5 percent of the respondents had small to medium family size.

## **Annual income from banana cultivation**

The annual family income from banana cultivation scores (taka in thousands) of the farmers ranged from 20 to 675 with a mean of 120.01 and standard deviation of 119.93. Majority farmers were of middle income (54.7%) followed by 31.3 percent of low income and 14 percent of high income.

## **Experience in banana cultivation**

The banana cultivation experience scores (number of years) of the farmers ranged from 2 to 20 with the mean and standard deviation of 6.03 and 3.49 respectively. Majority (81.7%) of the farmers had medium banana cultivation experience, 7.8 percent had low and 10.5 percent had high banana cultivation experience.

### **Knowledge on banana cultivation**

The banana cultivation knowledge scores of the respondents ranged from 12 to 19 against a possible range of 0 to 20 with a mean and standard deviation of 14.51 and 1.47 respectively where majority (59.00%) of the had medium knowledge on banana cultivation.

### **Innovativeness**

The observed innovativeness scores of the respondents ranged from 10 to 40 against the possible range of 0 to 48. The mean and standard deviation were 20.46 and 4.13 respectively. More than three fourth (86.9 %) of the respondents had medium innovativeness as compared to 11.3 percent low and 1.71 percent high innovativeness.

### **Extension media contact**

Extension media contact scores of the farmers ranged from 5 to 27, against the possible score of 0 to 36. The mean and standard deviation were 11.86 and 4.71 respectively. Low contact category constituted the highest proportion (62 %), medium contact (37 %) and high contact (1 %). Overwhelming majority (99.00%) of the farmers had low to medium extension media contact.

### **Problem faced by the banana farmers**

The problem faced scores of the farmers ranged from 15 to 25, against the possible score 0 to 48. The mean and standard deviation were 21.45 and 2.00 respectively. The highest proportion (99 %) of the farmers belongs to the group of medium problem and followed by 1 % in low problem.

### **5.1.2 Use of BARI recommended Banana Cultivation Practices**

88.6 percent of the farmers had medium use of banana cultivation practices while 7 percent had low use and 4.4 percent had high use of banana cultivation practices. The findings expresses that majority of the farmers (95.6%) had low to medium use of banana cultivation practice.

### **5.1.3 Contribution of the Selected Characteristics of the farmers on their use of BARI recommended banana cultivation practices**

Step wise multiple regressions shows that out of 9 independent variables whereas only 3 independent variables namely extension media contact, innovativeness, annual income from banana cultivation had significant contribution on the use of BARI recommended banana cultivation practices . The unstandardized co-efficient (B) of the 3 independent variables formed the equation contributing to 43.00 percent of the total variation on use of BARI recommended banana cultivation practices.

## **5.2 Conclusions**

Based on the findings and their logical analyses in the light of relevant facts the researcher has drawn the following conclusions:

- A vast majority (88.6%) of the farmers had medium use of BARI recommended banana cultivation practices. These facts lead to conclude that farmers had a satisfactory level of use of banana cultivation practices. Therefore, it may be concluded that there is necessity to increase the use of BARI recommended banana cultivation practices by the farmers from partially to fully use to get more yield as well as more income.



- Extension media contact had highest contribution on their use of BARI recommended banana cultivation practices. It may be concluded that extension media contact increased the abilities of the respondents at a short time than others which motivated them to maximize the use of BARI recommended banana cultivation practices by the farmers and makes more working spirit among farmers.
- Innovativeness had the second highest contribution on using of BARI recommended banana cultivation practices by the farmers. Innovativeness enhances courage and leadership of the respondents at a short time than others which transformed them to maximize the use of BARI recommended banana cultivation practices by the farmers.
- Annual income from banana cultivation had third contribution on using of BARI recommended banana cultivation practices. More annual income increased the capabilities of a respondent to buy different modern agricultural implements for using in banana field and might use more banana cultivation technologies.

### **5.3 Recommendations**

#### **5.3.1 Recommendations for policy implications**

The following recommendations were made on the basis of the findings and conclusions of the study:

- Majority (88.6%) of the banana farmers use BARI recommended banana cultivation practices partially. Therefore it may be recommended that attempts should be taken by Department of

Agricultural Extension (DAE) and other extension providers to arrange training, motivational campaigning and provide cultivation practices leaflets for increasing cultivation knowledge and skills of the farmers.

- Extension media contact of the respondents had highest contribution on their use of banana cultivation practices. Farmers were found in deep crisis to combat PANAMA disease. It is farmers' nature to seek any solutions quickly from other farmers. But if they fail in this case, they just go to near pesticide shops. After applying them when they did not get satisfactory result, then they come to SAAOs'. But that time generally goes late for proper curing by Agricultural office. But farmers' every time claim agricultural officers. The researcher experienced such kind of bad experience from farmers' of Monohordia block that after applying BARI recommended dose they did not get proper curing and they were fed up on agricultural office. Thus extension media contact could be hampered greatly. So proper steps should be taken to lessen down problems related to extension media contact.
- Innovativeness of the farmers had 2<sup>nd</sup> highest contribution on their use of banana cultivation practices. Therefore it may be recommended that attempts should be taken by the government to involve farmers in various innovative activities for increasing the use of BARI recommended banana cultivation practices by the farmers.
- Annual income from banana cultivation contributed 3<sup>rd</sup> on their use of banana cultivation practices. Therefore it may be recommended that attempts should be taken to involve farmers in various income

generating activities for increasing the use of BARI recommended banana cultivation practices by the farmers.

- There were many farmers who did not consider Gypsum as a fertilizer and they were not willing to use that fertilizer. But scientists say that Gypsum is essential for banana tree for its vigourity and robustness. Thus banana tree can sustain lower type of storms. So, concerned authorities should take steps about this.

### **5.3.2 Recommendations for further study**

The present study mainly highlights some aspects of particular dimensions (use of banana cultivation practices) of agricultural development, so it is suggested that concerned agencies should undertake further studies in order to have a deeper insight into the various aspects of the use of banana cultivation practices for banana production. The aspects for future study are presented below:

- The present study was conducted in 11 blocks of Sadar under Kushtia district. So, similar studies may be undertaken in other parts of the country to validate the findings of the present study.
- The present investigation explored the contribution of 9 selected characteristics of the banana growers on their use of banana cultivation practices. Further research may be conducted by taking other characteristics to observe relationships with their use of banana cultivation practices for banana cultivation.
- Extension media contact, annual income from banana cultivation, innovativeness showed significant contribution with on their use of banana cultivation practices. Hence, further investigation is necessary to find out such contributions to authenticate the present study.
- The present study was concern only with the use of banana cultivation practices. It is therefore, suggested that future studies should include

innovations, adoption, practice, knowledge and attitude towards banana cultivation practices and so on.

- The present study was conducted to find out the use of BARI recommended banana cultivation practices. Further investigations are necessary to other crops of Bangladesh.

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**Appendix-A**  
**(English version of the interview schedule)**  
**Department of Agricultural Extension and Information Systems**  
**Sher-e-Bangla Agricultural University, Dhaka - 1207**

Interview schedule for collection of data in connection with the study

**“USE OF BARI RECOMMENDED BANANA CULTIVATION PRACTICES BY THE FARMERS”**

**Part - A**

Serial No.:

Respondent Name:.....

Cell no:.....

Block:..... Upazilla:.....Sadar.....

District:.....Kushtia.....

[Please provide the following information. Your information will be kept confidential and will be used for research purpose only.]

**Part - B**

**1. Age**

Please mention your age.....years.

**2. Education**

Please mention your level of education

- ❖ I cannot read or write.
- ❖ I can sign only.
- ❖ I have studied up to class .....

**3. Family size**

Please mention the number of your family member in the following groups:

Male person	Female person	Total

#### 4. Annual income from banana cultivation

Please mention your annual income from banana cultivation  
.....Tk.

#### 5. Experience in banana cultivation

How long do you cultivate Banana?.....years.

#### 6. Knowledge on banana cultivation

Please answer the following questions regarding banana cultivation.

Sl. No.	Questions	Assigned Score	Obtained Score
1	Name two recommended varieties of banana in your locality?	1	
2	Mention recommended fertilizer dose during land preparation in banana cultivation.	2	
3	How do you apply Urea & MOP fertilizer in banana cultivation?	2	
4	How many times does it need to irrigate the banana field?	1	
5	Which weather condition is vulnerable for the infestation of diseases?	1	
6	How do you control banana fruit & leaf beetle?	2	
	What is the dose of Urea & MOP after flower emergence?	2	
8	What is the duration of interval for applying of irrigation in dry season? (15-20 days).	1	
9	How do you control Panama disease in banana?	2	
10	How many days it takes for the maturity of Banana? (10-13 months)	1	
11	How long times does it take to mature after bunch initiation? (3-4 month)	2	
12	What is the size of sword sucker to be used for long & short plant? (35-40 cm/ 50-60 cm)	2	
13	When irrigation should not be given?	1	
14	<b>Total</b>	<b>20</b>	

## 7. Innovativeness

If you use the following technologies, please mention the duration of its use from first hearing.

Sl. No.	Name of the practice	Do not use	Used within one year	Used within two years	Used within three years	Used after four years
1	Cultivation of BARI 3 / 4 varieties of Banana					
2	Use of mulch materials in the Banana field					
3	Use of green manure as organic fertilizer					
4	Use of cultivator for tillage operation					
5	Use of shallow tube well for irrigation					
6	Use of sword sucker as seed					
7	Use of polythene in seedbed					
8	Use of IPM practices					
9	Use of DAP					
10	Use of banana bagging technology					
11	Use of vermicompost					
12	Use of mix cropping					
	<b>Total</b>					

## 8. Extension media contact

Please state the extent of your contact with the following communication media

Sl. No.	Categories of farmers	Extent of participation				
		Regularly (4)	Frequently (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Agricultural Extension Officer (AEO) (per year)	>6 times	5-6 times	3-4 times	At least 1 time	0
2	Sub-Assistant Agriculture Officer (SAAO) (per year)	>6 times	5-6 times	3-4 times	At least 1 time	0
3	Agricultural input dealer (per month)	>6 times	5-6 times	3-4 times	At least 1 time	0
4	NGO worker (per year)	>6 times	5-6 times	3-4 times	At least 1 time	0
5	Model farmers (per month)	>6 times	5-6 times	3-4 times	At least 1 time	0
6	Participation in group discussion (per year)	>4 times	3-4 times	2 times	1 time	0
7	Listening agricultural program in Radio (per week)	>4 times	3-4 times	2 times	1 time	0

8	Watching agricultural program on TV (per week)	>6 times	5-6 times	3-4 times	At least 1 time	0
9	Reading printed media e.g. agricultural newspaper poster, leaflet (per 3 month)	>6 times	5-6 times	3-4 times	At least 1 time	0
	<b>Total</b>					

### 9. Problem faced by the banana farmers

Please state the extent of the following problems faced in banana cultivation

Sl. No.	Problems	Extent of problems				
		Very severe (4)	Severe (3)	Moderate (2)	Low (1)	Not at all (0)
1	High production cost					
2	Labor crisis					
3	Poor drainage facilities					
4	Poor irrigation facilities					
5	Unavailability of farm input like seeds, fertilizer, pesticide etc.					
6	Inadequate training facilities					
7	Severe insect attack					
8	Severe disease infestation					
9	Stormy weather					
10	Water standing condition at root zone					
11	Poor communication system					
12	Lack of fair price					
	<b>Total</b>					

**10. Use of BARI recommended practices in banana cultivation (Sep, 2014 Handbook)**

Mention your level of practice from banana cultivation to harvesting

Sl. No.	Statements	Extent of use		
		Yes		No use (0)
		Fully use (2)	Partially use (1)	
1	Maintaining the spacing for pit method of sowing (60 x 60 x 60 cm)			
2	Making pit ready & retaining it for one month			
3	Using of recommended planting time			
4	Using of 50-60 cm sword sucker of 3 month for planting in main field			
5	Applying recommended doses of manure & fertilizer (15-20 kg manure, Urea: TSP: MOP= 500 gm: 400 gm: 600 gm)			
6	Using 50% Cow dung, TSP, Gypsum during land preparation			
7	Using rest 50% of cowdung, TSP, Gypsum & 25% MOP during pit preparation			
8	Using 25% Urea & MOP after 2 months of planting			
9	Using IPM method for controlling pest and disease			
10	After flower emerging applying 100 gm MOP & 150 gm Urea/ pit			
11	Applying irrigation after 15-20 days interval in dry season			
12	Burning of Panama/Sigatoka/Bunchy Top diseased plant from root			
13	Following crop rotation in insect & diseased infesting areas			
14	Spraying Sevin 85 WP to control Thrips & Beetle insect			
15	Spraying Tilt 250 EC (0.5 ml/litre) or Bavistin (1gm/litre) for controlling Sigatoka disease at 15 days intervals immediately on appearance of the disease			
16	Using Porous polythene for emerging bunch of banana to control beetle insect			
<b>Total</b>				

Thank you very much for your kind co-operation

**Interviewer**

.....

**Signature of**

**Date:**



## Appendix- B

CORRELATION MATRIX

		Age	Education	Family Size	Annual Income from Banana Cultivation	Experience	Knowledge on Banana Cultivation	Innovativeness	Extension Media Contact	Problem Faced by Banana Farmers	Use of Practices in Banana Cultivation
Age	Pearson Correlation	1	-.265**	.219*	-.149	.027	-.167	-.007	-.151	-.011	-.043
	Sig. (2-tailed)		.004	.019	.112	.778	.075	.943	.108	.910	.652
	N	115	115	115	115	115	115	115	115	115	115
Education	Pearson Correlation	-.265**	1	-.114	.162	-.042	.223*	.061	.086	-.178	.006
	Sig. (2-tailed)	.004		.223	.083	.654	.017	.520	.362	.057	.951
	N	115	115	115	115	115	115	115	115	115	115
FamilySize	Pearson Correlation	.219*	-.114	1	-.053	-.112	.018	-.134	.155	.012	.057
	Sig. (2-tailed)	.019	.223		.574	.234	.847	.153	.098	.898	.546
	N	115	115	115	115	115	115	115	115	115	115
AnnualIncomeFromBananaCultivation	Pearson Correlation	-.149	.162	-.053	1	.034	.475**	.317**	.482**	-.271**	.488**
	Sig. (2-tailed)	.112	.083	.574		.721	.000	.001	.000	.003	.000
	N	115	115	115	115	115	115	115	115	115	115
Experience	Pearson Correlation	.027	-.042	-.112	.034	1	.199*	.244**	-.096	.010	.166
	Sig. (2-tailed)	.778	.654	.234	.721		.033	.009	.307	.914	.076
	N	115	115	115	115	115	115	115	115	115	115
KnowledgeOnBananaCultivation	Pearson Correlation	-.167	.223*	.018	.475**	.199*	1	.204*	.273**	-.354**	.323**
	Sig. (2-tailed)	.075	.017	.847	.000	.033		.029	.003	.000	.000
	N	115	115	115	115	115	115	115	115	115	115
Innovativeness	Pearson Correlation	-.007	.061	-.134	.317**	.244**	.204*	1	.198*	-.454**	.436**
	Sig. (2-tailed)	.943	.520	.153	.001	.009	.029		.034	.000	.000
	N	115	115	115	115	115	115	115	115	115	115
ExtensionMediaContact	Pearson Correlation	-.151	.086	.155	.482**	-.096	.273**	.198*	1	.097	.552**
	Sig. (2-tailed)	.108	.362	.098	.000	.307	.003	.034		.302	.000
	N	115	115	115	115	115	115	115	115	115	115
ProblemFacedByBananaFarmers	Pearson Correlation	-.011	-.178	.012	-.271**	.010	-.354**	-.454**	.097	1	-.151
	Sig. (2-tailed)	.910	.057	.898	.003	.914	.000	.000	.302		.107
	N	115	115	115	115	115	115	115	115	115	115
UseOfPracticesInBananaCultivation	Pearson Correlation	-.043	.006	.057	.488**	.166	.323**	.436**	.552**	-.151	1
	Sig. (2-tailed)	.652	.951	.546	.000	.076	.000	.000	.000	.107	
	N	115	115	115	115	115	115	115	115	115	115

**Appendix- C**  
**Regression Analysis**

**Variables Entered / Removed<sup>a</sup>**

Model	Variables Entered	Variables Removed	Method
1	Extension Media Contact		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Innovativeness		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Annual Income from Banana Cultivation		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Use of Practices in Banana Cultivation

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.552 <sup>a</sup>	.305	.298	2.32710
2	.644 <sup>b</sup>	.415	.405	2.14344
3	.667 <sup>c</sup>	.445	.430	2.09698

a. Predictors: (Constant), Extension Media Contact

b. Predictors: (Constant), Extension Media Contact, Innovativeness

c. Predictors: (Constant), Extension Media Contact, Innovativeness, Annual Income from Banana Cultivation

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	267.920	1	267.920	49.474	.000 <sup>b</sup>
	Residual	611.941	113	5.415		
	Total	879.861	114			
2	Regression	365.296	2	182.648	39.755	.000 <sup>c</sup>
	Residual	514.565	112	4.594		
	Total	879.861	114			
3	Regression	391.759	3	130.586	29.697	.000 <sup>d</sup>
	Residual	488.102	111	4.397		
	Total	879.861	114			

a. Dependent Variable: Use of Practices in Banana Cultivation

b. Predictors: (Constant), Extension Media Contact

c. Predictors: (Constant), Extension Media Contact, Innovativeness

d. Predictors: (Constant), Extension Media Contact, Innovativeness, Annual Income from Banana Cultivation

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.103	.590		20.502	.000
	Extension Media Contact	.325	.046	.552	7.034	.000
2	(Constant)	7.911	1.061		7.458	.000
	Extension Media Contact	.286	.043	.484	6.571	.000
	Innovativeness	.228	.049	.339	4.604	.000
3	(Constant)	8.615	1.077		8.002	.000
	Extension Media Contact	.233	.048	.395	4.892	.000
	Innovativeness	.196	.050	.292	3.914	.000
	Annual Income from Banana Cultivation	.005	.002	.205	2.453	.016

a. Dependent Variable: Use of Practices in Banana Cultivation

**Excluded Variables**

Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics	
					Tolerance	
1	Age	.042 <sup>b</sup>	.523	.602	.049	.977
	Education	-.042 <sup>b</sup>	-.529	.598	-.050	.993
	Family Size	-.029 <sup>b</sup>	-.369	.713	-.035	.976
	Annual Income from Banana Cultivation	.289 <sup>b</sup>	3.374	.001	.304	.768
	Experience	.222 <sup>b</sup>	2.901	.004	.264	.991
	Knowledge on Banana Cultivation	.186 <sup>b</sup>	2.326	.022	.215	.925
	Innovativeness	.339 <sup>b</sup>	4.604	.000	.399	.961
	Problem Faced by Banana Farmers	-.207 <sup>b</sup>	-2.693	.008	-.247	.991
	2	Age	.034 <sup>c</sup>	.457	.648	.043
Education		-.057 <sup>c</sup>	-.781	.436	-.074	.991
Family Size		.029 <sup>c</sup>	.385	.701	.037	.948
Annual Income from Banana Cultivation		.205 <sup>c</sup>	2.453	.016	.227	.717
Experience		.142 <sup>c</sup>	1.901	.060	.178	.919
Knowledge on Banana Cultivation		.134 <sup>c</sup>	1.784	.077	.167	.902
Problem Faced by Banana Farmers		-.058 <sup>c</sup>	-.699	.486	-.066	.758
3	Age	.051 <sup>d</sup>	.711	.479	.068	.967
	Education	-.081 <sup>d</sup>	-1.134	.259	-.108	.973
	Family Size	.049 <sup>d</sup>	.664	.508	.063	.937
	Experience	.137 <sup>d</sup>	1.885	.062	.177	.918
	Knowledge on Banana Cultivation	.075 <sup>d</sup>	.935	.352	.089	.769
	Problem Faced by Banana Farmers	-.002 <sup>d</sup>	-.024	.981	-.002	.697

a. Dependent Variable: Use of Practices in Banana Cultivation

b. Predictors in the Model: (Constant), Extension Media Contact

c. Predictors in the Model: (Constant), Extension Media Contact, Innovativeness

d. Predictors in the Model: (Constant), Extension Media Contact, Innovativeness, Annual Income from Banana Cultivation

## Appendix-D (Plates)



Plate 1: During pre-test in Hatsh Haripur block from Abdul Halim



Plate 2: Innovative farmer (mid) using bagging technology



Plate 3: Rapport establishing with farmer at home



Plate 4: After collecting data from farmers taking photo along with SAAO and other selected farmers.





Plate 5: Data collection in the office of SAAO in Union Parishad Building



Plate 6: Rapport establishment and data collection



Plate 7: Data collection by rapport establishment



Plate 8: Data collection through work place visit.



## Appendix-E



1.



2.



3.

**Plate 1. Uprooted Panama diseased plant**

**Plate 2. Mix cropped banana plant with Sigatoka diseased in leaf**

**Plate 3. A Panama diseased plant (cracking from middle of plant)**