INNOVATIVENESS OF BETEL LEAF GROWERS TO USE IMPROVED PRACTICES

MT. KOHINUR. KHATUN

DEPARTMENT OF
AGRICULTURAL EXTENSION AND INFORMATION SYSTEM
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207

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By

MT. KOHINUR. KHATUN
REGISTRATION NO. 15-07002

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Approved by:

……
(Md. Mahbubul Alam, PhD)
Supervisor
Assoc. Prof. & Chairman
Department of Agricultural Extension & Information System
Sher-e-Bangla Agricultural University, Dhaka

……
(**Prof. Dr. Md. Sekender Ali**)
Co-supervisor
Department of Agricultural Extension & Information System
Sher-e-Bangla Agricultural University, Dhaka

……
(Md. Mahbubul Alam, PhD)
Assoc. Prof. & Chairman
Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka

Department of Agricultural Extension and Information System

Sher-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh

Memo No.: SAU/AEIS

CERTIFICATE

This is to certify that the thesis entitled, **" INNOVATIVENESS OF BETEL LEAF GROWERS TO USE IMPROVED PRACTICES"** 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,** embodies the result of a piece of bona fide research work carried out by **MT. KOHINUR. KHATUN**, Registration No. **15-07002**, under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.

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

Dated: December, 2016
Dhaka, Bangladesh

.....
(Md. Mahbubul Alam, PhD)
Supervisor
Assoc. Prof. & Chairman
Department of Agricultural Extension
& Information System
Sher-e-Bangla Agricultural University, Dhaka

Dedicated to
Beloved Parents

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The Author

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LIST OF ABBREVIATIONS AND ACRONYMS

BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
DAE	Department of Agricultural Extension
d.f.	Degrees of Freedom
SD	Standard Deviation
Sq	Square
MoA	Ministry of Agriculture
PFI	Problem Faced Index

INNOVATIVENESS OF BETEL LEAF GROWERS TO USE IMPROVED PRACTICES

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ABSTRACT

The major purpose of the study was to determine the extent of innovativeness of betel leaf growers to use improved practices for betel leaf cultivation in some selected areas of Rajshahi district. Attempts were also made to describe some of the selected characteristics of the betel leaf growers and their effect to innovativeness of using improved farm practices in betel leaf cultivation. One hundred and thirty three (133) growers were selected randomly from a total of 1127 growers of two unions of Bagmara upazila under Rajshahi district. An interview schedule was used for collection of data, which took 25 days from 5 July to 29 July, 2017. The findings of the study indicate that more than half (60.9 percent) of the growers were found moderately innovative compared to 39.1 percent were found highly innovative in practicing improved techniques for betel leaf cultivation. Pearson Product-moment Correlation Coefficient indicates that among the selected characteristics, farm size, farming experience, knowledge in betel leaf cultivation and attitude towards betel leaf cultivation showed positive significant relationship with their innovativeness to use improved practices. On the other hand, age, education, annual family income and agricultural training of the growers did not show any significant relationship with their innovativeness to use improved practices in betel leaf cultivation.

CHAPTER I

INTRODUCTION

1.1 General Background

Traditionally and predominantly Bangladesh is an agro based country with an area of 147570 sq. km. The country produces different type of crops such as cereal crops, cash crops, beverage crops, narcotic crops etc. Betel leaf is one of the most important narcotic crops in Bangladesh. The deep green heart shaped leaves of betel vine are popularly known as *Paan* in Bangladesh. The scientific name of betel leaf is *Piper Betel L*. The betel piper is the leaf of a family of a vine belonging to the *Piperaceae* family i.e., black pepper family. The most probable place of origin of betel vine is Malaysia . There are about 125 to 150 cultivars in the world (Verma et al, 2004). The leaf is popular as antiseptic and is commonly applied on wounds and lesions for its healing effects (Sarkar et al, 2008). Furthermore, it is also known as for its medicinal value, for instances its use for cold and asthma are well reported. However, it may cause severe health problems such as increased heart rate, palpitations, cardio-vascular disease, mouth tumor and cancer. The significance of betel leaf has been explained in relation to every sphere of human life including social, cultural, religious, and even day to day life (Guha, 2006). The demand for fresh betel leaves is not only limited to Nepal, Canada, and gulf countries but also there is tremendous demand from the European countries (Balasubramanian, et al., 2011).

Betel leaf is mostly cultivated in South and Southeast Asia. In Bangladesh, betel leaf is produced in Barisal, Chittagong, Rajshahi and Kustia district. It is a long durational vegetative propagated plant and generally cultivated in low rainfall belt (below 1500 mm) of southwest and northwest part in Bangladesh. In the year of 2013-2014 the total betel leaf cultivation area in Bangladesh was 54414 acre and the production was 115448 MT (BBS, 2014).

Rajshahi is a high land area. There is a little irrigation facilities in that area. Major crops like rice, maize, jute, potato etc. are difficult to grow in that area. Betel vine is a shade loving crop. So, it does not require much water like other crops and it can be easily cultivated in that area. In comparison to other crops like rice, wheat, maize, potato, betel vine is more profitable. It is planted in only one time but it produces many more time. Therefore, production cost of betel leaf is relatively low but price is

relatively higher than other crops. Table 1.1 shows the comparison between income of betel leaf with other major crops.

Table 1.1 Comparison of income of Betel leaf with other crops

Sl. No.	Name of crops	Production per hectare (M.T.)	Price per hectare (Taka)
1	T. Aman	2.80	10,267.857
2	Boro	13.24	2,171.45
3	Potato	22.35	447.42
s4	Onion (bulb)	12.00	1,145.83
5	Onion (all)	20.74	1,2050.00
6	Wheat	3.628	5,926.13
7	Mustard	1.29	34,883.72
8	Maize (kharif)	5.75	3,043.40
9	Maize(Rabi)	19.52	1,024.11
10	Lentil	1.20	83,333.33
11	Winter vegetables	16.49	1,819.28
12	Summer vegetables	12.00	3,333.33
13	Jute	12.60	3,74.60
14	Aus	2.849	10,091.26
15	Banana	27.55	1,0884.92
16	Betel leaf	18.30	32,940,000.00

Source: Upazila Agriculture Office, Bagmara Upazila

Production of betel leaf can be increased and growers can be earned more by using improved practices. A considerable effort is being made through research and extension to increase betel vine production in our country. However, proper use of improved practices and timely receiving farm-related information are the vital for increased production. Moreover, growers' personal, economic, social and psychological characteristics exert influence over their decision to use improved practices for their farming. Hence, the present study was designed to determine the extent of innovativeness of the betel leaf growers to use improved practices. Attempts were also made to identify the factors that significantly related to innovativeness of the growers to use improved practices for betel leaf production.

1.2 Statement of the Problem

The success of any practice depends on its dissemination among the potential users which ultimately is measured by the level of innovativeness to use or adopt of that practice. It is assumed that notable improvements can take place in Bangladesh agriculture. Some of the available practices are accepted and adopted by the growers. Among various practices, cultivation of pre-treated vine of betel leaf, use of

recommended fertilizers, use of plant protection measures, irrigation, practice of IPM are quite suitable for betel leaf cultivation and also recommended by experts. However, very little is known about the innovativeness of the growers to use those practices, particularly in one of the betel leaf growing regions of Bangladesh, Rajshahi. Generalization from studies conducted home and abroad regarding the innovativeness of other practices may not be always applicable due to considerable variation in attributes of the practices and for other factors.

In view of the forgoing discussion, the researcher undertook this piece of research entitle "Innovativeness of Betel Leaf Growers to Use Improved Practices". Conducting the research in a planned and appropriate way, the researcher put forwarded the following questions:

i. What are the characteristics of the betel leaf growers that related to their innovativeness to use improved practices of betel leaf cultivation?

ii. What is the extent of innovativeness of betel leaf growers to use improved practices for their farming?

iii. What are the relationships between each of the selected characteristics of the betel leaf growers with their extent of innovativeness to use improved practices?

iv. What are the problems faced by the growers to use improved practices for betel leaf cultivation?

1.3 Specific Objectives of the Study

The following specific objectives were set forth in order to give proper direction of the study.

i. To determine and describe some selected characteristics of betel leaf growers which may related to their innovativeness to use improved practices. The characteristics are as follows:

   a. Age
   b. Education
   c. Farm size
   d. Annual family income
   e. Farming experience in betel leaf cultivation

f. Agricultural training
g. Knowledge in betel leaf cultivation
h. Attitude towards betel leaf cultivation

ii. To determine the extent of innovativeness of the betel leaf growers to use improved practices of betel leaf cultivation,

iii. To determine the relationships between each of the selected characteristics of the betel leaf growers and their innovativeness to use improved practices,

iv. To identify the problems faced by the growers to use improved practices for betel leaf cultivation.

1.4 Justification of the Study

The economic and medicinal value of betel leaf is well recognized and it has been considered as one of the important cash crops of Bangladesh. Studies have already shown the economic benefits of betel leaf cultivation over other crops. Betel leaf is also a common ingredient for social events in Bangladesh. To obtain a higher yield and harvest good quality leaves, growers need to adopt improved practices. However, betel leaf is found to be a less discussed topic in academic research and not many studies were found on this issue. Therefore, the researcher undertook a research study entitled "Innovativeness of Betel Leaf Growers to Use Improved Practices". The purpose of the study was to determine the extent of innovativeness of betel leaf growers to use improved practices and also to ascertain the relationships and the contribution of the selected characteristics of the growers to their innovativeness to use improved practices.

1.5 Scope and Limitations of the Study

This research tried to understand betel leaf growers' innovativeness to use improved farming practices and identify the effect of their selected characteristics to their innovativeness. However, there were some limitations that need to be considered while studying the research findings. These limitations were as follows:

1. The study was confined to Bagmara upazila of Rajshahi district.
2. Characteristics of the betel leaf growers were many and varied, but only eight were selected for investigation in this study as stated in the objectives. This is done to complete the study within limited resources and time.

3. Population for the present study was kept confined within the heads of the betel leaf growing farm families. Because they were the major decision makers and knowledgeable members in their family to use improved practices for their farming.
4. For information about the study the researcher depended on the data as furnished by the selected betel leaf growers during their interview with her.

The findings of the study will be especially applicable to Bagmara upazila area. However, the findings will also have the implications for other areas of the country having similarities with the study area. Thus, the findings are expected to be useful to the extension workers and planners for preparation of programs for innovativeness to use betel leaf cultivation practices by the growers. The findings may also be helpful to the field workers of different GOs and NGOs to improve their techniques and strategies of action for effective working method with the rural people to generate rural employment and to improve rural economy.

1.6 Assumptions of the Study

"An assumption is the supposition that an apparent fact or principle is true in light of the available evidence" (Good, 1945). The researcher had the following assumptions in mind while undertaking this study.

1. The respondents included in the sample for this study were competent enough to furnish proper responses to the queries made in the interview schedule.
2. The researcher as well as the interviewer was adjusted to social and environmental conditions of the study area. Hence, the data collected by her from the respondents were free from bias.
3. The responses furnished by the respondents were reliable. They expressed the truth about their convictions and opinions.
4. Views and opinions furnished by betel leaf growers included in the sample were representative views and opinions of the whole population of the study area.
5. The findings of the study will have general application to other parts of the country with similar personal, socio-economic and cultural condition of the study area.

1.7 Definition of the Terms

The key terms that used throughout the study are defined in this section for clarity of understanding.

Age: It is defined as the period of time from the birth of the betel leaf growers to the time of interview. It was measured in terms of years.

Education: Education is defined as the ability if an individual to read and write or, formal education was measured in terms of actual year of successful schooling.

Farm size: Farm size refers to the cultivated area either owned by a farmer or obtained from others on 'Borga' (share cropping) system the area being estimated in terms of full benefit and benefit to the farmer respectively. The self-cultivated land as well as mortgaged land from others was full benefit.

Annual family income: The term annual income refers to the total earnings of the respondent family from agricultural and non-agricultural sources (service, business, etc.) during a year. It was expressed in Taka.

Experience in betel leaf cultivation: Experience means how long a betel leaf grower involved in betel leaf cultivation.

Innovation: An innovation is an idea or practice as new by the individual. It is the newness of the idea to the individual that determines his reaction to it.

Innovativeness: Innovativeness is the degree to which an individual is relatively earlier in adopting agricultural innovations, new ideas, practices and things than the other members of a social system (Rogers, 1995). This was comprehended by the quickness of accepting innovations by an individual in relation to others and was measured on the basis of time dimension.

Agricultural training: It means if the respondents receive any farm-related training.

Knowledge in betel leaf cultivation: It is the extent of basic understanding of the growers in different aspects of betel leaf cultivation. It includes the basic understanding of the use of different betel leaf cultivation practices.

Practices: Practices in respect of cultivation of any crop refer to those which are recommended by some competent authorities. These practices, if used, are helpful for improving the yield and/or quality of the crop. In this study, five practices of betel leaf cultivation were considered.

Problem: Problem refers to a difficulty about which something to be done. Problem faced by the growers in this study was defined as the extent of difficulties faced by betel leaf growers in the way of cultivation of Betel leaf.

CHAPTER II

REVIEW OF LITERATURE

The researcher made an elaborate search of available literature for the research. Available literature was extensively reviewed to find out work in Bangladesh as well as abroad. The reviews are conveniently presented passed on the major objectives of the study. This chapter is divided into three major sections. The first section deals with the growers' innovativeness. The second section deals with the relationships between growers' characteristics and innovativeness. The third section deals with the conceptual framework of the study.

2.1 Innovativeness and Their Roles to Use Improved Practices

In agriculture, innovativeness can be defined as to develop or try out an innovation (Reij and Waters-Bayer, 2001) by members of a farming community. Innovations are the new ideas, practices or techniques used for achieving sustained increases in farm productivity and income (Adams, 1992). A farm innovation can either be generated from research stations or from growers' fields. This can be a discovery of a completely different way of doing something or a modification of an existing technology (Yohnnnes, 2001). Therefore, innovativeness refers to a unique characteristic of a farmer which drives him to try out new technology, idea or practice relatively earlier than his peers or other members of a social system.

In the late 1990s, a number of studies in innovation diffusion research, marketing, and social and individual psychology investigated the effect of personal traits on adoption behavior as an internal motivation stimulus (Webster and Martochhio, 1992; Campeau et al., 1999; June et al., 2005). Innovativeness is a unique trait that shows individual's willingness to adopt an innovative technology. Therefore, unlike other traits, innovativeness is a stronger predictor of individual's innovation adoption. Moreover, determining innovativeness, one can easily identify which member of a farming community is likely to adopt an innovation once available for use (Agarwal & Prasad, 1998; Hung, Ku, & Chang, 2003; Yang, 2005). In other words, innovativeness can be treated as a 'proxy' of adoption intention of members of a farming community assuming that person's high in innovativeness scale is highly likely use improved practices for their farming.

2.2 Growers' Selected Characteristics and Their Relationships with Innovativeness

As mentioned earlier, despite the economic and medicinal value of betel leaf is well recognized, it has been paid less attention in academic research. Among the few researches conducted on betel leaf mostly determined growers' problems faced index. To the best of the researcher's knowledge, none of the study investigated the relationship of growers' personal and socio-economic traits to their innovativeness to use improved practices for betel leaf cultivation. The review presented in the sections below were collected from the literature related to the context, objectives and hypotheses of the present study. Keeping the time and resource constraints in mind, this study thus, considered eight selected characteristics of betel leaf growers that might related to their innovativeness to use improved practices for betel leaf cultivation.

2.2.1 Age and innovativeness

One of the most common personal traits is age considered as an important factor of technology adoption. Studies suggested a mixed findings of age and technology use relationship. By getting aged, individuals gain knowledge and achieve experience. Therefore, they might make right decision about their farming. On the other hand, with aged person's tendency to take risk about their farming considerably decreases. The aged people mostly show reluctance to use new practices compare to their younger counterparts (Green, Rich & Nesman, 1985). Therefore, despite Bedasso (2008) reported a positive and significant relationship between age and innovativeness to use new practice, this study assumed that relationship between these two is negatively significant.

2.2.2 Education and innovativeness

Education is seen as a capacity of human enable her to choose right course of action from various other alternatives. An educated man is better able to use farming information and manage complex situation. Therefore tendency of trying out new thing or tolerance to risk is higher in educated members than the less educated members of a farming community (Webster, 1967). Furthermore, due to high contact to media, educated people may able to predict the benefit of using improved practices over the traditional farming practices. Therefore, their tendency towards using new idea or practice were found higher compare to non-educated people. A considerable

number of prior studies also reported the significant relationship between educational level and innovativeness (Aiken and Hage, 1970; Brickell, 1967; Chesler, 1966; Lippitt, et al., 1967; Penny, 1970; Rogers, 1963; 1983; Zimmerman, 1970 and Harrington, 1976).

2.2.3 Farm size and innovativeness

Farm size is expected to be positively significant with innovativeness of a betel leaf grower. Growers having a big farm size are often rich and have better access to resources. Therefore, their mechanism to cope with failed experiments are much higher than the smallholder growers (Reij and Waters-Bayer, 2001). Due to big farm size, they have the scope to experiment new things. Big farm size holders tend to try out new ideas and practices for better yields and thereby their innovativeness is higher than others (Bedasso, 2008).

2.2.4 Annual family income and innovativeness

Like big farm size, the higher income groups tend to have a better mechanism to cope with the failed experiment. Therefore, their risk taking tendency is higher compared to low income groups. Driven by the idea of getting more profit and at the same time achieving higher social status by using new practices, the higher income farmer groups are found to be more innovative than low income group. Hartwich and Scheidegger (2010) also confirmed in their findings that income level are significantly related to innovativeness.

2.2.5 Farming experience and innovativeness

Growers having high farming experience are more likely to be innovative in their farming practices. High experience in farming enables them to have better knowledge about their farming and help to identify the requirements for good agricultural practices (Gebre & Zegeye, 2014). Bedasso (2008) reported that farming experience and innovativeness are significantly related. In a study entitled, "Women's innovations in rural livelihood systems in arid areas of Tunisia", Nasr, et al., (2001) stated that the innovative growers identified in their study area are to be relatively experienced. Therefore, this study assumes that farming experience is positively significant with innovativeness.

2.2.6 Agricultural training and innovativeness

Training is one of the important aspects of skill development and acquiring new knowledge. It is a process of learning and development that bring permanent change in a person's ability to perform job better by improving his technical knowledge and skills (Thassanabanjong, Miller and Marchant, 2009). Although research on tranining in relation to innovativeness is relatively rare in agricultural extension literature, the link betweeen these two variables is well established in organziational behavior literature that suggest continuous employee traininng plays a significant role in developing employees' skills (Abdullah, Ping, Wahab, & Shamsuddin, 2014). According to Amir (2013), training encourages creativity and innovativeness that lead a person to try out new things with a view to achieve better productivity. Therefore, the study assumes agricultural training is positively associated with innovativeness.

2.2.7 Knowledge and innovativeness

Knowledge and innovativeness are mostly inseparable. A person's behavior to try out new practices requires him to possess certain attributes (e.g., cognitive ability, expertise, task-specific knowledge) and willingness (e.g., motivation, satisfaction). A knowledgeable person is better able of taking risks and has higher problem solving skills. Moreover, a person high in task-specific knowledge is more capable of choosing right solutions for his problems. Task-specific knowledge can be defined as the knowledge that is required to perform farming activities. Task-specific knowledge and skills as well as general knowledge and intellect have been found to facilitate innovativeness (Barron & Harrington, 1981, Taggar, 2002). Therefore, this study assumes a betel leaf grower having higher knowledge in betel leaf cultivation will be better capable to choosing improved practices, thus, will be high in innovativeness.

2.2.8 Attitude and innovativeness

There is another important factor that facilitate a person's innovativeness is attitude towards using improved practices for his farming. Attitude is a person's predisposition to respond towards a new idea and practice favorable or unfavorable. A person's course of action is highly influenced by his attitude towards an attitude object. Attitude can be divided into three forms, affective (person's feeling or emotion towards an object), behavioral (person's act based on his predisposed attitude towards an object) and cognitive (person's beliefs or knowledge about the utility of an object). Therefore, a person's decision to try or not to try out a new idea or practice is highly

dependent on his affective, cognitive or behavioral attitude. Both agricultural extension and organizational behavior literature (Carr, 1985; Evans and Lipperman, 1968; Harrington, 1976; Harvey, 1970; Havelock, 1971; Hyer, 1972; Nickse, 1972; Rogers, 1983, Shaw and Wright, 1967; Stahl, 1972) provided support that the person's innovativeness is positively related to his attitude toward innovations.

2.3 Conceptual Framework of the Study

The present study attempts to focus two concepts; first, growers' selected characteristics and the second, their innovativeness to use improved practices in betel leaf cultivation. Innovativeness to use improved practices in betel leaf cultivation of an individual may be influenced and affected through interacting forces in his surroundings. Innovativeness to use improved practices in betel leaf cultivation and individual farmer may also be influenced by their personal, economic, social and physiological characteristics. In this study, eight selected characteristics of farmer have been taken into consideration. Moreover, it is quite impossible to deal with all the characteristics. Selected characteristics are: age, education, farm size, annual family income, experience in betel leaf cultivation, agricultural training received, knowledge in betel leaf cultivation and attitudes towards betel leaf cultivation. These eight characteristics are the causal variables of this study, while innovativeness to use improved practices in betel leaf cultivation being the main focus of the study constituted the only outcome variable. A conceptual framework in this connection has been given below:

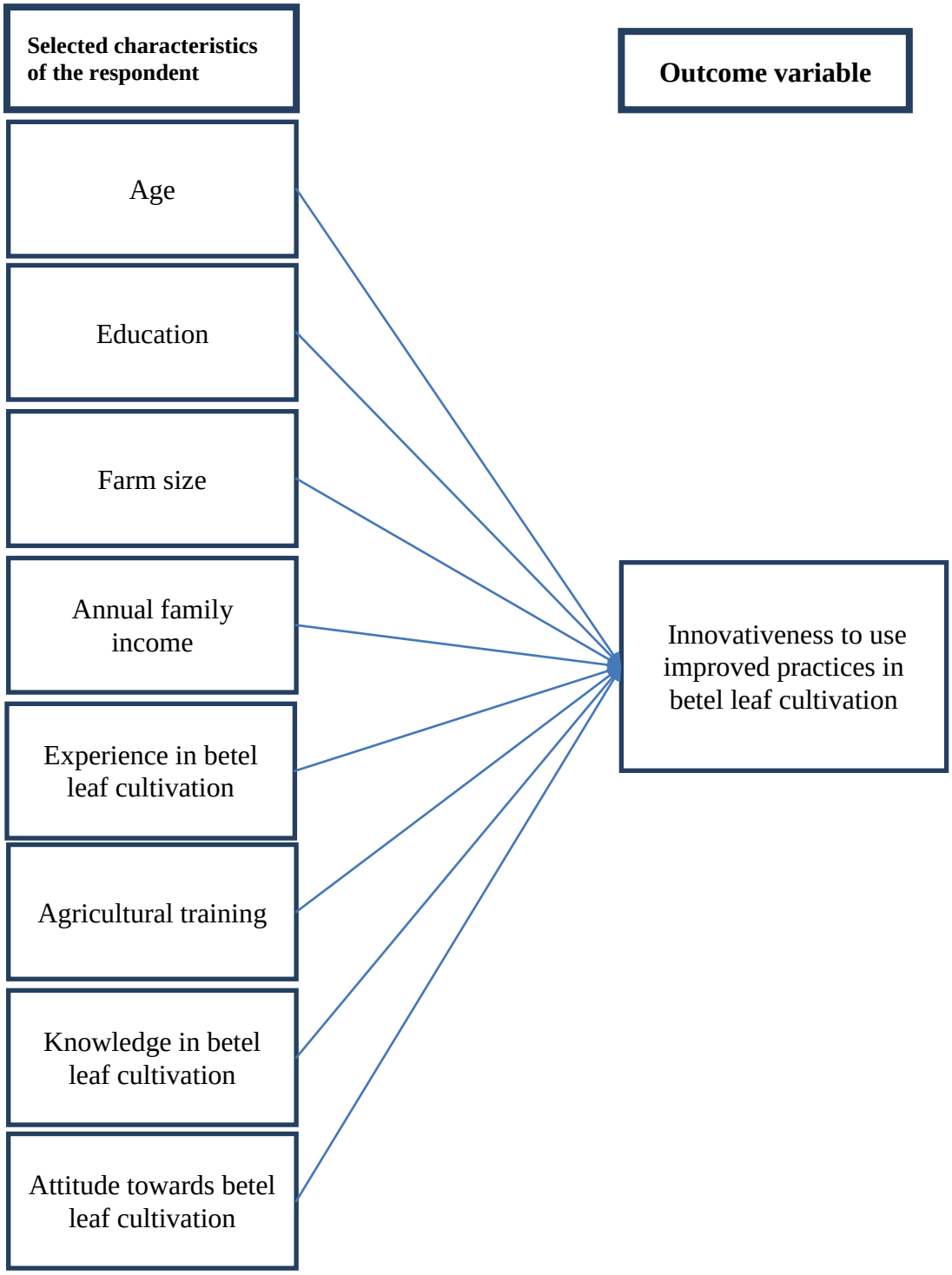

Figure 2.1 Conceptual framework of the study

CHAPTER III

METHODOLOGY

This Chapter deals with the presentation of methods and procedures followed to operationalize the study, specifically measurement of variables. The discussion also contains the method of collecting information and statistical analysis of the data.

3.1 Locale of the Study

Considering the betel leaf growing area, Bagmara upazila of Rajshahi district was purposively selected as the study area. Bagmara upazila has sixteen (16) unions with an area of about 363.3 sq. kilometers. Two unions namely Ganipur and Subvodanga were randomly selected for the study purpose. A total of four (4) villages, two villages from each union, then randomly selected as the locale of the study. Both the unions were well communicated from upazila headquarter. Betel leaf is one of the important cash crops of the growers of these unions. The map of Rajshahi district showing Bagmara upazila and a map of Bagmara upazila showing the study area have been shown in the Fig. 3.1 and 3.2.

3.2 Population and Sampling Design

To determine the population of the study, four update lists of all the four selected betel leaf growers of the selected villages was collected with the help of Sub-Assistant Agriculture Officer (SAAO) of the concerned unions. The list comprised of a total of 1127 growers constituting the population of this study. The total sample size of the study area was one hundred and thirty three (133) betel leaf growers which was determined by Yamane's (1967) formula.

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

Where,

n = Sample size
N = Population size = 1127
e = Level of precision = 8%
z = the value of the standard normal variable given the chosen confidence level (e.g., z = 1.96 with a confidence level of 95 %), and
P = The proportion or degree of variability = 50%

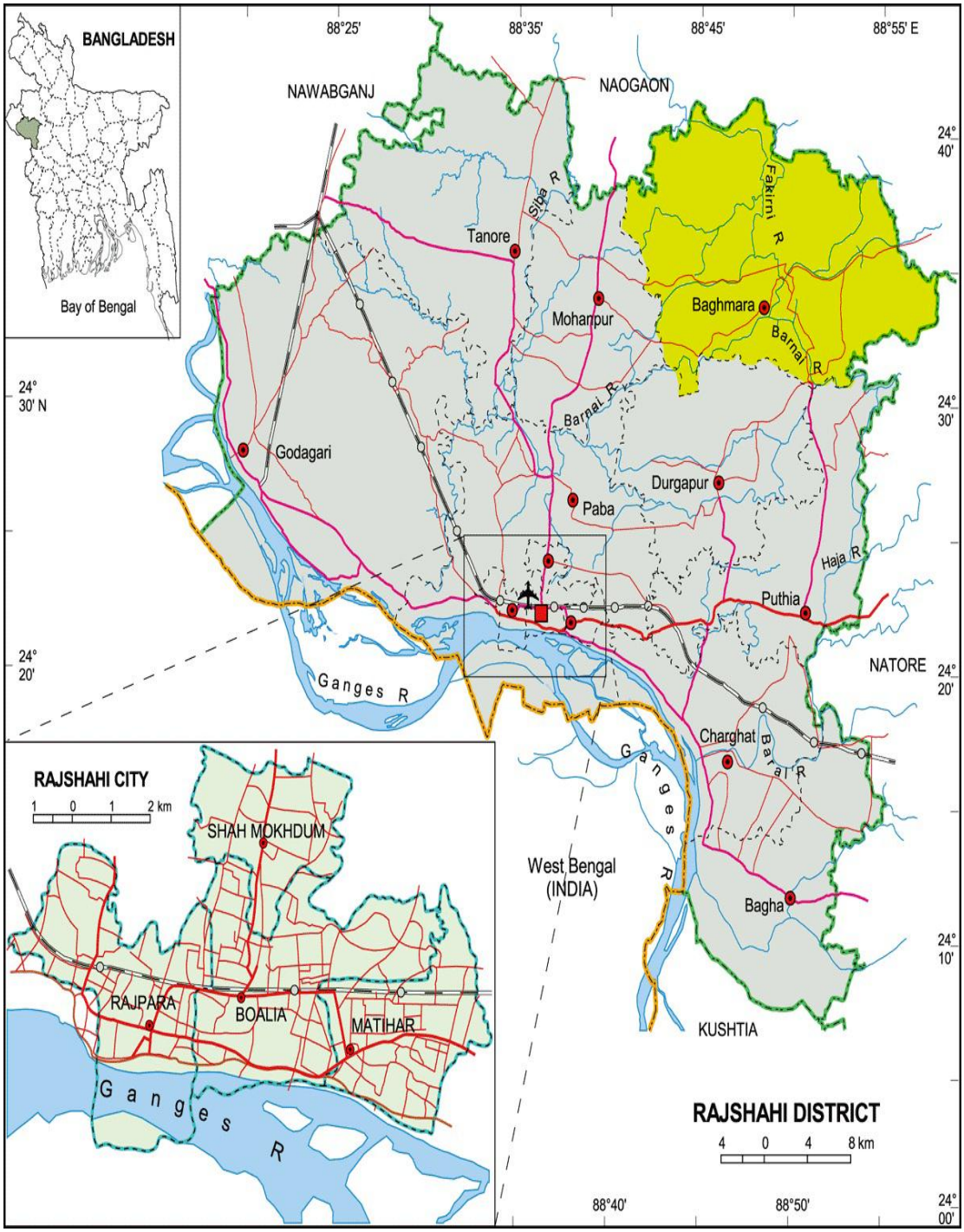

Figure 3.1 Map of Rajshahi district showing the Bagmara upazila

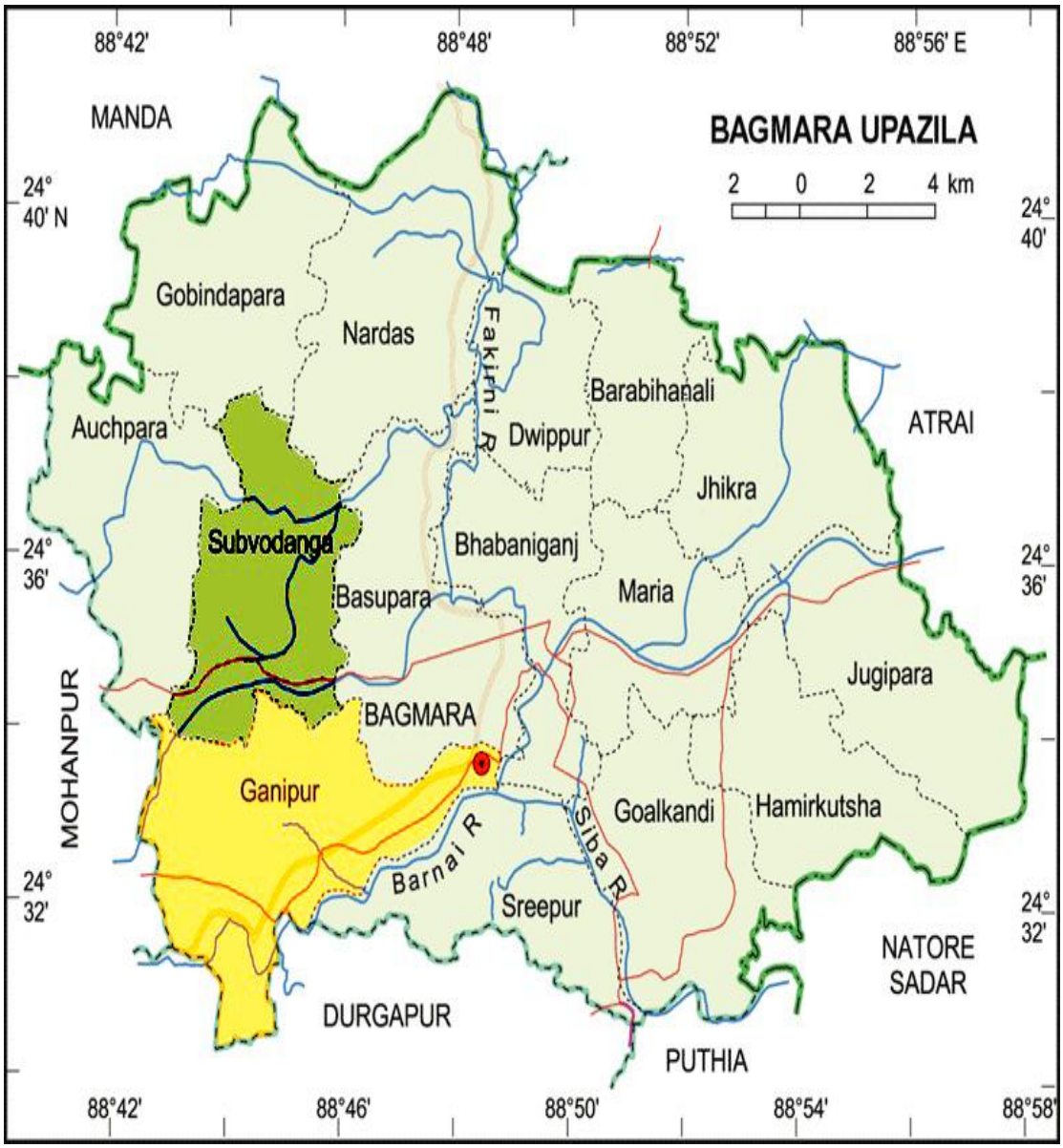

Figure 3.2 Map of Bagmara upazila showing the study area

A proportionate random sampling technique was administered to determine the sample from each study village (Table 3.1). In addition to that, a reserve list (10% of the sample) was also determined. Thus, the additional sample, so drawn stood fourteen (14) growers, which were included in the reserve list. In case of respondents included in the original sample were not available at the time of data collection, the reserve list was used for the purpose. The distribution of the growers included in the population, sample and those in the reserve list appears in Table 3.1.

Table 3.1 Distribution of betel leaf growers constituting the population, sample and reserve list

Unions	Villages	Population	Sample	Reserve list
Ganipur	Madhaimuri	395	47	4
	Dakhin Daulotpur	295	35	3
Subvodanga	Machmail	196	23	1
	Soyodpur	241	28	2
Total		**1127**	**133**	**10**

3.3 Instrument for Data Collection

In order to collect relevant information an interview schedule was carefully designed keeping the objectives of the study in mind. The interview schedule was designed in Bangla to ensure easy communication between the researcher and the respondent. The interview schedule initially prepared was pre-tested by administering the same to ten betel leaf growers of the study area. The pre-test was helpful to identify faulty questions and statements in the draft schedule. Necessary additions, corrections, alterations and adjustments were made in the schedule on the basis of the pre-test experience. The schedule was multiplied in its final form for the collection of data. An English version of the interview schedule has been presented in the Appendix A. The Bangla version of the interview schedule was used during final data collection.

3.4 Collection of Data

The researcher herself collected data from the betel leaf growers by using the interview schedule. The interviews were conducted individually in the household of the respondents during their leisure period. Ten (10) betel leaf growers of the original list were not available during interview and hence, they were replaced from the reserve list. Prior information was given to the respondents before going to them for interviewing. The researcher took all possible care to establish rapport with them. While any respondent faced difficulty in understanding any question, the researcher took utmost care to explain the issue. She obtained excellent cooperation from the respondents and others concerned during the time of interview. The entire process of collecting data took 25 days from July 5 to July 29, 2017.

3.5 Variables of the Study

In a descriptive social research, selection and measurement of the variables is an important task. In this connection, the researcher reviewed literature as far as possible to widen her understanding about the nature and scope of the variables relevant to this research. A variable is any measurable characteristic which can assume varying or

different values in successive individual Cases (Ezekiel and Fox 1959). The selected individual characteristics of the betel leaf growers study namely, age, education, farm size, annual family income, experience in betel leaf cultivation, agricultural training, knowledge in betel leaf cultivation, attitude towards betel leaf cultivation and the innovativeness of the betel leaf growers to use improved practices were the variables for this study.

3.6 Measurement of variables

The measurement procedures of these variables are given below:

3.6.1 Age

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

3.6.2 Education

Education was measured as the ability of an individual betel leaf grower to read and write or formal education received up to a certain standard. Education of a respondent was measured on the basis of classes he has passed in formal educational institution. For example, if a respondent passes class 5, his education score was 5. If a respondent did not know how to read and write, his education score was taken as zero (0). A score of 0.5 was given to that respondent who could only sign his name. If a respondent passed the SSC examination, his educational score was given as 10.

3.6.3 Farm size

Farm size of a respondent was determined as the total area of his farm (including betel leaf and other crops) on which he continued his farming operations during the period of this study. It included the area of farm owned by him as well as those obtained from others as borga, lease or mortgage. The area was being estimated in terms of full benefits to the respondents and the unit of measurement in hectare. The farm size of a respondent was measured by using the following formula.

$$\mathbf{FS = F_1 + F_2 + \frac{1}{2}(F_3 + F_4) + F_5}$$

Where, FS = Farm size, F_1 = Homestead (with pond), F_2 = Own land under own cultivation, F_3 = Own land given to other on borga, F_4 = Land taken from other to borga and F_5 = Land taken from others on lease.

3.6.4 Annual family income

Annual family income of a respondent was measured on the basis of total yearly earning from agricultural and non-agricultural sources (e.g., service, business, daily labor) by the respondent himself and other family members. The value of all the agricultural products encompassing crops, livestock, fisheries, fruits, vegetables etc. were taken into consideration. For calculation a score of one (1) was assigned for each one thousand taka of income.

3.6.5 Farming experience in betel leaf cultivation

Farming experience in betel leaf cultivation was determined by the total number of year involved in betel leaf cultivation. A score of one was assigned for each year of experience in betel leaf cultivation. Scoring was done according to survey results and was categorized into 3 levels as low, medium and high.

3.6.7 Agricultural training

Agricultural training of the respondents was calculated by the number of days that a respondent had received agricultural training in his entire life. It was indicated by the total number of days of receiving agricultural training by a respondent under different training programs.

3.6.7 Knowledge in betel leaf cultivation

To measure the knowledge in betel leaf cultivation of a respondent 12-items scale was constructed in the interview schedule. Each respondent was asked to answer all the 12 questions. Out of assigned scores against each question, the summation of obtained scores against 12 questions represented the agricultural knowledge of a respondent. Agricultural knowledge was measured by the total knowledge score about agriculture. The total assigned score was 24. Full score (2) was assigned for each correct answer, zero (0) for the wrong answer and partial score was assigned for partially correct answer. For correct responses to all questions, a respondent could get a total score of 24 and for wrong responses to all questions he could get 0 (zero). Thus, knowledge in betel leaf cultivation of the respondents could range from 0-24, where ‘0’ indicates very poor knowledge in betel leaf cultivation and ‘24’ indicates very high knowledge in betel leaf cultivation.

3.6.8 Attitude towards betel leaf cultivation

An attitude may be defined as predisposition to act towards an object in a certain manner. Attitude of a grower towards betel leaf cultivation was used to refer to his

belief, feelings and action towards the various aspects of betel leaf cultivation. A five point rating scale was used against four selected statements ranging from 'strongly disagree' to 'strongly agree' (1-5). Attitude score of a respondent was determined by summing the scores obtained by his for all the items in the scale. Thus, the scores of respondents could range from 4 to 20 where '4' indicates unfavorable and '20' indicates favorable attitude towards betel leaf cultivation.

3.6.9 Innovativeness of betel leaf growers to use improved practices

Innovativeness of a betel leaf grower was measured by computing an innovativeness score on the basis of their use of five (5) improved practices of betel leaf cultivation. Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1995). Scores were assigned on the basis of time required by an individual to adopt each of the technology in the following manner:

Extent of innovativeness	**Score**
Within one year of hearing	4
Within above one to two years of hearing	3
Within two to three years of hearing	2
After three years of hearing	1
Do not use	0

The scores for all the selected technologies were added together to constitute the innovativeness score of a respondent. Thus, innovativeness score of a respondent growers could range from 0 to 20, where, '0' indicating no innovativeness and '20' indicating highest innovativeness.

3.7 Measurement of Problem Faced for Using Improved Practices in Betel Leaf Cultivation

Growers in the study area might have faced various types of problems to use improved practices in betel leaf cultivation but the investigator gained an experience through personal contact regarding common problems faced by the respondents before collection of data. Besides, the researcher gained experience through consultation with experts pre-testing experience and reviewing previous research findings. Finally, she prepared a list of thirteen possible problems in this regard. A scale was prepared to indicate the extent to which each of the thirteen problems was applicable in the case of a respondent. The responses were obtained through a 6-point

scale: very high, high, medium, low, very low, and no problem and weights were assigned to these responses as, 5, 4, 3, 2, 1 and 0, respectively. Problem faced score of respondents could range from 0 to 65, where '0' indicates no problem faced and '65' indicates high problem faced by the growers.

In order to determine the comparative importance of the thirteen problems, a problem faced index (PFI) was computed for each of the thirteen problems scores obtained by all the respondents by using the following formula:

PFI = fvh x 5 + fh x 4 + fm x 3 + fl x 2+fvl x l+ fn x 0

Where,

PFI = Problem Faced Index
fvh = No. of respondents faced very high problem
fh = No. of respondents faced high problem
fm = No. of respondents faced medium problem
fl = No. of respondents faced low problem
fvl = No. of respondents faced very low problem
fn = No. of respondents faced no problem at all

3.8 Statement of the Hypothesis

In order to guide relevant data collection, analysis and interpretation of data, a set of hypotheses would be formulated for empirical testing. According to Goode and Hatt (1952), "a hypothesis is a proposition which can be put to test to determine its validity". It may seem contrary to, in accord with common sense. It may prove to be correct or incorrect. Hypothesis may be divided into two categories, research hypothesis (Hi) and null hypothesis (H2). In studying relationships between variables an investigator first formulates research hypothesis which states anticipated relationships between the variables. On the other hand, for statistical test, it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis would be formulated to explore the relationship of the selected characteristics of the growers with their innovativeness to use improved practices for betel leaf cultivation, "there is no relationship between each of the selected characteristics of the growers and their innovativeness to use improved practices for betel leaf cultivation''.

3.9 Data Processing

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

3.10 Categorization of Data

The collected data were classified into various categories. These categories were developed for each of the variables. Categorizations were done based on the possible score of the concerned variables with few exceptions such as age, education, farm size and annual family income. The procedure and categorization of a particular variable were further discussed in the Chapter IV in detail.

3.11 Statistical Analysis

After completion of data collection the responses were coded, tabulated and analyzed according to the objectives of the study. Local units of measurement were converted into standard units. The responses to the questions in interview schedule were transferred to a master sheet to facilitate tabulation. The analysis was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) v.23 computer package programmer). Pearson's Product Moment Correlation Coefficient was used to test the interrelationship between each of the selected characteristics of the betel leaf growers with their innovativeness in using improved practices (for objective 3). Five percent (5%) level of significance was used to test the significance level of each hypothesis.

CHAPTER IV

RESULT AND DISCUSSION

In this chapter, the findings of the study and interpretation of the results have been presented. Data obtained from respondents by interview were measured, analyzed, tabulated and statistically treated according to the objectives of the study. These are presented in four sections according to the objectives of the study. The first section deals with selected characteristics of the betel leaf growers, the second section deals with the innovativeness of the betel leaf growers to use improved practices, the third section deals with the relationships between selected characteristics of the betel leaf growers and their innovativeness to use improved practices for betel leaf cultivation. The fourth and final section deals with the problem faced by the growers in betel leaf cultivation.

4.1 Selected Characteristics of the Betel Leaf Growers

Behavior of an individual is determined to a large extent by his personal characteristics. The characteristics of an individual are important factors in making decisions about various issues of livelihood, particularly farm-related decisions are largely influenced by various characteristics of an individual. The characteristics of the growers were selected to find out their relationship as well as their contribution to their innovativeness to use improved practices. The selected characteristics included their age, education, farm size, annual family income, farming experience in betel leaf cultivation, agricultural training, knowledge in betel leaf cultivation and attitude towards betel leaf cultivation. These characteristics of the growers have been described in the section below.

4.1.1 Age

The age of the betel leaf growers varied from 25 to 80 years with a mean and standard deviation of 46.32 and 13.149 respectively. Considering the recorded age the respondents were classified into three categories namely, young, middle and old aged. The distribution of the respondents in accordance with their age is presented in Table 4.1.

Table 4.1 Distribution of the respondents according to their age

Category	Number	Percent	Observed range (year)	Mean	Standard deviation
Young aged (up to 35 years)	37	27.8	25-80	46.32	13.149
Middle aged (36-50 years)	57	42.9			
Old aged (above 50 years)	39	29.3			
Total	113	100			

Table 4.1 revealed that the middle-aged betel leaf growers comprised the highest proportion (42.9 percent) followed by old aged category (29.3 percent) and young aged category (27.8 percent). Data also indicates that the middle and old aged respondents constituted almost three-fourths (72.2 percent) of the respondents. Therefore, it can be concluded that the middle and old aged respondents were generally more involved in betel leaf cultivation than their younger counterparts.

4.1.2 Education

The level of educational scores of the betel leaf growers ranged from 0 to 14 with a mean and standard deviation of 5.133 and 4.707 respectively. Based on the educational scores, the respondents were classified into six categories such as no education (0), can sign only (0.5), primary education (1 to 5), secondary education (6 to 10), higher secondary education (11-12) and above higher secondary education (above 12). The distributions of the respondents according to their level of education are presented in Table 4.2.

Table 4.2 Distribution of the growers according to the their level of education

Categories	Number	Percent	Observed range	Mean	Standard deviation
No education (0)	36	27.1	0-14	5.133	4.707
Can sign only (0.5)	15	11.3			
Primary education (1-5)	33	24.8			
Secondary education (6-10)	32	24.1			
Higher secondary education (11-12)	10	7.5			
Above higher secondary education (above 12)	7	5.3			
Total	133	100			

Data presented in Table 4.2 reveals that more than one-third (38.4) of the respondents never received any formal education. The highest proportion of the respondents (27.1 percent) fall into 'no education' category while almost an equal proportion of the respondents (24.8 and 24.1 percent) received primary and secondary level education respectively. Despite literacy status of the study area was found a little higher than the national average (72.9 percent), only a little more than one-tenth (12.8 percent) of the respondents either received higher secondary or above higher secondary level education indicates poor education status of the respondent group.

4.1.3 Farm size

The farm size of the respondent growers' scores ranged from 0.080-3.048 ha with a mean and standard deviation of 0.689 and 0.507 respectively. Based on their farm size, the respondents were classified into four categories following the categorization of Department of Agricultural Extension (DAE, 2009). These categories were marginal farm holder (0.021-0.20 ha), small farm holder (0.21-1.00 ha), medium farm holder (1.01 ha to 3.0 ha) and large farm holder (3.01 and above ha). The distribution of the Betel leaf growers according to their farm size is presented in Table 4.3.

Table 4.3 Distribution of the respondents according to their farm size

Categories	Number	Percent	Observed range (ha)	Mean	Standard deviation
Marginal (up to 0.20 ha)	13	9.8	.080-3.048	0.689	0.507
Small (.21-1 ha)	94	70.7			
Medium (1.01-3.0 ha)	25	18.8			
Large (above 3.0 ha)	1	0.8			
Total	133	100			

Table 4.3 indicates that the small farm holder constitutes the highest proportion (70.7 percent) followed by medium farm holder (18.8 percent). The findings of the study reveal that majority of the betel leaf growers were small to medium sized farm holder. The average farm size of the growers of the study area (0.68 ha) was higher than that of national average (0.60 ha) of Bangladesh (BBS, 2014).

4.1.4 Annual family income

The score of annual family income of the betel leaf growers ranged from 28 to 992 thousand taka with a mean and standard deviation of 256.328 and 186.583 respectively. On the basis of annual family income score, the betel leaf growers were classified into three categories viz. low, medium and high income. The distribution of

the betel leaf growers according to their annual family income is presented in Table 4.4.

Table 4.4 Distribution of the respondents according to their annual family income

Category	Number	Percent	Observed range (thousand taka)	Mean	Standard Deviation
Low income (up to120 thousand taka)	27	20.3	28-992	256.328	186.583
Medium income (121-250 thousand taka)	56	42.1			
High income (above 250 thousand taka)	50	37.6			
Total	133	100			

Table 4.4 indicates that betel leaf growers having medium annual income constitute the highest proportion (42.1 percent) while the lowest proportion in low income (20.3 percent) followed by high income (37.6 percent). An overwhelming majority (80 percent) of the betel leaf growers had medium to high annual family income.

4.1.5 Farming experience in betel leaf cultivation

Growers' experience in betel leaf cultivation ranged from 3 to 30 years with a mean and standard deviation of 13.02 and 6.070 respectively. On the basis of experience score and observed range, they were classified into three categories viz. low, medium and high experiences. The distribution of the betel leaf growers according to their experience is presented in Table 4.5.

Table 4.5 Distribution of the respondents according to their experience in betel leaf cultivation

Categories	Respondents		Observed range (year)	Mean	Standard Deviation
	Number	Percent			
Low (up to 10 yrs.)	54	40.6	3-30	13.02	6.070
Medium (11-20 yrs.)	51	38.3			
High (above 20 yrs.)	28	21.1			
Total	133	100			

Table 4.5 reveals almost equal proportion of the respondents had low and medium experience in betel leaf cultivation (40.6 and 38.3 percent) while a little more than one-fifth of the respondents (21.1 percent) involved in betel leaf cultivation for longer period of time.

4.1.6 Agricultural training

Agricultural training scores of the respondents ranged from 0-15 with an average of 3.50 and a standard deviation of 6.36. Based on their agricultural training received scores, two groups of the respondents were identified: training receiver and non-receiver, is shown in Table 4.6.

Table 4.6 Distribution of the growers according to their agricultural training received

Categories	Respondents		Observed range(Score)	Mean	Standard Deviation
	Number	Percent			
Training non-receiver	102	76..69	0-15	3.50	6.366
Training receiver	31	23.31			
Total	133	100			

The finding indicates that majority (76.69 percent) of the betel leaf growers received no training while less than one-fourth of the respondents (23.31 percent) received agricultural training. The finding reveals that respondents' agricultural training received status is poor. Training is very important process of learning new things and developing skills. Insufficient facilities of receiving agricultural trainings might impede growers' skills development process. As a results, they might not be informed about the modern farming practices and face economic losses.

4.1.7 Knowledge in betel leaf cultivation

Knowledge in betel leaf cultivation scores of the respondents ranged from 7 to 24 against the possible range of 0 to 24 with a mean and standard deviation of 19.50 and 4.803 respectively. Based on the possible score of knowledge in betel leaf cultivation, respondents were classified into three categories: poor knowledge (up to 8), medium knowledge (9 to 16) and high knowledge (above 16). The distribution of the respondents according to their knowledge in betel leaf cultivation is shown in Table 4.7.

Table 4.7 Distribution of the respondents according to their knowledge in betel leaf cultivation

Categories	Respondents		Observed range(Score)	Mean	Standard Deviation
	Number	Percent			
Poor knowledge (up to 8)	7	5.3	7-24	19.50	4.803
Medium knowledge (9-16)	26	19.5			
High knowledge (above 16)	100	75.2			
Total	133	100			

Table 4.7 suggests that three-fourths of the respondents (75.2 percent) were highly and one-fifth of the respondents (19.5 percent) were moderately knowledgeable while only 5.3 percent of them possessed poor knowledge in betel leaf cultivation. Betel leaf is an important cash crop and growers involved in betel leaf cultivation were well aware of the commercial and medicinal value of it. That means they cultivate betel leaf on purpose mostly for earning revenue. A relatively higher farm size compare to national average (Table 4.3) and annual family income (Table 4.4) support this assumption that growers involved in betel leaf cultivation for commercial purposes and hence, they were updated themselves with modern production technologies of betel leaf cultivation.

4.1.8 Attitude towards betel leaf cultivation

The attitude towards betel leaf cultivation scores ranged from 10 to 20 with an average of 14.49 and a standard deviation of 2.430. Based on the possible attitude score (4-20), respondents were classified into three categories, unfavorable (up to 12), less favorable (13-16) and high favorable attitude (17-20). Distribution of the respondents according to their attitude towards betel leaf cultivation is shown in Table 4.8.

Table 4.8 Distribution of the growers according to their attitude towards betel leaf cultivation

Categories	Growers		Observed range(Score)	Mean	Standard Deviation
	Number	Percent			
Unfavorable attitude (up to 12)	18	13.5	10-20	14.49	2.430
Less favorable attitude (13-16)	88	66.2			
High favorable attitude (17-20)	27	20.3			
Total	133	100			

Data presented in Table 4.8 reveals that more than half of the respondents (66.2 percent) had less favorable attitude followed by 20.3 percent had high favorable attitude while 13.5 percent of the respondent had unfavorable attitude suggest a positive impression of betel leaf cultivation by the respondents. Attitude is an important state of human characteristic indicates person's adoption or rejection of any practice. Therefore, less to high favorable attitude toward betel leaf cultivation indicates grower's wide acceptance of betel leaf as an income earning source.

4.2 Innovativeness of Betel Leaf Growers to Use Improved Practices of Betel Leaf Cultivation

There were many technologies or practices available in betel leaf cultivation. Upon literature search and discussed with experts, five improved practices of betel leaf cultivation were taken into consideration in this study for determining their innovativeness to use improved practices in betel leaf cultivation. The five practices were:

a. Cultivation of pre-treated vine of betel leaf
b. Use of recommended doses of fertilizers (e.g., Urea, TSP, MoP)
c. Use of pesticides for protection of plant (e.g., fungicide, insecticide)
d. Improved irrigation (underground water irrigation)
e. Practice of biological method for betel leaf cultivation

The observed range of innovativeness to use improved practices of betel leaf cultivation of the growers ranged from 10 to 20. The average score was 13.77 with a standard deviation of 2.279. Based on the possible range of innovativeness score (0-20), respondents were classified into two categories, medium innovativeness and high innovativeness. Distribution of the respondents according to their innovativeness is shown in Table 4.9.

Table 4.9 Distribution of the respondents according to their innovativeness to use improved practices of betel leaf cultivation

Categories	Growers		Observed range	Mean	Standard Deviation
	Number	Percent			
Medium innovativeness (8-14)	81	60.9	10-20	13.77	2.279
High innovativeness (above 14)	52	39.1			
Total	133	100			

Table 4.9 reveals that to some extent all the respondents were innovative in their betel leaf farming practices to use improved practices of betel leaf cultivation. Majority of the respondents had medium innovativeness (60.9 percent) and a considerable number of respondents (39.1 percent) had high innovativeness to use improved practices. Respondent's highly favorable attitude (Table 4.8) and high knowledge in betel leaf cultivation also support this finding. Therefore, it could be concluded that respondents in the study area were moderate to highly innovative in their farming practices.

4.3 Relationships between each of the Selected Characteristics of the Betel Leaf Growers and Their Innovativeness to Use Improved Practices

This section deals with the relationships between eight selected characteristics of the betel leaf growers and their innovativeness to use improved practices. Pearson's product moment correlation co-efficient (r) has been used to test the hypothesis concerning the relationships between each of the selected characteristics of the betel leaf growers with their innovativeness. Five percent level of significance was used as the basis for acceptance or rejection of any null hypothesis.

The summary of the results of the correlations co-efficient relationships between each of the selected characteristics of the respondents and their innovativeness to use improved practices of betel leaf cultivation is presented in Table 4.10.

Table 4.10 Co-efficient of correlation of each of the selected characteristics of the growers and their innovativeness to use improved practices of betel leaf cultivation

Variables		Computed value of 'r'	Table value of 'r' at 131 degree of freedom	
innovativeness	Age	-0.090^{NS}	0.05	0.01
	Education	0.059^{NS}	0.174	0.227
	Farm size	0.256**		
	Annual family income	0.095^{NS}		
	Farming experience in betel leaf cultivation	0.253**		
	Agricultural training	0.002^{NS}		
	Knowledge in betel leaf cultivation	0.555**		
	Attitude towards betel leaf cultivation	0.565**		

^{NS}Non-significant
*Significant at 0.05 level of probability
**Significant at 0.01 level of probability

4.3.1 Age of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between age of the betel leaf growers and their innovativeness was examined by testing the following null hypothesis.

"There was no relationship between age of the growers and their innovativeness to use improved practices of betel leaf cultivation".

Co-efficient of correlation between the concerned variables was found to be 'r'= -0.090 as shown in Table 4.10. This led to the following observation regarding the relationship between the variables under consideration:

- The relationship showed a negative trend.
- The computed value of 'r'= -0.090 which was smaller than the table value (r=0.174) with 131 degrees of freedom at 0.05 level probability.
- The co-efficient of correlation between the concerned variable was insignificant at 0.05 level of probability.
- The null hypothesis was accepted.

On the basis of above findings, the null hypothesis was accepted. Hence, the researcher concluded that age of the growers had no significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.2 Education level of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between education of the growers and their innovativeness to use improved practices of betel leaf cultivation was examined by testing the following null hypothesis.

"There was no relationship between education of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation".

Co-efficient of correlation between the concerned variable was found to be 'r'=.059 as shown in Table 4.10. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r'=0.059 which was smaller than the table value (r=0.174) with 131 degrees of freedom at 0.05 level probability.
- The co-efficient of correlation between the concerned variable was not significant at 0.05 level of probability.
- The null hypothesis was accepted.

On the basis of above findings, the null hypothesis was accepted. Hence, the researcher concluded that education of the growers had no significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.3 Farm size of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between farm size of the growers and their innovativeness to use improved practices of betel leaf cultivation was examined by testing the following null hypothesis.

"There was no relationship between farm size of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation".

Co-efficient of correlation between the concerned variables was found to be 'r' =0.256 as shown in Table 4.10. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r'= 0.256 which was greater than the table value (r=0.227) with 131 degrees of freedom at 0.01 level of probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis was rejected.

On the basis of above findings, the null hypothesis was rejected. Hence, the researcher concluded that farm size of the growers had highly significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.4 Annual income of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between annual income of the growers and their innovativeness to use improved practices of betel leaf cultivation was examined by the following null hypothesis.

"There was no relationship between annual income of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation."

Co-efficient of correlation between the concerned variables was found to be 'r'=0.095 as shown in Table 4.10. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.

- The computed value of 'r'=0.095 which was smaller than the table value (r=.174) with 131 degrees of freedom at 0.05 level probability.
- The co-efficient of correlation between the concerned variable was not significant at 0.05 level of probability.
- The null hypothesis was accepted.

On the basis of above findings, the null hypothesis was accepted. Hence, the researcher concluded that annual income of the growers had no significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.5 Farming experience in betel leaf cultivation of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between farming experience of the growers and their innovativeness to use improved practices of betel leaf cultivation was examined by the following null hypothesis.

"There was no relationship between farming experience of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation".

Co-efficient of correlation between the concerned variables was found to be 'r'=.253 as shown in Table 4.10. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r'= 0.253 which was greater than the table value r=0.227 with 131 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis was rejected.

On the basis of above findings, the null hypothesis was rejected. Hence, the researcher concluded that experience of the growers had highly significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.6 Agricultural training received by the betel leaf growers and their innovativeness of the betel leaf growers to use improved practices of betel leaf cultivation

The relationship between agricultural training received by the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation was examined by the following null hypothesis.

"There was no relationship between agricultural training of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation".

Co-efficient of correlation between agricultural training of the betel leaf growers and their innovativeness was found to be r=.002 as shown in Table 4.10. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a tendency in the positive direction.
- The computed value of r=0.002 was found to be smaller than the table value of r (0.174) with 131 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was not significant at 0.05 level of probability.

The finding implies that the agricultural training of the betel leaf growers had no significant relationship with their innovativeness to use improved practices of betel leaf cultivation.

4.3.7 Knowledge of the betel leaf growers in betel leaf cultivation and their innovativeness to use improved practices

The relationship between knowledge of the growers in betel leaf cultivation and their innovativeness to use improved practices of betel leaf cultivation was examined by the following null hypothesis.

"There was no relationship between knowledge of the growers and their innovativeness to use improved practices of betel leaf cultivation".

Computed value of the co-efficient of correlation between growers' knowledge in betel leaf cultivation and their innovativeness to use improved practices was found to be r=.555 as shown in Table 4.10. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- A significant relationship was found to exist between the two variables.
- The computed value of r=0.555 was found to be greater than the table value of r=0.227 with 131 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

The finding reveals that knowledge in betel leaf cultivation had highly significant positive relationship with growers' innovativeness to use improved practices of betel leaf cultivation. This findings indicate that innovativeness increases with the increase of knowledge of the growers. It helps the growers to grow crops by using improved practices.

4.3.8 Attitude towards betel leaf cultivation of the betel leaf growers and their innovativeness to use improved practices of betel leaf cultivation

The relationship between attitude towards betel leaf cultivation and innovativeness to use improved practices of betel leaf cultivation was examined by the following null hypothesis.

"There was no relationship between attitude towards betel leaf cultivation of the growers and their innovativeness to use improved practices of betel leaf cultivation".

Computed value of the co-efficient of correlation between attitude towards betel leaf cultivation and their innovativeness found to be r=.565 as shown in table 4.10. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of r=0.565 was found to be greater than the table value of r=.227 with 131 degrees of freedom at 0.01 level of probability.
- Hence, the concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

The finding reveals that attitude towards betel leaf cultivation had highly significant positive relationship with their innovativeness to use improved practices of betel leaf cultivation. Attitude could directly influence innovativeness. Innovative growers are more dynamic, conscious and have more eagerness towards innovation. Therefore, persons possessing highly favorable attitude towards betel leaf cultivation are also high in their innovativeness.

4.4 Problem Faced by the Betel Leaf Growers to Use Improved Practices of Betel Leaf Cultivation

Problems faced by the betel leaf growers was measured by computing scores according to the extent of problems a betel leaf grower faced during cultivation. Scores of problem faced by the betel leaf growers to use improved practices for their farming ranged from 35 to 46 with a mean and standard deviation of 40.38 and 1.283 respectively. On the basis of possible range of problems faced scores (0-65), respondents were categorized into two categories, medium and high problem faced is shown in Table 4.11.

Table 4.11 Distribution of the respondents according to their problems faced in betel leaf cultivation

Categories	Growers		Observed range	Mean	Standard Deviation
	Number	Percent			
Medium problem faced (35-40)	70	52.6	35-46	40.38	1.283
High problem faced (41-46)	63	47.4			
Total	133	100			

Data in Table 4.11 reveals 52.6 percent of the respondents faced medium problem to use improved practices in betel leaf cultivation and 47.4 percent of the respondents faced high problem. In order to identify the significance of each problem, a Problem Faced Index (PFI) was computed.

Rank order was made based on the descending order of the PFI is shown in table 4.12.

Table 4.12 Ranked order of the selected problems faced by the growers in betel leaf cultivation

SI. No	Problems	Extent of problem						Total Score	Rank Order
		Very high (5)	High (4)	Medium (3)	Low (2)	Very low (1)	No problem at all(0)		
1	Lack of variety of betel leaf vine	103	15	10	0	5	0	610	1
2	High cultivation cost (input cost)	91	11	18	2	11	0	568	2
3	Lack of capital	64	9	18	11	31	0	463	3
4	No preservation process	62	9	12	6	44	0	438	4
5	High disease infestation (e.g., leaf rot and stem rot)	42	6	47	14	24	0	427	5
sss 6	Poor storage facilities	54	10	13	12	44	0	417	6
7	Damage of betel leaf due to cold, wind, hail storm etc.	51	6	19	9	48	0	402	7
8	Lack of skilled labor	53	4	15	19	52	0	396	8
9	Lack of knowledge on balanced fertilizer and manure application	25	31	21	16	40	0	384	9
10	Lack of extension contact	20	11	57	14	31	0	374	10
11	Lack of irrigation facilities	39	5	10	9	70	0	333	11
12	Lack of loan facility and high rate of interest	25	7	20	8	73	0	302	12
13	Poor transport facilities	18	1	18	17	79	0	261	13

Ranked order (Table 4.12) of the selected problems faced by the growers in betel leaf cultivation indicates that ‘lack of improved variety of betel leaf vine’ was ranked first followed by ‘high cultivation cost (input cost)’ and ‘lack of capital’. ‘Poor transport facilities’ was ranked the last.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This Chapter summarizes the key findings of the selected characteristics of the betel leaf growers, their innovativeness to use improved practices, relationships between each of the selected characteristics of the betel leaf growers with their innovativeness to use improved practices in betel leaf cultivation and growers' problems faced index. Based on the findings, conclusions and recommendations are put forwarded for policy actions. This Chapter finally recommends probable research endeavors that can be carried out in future.

5.1 Summary of findings

The major findings of the study are summarized below:

5.1.1 Selected characteristics of the betel leaf growers

Age:

The highest proportion (42.9 percent) of the respondents was in middle aged category compared to 29 .3 percent old aged and 27.8 percent young aged category.

Education:

A large proportion (24.8 percent) of the respondents fell under category of 'primary education' compared to 24.1 percent 'secondary education', 7.5 percent higher 'secondary education', 5.3 percent above higher secondary education and 27.1 percent 'no education'. Thus, almost 61.7 percent of the respondents had at least some sort of formal education.

Farm size:

The highest proportion of the respondents (70.7 percent) had small farm size followed by 18.8 percent had medium farm size. The findings of the study reveal that majority of the betel leaf growers were small to medium sized farm holder.

Annual family income:

Annual family income of the growers ranged from Tk. 28 to 992 thousand taka. The highest proportion (42.1 percent) of the respondents had medium annual income compared to 37.6 percent having high income and 20.3 percent having low income.

Farming experience in betel leaf cultivation:

Score of experience in betel leaf cultivation ranged from 3 to 30 years. Highest percent (40.6) of the betel leaf growers had low experience followed by medium experience category (38.3 percent) while 21.1 percent of them had high experience in betel leaf cultivation.

Agricultural training:

Agricultural training scores of the growers ranged from 0 to 15. The finding indicates that majority (76.69 percent) of the growers received no training. On the other hand, 23.31 percent of them received training.

Knowledge in betel leaf cultivation:

Knowledge in betel leaf cultivation scores ranged from 7 to 24 against the possible range of 0 to 24. The finding shows that highest proportion (75.2 percent) of the respondents had high knowledge compared to 19.5 percent had medium knowledge while 5.3 percent had poor knowledge in betel leaf cultivation.

Attitude towards betel leaf cultivation:

The attitude towards betel leaf cultivation scores of the growers ranged from 10 to 20. The average attitude towards betel leaf cultivation score was 14.49. The finding shows that the highest proportion (66.2 percent) of the growers had less favorable attitude compared to 20.3 percent having high favorable attitude towards betel leaf cultivation and 13.5 percent of the respondents had unfavorable attitude towards betel leaf cultivation.

5.1.2 Innovativeness to use improved practices in betel leaf cultivation:

All the respondents used some sort of improved practices therefore none of them was found to be low in innovativeness. Majority of the respondents had medium innovativeness (60.9 percent) and a considerable number of respondents (39.1 percent) had high innovativeness to use improved practices. Therefore, it could be concluded that respondents in the study area were moderate to highly innovative in their farming practices.

5.1.3 Relationships between each of the selected characteristics of the betel leaf Grower's to their innovativeness to use improved practices

Pearson's Product Moment Correlation Coefficient (r) reveals that out of these eight, four factors viz. farm size, farming experience in betel leaf cultivation, knowledge in betel leaf cultivation and attitude towards betel leaf cultivation were found to be positively associated with their innovativeness while rest of the characteristics viz. age, education, annual family income and agricultural training were found to be non-significant with their innovativeness to use improved practices.

5.1.4 Problems faced by the betel leaf growers to use improved practice of betel leaf cultivation

Scores of problem faced by the betel leaf growers to use improved practices for their farming ranging from 35 to 46 with a mean and standard deviation of 40.38 and 1.283 respectively. Majority of the respondents (52.6) faced medium problem to use improved practices of betel leaf cultivation and 47.4 percent respondents had faced high problem. According to PFI, 'lack of improved variety of betel leaf vine' was ranked first followed by 'high cultivation cost (input cost)' and 'lack of capital' while 'poor transport facilities' was ranked last.

5.2 Conclusions

Findings of the present study and the logical interpretation of other relevant facts prompted the researcher to draw the following conclusion:

- Majority of the respondents (60.9 percent) had medium innovativeness to use improved practices in betel leaf cultivation and a considerable number of respondents (39.1percent) had high innovativeness to use improved practices. Therefore, it can be concluded that respondents in the study area were moderate to highly innovative in their farming practices.

- Majority of the respondents (75.2 percent) had high knowledge in betel leaf cultivation. Pearson product moment correlation coefficient reveals that knowledge of the growers in betel leaf cultivation significantly associated with their innovativeness. Therefore, it can be concluded that individuals having more knowledge in betel leaf cultivation are innovative to use improved practices.

- Majority of the betel leaf growers of the study area (66.2 percent) had less favorable attitude towards betel leaf cultivation and 20.3 percent had high favorable attitude towards betel leaf cultivation and it was found to be the strongest predictor of innovativeness. Thus, it may be concluded that respondents' having favorable attitude towards betel leaf cultivation are more innovative to use improved practices of betel leaf cultivation.
- "Lack of improved variety of betel leaf vine" was found to be the highest ranked problem faced by the betel leaf growers followed by "high cultivation cost" and "lack of capital". Therefore, it may be concluded that emphasis should be given to minimize these problems.

5.3 Recommendations

5.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations are proposed:

- Despite respondents were found to be moderately to highly innovative in their farming practices, demand-driven modern practices, particularly post-harvest management practices need to be introduced to ensure sustained economic gain from betel leaf cultivation.
- Knowledge in betel leaf cultivation of the respondents had positive significant relationship with innovativeness. It was found that respondents' knowledge in betel leaf cultivation were satisfactory. However, considering the importance of knowledge in using improved farm practices, extension service providers like Department of Agricultural Extension (DAE) should arrange more trainings on improved practices of betel leaf cultivation to the concerned growers.
- Attitude was found to be the positive predictor of innovativeness of using improved practices of betel leaf cultivation and majority of the respondents were found to have less favorable attitude to high favorable attitude towards betel leaf cultivation. Therefore, attempts must be taken to disseminate the economic value of betel leaf cultivation to the non-adopters.

- "Lack of improved variety of betel leaf vine" was found to be the highest ranked problem followed by "high cultivation cost" and "lack of capital". Therefore, efforts must be paid to advanced research to develop and disseminate more varieties of betel leaf vine and low-cost production technologies. To overcome the capital problem, Ministry of Agriculture (MoA) should provide special incentive and with the association of financial organizations like Bank and NGOs can provide a loan with low interest rate.

5.3.2 Recommendations for further study

- Considering the time and resource constraints, data were collected from a relatively small sample (133). Furthermore, this research was conducted in only a specific upazila of Rajshahi district. Therefore, generalizability of this study can only be applicable to an area where agro-ecological and socio-economic conditions are similar to the study area. To obtain a more generalized finding, further studies should be under taken covering more dimensions of practices in betel leaf cultivation.

- The present study was conducted in Bagmara upazila under Rajshahi district. It is recommended that similar studies should be conducted in other betel leaf growing areas of Bangladesh.

- This study investigated the relationship of eight selected characteristics of the growers with their innovativeness to use improved practices of betel leaf cultivation. Therefore, it is recommended that further study be conducted with other variables such as, respondents' risk taking behavior, communication media use behavior.

- Problems faced by the betel leaf growers were identified in this study. However, attempts should be made to understand growers' coping mechanism of these problems.

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APPENDIX-A

DEPARTMENT OF AGRICUITURAL EXTENSION AND INFORMATION SYSTEM

SHER-E-BANGLA-AGRICUITURAL UNIVERSITY, DHAKA- 1207

An interview schedule for collection of data on

"INNOVATIVENESS OF THE BETEL LEAF GROWERS TO USE IMPROVED PRACTICES"

Serial no.

Name of the Respondent :……

Village :……

Union :……

Thana/Upazila :……

District :……

(*Please answer the following questions. All information will be kept confidential.)*

1. Age

How old are you?……..years.

2. Educational Qualification

Please mention your educational qualification:

i. Do not know how to read or write ( )

ii. Do not know how to read or write but can sign only ( )

iii. Read up to class …….( )

3. Farm Size: Please indicate your farm size:

Sl. No.	Types of Land Ownership	Area of Land	
		Local Unit (Decimal)	Hectare
1.	Homestead		
2.	Own land under own cultivation		
3.	Own land given to other on borga		
4.	Land taken from others to borga		
5.	Land taken from others on lease		
Total			

4. Annual Family Income: Please furnish your annual family income from different sources in the last year:

Sl. No.	Sources of Income	Amount of Production (kg)	Unit Price (TK.)	Annual Income (TK.)
1.	Agriculture ❖ Betel leaf cultivation ❖ Rice ❖ Wheat ❖ Maize ❖ Potato ❖ Pulses ❖ Fruits ❖ Vegetables			
2.	Livestock			
3.	Poultry			
4.	Fishery			
5.	Business			
6.	Services			
7.	Labor wage			
8.	Remittance			
9.	Others			
Total				

5. Experience in betel leaf cultivation: How long have you been engaged in betel leaf cultivation? _____ Years.

6. Agricultural training: (a) Have you participated in any agricultural training program? Yes/No

b) If yes then please provide the following information:

Sl. No.	Name of Training	Organization	Duration (days)
1			
2			
3			
Total			

7. Knowledge in Betel leaf cultivation: Please answer the following questions:

Sl. No.	Questions	Score	
		Weighted	Obtained
1.	How do you prepare the land for betel leaf cultivation?	2	
2.	What efforts are taken during winter season to protect betel leaf from cold?	2	
3.	Mention two varieties of betel leaf?	2	
4.	Mention two important diseases of betel leaf?	2	
5.	Mention the suitable time for betel leaf cultivation?	2	
6.	Mention the function of oil cake in betel leaf cultivation?	2	
7.	What are the doses of fertilizers applied?	2	
8.	Mention irrigation time in betel leaf cultivation?	2	

9.	Mention the number of earthing-up is necessary for betel leaf cultivation?	2	
10.	Which type of betel vine is suitable for betel leaf cultivation?	2	
11.	How betel leaf is harvested?	2	
12.	What are the post –harvest operations of betel leaf?	2	
	Total	24	

8. Attitude towards betel leaf cultivation: Please mention the extent of your agreement or disagreement towards the following statements:

Sl. No.	Statements	Extent of agreement /disagreement				
		Strongly disagree	**Disagree**	**Undecided**	**Agree**	**Strongly agree**
1.	Cultivation of betel leaf is not unsuitable to me likes land availability.					
2.	Cultivation of betel leaf is profitable to me.					
3.	Cultivation of betel leaf requires less effort (farming practices).					
4.	Cultivation of betel leaf is suitable for my agro-climatic condition.					
Total						

9. Innovativeness: Please answer the following questions:

Sl. No.	Name of Technologies	Extent of innovativeness				
		Within 1 year of hearing (4)	**Within above 1- 2 years of hearing (3)**	**Within above 2-3 years of hearing (2)**	**After 3 years of hearing (1)**	**Do not use (0)**
1.	Cultivation of pre-treated vine of betel leaf					
2.	Use of recommended dose fertilizers (Urea, TSP, MoP, etc.)					
3.	Use of pesticide for protection of plant (fungicide, insecticide)					
4.	irrigation (underground water irrigation)					
5.	Practice of biological method for betel leaf cultivation					
Total						

10. Problems faced by the betel leaf grower: Please mention the extent of problems faced in betel leaf cultivation:

Sl. No.	Problems	Extent of problems					
		Very high (5)	**High (4)**	**Medium (3)**	**Low (2)**	**Very low (1)**	**No problem at all(0)**
1	Lack of improved variety of betel leaf vine						
2	High cultivation cost (input cost)						
3	Lack of capital						
4	No preservation process						
5	High disease infestation (e.g., leaf rot and stem rot)						
6	Poor storage facilities						
7	Damage of betel leaf due to cold, wind, hail storm etc.						
8	Lack of skilled labor						
9	Lack of knowledge on balanced fertilizer and manure application						
10	Lack of extension contact						
11	Lack of irrigation facilities						
12	Lack of loan facility and high rate of interest						
13	Poor transport facilities						
Total							

APPENDIX-B

CORRELATION MATRIX

Variable	Age	Education	Land Size	Income	Exp	Training	Knowledge	Attitude	Innovativeness
Age	1								
	133								
Education	-.379**	1							
	.000								
	132	132							
Land Size	-.004	.225**	1						
	.964	.010							
	133	132	133						
Income	-.014	.112	.566**	1					
	.870	.203	.000						
	133	132	133	133					
Experience	.478**	-.178*	.299**	.167	1				
	.000	.041	.000	.054					
	133	132	133	133	133				
Training	-.359**	.114	.005	-.078	-.222*	1			
	.000	.194	.950	.370	.010				
	133	132	133	133	133	133			
Knowledge	-.130	.046	.213*	.179*	.327**	-.110	1		
	.136	.598	.014	.039	.000	.207			
	133	132	133	133	133	133	133		
Attitude	-.067	.020	.233**	.167	.267**	-.060	.431**	1	
	.440	.819	.007	.055	.002	.494	.000		
	133	132	133	133	133	133	133	133	
Innovativeness	-.090	.059	.256**	.095	.253**	.002	.555**	.565**	1
	.303	.505	.003	.276	.003	.984	.000	.000	
	133	132	133	133	133	133	133	133	133

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).