

# **PROBLEMS FACED BY THE FARMERS IN BETEL LEAF CULTIVATION**

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**PROBLEMS FACED BY THE FARMERS IN BETEL  
LEAF CULTIVATION**

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## **CERTIFICATE**

This is to certify that the thesis entitled, “**PROBLEMS FACED BY THE FARMERS IN BETEL LEAF CULTIVATION**” 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 (MS) in Agricultural Extension**, embodies the result of a piece of bona fide research work carried out by **Md. Khalid Imran**, Registration No. 10-04131, 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, as has been availed of during the course of investigation have been duly acknowledged.

Dated: June, 2016  
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# **DEDICATION**

**DEDICATED TO MY BELOVED PARENTS AND  
RESPECTED TEACHERS OF SHER-E-BANGLA  
AGRICULTURAL UNIVERSITY**

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**The Researcher**

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## LIST OF ABBREVIATIONS AND GLOSSARY

<b>Abbreviation</b>	<b>Full word</b>
Ag. Ext. Ed.	Agricultural Extension Education
Ag. Ext. and Info. Sys.	Agricultural Extension and Information System
BBS	Bangladesh Bureau of Statistics
BEC	Bangladesh Economic Census
DAE	Department of Agricultural Extension
<i>et. al.</i>	All Others
GDP	Gross Domestic Product
PFI	Problem Faced Index
SAAO	Sub Assistant Agriculture Officer
UAO	Upazila Agriculture Officer
WHO	World health Organization

# **PROBLEMS FACED BY THE FARMERS IN BETEL LEAF CULTIVATION**

MD. KHALID IMRAN

## **ABSTRACT**

The study examines the extent of problems faced by the farmers in betel leaf cultivation and shows the relationship of the selected characteristics of the farmers with their problems faced in betel leaf cultivation. Data were collected from 85 betel leaf farmers of Baliakandi, Goalanda, Pangsha, Kalukhali and Rajbari sadar upazila of Rajbari district during the period from January 25 to February 24, 2017. Descriptive statistics, Pearson's Product Moment Coefficient of Correlation ( $r$ ) were used for data analysis. The highest proportion (55.3 percent) of the farmers faced medium problems where 23.5 percent farmers faced low and the 21.2 percent farmers faced high problems in betel leaf cultivation. Farmers' age, level of education, experience in betel leaf cultivation, Benefit Cost Ratio (BCR), knowledge on betel leaf cultivation had negative significant relationship with their problems faced in betel leaf cultivation. Farmers' family size, betel leaf cultivation area, annual income from betel leaf cultivation, practices in betel leaf cultivation, agricultural extension media contact and distance to market place had non-significant relationship with the problems faced by them in betel leaf cultivation. As per Problem Faced Index (PFI), infection of leaf rot disease ranked 1<sup>st</sup> and lack of credit facility in last position. Most of the farmers (89.4 percent) used Actara for insect-pest control, maximum (91.7 percent) used Amistartop for disease control and for quick growing, the highest (32.9 percent) farmers used Flora. It is concluded that most of the farmers faced problems in betel leaf cultivation which needs effective intervention by DAE and NGOs to ensure sustainable betel leaf cultivation.

**Key words:** Problems, betel leaf cultivation;

# CHAPTER I

## INTRODUCTION

### 1.1 General background

Bangladesh is a densely populated agro-based country. About 76% of the people live in rural areas, and 47.5% of the total manpower is involved in agriculture. In Bangladesh, agriculture contributes 18.82% of the Gross Domestic Product (GDP) of the country in the year of 2014-2015 (BEC, 2016). Around 152.51 million people lives in its 1,47,570 square kilometer of land (BBS, 2014). Most of the rural people are dependent for their livelihood mainly on cropping and livestock farming. Besides cultivation of cereals, several farmers in Bangladesh are engaged in betel leaf cultivation in various district. Betel vine (*Piper betel* L.) having the heart shaped deep green leaves are an important horticultural crop of aesthetic and commercial values. Betel leaf is also grown as an important cash crop. Betel leaves have good export potential and Bangladesh exports betel leaves to other countries. The betel farming activities can generate employment opportunities for throughout the year. Further, the national employment generation is concerned, a large number of people derive their livelihood directly or indirectly from cultivation, processing, transportation and marketing of betel leaves in Bangladesh.

Betel leaf (*Piper betel*) is locally known as paan, which has an important socio-cultural and ceremonial uses, besides having significant medicinal properties and nutritional values (DAWN, 2013). Betel leaf is beneficial to the throat and removes viscosity in human beings. It helps in digestion and removes the bad smell of mouth. It is also good for respiratory system and used in treatments of various diseases such as bronchitis, cough and cold (Chopra, 1956). Betel leaf cultivation has vast potential as it plays an important role in economics and livelihood of people in South Asia (Jeng *et al.*, 2002; Guha, 2006). However, betel leaf plant is sensitive to pest, diseases and weather, which requires intensive care, management and high inputs (Jana, 1996). Betel leaf plant

grows well under shade with low light intensity, mild temperature (15 to 30°C), high humidity with 2250 to 4750 mm annual rainfall (Guha, 2006). In an area with lower rainfall, however, betel leaf can be grown with frequent irrigation throughout the growing period. In general, betel leaf is grown under shaded condition in a structure called as boroj, which is a small hut approximately two meter in height. It is constructed with locally available materials like bamboo stems, jute sticks, paddy straw, petioles and leaves of banana etc. The cultivation area of betel leaves was increased by 10%, while the yield was decreased by 5.5% in 2010-2011 compared to five years ago (BBS, 2014).

Betel-leaf (*Piper betle* L.:Piperaceae), is a perennial dioecious climber that climbs up trees or other supporting materials with the help of its adventitious roots (Shaha and Azam, 2004; Nathet. *al.*, 2003; Guha and Jain, 1997). It is a popular mastication, usually chewed with slice of betel nut (*Areca catechu*) and lime, widely popular among people of Bangladesh, India, Pakistan, Nepal, Myanmar, Srilanka, Indonesia and Malaysia (Jana, 1996; Samanta, 1994; Sharma, 1996). The leaf is widely used in social, cultural and religious events for hospitality and also has medicinal value (Guha, 2006). It is an important economic crop in Bangladesh and exported to Middle East, Britain, Pakistan and some other African countries (Khaleque, 1998). In Bangladesh, it is widely cultivated in Sylhet, Moulvibazar, Jessore, Khulna, Kustia, Bagerhat, Satkhira, Bhola, Barisal, Faridpur, Rajshahi, Rangpur, Gaibanda, Pabna, Cox's Bazar and in greater Chittagong district (Fila *et al.*, 2006; BBS, 2014).

Betel leaf farmers set up a bamboo-encircled stage called "paanbarouj" where betel leaf vine crawls and develops. The barouj is fenced with bamboo or jute sticks also, coconut takes off. The vine is a dioecious, shade cherishing enduring root climber. There are around 100 assortments of betel vine on the planet, of which around 40 are found in India and 30 in West Bangal (Sumanta, 1994). Betel requires high land and fruitful soil. Waterlogged, saline and basic soils are not appropriate for its cultivation. The tilth soil is partitioned into wrinkles of 10 to 15 m length, 75 cm width and 75 cm profundity. Oilcakes,



excrement, dry leaves are completely incorporated with the topsoil of the wrinkles. The creeper cuttings are planted both toward the start and end of the rainstorm season. Appropriate shade and water system are fundamental for the effective cultivation of this product. It needs visit light and water system yet can't tolerant over the top warmth and standing water. Dried leaves, wood slag and bovine manure slurry are connected to the wrinkles at a consistent interim which are worthwhile for the better cultivation of the betel leaf. Inside 3 to 6 months in the wake of planting, the vines reach 150 to 180 cm tallness and they create branch. Collect starts when lower takes off of the vines wind up noticeably developed and it proceeds with 15 to 30 days interim. Gathering of betel leaf in the time of December, January, February, March, April and May is exceptionally gainful to the betel leaf farmers because of its high cost.

For getting the enhanced practices received by the farmers in betel leaf cultivation, no less than two things are essential. Firstly, the betel leaf farmers must know about the advantages of the betel leaf cultivation and besides, the betel leaf farmers ought not to confront trouble in acquiring vital conditions and administrations to embrace the enhanced practices for betel leaf cultivation. For the most part betel leaf farmers stand up to numerous issues amid betel leaf cultivation. As a rule, issue alludes to a few challenges when a betel leaf farmers encounters from reasonable circumstance and needs to get an answer for the same. Betel leaf farmers confront diverse issues. The issues can be named followings-

- Inputs issues: vines, bamboo stick, manure, fertilizer or dairy animals compost and so forth.
- Soil issues: weed, soil richness, soil profitability, soil sort and so forth.
- Climatic issues: Rainfall, temperature, light, dampness and so forth.
- Malady and bug issues: Two noteworthy ailments are leaf spot sickness and root decay illness.
- Physical and physiological issues: Mechanical damage, high parching rate, dropping off develops leaves amid winter season and so forth.

- Administration issues: Land readiness, weeding, water system, manure administration, work administration and post gather administration like storerooms and so on.
- Financial issues: Lack of capital, advance or credit, trim protection, high work cost and so on.

So long the issue showdown, specialists used to discover issues with level of seriousness as saw by the concerned respondents. In any case, the specialist of this review had an examination configuration to portray how each of the issue was handled by them amid betel leaf cultivation. Rajbari district is an appropriate place for betel leaf cultivation and there are a number of betel leaf farmers and they stand up to various issues in betel leaf cultivation. Little exertion has been made previously to embrace orderly examination in this regard. These truths show the requirement for directing a research concentrate entitled, 'Problems Faced by the Farmers in Betel Leaf Cultivation'.

## **1.2 Statement of the problem**

Betel leaf is one of the significant trades trim out Rajbari district of Bangladesh. It connotes their financial condition and expectation for everyday comforts. The betel leaf develops encounter various issues which rise up out of administration practices, innovative issues, showcasing framework and ecological perspectives. Many reviews were led by numerous scientists, which were restricted to distinguishing proof of problems alongside their seriousness as it were. To the significance of problems encounter was quite recently seeking and rundown down the issues of concerned issues. In realities, the significance of issue encounter ought to be distinctive. A few analysts have seen that the issue encounter ought to depict the strategies for handling problems. The betel leaf farmers of Rajbari district area are suitable where no issue can go unchallenged. Along these lines, their selfhood moves them to create gadget for settling betel leaf cultivation against problems. Where there is issue there is likewise arrangement. Sensibly, betel leaf farmers of Rajbari district distinguish problems and handle the problems giving some level of

accentuation. In the light of the previous talk the researcher embraced a research issue entitled ‘Problem Faced by Farmers in Betel Leaf Cultivation’. The motivation behind this review was to have a comprehension of the issues stood up to by the betel leaf farmers in regard of betel leaf cultivation exercises. The review likewise investigated the contribution of the chose qualities of the betel leaf farmers with their problems in betel leaf cultivation. In this association, the accompanying exploration inquiries were raised out for arrangement:

- What were the problems faced by the farmers in betel leaf cultivation?
- What were the characteristics of the betel leaf farmers?
- Was there any relationship of selected characteristics of the betel leaf farmers’ with their problem faced in betel leaf cultivation?

In order to get a clear view of the above questions the investigator undertook a study entitled ‘Problems faced by farmers in betel leaf cultivation’.

### **1.3 Objectives of the study**

- i. To assess the extent of problems faced by farmers in betel leaf cultivation
- ii. To describe the following selected characteristics of the betel leaf farmers:
  - Age
  - Level of education
  - Family size
  - Betel leaf cultivation area
  - Experience in betel leaf cultivation
  - Annual income from betel leaf cultivation
  - Benefit Cost Ratio (BCR)
  - Practices in betel leaf cultivation
  - Agricultural extension media contact
  - Knowledge on betel leaf cultivation
  - **Distance to market place**

- iii. To explore the relationships of the betel leaf farmers' selected characteristics their problem faced in betel leaf cultivation
- iv. To describe the use of chemicals/hormones by the farmers for betel leaf cultivation.

#### **1.4 Scope of the study**

The present study was designed to have an understanding on problems faced by the farmers in betel leaf cultivation and to explore its relationship with their selected characteristics.

- i. The findings of the study will, in particular, be applicable to the study area in Rajbari district. The findings may also be applicable to other locale of Bangladesh where socio-cultural, psychological and economic circumstance do not differ much than those of the study areas.
- ii. The findings of the study may also be subsidiary to the field worker of extension service to enhance their action strategies on problems in betel leaf cultivation.
- iii. The findings of the study will be conducive to accelerate the improvement in agriculture, farmers' logistic supports, information needs and the way of dissemination especially tuned to key role players in the society as well as problems in betel leaf cultivation. The outcomes might also be helpful to the planners and policy makers, extension workers and beneficiaries of agriculture.
- iv. To the academicians, it may help in the further conceptualization of the systems model for analyzing the problems in betel leaf cultivation. In addition, the findings of this study may have other empirical evidence to all aspects of problems in betel leaf cultivation which may be used to build an adequate theory of problems in betel leaf cultivation aspects.

### **1.5 Justification of the study**

Problems in betel leaf cultivation are a critical issue for the betel leaf farmers. Due to the problems, betel leaf cultivation is in horrible state all over Bangladesh. In this conditions, farmers check monetary misfortune with sadness. In any case, there are a few creative and venturesome farmers who stand up to the issues with the assistance of expansion benefit and applying their own encounters. Farmers of Rajbari district go up against problems of betel leaf cultivation system utilized against problems. In this way, the encounters of problems showdown by betel leaf farmers of Rajbari district could lean road for other farmers of another locale. Considering the previously mentioned focuses, the researcher has progressed toward becoming exceedingly intrigued to lead research entitled 'Problems Faced by the Farmers in Betel Leaf Cultivation'

### **1.6 Assumptions of the study**

An assumption is the supposition that an apparent fact or principle is true in the light of available evidence (Goode and Hatt, 1952). The researcher had considered the following assumptions while undertaking the study:

- i. The respondents were capable of furnishing proper answers to the questions contained in the interview schedule.
- ii. The data collected by the researcher were free from any bias and they were normally distributed.
- iii. The responses answered by the respondents were valid, acceptable and reliable.
- iv. Information sought by the researcher elicited the real situation was the representative of the whole population of the study area to gratify the objectives of the study.
- v. The researcher was well adjusted to himself with the social contiguous of the study area. Hence, the collected data from the respondents were free from favoritism.

- vi. The selected characteristics and the problems faced by the farmers in betel leaf cultivation of the study were normally and causally allotted with respective means and standard deviation.

### **1.7 Limitations of the study**

Considering the time, respondents, communication facilities and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as mentioned bellow:

- i. The study was confined to only one district namely Rajbari district which may fail to represent the actual scenario of the whole situation as people develop their strategies according to the concrete situation they face.
- ii. It was difficult to get exact information on problems in betel leaf cultivation indicator from the farmers as many of them were illiterate.
- iii. Characteristics of the farmers were many and varied, but only eleven characteristics were selected for the research study.
- iv. There were embarrassing situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum proper information.
- v. Several methods, scales and statistical tests have been utilized in this study over a relatively short period of time.

### **1.8 Definition of important terms**

**Causal variable:** A causal variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon.

**Predicted variable:** A predicted variable refers to the appears, disappears or varies as the researcher introduces, removes or varies the causal variable.

**Age:** Age of the betel leaf growers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the rural people.

**Education:** Education was measured by assigning score against successful years of schooling by a betel leaf grower.

**Family size:** Family size of a farmer refers by the total number of members in the family including him/her, children and other dependents.

**Betel leaf cultivation area:** The betel leaf cultivation area refers to the total area of land on betel leaf cultivation is carried out.

**Experience in betel leaf cultivation:** Experience in betel leaf cultivation to the total number of years involved in betel leaf cultivation by a betel leaf grower.

**Annual income from betel leaf cultivation:** Annual income from betel leaf cultivation refers to total financial return from betel leaf cultivation in one year.

**Benefit Cost Ratio (BCR):** Benefit Cost Ratio (BCR) of betel leaf cultivation refers to the measurement through dividing the total income from betel leaf cultivation by the total cost of betel leaf cultivation.

**Practices in betel leaf cultivation:** Practices in betel leaf cultivation refers to the measurement of practices by computing practice score on the basis of their nature of practices in betel leaf cultivation.

**Agricultural extension media contact:** Agricultural extension media contact defines as one's extent of exposure to different communication media related to farming activities. In this study only betel leaf growers exposure to media contact was considered.

**Knowledge on betel leaf cultivation:** Betel leaf cultivation knowledge refers to different components of betel leaf production knowledge.

**Distance to market place:** Distance to market place refers to the distance from farmer's field area to market place.

## CHAPTER II

### REVIEW OF LITERATURE

The purpose of this Chapter is to review the literatures having relevance to the present study. The researcher made an elaborate search of available literature for the above purpose. In conducting research the review of literature gives the clear and concise direction of the researcher in various aspect of conducting the research. In this chapter, review of literatures relevant to the study was presented. So, the directly related literatures were not readily available for this research. Some researchers addressed different aspects of problem faced in various crops.

A few of these studies relevant to this research are briefly discussed in this chapter under the following four sections: the first section deals with the literature related to problems faced by respondents in different aspects of agriculture, the second section with review concerning the relationship between selected characteristics of the respondents and their problem confrontation, the third section with research gap of the study and the fourth section with the conceptual framework of the study

#### **2.1 Literature related to problems faced by respondents in different aspects of agriculture**

Patil (2016) stated that organized market for the scientific sale of betel leaves was lack in Sangli, India.

Islam *et al.* (2015) revealed that the problems like leaf rot disease, high price of boroj materials, low price of betel leaf, high price of oilcake, etc. were facing by the betel leaf farmers.

Rahman (2015) expressed that the greater part (67.4%) of the respondents confronted medium issue in jackfruit commercialization exercises, while 18.6 percent confronted high issues and just 14 percent confronted low issues.



Kathirvel (2015) stated that non availability of quality indigenous planting material had lower values than the other variables in betel leaf cultivation.

Ali (2014) found that the most elevated 56.12 percent betel leaf agriculturists has a place with the gathering of medium issue encounter and the least rate 20.42 percent in high issue showdown.

Haider *et al.* (2013) found that leaf rot and stem rot are two common diseases occur in betel-leaf farm.

Kumar and Kumar (2004) expressed that the relative humidity enhances the incidence of the leaf rot disease.

Uddin (2004) in his review discovered five parts of issues confronted in business generation of betel leafs viz. seed issues, infection and creepy crawly invasion issues, field administration issues, showcasing of betel leaf issues and expansion work issues. Among these parts of issues, he communicated illness and nuisance pervasion issues confronted by the ranchers.

Goswami *et al.* (2002) expressed that *Phytophthora parasitica* and *Colletotrichum capsici* are the major constraints for cultivation of the betel leaf.

Pramanik (2001) studied on 24 issues of ranch youth in Mymensingh region identifying with different issues in yield development. Out of 24 issues the main 4 issues in rank request were: (1) nearby NGOs take high rate of enthusiasm against an advance, (2) absence of horticultural apparatus and instruments, (3) absence of money and (4) monetary failure for seeds, manure and water system.

Alam *et al.* (2000) directed a review on jute trims in seven locale in Bangladesh and found that shortage of value seeds, high work wage and low market cost of fiber were the significant issues of jute development.

Chaurasia (1994) found that leaf rot can damage the crop within a week when it attacks the vine.

Gumisiriza *et al.* (1994) uncovered a few issues of wheat generation in Uganda. Those were: customary cultivating practices, inaccessibility or absence of enhanced cultivars, data and innovation exchange, rust and foliar infections and ineffectual correspondence between research stations.

Ramachandran and Sripal (1990) discovered different issues in receiving of dry land innovation for rainfed cotton in Kamaraz area, Tamilnadu, India. They uncovered that ranchers issues confronted which included absence of precipitation weakness of bug and maladies, absence of experience, inaccessibility of contributions to time, absence of information, in adequate domesticated animals, hazard because of disappointment of rainstorm, high cost and so forth.

Raha *et al.* (1986) discovered some basic imperatives of cotton generation as seen by the agriculturists in Bangladesh. Those were absence of appropriate land, rare of water system office, absence of work, deficiency of greenbacks, absence of specialized learning, bring down cost of cotton and non-accessibility of seed, bug spray and manure.

Marothia (1983) led a review to discover the compels in the reception of paddy advancements in two towns in Raipur square, Madhya Pradesh, India. The discoveries uncovered that the lion's share of agriculturists still receive a fractional bundle of proposals, for the most part because of the high cost of info, monetary confinements and danger of harvest disappointment. Insufficient strong information offices were observed to be in charge of the moderate appropriation of paddy innovation.

Maiti and Sen (1977) stated that leaf rot and foot rot have been reported to be caused by *Phytophthora palmivora* and leaf rot may cause 30-100% leaf yield loss.

## **2.2 Review concerning the relationship between selected characteristics of the farmers and problems faced**

### **2.2.1 Age and problem faced**

Ali (2014) revealed that age had no relationship with their problem faced in cotton cultivation.

Anisuzzaman (2008) found that age had no noteworthy association with their problem faced in tuberose cultivation.

Rahman (2006) found that age of the farmers had no association with their requirements confronted in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

Huque (2006) found that age of the farmers had no noteworthy association with their problem faced in utilizing coordinated plant supplement administration.

Bashar (2006) found that age of the farmers had noteworthy negative association with their issue showdown in mashroom cultivation.

Aziz (2006) found that age of the farmers had no noteworthy association with their imperatives confronted in potato cultivation in Jhikargacha upazilla under Jessore region.

Nahid (2005) directed a review and found that there was no connection between age of the sugarcane cultivators and their issue showdown in sugarcane generation.

Bhuiyan (2002) in his audit found a positive and basic association between age of the farmers and their issues in banana cultivation. Similar revelations were procured by Rahman (1996) in his individual survey.

### **2.2.2 Level of education and problem faced**

Ali (2014) revealed that preparation had gigantic negative relationship with their problem faced in cotton cultivation.

Anisuzzaman (2008) found that education had negative huge associations with their problem faced in tuberose cultivation.

Nahid (2005) directed a review and found that there was high noteworthy negative connection between education of the sugarcane cultivators and their problem faced in sugarcane generation.

Huque (2006) found that education of the farmers had profoundly noteworthy negative association with their problem faced in utilizing incorporated plant supplement administration.

Bashar (2006) found that education of the farmers had huge negative association with their problem faced in mashroom cultivation.

Aziz (2006) found that education of the farmers had high huge negative association with their problem faced in potato cultivation in Jhikargacha upazilla under Jessore area

Ismail (2001) uncovered that there was no noteworthy connection amongst education and issue encounter of homestead youth. Comparable discoveries were gotten by Halim (2003) in their particular reviews. Consequently, it could be inferred that a lion's share of the inquires about found a negative connection between these two factors.

Islam (1987) in his survey found important negative association between level of preparing of respondents and their issue faced in manual sperm infusion. Relative revelations were in like manner gotten by Mansur (1989), Rahman (1995), Haque (1995), Rahman (1996), Karim (1996), Faroque (1997), Pramanik (2001), Ahmed (2002), Hossin (2002), Bhuiyan (2002) and Salam (2003) in their specific audits.

### **2.2.3 Family size and problem faced**

Anisuzzaman (2008) found that family size had no huge association with their problem faced in tuberose cultivation.

Huque (2006) found that family size of the farmers had no critical association with their problem faced in utilizing coordinated plant supplement administration.

Rahman (2006) found that family size of the farmers had no critical association with their imperatives confronted in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

Bashar (2006) found that family size of the farmers had no huge association with their issue encounter in mushroom cultivation.

Aziz (2006) found that family size of the farmers had high huge negative association with their requirements confronted in potato cultivation in Jhikargacha upazilla under Jessore locale.

Nahid (2005) directed a review and found that there was no huge connection between family size of the sugarcane cultivators and their issue showdown in sugarcane generation.

Salam (2003) in his survey found a positive imperative association between family evaluate and their issue experience in getting environmentally genial developing sharpens.

Haque (1995) found that there was no colossal association between family size and impediments stood up to of the Mohila Bittaheen Samabaya Samittee. Equivalent outcomes were gained by Rashid (1999), Bhuiyan (2002), Hossain (2002) and Ahmed (2002) in their individual surveys.

#### **2.2.4 Betel leaf cultivation range and problem faced**

Ali (2014) found in his survey a non basic association between betel leaf cultivation district of the farmers and their issue standoff in betel leaf cultivation of Natore region in Bangladesh.

#### **2.2.5 Experience in betel leaf cultivation and problem faced**

Ali (2014) found in his audit a colossal association between contribution in betel leaf cultivation of the farmers and their issue faced in betel leaf cultivation of Natore district in Bangladesh.

#### **2.2.6 Annual family income and problem faced**

Ali (2014) found in his audit a non essential association between family yearly income of the farmers and their problem faced in betel leaf cultivation of Natore district in Bangladesh.

Anisuzzaman (2008) found that yearly family income had no huge association with their problem faced in tuberose cultivation.

Huque (2006) found that yearly family income of the farmers had no critical association with their problem faced in utilizing coordinated plant supplement administration.

Rahman (2006) found that yearly family salary of the farmers had high negative huge association with their limitations confronted in Banana cultivation of Sunargaon Upazilla under Narayangonj district. Aziz (2006) found the same.

Bashar (2006) found that yearly family salary high noteworthy negative association with issue encounter in mushroom cultivation.

Nahid (2005) led a review and found that there was a high noteworthy negative connection between yearly wage of the sugarcane cultivators and their issue encounter in sugarcane generation.

Haque (2001) found in his review that yearly wage of FFS farmers had a positive noteworthy impact on their issue showdown.

Hossain (1985) found an important association among income and problem faced of the land less laborers.

Masur (1989) did not find any basic association between wage of the farmers and their issue faced in supports and reinforcing dairy animals. Regardless, the example of the relationship was negative.

### **2.2.7 Agricultural extension media contact and problem faced**

Ali (2014) found in his survey a gigantic association between media introduction of the farmers and their problem faced in betel leaf cultivation of Natore area in Bangladesh.

Anisuzzaman (2008) found that education had negative huge associations with their problem faced in tuberose cultivation.

Huque (2006) found that extension media contact of the farmers had high noteworthy negative association with their problem faced in utilizing coordinated plant supplement administration.

Rahman (2006) found that media contact of the farmers had no noteworthy association with their limitations confronted in Banana cultivation of Sunargaon Upazilla under Narayangonj area.

Bashar (2006) found that extension media contact of the farmers had noteworthy negative association with their issue showdown in mushroom cultivation.

Aziz (2006) found that extension media contact of the farmers had high noteworthy negative association with their imperatives confronted in potato cultivation in Jhikargacha upazilla under Jessore region.

Nahid (2005) led a review and found that there was a high noteworthy negative connection between extension media contact of the sugarcane cultivators and their problem faced in sugarcane generation.

Rahman (1995) in his review expressed that media presentation of the farmers had critical negative association with their confronted issue in cotton cultivation. Comparable discoveries were gotten by Rahman (1996), Faruque (1997), Pramanik (2001), Hossain (2002), Bhuiyan (2002) and Salam (2003) in their reviews.

### **2.2.8 Knowledge on betel leaf cultivation and problem faced**

Ali (2014) found that a huge connection between learning on betel leaf cultivation of the farmers and their problem faced in betel leaf cultivation of Natore area in Bangladesh.

### **2.2.9 Other selected characteristics of the farmers and problem faced**

No literature was found related to relationship of each of 'Benefit Cost Ratio (BCR)', 'Practices in betel leaf cultivation', and '**Distance to market place**' with problem confrontation of different agricultural activities

## **2.3 Research gap of the study**

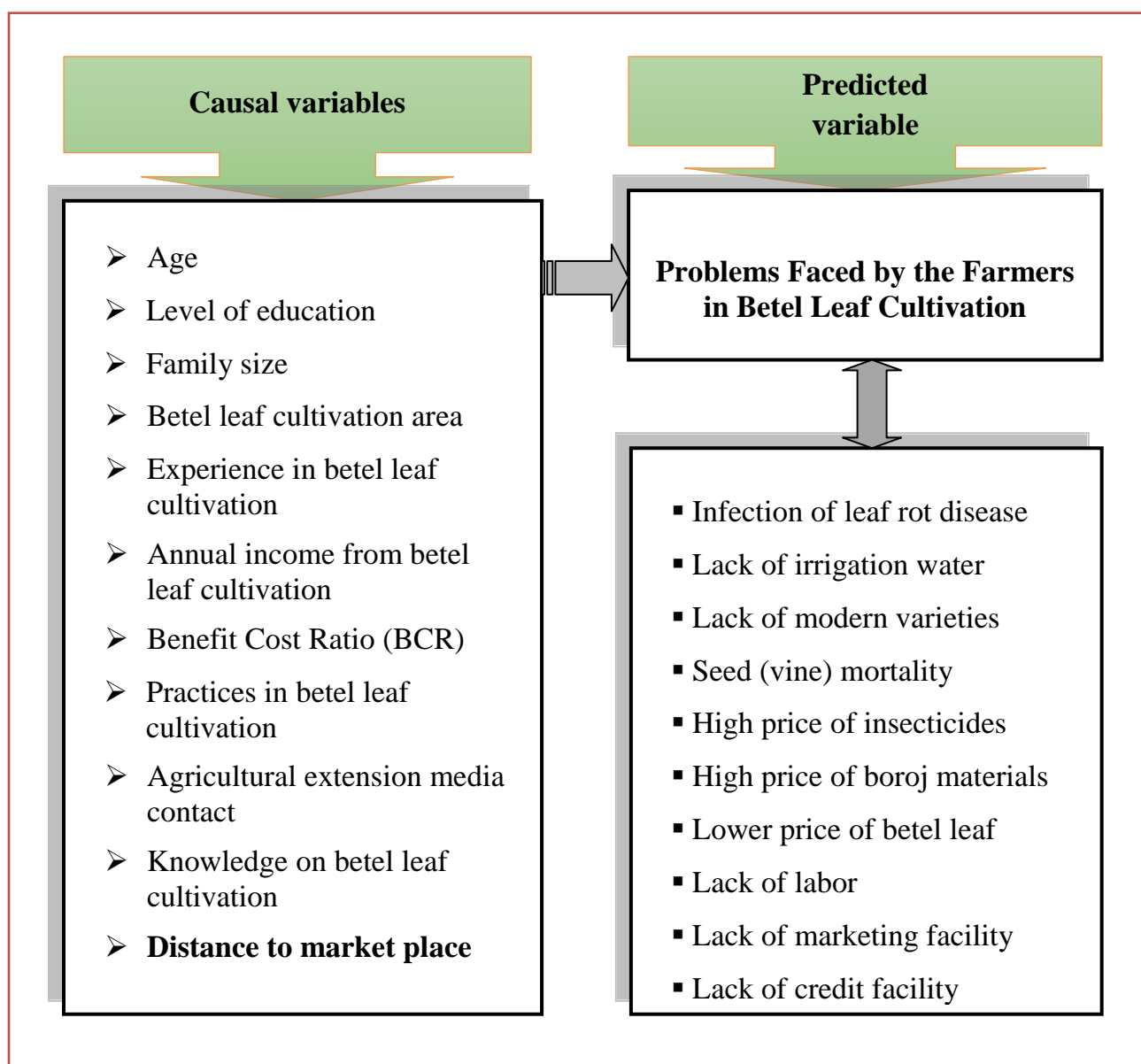
A very few researches had been done to solely assess the extent of problems faced by the farmers in betel leaf cultivation. In addition, among the constrained reviews on betel leaf cultivation however just a couple of researchers took after deliberate technique to survey the issues confronted by the farmers in betel leaf cultivation. This is one of the study holes of the research. Thus, the researcher have done the present study to survey the degree of issues confronted by the farmers in betel leaf cultivation In this manner, no exploration was attempted already taking after the procedure which was trailed by the researcher. This was likewise a huge research hole of the study. The strategy of the present work was extremely novel in such manner. Along these lines, the researcher actualized the study program taking after the strategy as specified.



Lastly, very few researches were conducted to assess the extent of problems faced by the farmers in betel leaf cultivation taking the variables which were used in the present study. This is likewise a huge research hole of the study. Therefore, the researcher carried out the present study using the variables as mentioned.

#### **2.4 Conceptual framework of the study**

In scientific research, selection and measurement of variables constitute an important task. This study is concerned with the ‘problems faced by the farmers in betel leaf cultivation’. Thus, the problems faced by the farmers in betel leaf cultivation was the predicted variable and 11 selected characteristics of the betel leaf farmers were considered as the causal variables to the study. Problems of betel leaf (Paan) farmers may be affected through interacting forces of these causal variables. It is not possible to deal with all the causal variables in a single study. It was therefore, necessary to limit the causal variables, which include age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and **distance to market place** for this study. Considering the above mentioned discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.1.



**Figure 2.1** The conceptual framework of the study

## CHAPTER III

### MATERIALS AND METHODS

Methods play an important role in a scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements has been presented in this chapter.

#### 3.1 Research Design

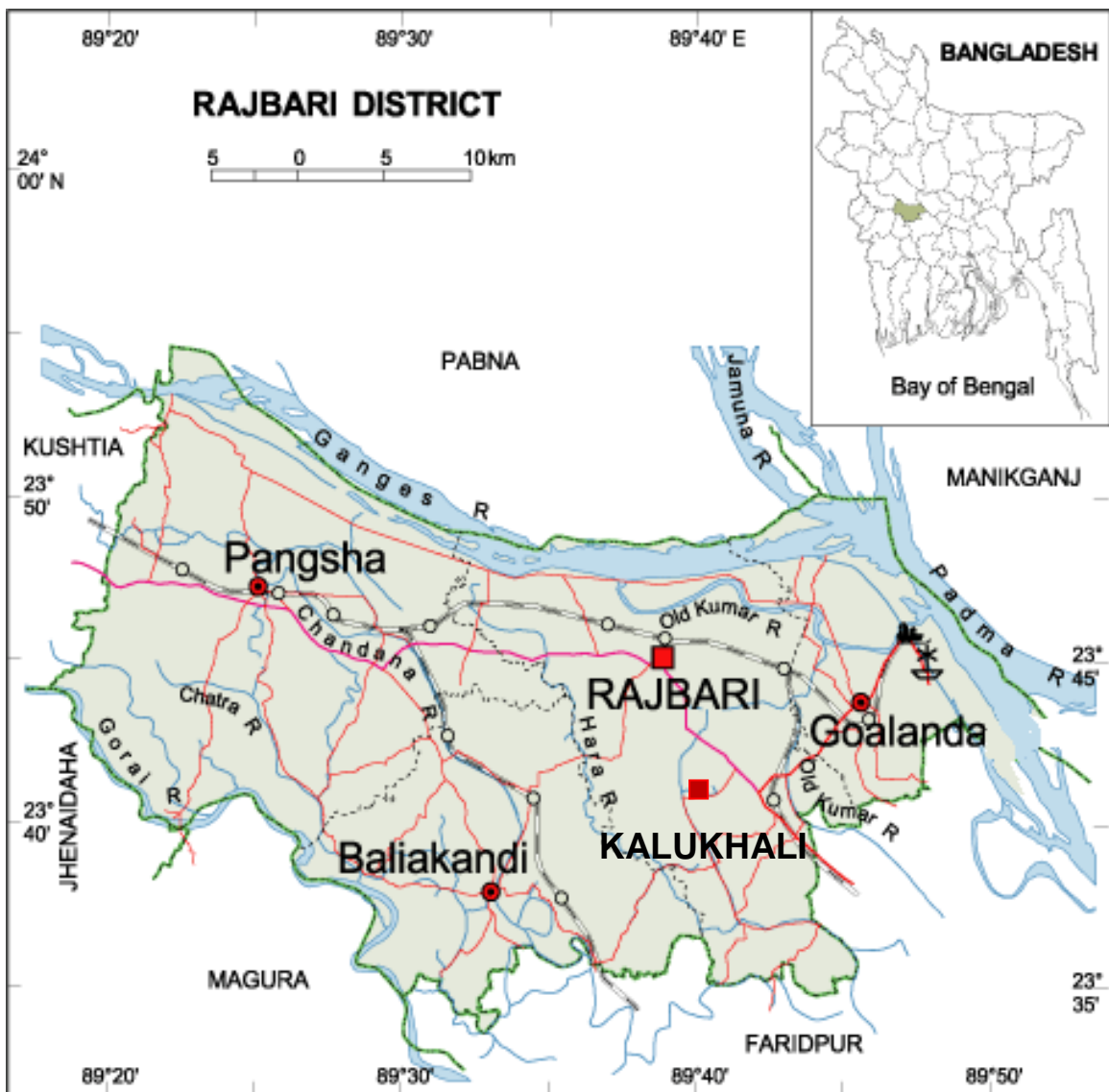
Detailed plan of investigation refers to research design. It is the blueprint of the detailed procedure of testing the hypothesis and analysis of the obtained data. The research design followed in this study was *ex-post facto*, because of uncontrollable and non-manipulating variables. This is absolute descriptive and diagnostic research design. A descriptive research design is used for fact findings with adequate interpretation. Diagnostic research design, on the other hand, is concerned with testing the hypothesis for specifying and interpreting the relationship of variables

#### 3.2 Locale of the study

The study was purposively conducted in the Rajbari district. The area of Rajbari district is 1118.8 sq km, located in between 22°40' and 23°50' north latitudes and in between 89°19' and 90°40' east longitudes. It is bounded by Pabna district on the north, Faridpur and Magura districts on the south, Manikganj district on the east, Kushtia and Jhenaidah on the west. There are

5 upazilas in this district. They are: Baliakandi, Pangsha, Kalukhali, Rajbari Sadar and Goalanda. The agricultural crops of Rajbari district are paddy, jute, wheat, mustard, gram, masuri, sugarcane, vegetables, fruits (Mango, jackfruit, guava, banana, papaya), etc. The farmers of the study area are involved in betel leaf cultivation besides other occupation. The number of farmers who involves in betel leaf cultivation in the study area are 740.

A map showing the study area Rajbari district has been shown in Figure 3.1.



**Figure 3.1** Map of Rajbari district showing the study area

### **3.3 Population and sample of the study**

#### **3.3.1 Population**

Betel leaf farmers of Rajbari district constituted the population of this study. Head of betel leaf cultivating families of Rajbari district were the population of the study. However, representative sample from the population were taken for collection of data following randomly sampling technique. Updated lists of all heads of betel leaf cultivating families were prepared from all the 5 upazilas of Rajbari district with the help of SAAO and local leader (Matobbor). The total number of betel leaf cultivators of 5 upazilas of Rajbari district was 740 which constituted the population of the study.

#### **3.3.2 Determination of sample size**

There are several methods for determining the sample size. In this study, Yamane's (1967) formula was used for determining sample size.

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

Where, n = Sample size

N= Population size =740

e = The level of precision = 10%

z = The value of the standard normal variable given the chosen confidence level (e.g., z = 1.96 with a confidence level of 95 %)

P = The proportion or degree of variability = 50%;

By using the formula, the sample size was determined as 85 for the study.

#### **3.3.3 Distribution of the population, sample size and reserve list**

According to Yamane's formula, the sample size comprised of 85 betel leaf cultivators for the study. A reserve list of 10 betel leaf cultivators were also prepared so that the betel leaf cultivators of this list could be used for interview if the betel leaf cultivators included in the original sample were not available at the time of conduction of interview. The sample betel leaf farmers of the Baliakandi, Goalanda, Pangsha, Kalukhali and Rajbari sadar upazila were

determined according to the proportionate of the total population size of 740. The distribution of the population, sample and number of respondents in the reserve list are given in Table 3.1.

**Table 3.1** Distribution of the betel leaf cultivators according to population, sample size and reserve list size

<b>Name of the selected upazila</b>	<b>Number of the respondents</b>	<b>Sample size</b>	<b>Reserve list size</b>
Baliakandi	426	49	5
Kalukhali	230	26	2
Pangsha	48	5	1
RajbariSadar	23	3	1
Goalanda	13	2	1
Total	740	85	10

### **3.4 Data collection methods and tools**

#### **3.4.1 Data collection methods**

The survey method was used to collect quantitative data that allow to answer the research questions framed and to gain an understanding of the determinants of betel leaf farmers' problems. Individual interviews were used in the survey and were conducted in a face-to-face (Bryman, 2001) situation by the researcher. This method is useful to get unanticipated answers and to allow respondents to describe the world as they really see it rather than as the researcher does (Bryman, 2001).

#### **3.4.2 Data collection tools**

Structured interview schedule was prepared to reach the objectives of the study. A structured interview schedule was prepared containing open and closed formed questions. The open questions allowed for the respondents to give answers using their own language and categories (Casley and Kumar, 1998). The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive. The instruments were first developed in English and then

translated into Bengali. The survey tools were initially constructed based on an extensive literature reviews and pre-tested. The schedule was pre-tested with 15 randomly selected betel leaf farmers in the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires were also checked for validity by supervisor and educational experts at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from field staff of different GOs and NGOs and local leader. The primary data were collected from 09 January, 2017 to 12 January, 2017 for pre-test. Books, journals, reports and internet documents were used as secondary sources of data supporting or supplementing the empirical findings of the study. Final part of data collection was started in 25 January, 2017 and completed in 24 February, 2017.

### **3.5 Variables and their measurement techniques**

The variable is a characteristic, which can assume varying, or different values in successive individual cases. In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last 11 characteristics of the betel leaf farmers were selected as the causal variables which includes age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and **distance to market place**. Problems faced by the farmers in betel leaf cultivation was the only predicted variable of the study. The methods and procedures in measuring the variables of this study are presented below:

### **3.5.1 Measurement of causal variables**

The 11 characteristics of the betel leaf farmers mentioned above constitute the causal variables of this study. The following procedures were followed for measuring the variables.

#### **3.5.1.1 Age**

Age of the farmers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the betel leaf farmers. A score of one (1) was assigned for each year of age. This variable appears in item number 1 in the interview schedule as presented in Appendix-I.

#### **3.5.1.2 Level of Education**

Education was measured by assigning score against successful years of schooling by a farmer. One score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a farmer passed the final examination of class five or equivalent examination, his/her education score has given as five (5). Each farmer of can't read & write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5. If a farmer did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number 2 in the interview schedule as presented in Appendix-I.

#### **3.5.1.3 Family size**

Family size of a farmer was determined by the total number of members in his/her family including him/her, children and other dependents. The scoring was made by the actual number of family members expressed by the farmers. For example, if a farmer had five members in his/her family, his/her family size score was given as 5. This variable appears in item number 3 in the interview schedule as presented in Appendix-I.



#### **3.5.1.4 Betel leaf cultivation area**

The betel leaf cultivation area a farmer referred to the total area of land on which his/her family carried out the betel leaf cultivation. The data was first recorded in terms of local measurement unit i.e. kani or decimal and then converted into hectare. The total area, thus, obtained is considered as the score of betel leaf cultivation area by assigning a score of one for each hectare of land. This variable appears in item number four (4) in the interview schedule Appendix-I.

#### **3.5.1.5 Experience in betel leaf cultivation**

Experience in betel leaf cultivation of the cultivators was determined by the total number of years involved in betel leaf cultivation. A score of one (1) was assigned for each year of betel leaf cultivation. This variable appears in item number 5 in the interview schedule as presented in Appendix-I.

#### **3.5.1.6 Annual income from betel leaf cultivation**

Annual income from betel leaf cultivation refers to the total financial return from betel leaf cultivation in one year. It was expressed in Taka. One score was given for 1000 taka. This variable appears in the second part of the item number six (6) in the interview schedule as presented in Appendix-A.

#### **3.5.1.7 Benefit Cost Ratio (BCR)**

Benefit Cost Ratio (BCR) was calculated by dividing the total income from betel leaf cultivation by the total cost of betel leaf cultivation. This variable appears in item number 6 in the interview schedule as presented in Appendix-I.

#### **3.5.1.8 Practices in betel leaf cultivation**

Practices in betel leaf cultivation by a respondent were determined by providing score. Practices in betel leaf cultivation by a farmer were measured by computing practice score on the basis of their nature of practices in betel leaf cultivation with six practices. Each farmer was asked to indicate his/her nature of practices with four alternative responses, like regular, occasional, rare and not at all basis to each of the six- practice and score of three, two, one and

zero were assigned for those alternative responses respectively. Practices in betel leaf cultivation of the farmers were measured by adding the scores of six selected cultural practice. Thus, practices in betel leaf cultivation score of a farmer could range from 0 to 18, where zero indicated no practice and 18 indicated highest level of practices. This variable appears in item number 7 in the interview schedule as presented in Appendix-I.

#### **3.5.1.9 Agricultural extension media contact**

It was defined as one's extent of exposure to different communication media related to farming activities. Agricultural extension media contact of a farmer was measured by computing extension media contact score on the basis of their nature of contact with nine extension media. Each farmer was asked to indicate his nature of contact with five alternative responses, like regularly, often, occasionally, rarely and not at all basis to each of the nine media and score of four, three, two, one and zero were assigned for those alternative responses respectively. These five options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Extension media contact of the farmers was measured by adding the scores of nine selected source of information. Thus, extension media contact score of a farmer could range from 0 to 36, where zero indicated no extension media contact and 36 indicated highest level of extension media contact. This variable appears in item number 8 in the interview schedule as presented in Appendix-I.

#### **3.5.1.10 Knowledge on betel leaf cultivation**

Betel leaf cultivation knowledge of a farmer was measured by asking him/her 12 questions related to different components of betel leaf production. It was measured assigning weightage as two (2) for each question. So, the total assigned scores for all the questions became twenty-four. The score was given according to response at the time of interview. Answering a question correctly an individual could obtain a full score of 2 while for wrong answer or no

answer he obtained zero (0) score. Partial score was assigned for partially correct answer. Thus, the betel leaf cultivation knowledge score of a farmer could range from zero (0) to twenty-four (24), where zero indicates very poor knowledge and 24 indicates highest knowledge on betel leaf cultivation. This variable appears in item number 9 in the interview schedule as presented in Appendix-I.

### **3.5.1.11 Distance to market place**

Distance to the market place was asked to the betel leaf farmers. Based on the information cited by the farmers, the distance of the market place was determined and was expressed in kilometer. This variable appears in item number 10 in the interview schedule as presented in Appendix-I.

### **3.5.2 Measurement of predicted variable**

Problem faced by the farmers in betel leaf cultivation was the predicted variable of the study. Problems faced in betel leaf cultivation was measured on the basis of extent of problems faced by the farmers on 10 selected problems of betel leaf production. The following scores were assigned against each of the problems:

<b>Nature of problems</b>	<b>Scores assigned</b>
Severe problem	3
Medium problem	2
Low problem	1
Not at all	0

Thus, problems faced in betel leaf cultivation score of a respondent could range from 0 to 30 where 0 indicated no problems and 30 indicated severe problems faced in betel leaf cultivation. This variable appears in item number 11 in the interview schedule as presented in Appendix-I.

### **Rank order of problems faced by farmers in betel leaf cultivation**

To ascertain the severity of item-wise problems faced by the farmers, Problem Faced Index (PFI) was computed for each problem. Problem Faced Index (PFI) was computed by using the formula:

$$PFI = f_s \times 3 + f_m \times 2 + f_l \times 1 + f_n \times 0$$

Where, PFI = Problem Faced Index

$f_s$  = No. of respondents faced severe problem

$f_m$  = No. of respondents faced moderate problem

$f_l$  = No. of respondents faced low problem

$f_n$  = No. of respondents faced no problem

Problem Faced Index (PFI) for each problem item could range from 0 to 255, where 0 indicating no problem and 255 indicating highest extent of problems faced by the farmers in betel leaf cultivation.

### **3.6 Using chemicals/ hormone for betel leaf cultivation**

Using of chemicals/ hormone for betel leaf cultivation referred to the chemicals/ hormone which is used by the farmers to cultivate the betel leaf. It was expressed through the name of chemical/ hormone, dose, frequency and mode of use the chemical/hormone. This was appeared in item number 12 in the interview schedule as presented in Appendix-I.

### **3.7 Hypothesis of the study**

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis.

#### **3.7.1 Research hypothesis**

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

“Each of the 11 selected characteristics (age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and **distance to market place**) of the farmers has significant relationship with the problem faced by them in betel leaf cultivation.”

### **3.7.2 Null hypothesis**

A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was formulated to explore the relationship of the selected characteristics of the farmers with the problem faced by them in betel leaf cultivation. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows:

“There is no relationship of each of the selected characteristics (age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and **distance to market place**) of the farmers with the problem faced by them in betel leaf cultivation.”

### **3.8 Data processing and analysis**

Bogdan and Biklen (2006) insist that data analysis is an on-going part of data collection. Initially, all collected data were carefully entered in Access, exported to Microsoft Excel. Exported data were checked randomly against original completed interview schedule. Errors were detected and necessary corrections were made accordingly after exporting. Finally, data were exported from the program Microsoft Excel to SPSS/windows version 22.0, which offered statistical tools applied to social sciences. Qualitative data were converted into quantitative numbers, if required, after processing, scaling and indexing of the necessary and relevant variables to perform subsequent statistical analysis for drawing inferences.

### **3.9 Statistical analysis**

As outlined earlier, there are many different forms and methods that can be used to analyze both quantitative and qualitative data in accordance with the objectives of the study. Both descriptive and analytical methods were employed in order to analyze the data. Descriptive techniques have been used to illustrate current situations, describe different variables separately and construct tables presented in results. These included: frequency distribution, percentage, range, mean, and standard deviation.

In most cases the opinions of respondents were grouped in broader categories. Analytical techniques have been utilized to investigate the relationship of the selected characteristics of the farmers with the problem faced by them in betel leaf cultivation. Pearson's Product Moment Coefficient of Correlation ( $r$ ) was used in order to explore the relationships between the concerned variables. Five percent (0.05) level of probability was the basis for rejecting any null hypothesis throughout the study. The SPSS computer package was used to perform all these process.

## **CHAPTER IV**

### **RESULTS AND DISCUSSION**

The recorded observations in accordance with the objective of the study were presented and probable discussion of the findings was made with probable justifiable and relevant interpretation in this chapter. The findings of the study and their interpretation have been presented in four sections according to the objective of the study. The first section deals with the selected characteristics of the farmers, while the second section deals with the problems faced by the farmers in betel leaf cultivation. The third section deals with the relationship of each of the farmers' selected characteristics with their problems faced by the farmers in betel leaf cultivation, while the fourth section deals with the using chemicals/hormone for betel leaf cultivation.

#### **4.1 Characteristics of the farmers**

Behavior of an individual is determined to a large extent by one's personal characteristics. There were various characteristics of the farmers that might have consequence to face the problems of different issues. But in this study, eleven characteristics of them were selected as causal variables, which included their age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and distance to market place that might be greatly influenced the problem faced status of the betel leaf farmers. The salient features of these characteristics of the betel leaf farmers are presented below:

##### **4.1.1 Age**

The age of the farmers has been varied from 33 to 75 years with a mean and standard deviation of 46.57 and 9.30 respectively. Considering the recorded age the farmers were classified into three categories namely 'young', 'middle

aged’ and ‘old’ aged following MoYS (2012). The distributions of the farmers in accordance of their age are presented in Table 4.1.

**Table 4.1** Distribution of the betel leaf farmers according to their age

Category	Basis of categorization (years)	Observed range (years)	Farmers		Mean	SD
			Number	Percent		
Young aged	≤ 35	33-75	8	9.4	46.57	9.30
Middle aged	36-50		52	61.2		
Old aged	> 50		25	29.4		
Total			85	100		

Table 4.1 reveals that the middle-aged farmers comprised the highest proportion (61.2 percent) followed by old aged category (29.4 percent) and the lowest proportion were made by the young aged category (9.4 percent). Data also indicates that the middle and old aged category constitute almost 90.6 percent of total farmers. The middle and old aged farmers were generally more involved in betel leaf cultivation than the younger.

#### 4.1.2 Level of education

The level of educational scores of the farmers ranged from 0 to 12 with a mean and standard deviation of 6.01 and 3.29, respectively. Based on the educational scores, the farmers were classified into five categories. The distributions of farmers according to their level of education are presented in Table 4.2.

**Table 4.2** Distribution of betel leaf farmers according to their level of education

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Can't read and sign	0	0-12	1	1.2	6.01	3.29
Can sign only	0.5		5	5.9		
Primary education	1-5		40	47.1		
Secondary education	6-10		34	40.0		
Above secondary	>10		5	5.9		
Total			85	100		



Table 4.2 shows that farmers under primary education category constitute the highest proportion (47.1 percent) followed by secondary education (40.0 percent). On the other hand, the lowest 1.2 percent in can't read and sign category. Therefore the data revealed that 92.9% of the betel leaf farmers literate which is better than the average literacy rate of Bangladesh.

#### 4.1.3 Family size

Family size of the farmers ranged from 3 to 7 with the mean and standard deviation of 4.89 and 1.23 respectively. According to family size the farmers were classified into three categories viz. 'small', 'medium' and 'large' family. The distribution of the betel leaf farmers according to their family size is presented in Table 4.3.

**Table 4.3** Distribution of the betel leaf farmers according to their family size

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Small family	≤ 3 (Mean-1SD)	3-7	12	14.1	4.89	1.23
Medium family	4-6 (Mean ± SD)		64	75.3		
Large family	> 6 (Mean+1SD)		9	10.6		
Total			85	100		

Table 4.3 indicates that the medium size family constitute the highest proportion (75.3 percent) followed by the small size family (14.1 percent). Only 10.6 percent farmers had large family size. Such finding is quite normal as per the situation of Bangladesh.

#### 4.1.4 Betel leaf cultivation area

The betel leaf cultivation area of the farmers ranged from 0.12 ha to 0.48 ha with a mean and standard deviation of 0.27 and 0.09 respectively. Based on their betel leaf cultivation area, the farmers were classified into three categories namely 'small', 'medium' and 'high' betel leaf cultivation area. The

distribution of the betel leaf farmers according to their betel leaf cultivation area is presented in Table 4.4.

**Table 4.4** Distribution of betel leaf farmers according to their betel leaf cultivation area

Category	Basis of categorization (ha)	Observed range (ha)	Farmers		Mean	SD
			Number	Percent		
Small area	$\leq 0.17$ (Mean-1SD)	0.12-0.48 (ha)	19	22.4	0.27	0.09
Medium area	0.18-0.36 (Mean $\pm$ SD)		49	57.6		
Large area	$> 0.36$ (Mean+1SD)		17	20.0		
Total			85	100		

Table 4.4 indicates that the medium betel leaf cultivation area constituted the highest proportion (57.6 percent) followed by small betel leaf cultivation area (22.4 percent), whereas the lowest 20.0 percent farmers had large betel leaf cultivation area.

#### 4.1.5 Experience in betel leaf cultivation

Score of experience in betel leaf cultivation of farmers ranged from 12 to 40 with the mean and standard deviation of 22.61 and 7.49 respectively. On the basis of experience in betel leaf cultivation scores, the farmers were classified into three categories namely 'low', 'medium' and 'high' experience in betel leaf cultivation. The distribution of the farmers according to their experience in betel leaf cultivation is given in Table 4.5.

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

Category	Basis of categorization (year)	Observed range (year)	Farmers		Mean	SD
			Number	Percent		
Low experience	$\leq 14$ (Mean-1SD)	12-40	14	16.5	22.61	7.49
Medium experience	15-30 (Mean $\pm$ SD)		56	65.9		
High experience	$> 30$ (Mean+1SD)		15	17.6		
Total			85	100		

Table 4.5 reveals that the majority (65.9 percent) of the farmers fell in medium experience in betel leaf cultivation category, whereas the lowest 16.5 percent in low experience category and 17.6 percent in high experience in betel leaf cultivation category. The findings of the present study reveal that around 84.5 percent of the farmers in the study area had medium to high experience in betel leaf cultivation.

#### 4.1.6 Annual income from betel leaf cultivation

Score of annual income from betel leaf cultivation of farmers ranged from 115 to 460 with mean and standard deviation of 250.88 and 88.77 respectively. On the basis of annual income from betel leaf cultivation scores, the farmers were classified into three categories namely 'low', 'medium' and 'high' annual income. The distribution of the farmers according to their annual income from betel leaf cultivation is given in Table 4.6.

**Table 4.6** Distribution of the betel leaf farmers according to their annual income from betel leaf cultivation

Category	Basis of categorization ('000' Tk.)	Observed range ('000' Tk.)	Farmers		Mean	SD
			Number	Percent		
Low income	≤ 120	115-460	2	2.4	250.88	88.77
Medium income	121-250		45	52.9		
High income	> 250		38	44.7		
Total			85	100		

Table 4.6 indicates that the medium annual family income from betel leaf cultivation constituted the highest proportion (52.9 percent) followed by the high annual family income from betel leaf cultivation (44.7 percent). Only 2.4 percent farmers had low annual family income from betel leaf cultivation.

#### 4.1.7 Benefit Cost Ratio (BCR)

Benefit Cost Ratio (BCR) of betel leaf cultivation score of the farmers ranged from 1.12 to 1.43 with a mean and standard deviation of 1.27 and 0.06 respectively. Based on the Benefit Cost Ratio (BCR) score, the farmers were

classified into three categories namely ‘low, ‘medium’ and ‘high’ Benefit Cost Ratio (BCR). The distribution of the farmers according to their Benefit Cost Ratio (BCR) is presented in Table 4.7.

**Table 4.7** Distribution of betel leaf farmers according to their Benefit Cost Ratio

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low BCR	$\leq 1.20$ (Mean - 1SD)	1.12-1.43	12	14.1	1.27	.06
Medium BCR	1.21–1.33 (Mean $\pm$ SD)		56	65.9		
High BCR	$> 1.33$ (Mean + 1SD)		17	20.0		
Total			85	100		

Table 4.7 indicates that the highest proportion (65.9 percent) of the farmers had medium Benefit Cost Ratio (BCR) compared to 20.0 percent had high Benefit Cost Ratio (BCR) and the lowest proportion (14.1 percent) had low BCR.

#### 4.1.8 Practices in betel leaf cultivation

Score of practices in betel leaf cultivation of the farmers ranged from 10 to 16 against the possible range of 0-18 with mean and standard deviation of 13.47 and 1.33 respectively. On the basis of practices in betel leaf cultivation scores, the farmers were classified into three categories namely ‘low, ‘medium’ and ‘high’ practices in betel leaf cultivation. The distribution of the farmers according to their practices in betel leaf cultivation is given in Table 4.8.

**Table 4.8** Distribution of betel leaf farmers according to their practices in betel leaf cultivation

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low practice	$\leq 12$ (Mean - 1SD)	10-16	22	25.8	13.47	1.33
Medium practice	13-14 (Mean $\pm$ SD)		40	47.1		
High practice	$>14$ (Mean + 1SD)		23	27.1		
Total			85	100		

Table 4.8 reveals that the majority (47.1 percent) of the farmers were felt in medium practices in betel leaf cultivation category, whereas only 27.1 percent in high practices and the lowest 25.8 percent in high practices in betel leaf cultivation category. The findings of the present study reveal that around 74.2 percent of the farmers in study area had medium to high practices in betel leaf cultivation.

#### 4.1.9 Agricultural extension media contact

The observed score of agricultural extension contact of the farmers ranged from 8 to 16 percent against the possible range of 0 to 36. The average score of the farmers was 10.42 with a standard deviation of 2.03. The farmers were classified into three categories on the basis of their agricultural extension media contact scores namely low, medium and high agricultural extension media contact. The distribution of the farmers according to their agricultural extension media contact is given in Table 4.9.

**Table 4.9** Distribution of betel leaf farmers according to their agricultural extension media contact

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Less contact	≤ 8 (Mean -1SD)	8-16	21	24.7	10.42	2.03
Medium contact	9-12 (Mean ± SD)		52	61.2		
High contact	>12 (Mean+1SD)		12	14.1		
Total			85	100		

Table 4.9 shows that the highest proportion (61.2 percent) of the farmers had medium agricultural extension media contact as compared to 24.7 percent of them having less agricultural extension contact and the lowest 14.1 percent farmers had high extension media contact.

#### 4.1.10 Knowledge on betel leaf cultivation

Knowledge on betel leaf cultivation scores of the farmers ranged from 13 to 22 against possible score of 0 to 24. The average score and standard deviation were 18.35 and 2.35 respectively. Based on the knowledge on betel leaf cultivation scores, the farmers were classified into three namely low knowledge, medium knowledge and high knowledge on betel leaf cultivation (Table 4.10).

**Table 4.10** Distribution of betel leaf farmers according to their knowledge on betel leaf cultivation

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low knowledge	≤15 (Mean - 1SD)	13-22	16	18.8	18.35	2.35
Medium knowledge	16-20 (Mean ± SD)		56	65.9		
High knowledge	> 20 (Mean + 1SD)		13	15.3		
Total			85	100		

Table 4.10 reveals that 65.9 percent of the farmers had medium knowledge on betel leaf cultivation, 18.8 percent had low knowledge on betel leaf cultivation and the lowest 15.3 percent had high knowledge on betel leaf cultivation. Thus, an overwhelming majority (84.7 percent) of the farmers had low to medium knowledge on betel leaf cultivation.

#### 4.1.11 Distance to market place

Distance to market place scores of the farmers ranged from 3 to 30 km. The average score and standard deviation were 15.45 and 5.02 respectively. Based on the distance to market place scores, the farmers were classified into three categories namely low, medium and long distance to market place (Table 4.11).

**Table 4.11** Distribution of betel leaf farmers according to their distance to market place

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low distance	≤10 (Mean - 1SD)	3-30	5	5.9	15.45	5.02
Medium distance	11-20 (Mean ± SD)		75	88.2		
Long distance	> 20 (Mean + 1SD)		5	5.9		
Total			85	100		

Table 4.11 reveals that 88.2 percent of the farmers had medium distance to market place where 5.9 percent had low distance to market place and the same 5.9 percent had long distance to market place.

#### 4.2 Problems faced by the farmers in betel leaf cultivation

Problems faced by the farmers in betel leaf cultivation scores ranged from 16 to 25 against possible score of 0 to 30. The average score and standard deviation were 20.37 and 2.26 respectively. Based on the problems faced by the farmers in betel leaf cultivation scores, the respondents were classified into three categories namely low, medium and high problems faced by the farmers in betel leaf cultivation (Table 4.12).

**Table 4.12** Distribution of betel leaf farmers according to their problems faced by the farmers in betel leaf cultivation

Category	Basis of categorization (score)	Observed range (score)	Respondents		Mean	SD
			Number	Percent		
Low problems	≤ 18 (Mean - 1SD)	16-25	20	23.5	20.37	2.26
Medium problems	19-22 (Mean ± SD)		47	55.3		
High problems	> 22 (Mean + 1SD)		18	21.2		
Total			85	100.0		

Table 4.12 reveals that 55.3 percent of the farmers faced medium problems in betel leaf cultivation where 23.5 percent farmers faced low problems in betel

leaf cultivation and the 21.2 percent farmers faced high problems in betel leaf cultivation. Thus, an overwhelming majority (78.8 percent) of the farmers had low to medium problems in betel leaf cultivation.

### **Rank order of the problems faced by farmers in betel leaf cultivation**

Rank order of the selected ten problems faced by the farmers in betel leaf cultivation is presented in Table 4.13. As per descending order of the Problems Faced Index (PFI), infection of leaf rot disease ranked the 1<sup>st</sup> and lack of credit facility ranked as last position.

The problems faced by the farmers in betel leaf cultivation according to descending order of PFI infection of leaf rot disease ranked first followed by lack of irrigation water, lack of labor, high price of boroj materials, lack of modern varieties, lower price of betel leaf, seed (vine) mortality, high price of insecticides, lack of marketing facility and lack of credit facility respectively (Table 4.13).

The highest problems faced by the farmers in betel leaf cultivation was high infection of leaf rot disease. This might be caused because of disease sensitive nature of the vine found in the study area.

**Table 4.13** Rank order of problems faced by farmers in betel leaf cultivation

<b>Sl. No.</b>	<b>Nature of constraints</b>	<b>S (3)</b>	<b>M (2)</b>	<b>L (1)</b>	<b>N (0)</b>	<b>PFI score</b>	<b>Rank</b>
1.	Infection of leaf rot disease	41	35	9	0	202	1 <sup>st</sup>
2.	Lack of irrigation water	40	35	8	2	198	2 <sup>nd</sup>
3.	Lack of labor	38	36	8	3	194	3 <sup>rd</sup>
4.	High price of boroj materials	35	38	6	6	187	4 <sup>th</sup>
5.	Lack of modern varieties	30	40	11	4	181	5 <sup>th</sup>
6.	Lower price of betel leaf	28	42	7	8	175	6 <sup>th</sup>
7.	Seed (vine) mortality	22	45	5	13	161	7 <sup>th</sup>
8.	High price of insecticides	20	40	14	11	154	8 <sup>th</sup>
9.	Lack of marketing facility	12	38	29	6	141	9 <sup>th</sup>
10.	Lack of credit facility	5	45	33	2	138	10 <sup>th</sup>

**Note:** S=Severe, M=Medium, L=Low, N=Not at All



The lowest problem faced in betel leaf cultivation at the study area was lack of credit facility. This might be happened because the NGOs (private sectors) as well as government organization were more available to supply the credit among the betel leaf farmers of the study area.

#### **4.3 Relationship between the selected characteristics of the farmers and their problems in betel leaf cultivation**

This section deals with exploring the relationships between the causal and predicted variables of the study. The causal variables were age, level of education, family size, betel leaf cultivation area, experience in betel leaf cultivation, annual income from betel leaf cultivation, Benefit Cost Ratio (BCR), practices in betel leaf cultivation, agricultural extension media contact, knowledge on betel leaf cultivation and distance to market place. Problems faced by the farmers in betel leaf cultivation was one of the predicted variable. .

Pearson's Product Moment Co-efficient of Correlation ( $r$ ) was used to test the null hypothesis concerning the relationships between each of the selected characteristics of the farmers with their problems in betel leaf cultivation. Five percent (0.05) level of probability was used as the basis for acceptance or rejecting the null hypothesis at  $(85-2) = 83$  degrees of freedom. The results of correlation of coefficient ( $r$ ) between the causal and predicted variables have been shown in Table 4.14. The details of inter correlation among all the variables have been shown in Appendix-II.

**Table 4.14** Co-efficient of correlation between each of the selected characteristics of the farmers with their problems in betel leaf cultivation

(n = 85)

Focus variable	Explanatory variables	Correlation co-efficient values (r)	Tabulated value of 'r' with 83 df	
			0.05	0.01
Problems faced by the farmers in betel leaf cultivation	Age	-0.822**	0.198	0.263
	Level of education	-0.475**		
	Family size	0.083 <sup>NS</sup>		
	Betel leaf cultivation area	0.009 <sup>NS</sup>		
	Experience in betel leaf cultivation	-0.696**		
	Annual income from betel leaf cultivation	-0.041 <sup>NS</sup>		
	Benefit Cost Ratio (BCR)	-0.314**		
	Practices in betel leaf cultivation	0.051 <sup>NS</sup>		
	Agricultural extension media contact	0.094 <sup>NS</sup>		
	Knowledge on betel leaf cultivation	-0.634**		
	Distance to market place	0.112 <sup>NS</sup>		

<sup>NS</sup> Not Significant

\* Significant at 0.05 level (5 percent)

\*\* Significant at 0.01 level (1 percent)

#### 4.3.1 Relationships between age of farmers and their problems in betel leaf cultivation

The following observations were recorded regarding relationship between age of the farmers and their problems in betel leaf cultivation on basis of correlation coefficient:

- i. The computed value of 'r' (0.822) was found to be higher than the tabulated value (0.263) with 83 degrees of freedom at 0.01 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it can be said that age of the farmers was an important factor for problems in betel leaf cultivation. This means that age of the farmers and their problems in betel leaf cultivation were not independent to each other. It means that problems in betel leaf cultivation were found more among those farmers who had young than the older aged.

#### **4.3.2 Relationships between level of education of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between level of education of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.475) was found to be higher than the tabulated value (0.263) with 83 degrees of freedom at 0.01 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.
- iii. The null hypothesis could not be accepted.

Based on the above findings, it can be said that level of education of the farmers was an important factor for problems in betel leaf cultivation. This means that level of education of the farmers and their problems in betel leaf cultivation were not independent to each other. It means that problems in betel leaf cultivation were found more among those farmers who had lower education than the farmers with more educations.

#### **4.3.3 Relationships between family size of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between family size of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.083) was found to be lower than the tabulated value (0.198) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was non-significant at 0.05 level of probability.
- iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that family size of the farmers was not an important factor for problem awareness in betel leaf cultivation. This means that family size of the farmers and their problems in betel leaf cultivation were independent to each other.

#### **4.3.4 Relationships between betel leaf cultivation area of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between betel leaf cultivation area of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.009) was found to be lower than the tabulated value (0.198) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was non-significant at 0.05 level of probability.
- iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that betel leaf cultivation area of the farmers was not an important factor for problems in betel leaf cultivation. This means that betel leaf cultivation area of the farmers and their problems in betel leaf cultivation were independent to each other.

#### **4.3.5 Relationships between experience in betel leaf cultivation of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between experience in betel leaf cultivation of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.696) was found to be higher than the tabulated value (0.263) with 83 degrees of freedom at 0.01 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.
- iii. The null hypothesis could not be accepted.

Based on the above findings, it can be said that experience in betel leaf cultivation of the farmers was an important factor for problems in betel leaf cultivation. This means that experience in betel leaf cultivation of the farmers and their problems in betel leaf cultivation were not independent to each other. It means that problems awareness in betel leaf cultivation was found more among those farmers who had low experience in betel leaf cultivation than the farmers with high experience in betel leaf cultivation. That is, experience does not matter in facing problems of betel leaf cultivation.

#### **4.3.6 Relationships between annual income from betel leaf cultivation of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between annual income from betel leaf cultivation of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.041) was found to be lower than the tabulated value (0.198) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was non-significant at 0.05 level of probability.

iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that annual income from betel leaf cultivation of the farmers was not an important factor for problems in betel leaf cultivation. This means that annual income from betel leaf cultivation of the farmers and their problems in betel leaf cultivation were independent to each other.

#### **4.3.7 Relationships between Benefit Cost Ratio (BCR) in betel leaf cultivation of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between Benefit Cost Ratio (BCR) in betel leaf cultivation of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.314) was found to be higher than the tabulated value (0.263) with 83 degrees of freedom at 0.01 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.
- iii. The null hypothesis could not be accepted.

Based on the above findings, it can be said that Benefit Cost Ratio (BCR) in betel leaf cultivation of the farmers was an important factor for problems in betel leaf cultivation. This means that Benefit Cost Ratio (BCR) in betel leaf cultivation of the farmers and their problems in betel leaf cultivation were not independent to each other. It means that problems in betel leaf cultivation was found more among those farmers who had low Benefit Cost Ratio (BCR) in betel leaf cultivation than the farmers with high Benefit Cost Ratio (BCR) in betel leaf cultivation.

#### **4.3.8 Relationships between practices in betel leaf cultivation of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between practices in betel leaf cultivation of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.051) was found to be lower than the tabulated value (0.198) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.12.
- ii. The relationship between the concerned variables was non-significant at 0.05 level of probability.
- iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that practices in betel leaf cultivation of the farmers was not an important factor for problems in betel leaf cultivation. This means that practices in betel leaf cultivation of the farmers and their problems in betel leaf cultivation were independent to each other.

#### **4.3.9 Relationships between agricultural extension media contact of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between agricultural extension media contact of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.094) was found to be lower than the tabulated value (0.198) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.05 level of probability.
- iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that agricultural extension media contact of the farmers was not an important factor for problems in betel leaf

cultivation. This means that agricultural extension media contact of the farmers and their problems in betel leaf cultivation were independent to each other.

#### **4.3.10 Relationships between knowledge on betel leaf cultivation of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between knowledge on betel leaf cultivation of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.634) was found to be higher than the tabulated value (0.263) with 83 degrees of freedom at 0.01 level of probability as shown in Table 4.14.
- ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.
- iii. The null hypothesis could not be accepted.

Based on the above findings, it can be said that knowledge on betel leaf cultivation of the farmers was an important factor for problems in betel leaf cultivation. This means that knowledge on betel leaf cultivation of the farmers and their problems in betel leaf cultivation were not independent to each other. It means that problem awareness in betel leaf cultivation was found more among those farmers who had low knowledge on betel leaf cultivation than the farmers with high knowledge on betel leaf cultivation.

#### **4.3.11 Relationships between distance to market place of farmers and their problems in betel leaf cultivation**

The following observations were recorded regarding relationship between distance to market place of the farmers and their problems in betel leaf cultivation on the basis of correlation coefficient:

- i. The computed value of 'r' (0.112) was found to be lower than the tabulated value (0.194) with 83 degrees of freedom at 0.05 level of probability as shown in Table 4.12.



- ii. The relationship between the concerned variables was significant at 0.05 level of probability.
- iii. The null hypothesis could be accepted.

Based on the above findings, it can be said that distance to market place of the farmers was not an important factor for problems in betel leaf cultivation. This means that distance to market place of the farmers and their problems in betel leaf cultivation were independent to each other.

#### 4.4 Using chemicals/hormone for betel leaf cultivation

##### 4.4.1 Insect-pest control

For insect-pest control against different insect-pests in betel leaf cultivation, farmers used Actara, Karate, Regent, Omicron etc. According to the information cited by the farmers, most of them (89.4 percent) used Actara for insect-pest control where 80 percent farmers used Karate, 54.1 percent farmers used Regent, 37.6 percent farmers used Omicron for controlling insect-pest in their betel leaf field. The distribution of farmers according to use of different insecticides, dose, frequency, mode of use of insecticides is presented in the following Table 4.15.

**Table 4.15** Distribution of the betel leaf growers according to insecticide usage

Purpose	Name of chemical/hormone	Dose	Frequency	Mode of use	Respondents	
					Number (N)	%
For insect-pest control	Actara	1ml/liter	3times	Spraying	76 (85)	89.4
	Karate	1ml/liter	3times	Spraying	68 (85)	80
	Regent	1ml/liter	3times	Spraying	46 (85)	54.1
	Omicron	1ml/liter	3times	Spraying	32 (85)	37.6

##### 4.4.2 Disease control

For disease control against different diseases in betel leaf cultivation, farmers used Amistartop, Tilt, Mancozeb etc. According to the information cited by the farmers, most of them (91.7 percent) used Amistartop for disease control where

72.9 percent farmers used Tilt, 65.8 percent farmers used Mancozeb, 37.6 percent farmers used Omicron for controlling disease in their betel leaf field. The distribution of farmers according to use of different fungicides, dose, frequency, mode of use of insecticides is presented in the following Table 4.16.

**Table 4.16** Distribution of the betel leaf growers according to fungicides usage

Purpose	Name of chemical/hormone	Dose	Frequency	Mode of use	Respondents	
					Number (N)	%
For disease control	Amistartop	1ml/liter	2-3times	Spraying	78 (85)	91.7
	Tilt	0.5ml/liter	3times	Spraying	62 (85)	72.9
	Mancozeb	2g/liter	3times	Spraying	56 (85)	65.8

#### 4.4.3 Quick growing chemicals

For quick growing in betel leaf cultivation, farmers used Diamonium Phosphate, Flora, Oil Cake etc. According to the information cited by the farmers, most of them (32.9 percent) used Flora for quick growing where 27.1 percent farmers used Diamonium Phosphate, 17.6 percent farmers used Oil cake for quick growing in their betel leaf field. The distribution of farmers according to use of different quick growing, dose, frequency, mode of use of insecticides is presented in the following Table 4.17.

**Table 4.17** Distribution of the betel leaf growers according to quick growing chemicals

Purpose	Name of chemical/hormone	Dose	Frequency	Mode of use	Respondents	
					Number (N)	%
For quick growing	Flora	2ml/liter	2times	Spraying	28 (85)	32.9
	Diamonium Phosphate	2.5 kg/decimal	2-3 times	Broadcasting	23 (85)	27.1
	Oil cake	9 kg/decimal	3-4 times	Placement	15 (85)	17.6

## CHAPTER V

### SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Major Findings

##### 5.1.1 Selected characteristics of the betel leaf cultivators

**Age:** The middle-aged betel leaf cultivators comprised the highest proportion (61.2 percent) and the lowest proportion (9.4 percent) constituted by the young aged category.

**Level of education:** Primary education constituted the highest proportion (47.1 percent) and the lowest 1.2 percent in can't read and sign category.

**Family size:** The medium family size constituted the highest proportion (75.3 percent), whereas the lowest proportion (10.6 percent) constituted by the large family category.

**Betel leaf cultivation area:** The medium betel leaf cultivation area constituted the highest proportion (57.6 percent) and the lowest 20.0 percent farmers had large betel leaf cultivation area.

**Experience in betel leaf cultivation:** The majority (65.9 percent) of the farmers fell in medium experience in betel leaf cultivation category, whereas the lowest 16.5 percent in low experience category.

**Annual income from betel leaf cultivation:** The medium annual income from betel leaf cultivation constituted the highest proportion (52.9 percent) and the lowest 2.4 percent farmers had low annual income from betel leaf cultivation.

**Benefit Cost Ratio (BCR):** The highest proportion (65.9 percent) of the farmers had medium Benefit Cost Ratio (BCR) and the lowest proportion (14.1 percent) had low Benefit Cost Ratio (BCR) category.

**Practices in betel leaf cultivation:** The majority (47.1 percent) of the farmers were felt medium practices in betel leaf cultivation category and the lowest 25.8 percent in low practices in betel leaf cultivation category.

**Agricultural extension media contact:** The highest proportion (61.2 percent) of the farmers had medium agricultural extension media contact and the lowest 14.1 percent farmers were felt high extension media contact category.

**Knowledge on betel leaf cultivation:** The highest proportion (65.9 percent) of the farmers had medium knowledge on betel leaf cultivation and the lowest 15.3 percent had high knowledge on betel leaf cultivation.

**Distance to market place:** The highest proportion (88.2 percent) of the farmers had medium distance where 5.9 percent had low distance to market place and same 5.9 percent farmers had long distance to market place category.

#### **5.1.2 Problems faced by the farmers in betel leaf cultivation**

The highest proportion (55.3 percent) of the farmers had medium problems where 23.5 percent farmers had low and the 21.2 percent farmers had high problems in betel leaf cultivation.

#### **Rank order of problems faced by farmers in betel leaf cultivation**

As per Problem Faced Index (PFI), infection of leaf rot disease ranked the 1<sup>st</sup> and lack of credit facility in last position.

#### **5.1.3 Relationship between the selected characteristics of the farmers and their problems in betel leaf cultivation**

There was found a negative relationship among farmers' age, level of education, experience in betel leaf cultivation, Benefit Cost Ratio (BCR), knowledge on betel leaf cultivation with their problems in betel leaf cultivation.

Therefore, farmers' family size, betel leaf cultivation area, annual family income from betel leaf cultivation, practices in betel leaf cultivation, agricultural extension media contact and distance to market place had a non-

significant relationship with the problems faced by them in betel leaf cultivation.

#### **5.1.4 Using chemicals/ hormone for betel leaf cultivation**

Most of the farmers (89.4 percent) used Actara for insect-pest control, maximum (91.7 percent) used Amistartop for disease control and for quick growing, the highest (32.9 percent) farmers used Flora.

### **5.2 Conclusions**

The findings and relevant facts of research work prompted the researcher to draw following conclusions.

- i. It is concluded that most of the farmers faced problems in betel leaf cultivation which needs to minimize for sustainable betel leaf cultivation.
- ii. Farmers' age, level of education, experience in betel leaf cultivation, Benefit Cost Ratio (BCR), knowledge on betel leaf cultivation had a significant negative relationship with the problems faced by them in betel leaf cultivation.
- iii. Conclusion is concluded that infection of leaf rot disease ranked the 1<sup>st</sup> and lack of credit facility was in last position according to PFI of betel leaf cultivation.

### **5.3 Recommendations**

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

On the basis of observation and conclusions drawn from the findings of the study following recommendations are made:

- i. It is recommended that an effective step should be taken by the Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for strengthening the farmers' qualities in favor of reducing the problems faced by the farmers in betel leaf cultivation to a higher degree.

- ii. It is recommended that the government should consider the farmers' age, level of education, experience in betel leaf cultivation, Benefit Cost Ratio (BCR), knowledge on betel leaf cultivation during implementation the program for reducing the problems faced by the farmers in betel leaf cultivation.
- iii. It is recommended that arrangements should be made for enhancing the education level of the betel leaf cultivators by the concerned authorities through the establishment of night school, adult education and other extension methods as possible which would promote their knowledge at all aged farmers and also would gathered experience.
- iv. It is recommended that arrangements should be made for enhancing the market facilities through government and non-government organizations with a view to bringing the BCR facilities which would subsequently reduce the problems faced by the farmers in betel leaf cultivation.

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

On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for future study.

- i. The present study was conducted in Rajbari district. It is recommended that similar studies should be conducted in other areas of Bangladesh.
- ii. This study investigated the relationship of eleven characteristics of the farmers with their problems faced by them in betel leaf cultivation as dependent variables. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers with their problems faced in betel leaf cultivation.
- iii. Studies need to be undertaken to ascertain the principles and procedures for installation and patronization of nursing organization in the rural areas of Bangladesh.

- iv. The present study was concern only with the extent of problems faced by the farmers in betel leaf cultivation. It is therefore suggested that future studies should be included more reliable measurement of concerned variable is necessary for further study.
- v. The study was based on the farmers' problems faced in betel leaf cultivation. Further studies may be conducted in respect of problems faced by the farmers of other crop production.

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## APPENDIX-I

### ENGLISH VERSION OF THE INTERVIEW SCHEDULE

#### Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

Dhaka-1207

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An Interview Schedule for the Study Entitled

#### PROBLEMS FACED BY THE FARMERS IN BETEL LEAF CULTIVATION

Name of the respondent: ..... Serial No: .....

Village: .....

Union: .....

Mobile No: .....

(Please provide following information. Your information will be kept confidential and will be used for research purpose only)

#### 1. Age

How old are you? \_\_\_\_\_ years.

#### 2. Level of education

Please mention your level of education.

a) I can't read and write

b) I can sign only

c) I have passed..... class.

d)I took \_\_\_\_\_ years non-formal education.

#### 3. Family size

How many members are there in your household including you? .....

#### 4. Betel leaf cultivation area

Please mention your betel leaf cultivation area ..... (local unit)/ .....hectare.

#### 5. Experience in betel leaf cultivation

Please mention your experience in betel leaf cultivation ..... years.

## 6. Benefit Cost Ratio (BCR)

Please mention the expenditure and income from betel leaf cultivation in this year.

### Total cost

Sl. No.	Expenditure items	Amount (Tk)
1		
2		
3		
4		
Total		

### Total income from betel leaf cultivation

Sl. No.	Income items	Amount (Tk)
1		
2		
3		
4		
Total		

$$BCR = \frac{\text{Total Income}}{\text{Total Cost}}$$

## 7. Practices in betel leaf cultivation

Please mention the extent of practice of the following:

Sl. No	Field of activities	Extent of activities			
		High (3)	Medium (2)	Low (1)	No (0)
1	Proper vine selection				
2	Intercultural operations				
3	Disease control				
4	Proper harvesting				
5	Betel leaf grading				
6	Timely marketing				

## 8. Agricultural extension media contact

Please indicate the extent of your exposure with the following information media:

Sl. No.	Name of information sources	Extent of contact				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1	Other betel leaf farmers	> 9 times/month	7-9 times/month	4-6 times/month	1-3 times/month	0 time/month
2	Commission agent	> 7 times/month	5-7 times/month	2-4 times/month	1 times/month	0 time/month
3	Dealers (fertilizers, Pesticide)	> 7 times/month	5-7 times/month	2-4 times/month	1 times/month	0 time/month
4	Extension officer	> 5 times/month	4-5 times/month	2-3 times/month	1 times/month	0 time/month
5	Group discussion	Once in a month	Once/ 2 months	Once/ 3 months	Once/ 4 months	0 time/6 months
6	Result demonstration	Once in a month	Once/ 2 months	Once/ 3 months	Once/ 4 months	0 time/6 months
7	Newspaper	Daily	Weekly	Fortnightly	Once/month	0 time/6 months
8	Radio	Daily	Weekly	Fortnightly	Once/month	0 time/6 months
9	Television	Daily	Weekly	Fortnightly	Once/month	0 time/6 months

## 9. Knowledge on betel leaf cultivation

Sl. No.	Questions	Assigned Mark	Obtain Mark
1	Mention the suitable time for betel leaf cultivation.	2	
2	When manure is needed in betel leaf cultivation?	2	
3	Mention irrigation time in betel leaf cultivation.	2	
4	How many numbers of irrigation is necessary for betel leaf cultivation?	2	
5	How many numbers of tillage is needed in betel leaf cultivation?	2	
6	Mention the items of inter-cultural operations those are practiced in betel leaf cultivation.	2	
7	Name two varieties of betel leaf.	2	
8	Mention two uses of betel leaf.	2	
9	Mention two diseases of betel leaf.	2	
10	What are the doses of fertilizers for betel leaf cultivation?	2	
11	How betel leaf is harvested?	2	
12	What operations are done after betel leaf harvesting?	2	



### 10. Distance to market place

Please mention distance of market place from your farm or home..... km

### 11. Problem faced by farmers in betel leaf cultivation

Sl. No.	Problem faced by farmers	Extent of problem faced by farmers			
		Severe (3)	Medium (2)	Low (1)	Not at all (0)
1	Infection of leaf rot disease				
2	Lack of irrigation water				
3	Lack of modern varieties				
4	Seed (vine) mortality				
5	High price of insecticides				
6	High price of boroj materials				
7	Lower price of betel leaf				
8	Lack of labor				
9	Lack of marketing facility				
10	Lack of credit facility				

### 12. Using chemicals/ hormone for betel leaf cultivation

Please mention your extent of using chemicals/ hormone for betel leaf cultivation

Purpose	Name of chemical/hormone	Dose	Frequency	Mode of use
For insect-pest control				
For disease control				
For quick growing				

Thank you for your kind co-operation

Date:

.....  
(Signature of the interviewer)

## Appendix-II

### Correlations matrix among the selected characteristics of the farmers and the problems faced by them in betel leaf cultivation

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>9</sub>	X <sub>10</sub>	X <sub>11</sub>	Y
X <sub>1</sub>	-											
X <sub>2</sub>	.415**	-										
X <sub>3</sub>	-.051	-.325**	-									
X <sub>4</sub>	-.039	-.042	-.025	-								
X <sub>5</sub>	.866**	.383**	-.073	-.082	-							
X <sub>6</sub>	-.021	-.024	-.025	.981**	-.090	-						
X <sub>7</sub>	.267*	.016	-.022	.146	.209	.202	-					
X <sub>8</sub>	.034	.094	-.259*	-.149	.064	-.150	.485**	-				
X <sub>9</sub>	-.038	-.073	.127	-.051	-.138	-.052	-.020	-.031	-			
X <sub>10</sub>	.531**	.501**	-.318**	-.246*	.464**	-.232*	.015	.189	-.041	-		
X <sub>11</sub>	-.199	-.004	.033	.035	-.242*	.030	-.308**	-.081	.033	.177	-	
Y	-.822**	-.475**	.083	.009	-.696**	-.041	-.314**	.051	.094	-.634**	.112	-

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

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

X<sub>1</sub>= age, X<sub>2</sub>=level of education, X<sub>3</sub>=family size, X<sub>4</sub>=betel leaf cultivation area, X<sub>5</sub>= experience in betel leaf cultivation, X<sub>6</sub>= annual income from betel leaf cultivation, X<sub>7</sub>=Benefit Cost Ratio (BCR), X<sub>8</sub>=practices in betel leaf cultivation, X<sub>9</sub>=agricultural extension media contact, X<sub>10</sub>=knowledge on betel leaf cultivation and X<sub>11</sub>=distance to market place

Y= Problems faced by the farmers in betel leaf cultivation