KNOWLEDGE GAP IN THE USE OF SUGARCANE PRODUCTION TECHNOLOGIES AMONG THE FARMERS OF JHENAIDAH DISTRICT

MD. HUSSAIN AHAMMAD

DEPARTMENT OF AGRICULTURAL EXTENSION &

INFORMATION SYSTEM

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

DHAKA-1207

June, 2020

KNOWLEDGE GAP IN THE USE OF SUGARCANE PRODUCTION TECHNOLOGIES AMONG THE FARMERS OF JHENAIDAH DISTRICT

BY

MD. HUSSAIN AHAMMAD

Reg. No. 12-05166

A thesis

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

SEMESTER: JANUARY-JUNE, 2020

APPROVED BY:

(Dr. Md. Rafiquel Islam)	**(Dr. Muhammad Humayun Kabir)**
Supervisor	Co-Supervisor
Professor	Professor
Dept. of Agril. Ext. and Info. System	Dept. of Agril. Ext. and Info. System
Sher-e-Bangla Agricultural University	Sher-e-Bangla Agricultural University

Dr. Muhammad Humayun Kabir
Prof. & Chairman
Examination Committee
Dept. of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University

Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar,
Dhaka-1207, Bangladesh

CERTIFICATE

This is to certify that the thesis entitled **"KNOWLEDGE GAP IN THE USE OF SUGARCANE PRODUCTION TECHNOLOGIES AMONG THE FARMERS OF JHENAIDAH DISTRICT"** submitted to the department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Agricultural Extension, embodies the result of a piece of bona fide research work carried out by **MD. HUSSAIN AHAMMAD, Registration No. 12-05166** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:
Dhaka, Bangladesh

Prof. Dr. Md. Rafiquel Islam
Supervisor
Department of Agricultural Extension
and Information System
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka-1207

DEDICATED

TO

MY BELOVED

PARENTS

ACKNOWLEDGEMENT

All praises are due to Almighty Allah, the Great, Gracious and Merciful, Whose blessings enabled the author to complete this research work successfully. Guidance, help and co-operation have been received from several persons or authority during the tenure of the study, the author is grateful to them all who made a contribution to this research work. Although it is not possible to mention all by names it will be an act of ungratefulness if some names are not mentioned here for their immense contribution to the accomplishment of this study.

In particular, the author takes the opportunity to express his deepest sense of gratitude his honorable Supervisor ***Prof. Dr. Md. Rafiquel Islam****, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for his continuous inspiration, valuable suggestions, constructive criticism, constant guidance and intensive supervision through the period of the study and preparation of this thesis without his intense co-operation this work would not have been possible.*

The author would like to express his deepest respect and boundless gratitude especially to, ***Co-supervisor and Chairman, Prof****.* ***Dr. Muhammad Humayun Kabir****, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for his active help and moral support in pursuing the study.*

It is also a great pleasure for the author to express hearty appreciation and regard to all teachers of Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for their affectionate feelings and valuable suggestions during the research work.

The author deeply acknowledges the cooperation and sincere help of Upazila Agriculture Officer, Agriculture Extension Officer of Kaliganj upazila and SAAOs of unions. The author also expresses her heartfelt gratitude to the respondents of the study area who patiently provided the information during the interview with the author.

The author expresses his grateful thanks to all staff and employees of the Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for their co-operation and encouragement to prepare this thesis.

Last but not least, the author expresses his deepest sense of gratitude, indebtedness and profound respect to his beloved mother, uncles, brothers, sister, relatives and friends for their blessings, encouragement and moral support in all phases of this academic pursuit from beginning to the end.

The Author

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

GDP	Gross Domestic Product
BBS	Bangladesh Bureau of Statistics
BSFIC	Bangladesh Sugar and Food Industries Corporation
BEC	Intergovernmental Panel on Climate Change
BSRI	Bangladesh Sugarcane Research Institute
BRRI	Bangladesh Rice Research Institute
HYV	High Yielding Varieties
ZDSM	Zill Bangla Sugar Mill
FFS	Farmers Field School
PFI	Problem Faced Index
SAAO	Sub-Assistant Agriculture Officer
etc.	et cetera
et al.	All others

KNOWLEDGE GAP IN THE USE OF SUGARCANE PRODUCTION TECHNOLOGIES AMONG THE FARMERS OF JHENAIDAH DISTRICT

MD. HUSSAIN AHAMMAD

ABSTRACT

The objectives of this study were to describe some selected characteristics of the farmers; to determine the extent of knowledge gap in the use of sugarcane production technologies; to find out the contributing factors that affecting farmers knowledge gap in the use of sugarcane production technologies and to compare the severity among the problems faced by the farmers in sugarcane cultivation. The study was conducted in three selected villages under Kaliganj upazila. Data were collected from 97 sugarcane farmers by using an interview schedule during 5th January and completed in 5th February, 2020. Farmers' knowledge gap in the use of sugarcane production technologies was the dependent variable and it was measured on the basis of knowledge gap scores. Multiple regression was used to examine the contribution of the selected characteristics of the farmers. The highest (45.36%) of the farmers had medium knowledge gap and (22.68%) of the farmers had high knowledge gap followed by (31.96%) low knowledge gap in the use of sugarcane production technologies. Four characteristics of the respondent's viz. education, agricultural training, extension contact and problem faced in sugarcane cultivation of the respondents had significant contribution with their knowledge gap in use of sugarcane cultivation technologies. Among of them education, agricultural training, extension contact had negative significant contribution with their knowledge gap in use of sugarcane cultivation technologies but problem faced in sugarcane cultivation of the respondents had significant positive contribution with their knowledge gap in the use of sugarcane cultivation technologies. On the basis of PFI, it was observed that "lack of quality setts" ranked first followed by "low price of produced sugarcane" and "lack of subsidy" was the last problem.

CHAPTER 1
INTRODUCTION

1.1 General Background

Bangladesh is basically a rural based agricultural country. Agriculture plays the vital role in capital formation. About 84.5 % of her total population lives in the rural areas and directly and indirectly depend on agriculture for their livelihood (BBS, 2020). Agriculture related sector contribute to as much as 13.35 % of Gross Domestic Product (GDP) of the country (BEC, 2020). The contribution of sugarcane crop to the national GDP was worked out at 0.67 % out of which highest GDP contribution was earned by gur sector (0.39 %) followed by sugar (0.15 %), chewing and juice (0.04 %), seed (0.03 %), cattle feed and fuel (0.03 %) and by product (0.03 %). On the other hand, GDP contribution of sugarcane economy was found highest in the gur production (57.35 %) followed by sugar (22.61 %), chewing and juice (6.25 %), seed (4.95 %), cattle feed and fuel (4.61 %) and by product (4.23 %) (Alam, 2005).

Sugarcane (*Saccharum officirum Lin*.) is a member of Saccharum, trible Androopogoneae, family graminee. Sugarcane species are usually highly polyploidy. Its cultivation is concentrated around the world between 35 North and 35 South of the latitude. It is a long durational vegetative propagated plant. In Bangladesh, it is generally cultivated in rainfall belt (below 1500 mm) of southwest and northwest part. It is the major sugar or gur producing crop of the country. The importance of sugarcane in the economy of Bangladesh can hardly be over emphasized. Besides sugarcane is the main source of sugar, but the production of sugarcane has not been able to keep place with the increased demand with the production growth. The area, production and yield per hectare in Bangladesh for the last three (3) years are shown in Table 1.1.

Table 1.1 Area and Production of Sugarcane from 2015- 2016 to 2017-2018

Year	Area (acres)	Production (MT)
2015-16	242943	4207592
2016-17	227389	3862775
2017-18	222784	363873

Source: Bangladesh Bureau of Statistics (BBS, 2020)

Sugarcane is one of the most important cash-cum industrial crop in Bangladesh providing economically viable farming and employment opportunities to lots of people. Every year it occupies on an average 2.3 % of the total cultivable land (BBS, 2020). Sugarcane ranks second among cash crops and third among the major field crops in the country. Bangladesh is seventh among the sugarcane growing countries of the world covering 1.15 % of the country's total cultivable land (BBS, 2020).

Sugarcane of the country contributes significantly to the development of rural areas by providing the rural employment, improvement of the rural infrastructure and saving valuable foreign exchange, which are adding directly and indirectly to the national development. The government of Bangladesh is emphasizing the attainment of self-sufficiency in sugar and gur production by stabilizing sugarcane area and increasing yield (BSFIC, 1986). In Bangladesh, there are two well defined zones of sugarcane cultivation, one is a mill zone and the other is non-mill zone. Sugar mills are situated mainly in the greater districts of Rajshahi, Pabna, Kushtia, Rangpur, Dinajpur, Bogra, Faridpur, Dhaka and Mymensingh.

Bangladesh suffers from chronic shortage of sweetener (sugar and gur) and raw material of sugar mills. But the climate condition in the sugarcane growing areas in Bangladesh support yield increase as high as 200-300 tones cane per hectare. So, there exists ample prospect and potentiality to increase the yield of sugarcane. In spite of this, average sugarcane yield in Bangladesh for the last five years is one of the lowest in the world (BBS, 2020).

Bangladesh Sugarcane Research Institute (BSRI) is engaged to conduct research to develop high production technologies to increase the yield of sugarcane. But, the farmers face a variety of problems for which sugarcane cultivation can not reach to a satisfactory level. So, there is a scope for increase in production of sugarcane, sugar, gur and it's by product though increasing yield per unit area which is not only to meet up country's growing demand of sugar and gur but also increase national GDP. Besides these, sugarcane plays an important role to develop infrastructure in rural areas, rural employment, income of the farm families, contribution to national exchequer, foreign exchange saving and value addition to the sugar, gur and as well as by product industries.

1.2 Statement of the Problem

There are number of proven recommended technologies but not all of those are accepted by the farmers although they are intelligent and hard working. As a result, a wide gap between actual achievement and achievable potential in the sugarcane cultivation system still exists. Attaiament of highest possible yields in sugarcane and thereby maximum profit may be achieved only when farmers are well equipped with required technological knowledge and needed inputs and other relevant supports and most authentically if knowledge and skills are applied correctly in the field.

In view of the foregoing discussion, the researcher undertook a study entitled "Farmers knowledge gap in the use of sugarcane production technologies". The main purpose of the study was to have an understanding on the farmers knowledge in the use of sugarcane production technologies and about some selected factors contributing in the farmers knowledge in the use of sugarcane production technologies. For conducting the research in a planned and appropriate way, the researcher put forwarded the following questions:

1. What are the characteristics of the farmers?

2. What is the extent of farmers knowledge in the use of sugarcane production technologies?

3. Is there any contribution of the selected characteristics of the farmers in the use of sugarcane production technologies?

4. What are the level severities of the different problems faced by the farmers in sugarcane cultivation?

1.3 Specific Objectives

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

1. To describe some selected characteristics of the farmers.

The characteristics are:

- Age
- Education
- Farm size
- Farm size for sugarcane cultivation
- Annual family income
- Income from sugarcane cultivation
- Sugarcane cultivation experience
- Agricultural training
- Extension media contact
- Problem Faced in Sugarcane Cultivation

2. To determine the extent of knowledge gap in use of sugarcane production technologies among the farmers;

3. To find out the contributing factors that affecting selected characteristics of the sugarcane farmers and their knowledge gap in use of sugarcane production technologies;

4. To compare the severity of the problems faced by the farmers in sugarcane cultivation.

1.4 Justification of the Study

Bangladesh Sugarcane Research Institute of Bangladesh developed some technologies to eliminate the constraints and to increase the present level of sugarcane yield. The Bangladesh Sugarcane Research Institute has released many varieties through conventional breeding approach along with production related technologies such as land preparation, timing of sowing, seed rate, sowing instrument (drum seeder), fertilizer doses, and supplementary irrigation, IPM practices, timing of harvesting etc. The potential yield of these varieties is 5.6 metric tons per acre whereas the average sugarcane yield is only 1-2 metric tons per acre in Bangladesh. Development of new technologies is generally not the major problem here: the most important problem is dissemination of these technologies among growers. Growers adopt new and improved sugarcane growing technologies at varying degree based on their own socio-economic condition and infrastructural facilities. Therefore, the result varies from the expected yield. It is assumed that there is knowledge gap between recommended technologies of scientists and practice in the field. The knowledge gap results yield gap. It is very important to understand the adoption of scientific sugarcane cultivation practices to bridge the gap between potential yield and actual yield at farmer's field and to increase sugarcane productivity in the country.

1.5 Scope of the Study

The main focus of the study was to determine knowledge gap in use of sugarcane production technologies. The findings of the study will be explicitly applicable to Jhenaidah District. However, the findings will also have implications for other areas of the country having relevance to the socio-cultural context of the study area. The researcher believes that the findings of the study will disclose the phenomenon related to technological gap and knowledge gap of innovation. These will be of special concern to the policy makers and planners in formulating and redesigning the extension programs specially for sugarcane cultivation. The findings are expected to be helpful to the field workers of different nation building organizations and departments related to sugarcane production with a

view to develop appropriate extension strategies for effective sugarcane production.

1.6 Assumptions of the study

An assumption is the supposition that an apparent fact or principle is true in the tight of available evidence (Goode and Hatt. 1952). The following assumptions were in mind of the researcher during conducting the study:

i. The respondents included in the sample were capable of furnishing responses properly to the questions included in the interview schedule.
ii. Views and opinions furnished by the respondents were the presentative opinions of the population of sugarcane growers of the study area.
iii. The responses furnished by the respondents were reliable and valid.
iv. The researcher who acted as the interviewer was well adjusted to the social environment of the study area. Hence, the data collected by the researcher were free from bias.
v. The respondents for the study were competent enough to answer the queries made by the researcher.

1.7 Limitations of the Study

The purpose of the study was to have an understanding of the extent of knowledge gap in use of sugarcane production technologies among sugarcane growers and to explore its relationship with their selected characteristics. Considering the time, money and other necessary resources available to the researcher and to make the research manageable and meaningful from the practical point of view, it was necessary to consider the following limitations:

- The study was confined mainly to sugarcane growers' knowledge gap in use of sugarcane production technologies.
- The study was confined to selected three villages of Kaligang union under Kaliganj upazila of Jhenaidah District.
- Where were many characteristics of the sugarcane growers but only ten of them were selected for this study?

- Facts and figures were collected by the investigator applied to the present
- situation in the selected area.
- For information about the study, the researcher was dependent on the data furnished by the sampled respondents during data collection. As none of the respondents kept records, they furnished information to the different queries by recall.
- Major information, facts and figure supplied by the respondents were applicable to the situation prevailing in the locality during the year 2019.

1.8 Definition of Terms

A researcher needs to know the meaning and contents of every term that he/she uses. For clarity of understanding of the following terms used frequently throughout the study have been defined and interpreted stated below in alphabetical order:

Education

Education is referred to describe change of human behavior i.e. change in knowledge, skill and attitude of an individual through reading, writing and other related activities. Education of a sugarcane grower refers to the development of desirable knowledge, skill and attitude in the individual through reading, writing and other related activities. In this study education was meant for total years of schooling of sugarcane growers.

Income from sugarcane grower cultivation

Income of an individual may be defined yearly earnings from different sources of income sugarcane cultivation is a source of income. So, income from sugarcane cultivation means how much a sugarcane grower could earn from sugarcane cultivation during last year.

Farm Size

Farm size of a sugarcane grower refers to the area of land owned by him or his wile on which farming activities are carried out and reap fully or partially benefits out a lit.

Knowledge gap in use of sugarcane production technologies

Knowledge gap may be defined as the discrimination between what knowledge an individual has about a particular phenomenon and what knowledge s/he ought to have according to the recommendation authority of that phenomenon. This study deals with knowledge gap in use of sugarcane production technologies of a sugarcane grower compared to the knowledge recommended by the sugarcane Research Centre.

Training exposure

By training exposure generally we mean the extent of attendance of an individual to different training programs for his/her career development. In this study, it refers to the total number of days attended by the sugarcane growers in his/her life to the various training courses related to sugarcane cultivation.

Use of information source

Use of information source means how much an individual is exposed to different communication channels/media. In this study the researcher tended to assess the extent of communication sources used by the sugarcane growers.

CHAPTER 2
REVIEW OF LITERATURE

This chapter deals with the review of past researches related to this investigation. The reviews are conveniently presented based on the major objectives of the study. In spite of sincere effort adequate numbers of direct related literatures were not readily available for this study. However, this chapter is divided into following Sections:

Section one: Farmers knowledge gap in use of different crop production technologies

Section two: Review of Past Studies Concerning Relationships their Selected Characteristics of the Farmers and

Section three: The Conceptual Framework of the Study

2.1 Farmers knowledge gap in use of different crop production technologies

Singh et at. (2001) reported that overall average knowledge gap in weed management practices in rice crop was 25 percent. Maximum average technological gap 31.4 percent in wheat crop was found in case of chemical weeding followed by integrated weed management 20.3 percent. Overall average gap in weed management practices in wheat crop was 25.8 percent.

Ahmed (1974) ascertained the farmer's knowledge on live aspects of farming. The comprehensive knowledge scores showed that 44 percent of the farmer possessed to knowledge 41 percent medium knowledge and 15 percent high knowledge. In fact, successful farmer needs cent percent knowledge in all kind of practices. So, from the study of Ahmed, it was reviewed that 85 percent respondents had medium to high knowledge gap.

Ratnakar (1991) conducted a study on knowledge of tribal farmers about recommended farm practices lie found that 53 percent of tribal farmers had low level of knowledge about recommended farm practices while 31 percent and 16

percent of them had medium and high knowledge, respectively. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Ratnakar, it was reviewed that 84 percent respondents had medium to high knowledge gap.

Rahman et al. (1992) conducted a study technological gap among the wheat growers of Sadar thana under Kurigram district. They found that only 51 percent farmers belonged to the category of high knowledge gap and 10 percent had low knowledge gap on wheat production technologies. Remaining 39 percent belonged to the category of medium knowledge gap.

Pal et al. (1993) reported that the mean score of knowledge gap index in sugarcane cultivation was 58.3 with a range from 6 to 96.

Parveen (1995) in her research found that 58 percent farm women had medium knowledge while 35 percent had high and only 7 percent had poor knowledge on use of fertilizers, pesticides and irrigation water. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Parveen, it was reviewed that 65 percent respondents had medium to high knowledge gap.

Khan (1996) conducted a research on effectiveness of farmers primer on growing rice in knowledge change of the farmers and found that 67 percent farmers had good knowledge at initial stage (before the treatment) where 21 percent had excellent knowledge and 12 percent had poor knowledge. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Khan, it was reviewed that 12 percent respondents had high knowledge gap.

Hossain (2000) while determining farmer's knowledge and perception of Binadhan-6 in boro season, found that highest proportion (65 percent) of the farmers possessed medium knowledge. 21 percent low knowledge and lowest proportion (14 percent) possessed high knowledge. In fact, successful farmer

needs cent percent knowledge in any kind of practices. So, from the study of Hossain, it was reviewed that 81 percent respondents had medium to high knowledge gap.

Hussen (2001) in his study found that 84 percent of the farmers had medium knowledge 13 percent had high knowledge and only 3 percent possessed low knowledge on modern sugarcane cultivation practices. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Hussen, it was reviewed that 87 percent respondents had medium to high knowledge gap.

Kamruzzaman et al. (2001) observed in his study that the wheat farmers had knowledge gap in most of the practices of modern wheat cultivation. However, maximum knowledge gap was found for recommended fertilizer dose.

Saha (2001) conducted research on farmers' knowledge on improved practices of pineapple cultivation and found that the majority (62 percent) of the farmer possessed good knowledge 33 percent poor knowledge and only 5 percent possessed excellent knowledge. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Saha, it was reviewed that 5 percent respondents had high knowledge gap.

Sarker (2002) made it study on farmers' knowledge and attitude towards BRRI Dhan-29 variety of rice found that the majority (60 percent) of the farmer possessed medium knowledge 33 percent high knowledge and only 7 percent possessed low knowledge. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Sarker, it was reviewed that 67 percent respondents had medium to high knowledge gap.

Hossain (2003) studied on farmers' knowledge and adoption of modern boro rice cultivation practices that 66 percent of the boro farmer possessed medium

knowledge compared to 17 percent high knowledge and on 17 percent possessed low knowledge. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Hossain, it was reviewed that 3 percent respondents had medium to high knowledge gap.

Saha (2003) conducted research on a comparative analysis of farmers' communication exposure and knowledge in rice and poultry farming and showed that 48 percent of the farmers had medium knowledge while 48 percent of the farmers had low knowledge and only 4 percent had high knowledge in rice faming. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Saha, it was reviewed that 96percent respondents had medium to high knowledge gap.

Sana (2003) conducted a study on famers' knowledge of shrimp cultivation and found that the majority (61 percent) of the farmer possessed medium knowledge 30 percent low knowledge and only 9 percent possessed high knowledge. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Sana, it was reviewed that 91 percent respondents had medium to high knowledge gap.

Roy (2006) observed in his study that the majority (57 percent) of the farmer possessed medium knowledge, 28 percent high knowledge and 15 percent possessed low knowledge on boro rice cultivation practices. In fact, successful farmer needs cent percent knowledge in any kind of practices. So, from the study of Roy, it was reviewed that 72 percent respondents had medium to high knowledge gap.

Islam et al. (2008) conducted a study on Management (lap in Boro Rice Cultivation at Farmers' Fields and they found that 72 percent of the farmers had medium gap in their overall management while 17 percent of the farmers had low gap i.e. they applied a little less than the full package of the recommended

selected IS practices in modern Boro rice cultivation. Remaining 11 percent of the farmers had high gap in management or Boro rice cultivation.

Islam et al. (2009) conducted a study on Application gap of Boro rice growers about recommended fertilizer doses found that 34 percent of rice growers had low level of overall application gap while 40 percent and 26 percent of them had medium and high level of application gap, respectively.

Kirar et al. (2009) observed in his study that the overall knowledge gap of contact and non-contact farmers regarding different selected practices of rice cultivation was 47.99 percent and 57.67 percent respectively. Khan (1996) and Brakash et al (2004) found more or less same result in their studies.

Pandey (2010) observed in his study that the overall knowledge gap regarding different selected practices of rice cultivation was 39.19 percent the knowledge gaps for plant protection measure and fertilizer use were 37.71 and 31.04 per cent, respectively. Majority of the farmers reported wide gap (66.88 percent) in seed treatment of rice, whereas, least gap (21.15 percent) was reported in modern rice varieties.

2.2 Review of Past Studies Concerning Relationships their Selected Characteristics of the Farmers

Characteristics of the respondents with their knowledge gap in different crop production technologies

2.2.1 Age and knowledge gap

Singh et al. (1991) conducted a study and concluded that age of the citrus growers had a negative trend but not significant relationship with knowledge gap of citrus growers.

Banarva et al. (1993) conducted a study and found that age of the farmers and their technological gap in recommended groundnut production technology was positive and insignificantly correlated.

Jha and Shaini (1994) reported in their studies that age of the tribal farmers was correlated with technological knowledge gap in cattle rearing practice but nonsignificant with the non-tribal farmers.

Ajore and Singh (1996) found significant positive relationship between age of the farmers and their adoption gap in reclamation of soils in progressive district but no relationship in less progressive district.

Baruah et al. (1998) conducted a study and found significant positive relationship between age and technological knowledge gap.

Singh and Kherde (1998) found negative and insignificant relationship between age and technological knowledge gap of the farmers with regard to cattle rearing practice.

Amin (2001) observed in his study that age of PETRRA and non-PETRRA beneficiaries had negative significant relationship with their knowledge on organic cocoon and skills on production, processing, storing of seeds. Huda et al. (1992) found that older farmers were more careful in keeping moisture content low of their seed. Hanif (2000) observed in his study that age of FFs farmers had significant relationship with IPM knowledge on environmental awareness. Rahman et al. (1988), Chandargi (1980) also found positive significant relationship between age and knowledge in their research.

Rahman (2015) observed in his study about Farmers' Knowledge and Attitude Regarding Cultivation of Salt Tolerant Variety (BRRI dhan 47) of Rice" that age

of rice farmers had a positive significant relationship with knowledge on BRRI dhan 47 cultivation.

2.2.2 Education and Knowledge gap

Kashem (1987) in his study revealed that there was no significant relationship between education of farmers and their agricultural knowledge whereas Pal et al. (1993) reported that education of (farmers had highly significant and negative relationship to knowledge gap.

Rahnian et al. (1992) conducted a study on technological gap among the wheat growers of Sadar thana under Kurigram district and reported that education of farmers had significant and negative relationship to knowledge (technological) gap of the wheat growers.

Hossain (2000) found that education of farmers had significant positive relationship with their knowledge on BINA dhan-6.

Hussen (2001) in his study revealed that farmers' education had highly significant positive relationship with their knowledge of modern sugarcane cultivation practices.

Saha (2001) found that education of farmers had significant positive relationship with their knowledge on improved practices of pineapple cultivation.

Hossain (2003) found that education of farmers had significant positive relationship with their knowledge on modern Boro rice.

Saha (2003) found among the six independent variables only education was positively and significantly related with poultry farming knowledge.

Khan (2004) in his study revealed that education of farmers had significant positive relationship with their knowledge of maize cultivation.

Rahman (2004) revealed that education of farmers had significant positive relationship with their knowledge on HYV Boro rice cultivation practices.

Roy (2006) in his study found that education of farmers had significant positive relationship with their knowledge on Boro rice cultivation practices.

2.2.3 Farm size and Knowledge gap

Rahman et al. (1992) conducted a study of technological gap among the wheat growers of Sadar thana under Kurigrani district and reported that area under wheat cultivation had no significant relationship with knowledge gap (technological gap) of the wheat growers.

Pal et al. (1993) reported that farmer’s size of farm had highly significant and negative relationship to knowledge gap.

Hossain (2000) found that farm size of farmers had no significant relationship with farmer’s knowledge on HYV dhan-6.

Hussen (2001) in his study revealed that farmers' farm size had highly significant positive relationship with their knowledge of modern sugarcane cultivation practices.

Sarker (2002) found that there was a positive relationship between farm size of the farmers and their knowledge on F3RRI dhan-29.

Rahman (2004) revealed that thou size of farmers had significant positive relationship with farmers' knowledge on Boro rice cultivation practices.

Roy (2006) in his study found that farm size of farmers had significant positive relationship with their knowledge on Boro rice cultivation practices.

2.2.4 Cultivation area and farmer's knowledge gap

Singh et al. (1998) conducted a study and found significant negative relationship between farm size of the farmers and technology knowledge gap. Singh et al. (1991) reported similar relationship.

Patel et al. (2001) mentioned that there was a significant difference in technological knowledge gap between farmers with small and large holdings.

Gourav (2001) found that land holding of the farmers had negative and significant relationship with technological knowledge gap in tomato cultivation.

Tanushree (2015) observed in her study that strawberry cultivation area of farmers had positive significant relationship with knowledge on strawberry cultivation. Rahman (2015) also observed in his that BRRI dhan 47 cultivation area of rice farmers had positive significant relationship with knowledge on BRRI dhan 47 cultivation. Vegetable cultivation area had a positive and substantial significant relationship with knowledge on vegetables production activities by women members in homestead area under world vision project. The result found by (Islam, 2004).

2.2.5 Income and Knowledge gap

No finding was noticed on this aspect to the researcher at the time of reviewing literature. But sonic related findings were presented below:

Singh (1991) found in the study that income of the farmers was associated with the knowledge of plant protection measures. He also found the low income tanners had greater tendency to apply less than recommended dose and lack of knowledge was found major reasons for non-adoption.

Hossain (2000) found the family income of the farmers had insignificant relation with their knowledge on BINA dhan-6.

Hussen (2001) in his study revealed that income of the farmers had highly significant positive relationship with their knowledge of modern sugarcane cultivation practices.

Hossain (2003) found the income of the farmers had negative relationship with their knowledge of modem Boro rice cultivation.

Rahman (2004) revealed that annual income had significant positive relationship with farmers' knowledge on HYV Boro rice cultivation practices.

Roy (2006) found that annual income had significant positive relationship with farmers' knowledge on I3oro rice cultivation practices.

2.2.6 Experience and Knowledge gap

Rahman et al. (1992) conducted a study of technological gap among the wheat growers of Sadar diana under Kurierarn district and reported that experience of wheat cultivation had no significant relationship with knowledge gap (technological gap) of the wheat growers.

Sarker (2002) found that farming experience of the farmers was not related to farmers' knowledge on I3RRI dhan-29.

Rahman (2004) revealed that firming experience of the farmers had significant positive relationship with farmers' knowledge on HYV Boro rice cultivation practices.

Islam. et al. (2008) conducted a study on management gap in boro rice cultivation at farmers' fields and they found that farming experience of the farmers had significant negative relationship with farmers management gap in Boro rice cultivation.

Azad (2014) in his study concluded that vegetable cultivation experience of the farmers had significant relationship with their knowledge on postharvest practices of vegetables.

Tanushree (2015) observed in her study that strawberry cultivation experience of farmers had positive significant relationship with knowledge on strawberry cultivation. In their different study, Rayaparaddy and Jayaranaiah (1989) and Setty (1973) found that experience of the farmers had no relationship with their knowledge.

Mandal (2016) in his study concluded that watermelon cultivation experience of the farmers had no significant relationship with their knowledge on watermelon cultivation.

2.2.7 Training and Knowledge gap

Manjunatha (1980) received that trained farmers had higher knowledge level compared to untrained. That is, trained farmer had less knowledge gap compared to untrained.

Karini et al. (1993) found a strongly significant positive relationship between training of the farmers and their agricultural knowledge.

Hussen (2001) in his study found that agricultural training experience had highly significant positive relationship with their knowledge of modern sugarcane cultivation practices.

Rahman (2004) revealed that agricultural training experience had significant positive relationship with farmers' knowledge on HYV Boro rice cultivation practices.

Ray (2006) in his study found that agricultural training received had significant positive relationship with their knowledge on Boro rice cultivation practices.

2.2.8 Extension contact and farmer's knowledge gap

No finding was noticed on this aspect to the researcher at the time of reviewing literature. But sonic related findings were presented below:

Rahman et al. (1992) conducted a study of technological gap among the wheat growers of Sadar thana under Kurigram district and reported that extension contact had significant and negative relationship to knowledge (technological) gap of the wheat growers.

Pal et al. (1993) reported that extension contact had highly significant and negative relationship to knowledge gap.

Nikhade et al. (1995) reported that extension contact had significant and negative relationship with adoption gap about use of seed rate and chemical fertilizers among cotton growers.

Hussen (2001) in his study revealed that extension media contact had highly significant positive relationship with their knowledge of modern sugarcane cultivation practices.

Sarker (2002) found that media exposure of the farmers was significantly related with their knowledge on I3RRI dhan-29.

Hossain (2003) found that communication exposure of the farmers had positive significant relationship with their knowledge of modem boro rice cultivation.

Khan (2004) in his study revealed that communication exposure of farmers' had significant positive relationship with their knowledge olmai7e cultivation.

Rahman (2004) revealed that extension media contact had significant positive relationship with farmers' knowledge on UYV Boro rice cultivation practices.

Roy (2006) in his study found that media contact had significant positive relationship with farmers' knowledge on I3oro rice cultivation practices.

Ahmed (1974) found that here was a significant positive relationship between extension contact of the farmers and their agricultural knowledge.

Venugopal (1977) found that there was a significant association between the overall knowledge of agricultural extension officers in respect of rice cultivation and type of training received by them.

Bezbora (1980) studied adoption of improved agricultural technology by the farmers of Assam. The study indicated a positive relationship between extension contact and adoption of improved agricultural technology.

The findings of the study of Manjunatha (1980) revealed that the trained farmers had higher knowledge level and adopting behaviour compared to untrained farmers.

Ali (1984) found that contact and non-contact farmers differed significantly in respect of their media exposure. He observed that media exposure of the contact and non-contact farmers had significant contribution towards their agricultural knowledge.

Vidyashankar (1987) in his study found that the contact with extension agencies had contribute favorably to the attitude of the farmers.

Kaur (1988) found that extension contact and mass media exposure had significant influence upon opinion and level of knowledge of selected programme of rural women.

Rahman's (1995) study on farmers" knowledge on improved practices of potato cultivation by the farmers of Kajipur upazilla of Sirajgonj district. The study indicated a significant relationship between extension contact of farmers and their knowledge on improved practices of potato cultivation.

Hossain (2000) concluded that media exposure of the farmers had a significant relationship with their knowledge of Binadhan-6.

Sana (2003), Sarker (2002) and Rahman (2001) found in their study that media exposure of farmers were highly positive significant relationships with their knowledge.

2.2.9 Problem and Knowledge gap

Raha (1989) reported from his study that farmers' knowledge in irrigation of modem Boro paddy had no significant relationship with their irrigation problem confrontation.

Khan (2004) in his study revealed that problem confrontation had significant negative relationship with farmers' knowledge of maize cultivation.

Rahman (2004) revealed that problem confrontation had significant positive relationship with farmers' knowledge on HYV Boro rice cultivation practices.

2.3 The Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly contains at least two important elements i.e. "a dependent variable" and "an independent variable". A dependent variable is that factor which appears, disappears or varies as the research introduces, removes or varies the independent variable (Townsend. 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. In view of prime findings of review of literature, the researcher constructed a self-explanatory conceptual model of the study which is presented in Figure 2.1.

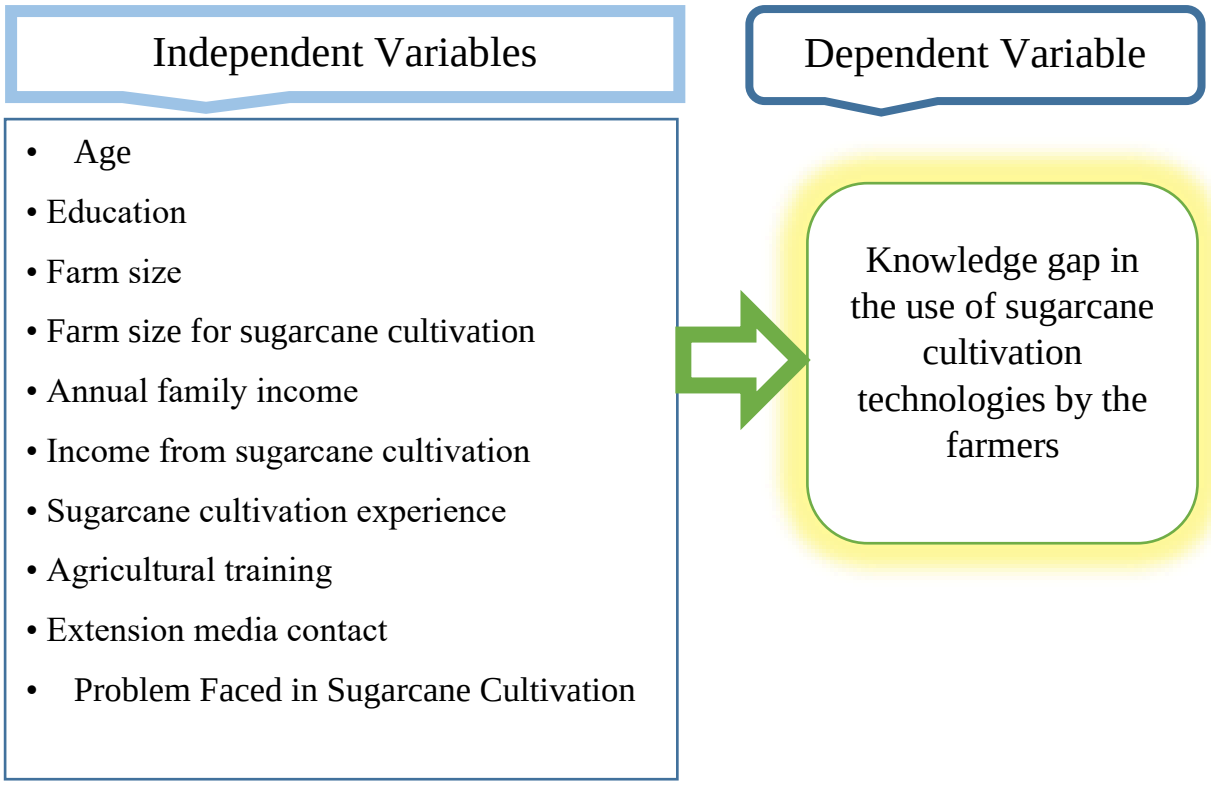

Figure 2.1: The Conceptual Framework of the Study

CHAPTER III
METHODOLOGY

Methodology deserves a very careful consideration in a scientific research. It is one of the most important parts before conducting a research work. 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. The researcher has great responsibility to describe clearly as to what sorts of research design, methods and procedures he would follow in collecting valid and reliable data and to analyze and interpret those to arrive at correct summary and conclusion. Methodology of any study should be such as to enable the researcher to collect valid and reliable information to analyze the same properly and to arrive at appropriate decisions. Methods and procedures followed in conducting this study has been discussed in this chapter.

3.1 Locale of the Study

Selecting locale of the study is an important step for conducting a scientific study. It depends on the objectives of the research. The union named Kliganj of Kaliganj upazila under Jhenaidah district was selected purposively as the locale of the study. Primary data was collected from three villages namely Babra, Hela and Bakule under Kliganj union of Kliganj upazila in Jhenaidah district. Three villages were considered as the locale of the study and its was selected randomly. A map of Jhenaidah district showing Kaliganj upazila is shown in Figure 3.1 and a map of Kaliganj upazila showing the study area is shown in figure 3.2.

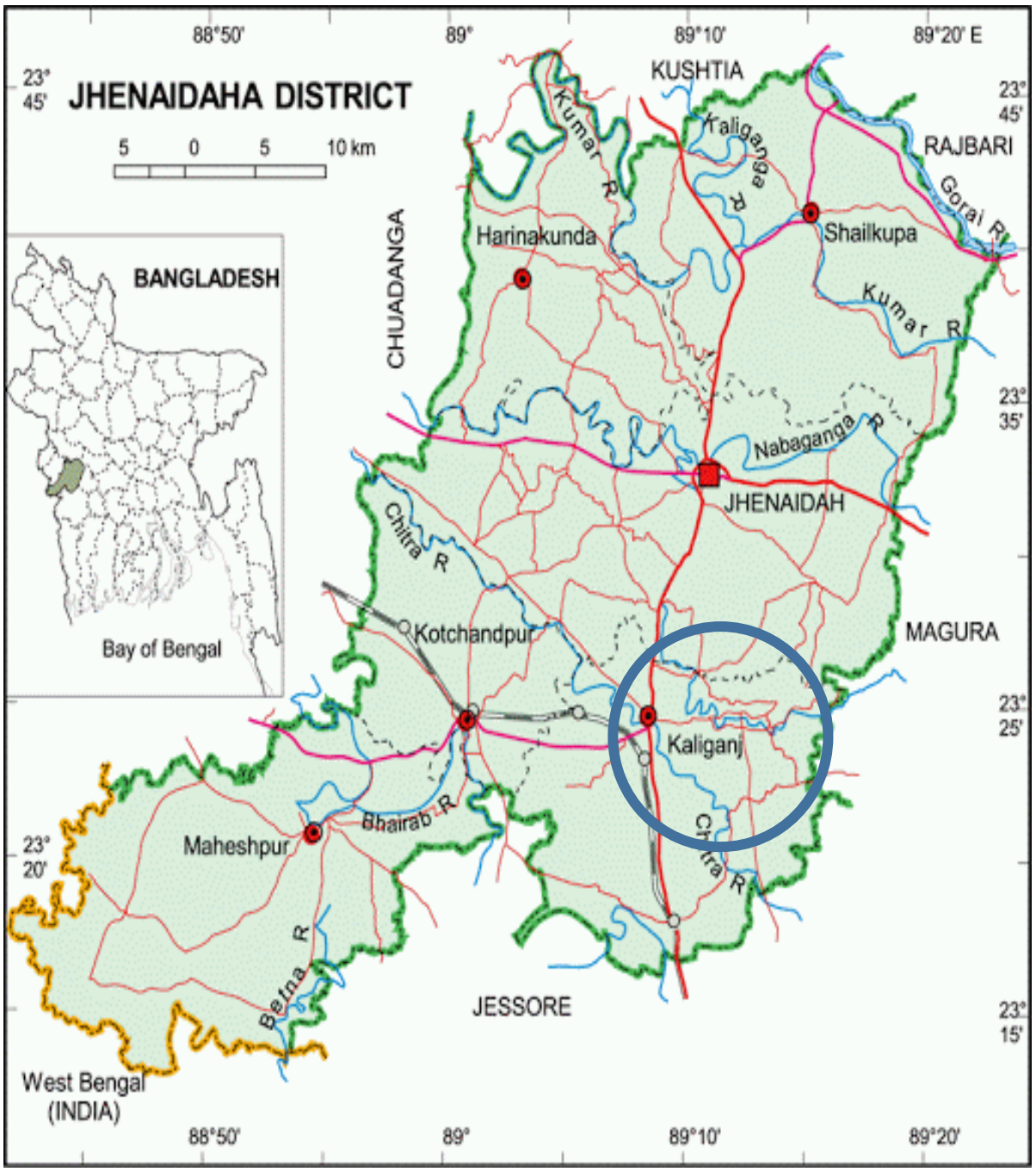

Figure 3.1 A map of Jhenaidah district showing Kaliganj upazila

Figure 3.2 A map of Kaliganj upazila showing the study area

3.2 Population and Sample of the Study

Three separate lists of farmers of the selected three villages were prepared by the researcher himself with the help of the Sub-Assistant Agriculture Officer (SAAO) of Upazila Agriculture Office (UAO), Kaliganj. The list comprised a total of 97 farmers from which total 97 farm family heads from three villages under the upazila of Kaliganj which constituted the population of the study. The whole populations were selected as the sample of the study.

Out of related 97 farmers a sample of total 97 were selected as the sample of the study. The distribution of the farmers constituting the population, Sample and reserve list showing in table 3.1.

Table 3.1 Distribution of the population and sample of the respondents in three Villages of Kaliganj upazila

Unions	Name of villages	Population (No. of total farmers)	Sample Size
Kaliganj	Babra	32	32
	Hela	39	39
	Bakule	26	26
Total		97	97

3.3 Data Collecting Instrument

In a social research, preparation of an interview schedule for collection of information with very careful consideration is necessary. Keeping this fact in mind the researcher prepared an interview schedule carefully for collecting data from the respondents. Objectives of the study were kept in view while preparing the interview schedule.

The initially prepared interview schedule was pre-tested among 10 respondents of the study area. The pretest was helpful to find out gaps and to locate faulty questions and statements. Alterations and adjustments were made in the schedule on the basis of experience of the pretest. English version of the interview schedule is shown in appendix-A.

3.4 Collection of Data

The researcher collected data from the sample farmers with the help of a pretested interview schedule. Before starting collection of data, the researchers met with the local SAAOs of the respective blocks in order to explain the objectives of the study and requested them to provide necessary help and cooperation in collection of data. The local leaders of the area were also approached to render essential help. As a result of all these a good working atmosphere was created in the study area which was very helpful for collection of data by the researcher.

Before going to the respondents for interview they were informed earlier, so that they would be available in their respective area. The interviews were held individually in the house or farms of the respective respondent. The researcher established adequate rapport so that the respondents did not feel hesitant to provide actual information. Whenever any respondent faced difficulty in understanding a particular question, the researcher took care to explain the same clearly. No serious constraints were faced by the researcher in collecting data. Collection of data took 30 days from 5th January to 5th February, 2020.

3.5 Variables of the study

A variable is any characteristics, which can assume varying or different values in successive individual cases. An organized piece of research usually contains at least two important variables viz., dependent and independent variables. But, it is very difficult to deal with all the factors in a single study. Taking the relevant available literature, discussion with teachers, experts and research fellows in the relevant field and considering the time and resources available to the researcher, variables were selected. Use of best management practices by the farmers was considered as the dependent variable of the study. The researcher selected nine characteristics of the respondent as the independent variables. The characteristics includes age, education, farm size, sugarcane farm size, annual family income, income from sugarcane cultivation, experience in sugarcane cultivation,

agricultural training, extension media contact problem faced by the farmers in sugarcane cultivation.

3.6 Measurement of Variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected variables. This section contains procedures for measurement of both independent as well as dependent variables of the study. The procedures followed in measuring the variables are presented below:

3.6.1 Measurement of Independent Variables

The selected characteristics of the respondent farmers constituted the independent variables of the study. To keep the research within the manageable sphere, 10 independent variables were selected for the study. The procedures of measurement of the selected variables were as follows:

3.6.1.1 Age

Age of a respondent was measured in terms of years from birth to the time of interview which was found on the basis of response (Azad, 2014). A score of one (1) was assigned for each year of age. Question regarding this variable appears in item no. 1 in the interview schedule (Appendix-A).

3.6.1.2 Education

Education was measured in terms of one's year of schooling. One score was given for passing each year in an educational institution (Amin, 2004). For example, if the respondent passed the S.S.C. examination, his education score was given as 10, if passed the final examination of class Seven (VII), his education scores was given as 7. If the respondent did not know how to read and write, his education score was given as '0' (zero). A score of 0.5 (half) was given to that respondent who could sign his/her name only. Question regarding this variable appears in the item no. 2 in the interview schedule (Appendix-A).

3.6.1.3 Farm size

Farm size of a respondent referred to the total area of land on which his family carried out the farming operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the respondent or cultivated on share-cropping, lease or taking from other including homestead area. It was measured in hectares for each respondent using the following formula (Khan, 2004):

$$FS = A + B + \frac{1}{2}(C + D) + E$$

Where, FS = Farm size,

A = Homestead area including garden and pond,

B = Own land under own cultivation,

C = Land taken from others as borga

D = Land given to other as borga,

E = Land taken from others on lease,

The data was first recorded in terms of local measurement unit i.e. decimal and then converted into hectare. The total area, thus, obtained is considered as his farm size score (assigning a score of one for each hectare of land). This variable appears in item number three (3) in the interview schedule as presented in Appendix.

3.6.1.4 Farm size for sugarcane cultivation

Sugarcane farm size of a respondent referred to the total area of land on which his family carried out the sugarcane operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the respondent or cultivated on share-cropping, lease or taking from other sugarcane cultivation. It was measured in hectares.

3.6.1.5 Annual family income

Annual income of a respondent was measured in '000' BDT on the basis of total yearly earning from agricultural and non-agricultural sources by the respondent himself and other family members (Appendix-A).

3.6.1.6 Income from sugarcane cultivation

Income from sugarcane cultivation of a respondent was measured in '000' BDT on the basis of total yearly earning from sugarcane cultivation sources by the respondent himself and other family members (Appendix-A).

3.6.1.7 Sugarcane cultivation experience

Experience in sugarcane cultivation experience of the respondent was measured by the number of years a respondent engaged in **sugarcane cultivation.** The measurement included from the year of starting of first farming till the year of data collection. A score of one (1) was assigned for each year of experience (Appendix-A).

3.6.1.8 Agricultural training

Training was measured by the total number of days a respondent received training in his/her life on farming practices related to agricultural purposes. A score of 1 (one) was given to a respondent for every day of training. A zero (0) score was assigned for no training exposure (Appendix-A).

3.6.1.9 Extension contact

The extension contact of a respondent was measured with fourteen selected extension media. A scale was developed arranging the weights for 0, 1, 2, 3 and 4 for the responses for not at all, rarely, occasionally, frequently and regularly contact with these media respectively. Extension contact score of the respondents could range from 0 to 56, while '0' indicating no extension contact and '56' indicating very high extension contact (Appendix-A).

3.6.1.10 Problem faced by the farmers in sugarcane cultivation

After thorough consultation with relevant experts, farmers and relevant a variable literature, 10 problems were selected related to sugarcane cultivation for the study. A list of 10 probable problems that farmers could face in different aspects were listed and asked to indicate the extent of their problem faced by the farmers in sugarcane cultivation. It was measured by using a four-point rating scale. For each problem score of 3, 2, 1 and 0 were assigned to indicate extent of problems as high, medium, low and no problem respectively. The problems score was computed for each respondent by adding his/her scores for all 10 problems. The possible range of problem scores thus could be 0 and 30. A total score of 30 indicated highest problems in respect of sugarcane cultivation, while a score of 0 indicated no problems faced in sugarcane cultivation.

To ascertain the comparison among the problem, Problem Faced Index (PFI) was computed using the following formula:

$$PFI=P_h*3 + P_m*2 + P_l*1 +P_n*0$$

Where,

PFI = Problem Faced Index

P_h= Percent of sugarcane cultivation having high problem

P_m= Percent of sugarcane cultivation having medium problem

P_l= Percent of sugarcane cultivation having little problem

P_n = Percent of sugarcane cultivation having not any problem at all

Thus, PFI is an item which could range from 0 to 291, where 0 indicated no problem at all and 291 indicated high problem in sugarcane cultivation.

3.7 Measurement of Dependent Variables

Knowledge gap in the use of sugarcane production technologies was the dependent variable of the study. It was measured based on knowledge gap in the use of sugarcane production technologies. The knowledge gap in the use of sugarcane production technologies was determined by computing a knowledge score based on a set of 4 technologies regarding recommended doses/rate/time. Each technology had assigned 3, 2, 1, 0 score for high, medium, low and no gap, respectively. Then, knowledge gap score of a farmer was obtained by adding together his/her weight for all the 10 questions. Thus, knowledge gap score of a farmer could range from 0 to 30, where 0 indicates no knowledge and 30 indicates highest level of knowledge gap in the use of sugarcane production technologies (Appendix-A).

3.8 Statement of the Hypotheses

As defined by Goode and Hatt (1952) a hypothesis is "a proposition which can be put to test to determine its validity. It may seem contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test."

3.8.1 Research hypotheses

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

"Each of the selected characteristics of the farmers had contribution to their knowledge gap in the use of sugarcane cultivation technologies."

3.8.2 Null hypotheses

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

"Each of the selected characteristics of the farmers had no contribution to their knowledge gap in the use of sugarcane cultivation technologies."

3.9 Data Processing

3.9.1 Editing

The collected raw data were examined thoroughly to detect errors and omissions. As a matter of fact, the researcher made a careful scrutiny of the completed interview schedule to make sure that necessary data were entered as complete as possible and well arranged to facilitate coding and tabulation. Very minor mistakes were detected by doing this, which were corrected promptly.

3.9.2 Coding and tabulation

Having consulted with the research supervisor and co-supervisor, the investigator prepared a detailed coding plan. In case of qualitative data, suitable scoring techniques were followed by putting proper weight age against each of the traits to transform the data into quantitative forms. These were then tabulated in accordance with the objective of the study.

3.9.3 Categorization of data

Following coding operation, the collected raw data as well as the respondents were classified into various categories to facilitate the description of the independent and dependent variables. These categories were developed for each of the variables by considering the nature of distribution of the data and extensive literature review. The procedures for categorization have been discussed while describing the variables under consideration in chapter IV.

3.10 Statistical Analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Science) computer program, version 20. The statistical measures such as range, mean, standard

deviation, percentage, rank order were used for describing both the independent and dependent variables. Tables were also used in presenting data for clarity of understanding. Initially, multiple regressions analysis was run to determine the contributions of the selected characteristics with their knowledge gap in use of sugarcane cultivation technologies by the farmers. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis throughout the study. Co-efficient values significant at 0.05 level is indicated by one asterisk (*) and that at 0.01 level by two asterisks (**).

CHAPTER IV
RESULTS AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.1 Characteristics of the Farmers

This section deals with the selected characteristics of farmers which were assumed to be associated with the knowledge gap by the farmers. Different farmers possess different characteristics which are focused by his/her behavior. In these section 10 characteristics have been discussed. The selected characteristics of the farmers were; age, education, farm size, farm size for sugarcane cultivation, annual family income, income from sugarcane cultivation, sugarcane cultivation experience, agricultural training, extension media contact and problem faced in sugarcane cultivation. Measuring unit, range, mean and standard deviations of those characteristics of farmers were described in this section. Table 4.1 provides a summary profile of farmers' characteristics.

Table 4.1 Characteristics profile of the respondents

Characteristics (with measuring unit)	Range		Mean	SD
	Possible	Observed		
Age (years)	Unknown	30–56	42.76	6.22
Level of education (schooling years)	Unknown	00 – 16	5.57	3.35
Farm size (hectare)	Unknown	0.35-2.02	.99	.39
Farm size for sugarcane cultivation (ha)	Unknown	0.13-1	.40	.16
Annual family income ('000'BDT)	Unknown	45–370	134.62	66.66
Income from sugarcane cultivation ('000'BDT)	Unknown	28–292	120.27	57.17
Sugarcane cultivation experience (years)	Unknown	1–15	6.03	3.157
Agricultural Training (Number of days)	Unknown	0–7	2.77	1.22
Extension Media contact (Score)	0 - 56	12-32	22.75	3.48
Problem Faced in Sugarcane Cultivation (score)	0-30	9-22	15.74	2.65

4.1.1 Age

Age of the respondents varied from 30 to 56 years, the average being 42.76 years with the standard deviation of 6.22. According to their age, the respondents were classified into three categories as “young aged”, “middle aged” and “old aged”. The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Categories	Basis of categorization (year)	Respondents	
		Numbers	Percent
Young aged	Up to 35	15	15.46
Middle aged	36-50	73	75.26
Old aged	Above 50	9	9.28
Total		97	100

Data represented in Table 4.2 indicate that the middle-aged farmer comprised the highest proportion (75.26 percent) followed by young aged category (15.46 percent) and the lowest proportion were made by the old aged category (9.28 percent). Data also indicates that the young to middle aged respondents constitute almost 90.72 percent of total respondents.

4.1.2 Level of Education

Education level of the respondents ranged from 0-16 in accordance with year of schooling. The average education score of the respondents was 5.57 with a standard deviation of 3.35. On the basis of their level of education, the farmers were classified into five categories as shown in Table 4.3.

Table 4.3 Distribution of the farmers according to their level of education

Categories	Basis of Categorization (schooling years)	Respondents	
		Number	Percent
Illiterate	0	3	3.09
Can sign only	0.5	12	12.37
Primary	1-5	40	41.24
Secondary	6-10	37	38.14
Above secondary	Above 10	5	5.15
Total		97	100

Data shown in the Table 4.3 indicates that respondent primary level of education constitute the highest proportion (41.24 percent) followed by secondary level (38.14 percent). On the other hand, the lowest proportion (3.09 percent) of the farmers was illiterate category followed by higher secondary level of education (5.15 percent) and con only sign (12.37 percent).

4.1.3 Farm Size

Farm size of the respondents ranged from .35 hectare to 2.02 hectares with the mean of 0.99 and standard deviation of 0.39. On the basis of their farm size, the farmers were classified into four categories followed by DAE (1999) as shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their farm size

Categories	Basis of categorization (ha)	Respondents	
		Number	Percent
Small farm size	0.21 – 1.0	56	57.73
Medium farm size	1.01 – 3.0	41	42.27
Total		97	100

Data presented in the Table 4.4 demonstrated that highest proportion (57.73 percent) of the farmers had small farm compared to 42.27 percent having medium farm. In Bangladesh most of the farmers live on below a subsistence level. This in one of the vital reasons for not adopting improved farming practices in their farm as well as having lower skill on marketing practices.

4.1.4 Farm size for sugarcane cultivation

Farm size of the respondents ranged from .13 hectare to 1.00 hectares with the mean of 0.40 and standard deviation of 0.16. On the basis of their farm size, the farmers were classified into four categories followed by DAE (1999) as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their sugarcane farm size

Categories	Basis of categorization (ha)	Respondents	
		Number	Percent
Marginal farm size	Up to 0.2	2	2.06
Small farm size	0.21 – 1.0	95	97.94
Total		97	100

Data presented in the Table 4.5 demonstrated that highest proportion (97.94 percent) of the farmers had small farm compared to 2.06 percent having marginal farm. In Bangladesh most of the farmers live on below a subsistence level. This in one of the vital reasons for not adopting improved farming practices in their farm as well as having lower skill on marketing practices.

4.1.5 Annual family income

Annual family income of the respondents ranged from 45 to 370 thousand taka. The mean was 134.62 thousand taka and standard deviation was 66.66. On the basis of annual family income, the respondents were categorized into three groups as shown in Table 4.6.

Table 4.6 Distribution of the farmer according to their annual family income

Categories	Basis of categorization ('000' BDT)	Number	Percent
Low income	Up to 68	4	4.12
Medium income	69-200	82	84.54
High income	Above 200	11	11.34
Total		97	100

Data shown in Table 4.6 presented that the highest proportion (84.54 percent) of the respondents had medium family income while 4.12 and 11.34 percent of the respondents had low and high annual family income respectively. The gross annual family income of a farmer is an important indicator of how much s/he can

invest in his farming. Generally higher income encourages one's integrity to achieve better performance and to show his/her individual better status in the society.

4.1.6 Income from sugarcane cultivation

Annual family income of the respondents ranged from 28 to 292 thousand taka. The mean was 120.27 thousand taka and standard deviation was 57.17. On the basis of annual family income, the respondents were categorized into three groups as shown in Table 4.7.

Table 4.7 Distribution of the farmer according to their income from sugarcane cultivation

Categories	Basis of categorization ('000' BDT)	Number	Percent
Low income	Up to 63	4	4.12
Medium income	64-177	81	83.51
High income	Above 177	12	12.37
Total		97	100

Data shown in Table 4.7 presented that the highest proportion (83.51 percent) of the respondents had medium income from sugarcane cultivation while 4.12 and 12.37 percent of the respondents had low and high income from sugarcane cultivation. The gross income from sugarcane cultivation of a farmer is an important indicator of how much s/he can invest in his farming. Generally higher income encourages one's integrity to achieve better performance and to show his/her individual better status in the society.

4.1.7 Sugarcane cultivation experience

Computed scores of the farmers about experience in vegetable production ranged from 1 to 15 years with a mean of 6.03 and standard deviation of 3.16. On the basis of farming experience, the respondents were classified into three categories as follows in Table 4.8.

Table 4.8 Distribution of the farmers according to their experience

Categories (year)	Basis of categorization (Years)	Respondents	
		Number	Percent
Low experience	Up to 3	21	21.65
Medium experience	4-9	65	67.01
High experience	Above 9	11	11.34
Total		97	100

Data contained in Table 4.8 showing that 67.01 percent of the farmers had medium sugarcane cultivation experience, where as 21.65 percent had low experience and 11.34 percent had high sugarcane cultivation experience. Experience is helpful to increase knowledge, improve skill and change attitude of the farmers. It also builds confidence of the farmers for making appropriate decisions at the time of need. Above five fourth (88.66 percent) of the farmers had low to medium experience.

4.1.8 Agricultural training

The score of training exposure of the farmers ranged from 0-7 days. The mean was 2.77 days and standard deviation was 1.22. On the basis of training, the respondents were categorized into four groups as shown in Table 4.9.

Table 4.9 Distribution of the farmer according to their training exposure

Categories	Basis of categorization (Day)	Respondents	
		Number	Percent
No training	0	6	6.19
Low training	1-2	29	29.90
Medium training	3-4	56	57.73
High training	Above 4	7	7.22
Total		97	100

Data presented in the Table 4.9 showed that about (57.73 percent) of the farmers had medium training exposure; while only 7.22 percent of the farmers had high training exposure. Where, 6.19% farmers had no agricultural training and 29.90% of the farmers had low agricultural training exposure. It means that an overwhelming majority (87.63 percent) of the farmers had low to medium agricultural training. Training develops farmers' knowledge, skill, and attitude in positive manner. However, the findings show interns of training received, respondent status was found unsatisfactory.

4.1.9 Extension contact

The observed extension contacts scores of vegetable grower ranged from 12 to 32 against the possible range from 0 to 56, the mean and standard deviation were 22.75 and 3.48 respectively. According to this score, the summer tomato farmers were classified into three categories: "low extension contact" (up to 19), "medium extension contact" (20-25) and "high extension contact" (above 25). The distribution of the farmers according to their extension contact is shown in Table 4.10

Table 4.10 Distribution of the farmers according to their extension contact

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low extension contact	Up to 19	12	12.38
Medium extension contact	20-25	70	72.16
High extension contact	Above 25	15	15.46
Total		97	100

Data presented in the Table 4.10 showed that a proportion of 72.16 percent of the farmer had medium extension contact compared to 12.38 percent of them having low extension contact and 15.46 percent of the farmer had high contact. Thus, overwhelming majority (87.62 percent) of the farmer had low to medium

extension contact. Extension contact is a very effective and powerful source of receiving information about various new and modern technologies. The status of number or having low and medium contacts might have significant impacts on knowledge gap.

4.1.10 Problem faced in sugarcane cultivation

The observed problem scores of sugarcane grower ranged from 9 to 22 against the possible range from 0 to 30, the mean and standard deviation were 15.74 and 2.65 respectively. According to this score, the summer tomato farmers were classified into three categories: “low problem” (up to 13), “medium problem” (14-17) and “high problem” (above 17). The distribution of the farmers according to their problem is shown in Table 4.11

Table 4.11 Distribution of the farmers according to their problem

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low problem	Up to 13	17	17.52
Medium problem	14-17	57	58.77
High problem	Above 17	23	23.71
Total		97	100

Data presented in the Table 4.11 showed that a proportion of 58.76 percent of the farmer had medium problem compared to 17.52 percent of them having low problem and 23.71 percent of the farmer had high problem. Thus, overwhelming majority (82.47 percent) of the farmer had medium to high problem.

4.2 Knowledge Gap in the use of sugarcane cultivation technologies

The scores of knowledges gap of the respondents ranged from 3 to 11 against the possible range of 0-30 with an average of 5.48 and standard deviation of 1.71. Based on the observed scores of knowledges gap, the respondents were classified into the three categories i.e. low knowledge gap, medium knowledge gap and

high knowledge gap. The distribution has been shown in Table 4.12.

Table 4.12 Distribution of the farmers according to their knowledges gap

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low knowledge gap	Up to 4	31	31.96
Medium knowledge gap	5-6	44	45.36
High knowledge gap	Above 6	22	22.68
Total		97	100.0

Data of Table 4.12 show that among the respondents the highest 45.36 percent of the farmers had medium knowledge gap and the lowest 22.68 percent of the farmers had high knowledge gap followed by (31.96) percent had low knowledge gap. Among the farmers, most of the farmer (67.04 percent) have medium to high knowledge gap.

4.3 The Contribution of the selected characteristics of the respondents on their knowledge gap in the use of sugarcane cultivation technologies

In order to estimate the farmers knowledge gap in the use of sugarcane cultivation technologies, the multiple regression analysis was used which is shown in the Table 4.13**.**

Table 4.13 Multiple regression coefficients of the contributing variables related to knowledge gap in the use of sugarcane cultivation technologies

Dependent variable	Independent Variables	β	P	R^2	Adj. R^2	F
Knowledge Gap in the use of sugarcane cultivation technologies	Age	-.033	.348	0.431	0.365	6.521
	Level of education	-.118	.043*			
	Farm size	-.166	.808			
	Sugarcane farm size	1.660	.347			
	Annual family income	.003	.316			
	Income from sugarcane cultivation	.001	.905			
	Sugarcane cultivation experience	.032	.629			
	Agricultural training	-.409	.005**			
	Extension media contact	-.142	.004**			
	Problem faced in sugarcane cultivation	.214	.000**			

** Significant at p<0.01; *Significant at p<0.05

Table 4.13 shows that level of education, agricultural training and extension contact of the respondents had significant negative contribution with their knowledge gap in use of sugarcane cultivation technologies. But problem faced in sugarcane cultivation of the respondents had significant positive contribution with their knowledge gap in use of sugarcane cultivation technologies. Of these, agricultural training and extension media contact and problem were the most important contributing factors (significant at the 1% level of significant) and education were less important contributing factors (significant at 5% level of significant). Coefficients of other selected variables don't have any contribution on their knowledge gap in the use of sugarcane cultivation technologies.

The value of R^2 is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of R^2 = 0.431 means that independent variables account for 43% of the variation with their use of best management practices. The F ratio is 6.521 which is highly significant ($p<0$).

However, each predictor may explain some of the variance in respondents their knowledge gap in use of sugarcane cultivation technologies simply by chanced. The adjusted R^2 value penalizes the addition of extraneous predictors in the model, but value 0.365 is still show that variance is farmers their knowledge gap in the use of sugarcane cultivation technologies can be attributed to the predictor variables rather than by chanced (Table 4.13). In summary, the models suggest that the respective authority should be considers the farmers' education, agricultural training and extension contact and problem on their knowledge gap in use of sugarcane cultivation technologies and in this connection some predictive importance has been discussed below:

4.3.1 Contribution of problem faced in sugarcane cultivation on the farmers' knowledge gap in the use of sugarcane cultivation technologies

From the multiple regression, it was concluded that the contribution of problem faced in sugarcane cultivation on the farmers' knowledge gap in the use of sugarcane cultivation technologies was measured by the testing the following null hypothesis;

"There is no contribution of problem faced in sugarcane cultivation on the farmers' knowledge gap in the use of sugarcane cultivation technologies".

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

a. The contribution of the problem was significant at 1% level (0.000)
b. So, the null hypothesis could be rejected.

c. The direction between problem and knowledge gap was positive.

The b-value of farmers time spent in farming was (.214). So, it can be stated that as farmers problem in sugarcane cultivation increased by one unit, farmers' knowledge gap increased by 0.214 units. Considering the effects of all other predictors are held constant. Based on the above finding, it can be said that farmers had more problem increased farmers' knowledge gap.

4.3.2 Contribution of extension contact on the farmers' knowledge gap in the use of sugarcane cultivation technologies

From the multiple regression, it was concluded that the contribution of extension contact on the farmers' knowledge gap in the use of sugarcane cultivation technologies was measured by the testing the following null hypothesis;

"There is no contribution of e extension contact on the farmers' knowledge gap in the use of sugarcane cultivation technologies".

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

a. The contribution of the extension contact was significant at 1% level (.004)
b. So, the null hypothesis could be rejected.
c. The direction between extension contact and knowledge gap was negative.

The b-value of extension contact is (-0.142). So, it can be stated that as extension contact increased by one unit, farmers' knowledge gap decreased by 0.142 units.

Based on the above finding, it can be said that farmers had more extension contact decreased farmers' knowledge gap in use of sugarcane cultivation technologies increased. So, extension contact has high significantly contributed

to the farmers' knowledge decreased. Extension contact increase farmer's knowledge about various aspect which helps farmers make more knowledge.

4.3.3 Significant contribution of training on the farmers' knowledge gap in the use of sugarcane cultivation technologies

From the multiple regression, it was concluded that the contribution of training on the farmers' knowledge gap in use of sugarcane cultivation technologies was measured by the testing the following null hypothesis;

"There is no contribution of training on the farmers' knowledge gap in the use of sugarcane cultivation technologies".

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

a. The contribution of the training exposure was significant at 1% level (0.005)
b. So, the null hypothesis could be rejected.
c. The direction between training exposure and knowledge gap was negative.

The b-value of training exposure was (-0.409). So, it can be stated that as agricultural training increased by one unit, farmers' knowledge gap decreases by 0.409 units.

Based on the above finding, it can be said that farmers had more training exposure decreased the knowledge gap in use of sugarcane cultivation technologies. So, training exposure has high significantly contributed to the farmers' knowledge gap in use of sugarcane cultivation technologies. Training helps farmers to gather more knowledge-on-knowledge gap in use of sugarcane cultivation technologies which ultimately helps farmers gather more knowledge.

4.3.4 Significant contribution of education on the farmers' knowledge gap in the use of sugarcane cultivation technologies

The contribution of education on the farmers' knowledge gap in the use of sugarcane cultivation technologies was measured by the testing the following null hypothesis;

"There is no contribution of education on the farmers' knowledge gap in the use of sugarcane cultivation technologies".

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

a. The contribution of the education was at 5% significance level (.043)
b. So, the null hypothesis could be rejected.
c. The direction between education and knowledge gap was negative.

The b-value of level education is (-0.118). So, it can be stated that as education increased by one unit, farmers' knowledge gap decreased by 0.118 units.

Based on the above finding, it can be said that if farmers' education will increase then the farmers' knowledge will be decreased. So, education has significantly contributed to the farmers' knowledge. Education enhance knowledge on many aspects such as training, extension contact and so on.

4.4 Comparative severity among the problems faced by the farmers in sugarcane cultivation

The observed Problem Faced Index of the problems ranged from 78 to 205 against the possible range of 0-291. Problem Faced Index (PFI) of the selected problems is shown in Table 4.14.

On the basis of PFI, it was observed that "lack of quality setts" ranked first followed by "low price of produced sugarcane", "inadequate technical advice

from extension workers", "high price of fertilizers" and "lack of subsidy" were the last problems faced by the farmers in sugarcane cultivation.

Table: 4.14 Problem Faced Index (PFI) with Rank Order

Statement on problems	High	Medium	Low	No	Computed score	Rank order
Lack of quality setts	60	10	6	21	205	1
Low price of produced sugarcane	54	10	18	15	200	2
Inadequate technical advice from extension workers	51	8	19	19	191	3
High price of fertilizers	50	10	16	21	186	4
Lack of necessary capital	40	12	20	25	164	5
Low price of produced sugarcane	36	16	20	25	160	6
Inadequate technical advice from extension workers	29	15	18	35	135	7
Insufficient government price fixation	21	17	15	45	112	8
Theft of sugarcane from field	16	15	17	49	95	9
Lick of subsidy	15	10	13	59	78	10

CHAPTER V

SUMMERY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

This chapter presents the summery of findings, conclusions and recommendations of the study. The study was conducted in the one union of Kaliganj upazila under Jhenaidah district to find out knowledge gap in the use of sugarcane production technologies among the farmers. Total 97 farmers were selected from the study area as the population and out of 97 total population constituted the sample of the study. A well-structured interview schedule was developed based on objectives of the study for collecting information. The independent variables were: age, education, farm size, farm size for sugarcane cultivation, annual family income, income from sugarcane cultivation, experience in sugarcane cultivation, agricultural training, extension media contact problem faced by the farmers in sugarcane cultivation. Data collection was started from 5th June and completed in 5th July, 2020. Various statistical measures such as frequency counts, percentage distribution, mean and standard deviation were used in describing data. In order to estimate the contribution of the selected characteristics of the respondents to their knowledge gap in use of sugarcane cultivation technologies by the farmers, multiple regression analysis was used. The major findings of the study are summarized below:

5.1 Summary of Findings

The major findings of the study are summarized below:

5.1.1 Selected characteristics of the farmers

Findings in respect of the 10 selected characteristics of the farmers summarized below:

Age

the middle-aged farmer comprised the highest proportion (75.26 percent) followed by young aged category (15.46 percent) and the lowest proportion were made by the old aged category (9.28 percent).

Education

that respondent primary level of education constitutes the highest proportion (41.24 percent) followed by secondary level (38.14 percent). On the other hand, the lowest proportion (3.09 percent) of the farmers was illiterate category followed by higher secondary level of education (5.15 percent) and con only sign (12.37 percent).

Farm size

The highest proportion (57.73 percent) of the farmers had small farm compared to 42.27 percent having medium farm.

Farm size for sugarcane cultivation

The highest proportion (97.94 percent) of the farmers had small farm compared to 2.06 percent having marginal farm.

Annual family income

The highest proportion (84.54 percent) of the respondents had medium family income while 4.12 and 11.34 percent of the respondents had low and high annual family income respectively.

Income from sugarcane cultivation

The highest proportion (83.51 percent) of the respondents had medium income from sugarcane cultivation while 4.12 and 12.37 percent of the respondents had low and high income from sugarcane cultivation.

Sugarcane cultivation experience

The majority 67.01 percent of the farmers had medium sugarcane cultivation experience, where as 21.65 percent had low experience and 11.34 percent had high sugarcane cultivation experience.

Agricultural training

About (57.73 percent) of the farmers had medium training exposure; while only 7.22 percent of the farmers had high training exposure. Where, 6.19% farmers had no agricultural training and 29.90% of the farmers had low agricultural training exposure.

Extension media contact

A proportion of 72.16 percent of the farmer had medium extension contact compared to 12.38 percent of them having low extension contact and 15.46 percent of the farmer had high contact.

Problem Faced in Sugarcane Cultivation

The majority 58.76 percent of the farmer had medium problem compared to 17.52 percent of them having low problem and 23.71 percent of the farmer had high problem.

5.1.2 Knowledge gap in the use of sugarcane cultivation technologies

The scores of knowledges gap of the respondents ranged from 3 to 11 against the possible range of 0-30 with an average of 5.48 and standard deviation of 1.71. Among the respondents the highest 45.36 percent farmers had medium knowledge gap and the lowest 22.68 percent had knowledge gap followed by low knowledge gap (31.96) percent by the farmers. Among the farmers, most of the farmer (77.32 percent) have medium to low knowledge gap.

5.1.3 Contribution of the selected characteristics to their knowledge gap in the use of sugarcane cultivation technologies

Level of education, extension contact, agricultural training and problem faced by the farmers in sugarcane cultivation had significant contribution to their knowledge gap in the use of sugarcane cultivation technologies.

Characteristics of the farmers like age, farm size, sugarcane farm size, annual family income, income from sugarcane cultivation and sugarcane cultivation experience had no significant contribution with their knowledge gap in the use of sugarcane cultivation technologies.

5.1.4 Comparative severity among the problems faced by the farmers in sugarcane cultivation

The observed Problem Faced Index of the problems ranged from 78 to 205 against the possible range of 0-291. Problem Faced Index (PFI) of the selected problems is shown in Table 4.14.

On the basis of PFI, it was observed that “lack of quality setts” ranked first followed by “low price of produced sugarcane”, “inadequate technical advice from extension workers”, “high price of fertilizers” and “lack of subsidy” were the last problems faced by the farmers in sugarcane cultivation.

5.2 Conclusions

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

i. Majority (77.32 percent) of the respondents had medium to low knowledge gap in the use of sugarcane cultivation technologies. So, these is a need to take initiative for decreasing farmer’s knowledge gap in the use of sugarcane cultivation technologies.

ii. Problem faced by the farmers in sugarcane cultivation had a positive significant contribution with their knowledge gap in use of sugarcane cultivation technologies. Majority (82.47 percent) of the respondents had medium to high problem. Therefore, it can be concluded that higher the problem by the respondents, higher the knowledge gap in use of sugarcane cultivation technologies.

iii. A farmer with more education level can increase the capabilities to reduce different problems about sugarcane cultivation. So, initiative to improve education can enhances the ability of the farmers to reduce knowledge gap in use of sugarcane cultivation technologies.

iv. The results indicate that more than half (87.62 percent) of the respondents had medium extension contact. Moreover, it was significant contributor on knowledge gap in use of sugarcane cultivation technologies. So, there is a need to take initiative to improve the extension contact of the farmers with various organization for decreasing the knowledge gap in use of sugarcane cultivation technologies.

v. Training on farming had a negative significant contribution with their knowledge gap in use of sugarcane cultivation technologies. Training received helps the respondents in different farming activities. Therefore, it can be concluded that more the training on farming by the respondents, reduce the knowledge gap in use of sugarcane cultivation technologies.

5.3 Recommendations

5.3.1 Recommendations for policy implications

i. Majority of the farmers of the study area were found to have medium level of knowledge. So, DAE should take initiative to influence farmers to reduce knowledge gap in use of sugarcane cultivation

technologies.

ii. Ministry of Agriculture through Bureau of Non-formal Education (BNFE) and NGOs can take necessary steps to increase farmers' primary level of education through adult education and regular farmers' workshop; rally needs to be organized to reduce their knowledge gap in use of sugarcane cultivation technologies.

iii. The study indicated that majority (87.62 percent) of the farmers had medium level of extension contact. So, in order to increase extension, contact of farmers, cultural activities, food programme, monetary facility etc. should be done.

iv. The study indicated that training on farming by the farmers had a negative and significant contribution with their knowledge gap in use of sugarcane cultivation technologies. So extension agencies should arrange more training to reduce knowledge gap in use of sugarcane cultivation technologies.

5.3.2 Recommendations for the future study

The following recommendations are made for the future study:

1. The present study conducted on the population of the farmers of four villages of one union under Kaliganj upazila under Jhenaidah district. The findings of the study need to be varied by undertaking similar research in other zones of the country.

2. The study investigated the contributions of the 10 selected characteristics of the farmers with their knowledge gap in the use of sugarcane cultivation technologies. But farmer's their knowledge gap in the use of sugarcane cultivation technologies might be affected by other various

personal, social, psychological, cultural and situational factors of the farmers. It is, therefore, recommended that further study should be conducted involving other characteristics in this regard.

3. In addition to their knowledge gap in the use of sugarcane cultivation technologies by the farmers also faced other problems such as social, economic, housing, sanitation, nutrition and domestic etc. Therefore, it may be recommended that research should be conducted contribution to other knowledge gap in the use of sugarcane cultivation technologies.

4. The research was conducted to find out their knowledge gap in the use of sugarcane cultivation technologies by the farmers. Further research should be taken related to other issues like rice, wheat, jute and other crop cultivation etc.

5. The research was conducted to sugarcane cultivars generally cultivated by the farmers. Further research should be taken to any specific crop.

REFERENCES

Ahmed, A. K. R. (1974). Agricultural Knowledge of Fanners. M.Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Teachers' Training, Bangladesh Agricultural University, Mymensingh.

Ajore, R. and Singh, A. P. (1996). Correlates of Adoption Gap in Reclamation of Sodic Soils. Indian Journal of Extension Education. 32(1-4):52-57.

Amin, M. S. (2001). Impact of Training on Transfer of Aquaculture Technologies in Some Selected Areas of Jamalpur District. M.S. (Ag.Ext. Ed.) Thesis, Department of Aquaculture, Bangladesh Agricultural University, Mymensingh.

Anonymous, (2009). Bangladesh Economic Survey Bangladesh Bureau of Statistics. Planning Division. Ministry of Planning. Government of People's Republic of Bangladesh.

Azad, M. J., Ali, M. S. and Islam, M. R. (2014). Farmers knowledge on postharvest practice of vegetables. International journal of experimental agriculture. 4(3):7-11.

Baksh, M. E., Harun-ur-Rashid, M., Islam, M., Pandit. D. B. & Sufian. M. A. (2007). Impacts of Participatory Variety Selection in Wheat on Agro-Economic Changes of Wheat Farmers in Bangladesh. Bangladesh *J. Agril. Res.* 32(3): 335-339.

Banarva, C. k, Kalla, P. N. and Sharina, K. C. (1993). Relationship Between Independent Variables and Overall Technological Gap in the Recommended Ground Nut Production Technology. Indian Journal of Social Research. Vol. XXXIV No. 2: 140-142.

Baruah, S. R. and Sarrilah, C. (1998). Transfer of Technology Gap in Scientific Tea Culture Among Small Tea Growers of Assam. Journal of Interacadenticia. 2(1-2): 90-97.

BBS. (2020). Statistical Year Book of Bangladesh. Bangladesh Bureau of Statistics, Statistical Division. Ministry of Planning, Government of the Peoples' Republic of Bangladesh, Dhaka

BBS. (2009). Statistical Year Book of' Bangladesh. Bangladesh Bureau of Statistics. Statistical Division. Ministry of Planning, Government of the Peoples Republic of Bangladesh. Dhaka

Bezbora, S. N. (1980). Factors Affecting Adoption of Improved Agricultural Technology for Paddy Cultivation by the Farmers of Assam, Summery of Extension Research, Department of Extension Education, Panjab Agricultural University, Ludhiana, 6:24-27.

Goode, W. J. and Halt, P. K. (1952). Method of Social Research. New York: McGraw Hill Book Company, Inc.

Gourav, V. (2001). Adoption and Technological Gap in Tomato Cultivation in Haryana. Thesis Abstract. Vol. XXVII No. l March 2002. Directorate of Extension Education. Chaudhary Charan Singh Haryana Agricultural University.

Hanif, M. A. (2000). Comparative Analysis Between FFS and Non-FFS Farmers Regarding Environmental Awareness. M.S. (Ag. Ext. Ed.). Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Hossain, M. M. (2003). Farmers' Knowledge and Adoption of Modern Boro Rice Cultivation Practices. M. Sc. (Ag. Extn. Edu.) Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Hossain, S. M. (2000). Farmers' Knowledge and Perception of Binadhan-6. M.S. (Ag.Ext.Ed.). Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Hussen, M. A. M. (2001). Farmers' Knowledge and Adoption of Modern Sugarcane cultivation Practices. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Islam, M. A., Kashem, M. A., Miah, M. A. M. and Rahinan, M. Z. (2008). Management Gap in Boro Rice Cultivation at Farmers' Fields. *Bangladesh J. Extn. Edu.* 20 (1& 2): 91-97

Islam, M. E., Miah, M. A. M. and Farouque, M. G. (2009). Application Gap of Fertilizer in Boro Rice Cultivation: A Field Level Study. *Bangladesh J. Extn. Edu.* 21(1 & 2): 27-34.

Islam, M. N. (2008). Knowledge on Vegetables Production Activities by Woman Members in Homestead Area Under World Vision Project. M.S. (AEIS). Thesis, Department of Agricultural Extension and Information System, Shere-Bangla Agricultural University, Dhaka.

Jha, B. K. and Shaini, R. L. (1994). A Study on Technological Gap Cattle Rearing Practices in a Tribal Sitting of Burdawn District (W.13.) Indian Journal of Dairy Science. 47(11): 921-925.

Karim, M. and Hossain, M. D. (1993). Analysis of Farmers Agricultural Knowledge in Sugarcane Cultivation. *Bangladesh J. Agril. Edu.* 16(2):97-105.

Kashem. M. A. (1987). Small farmers constrains to the adoption of modern rice technology. *The Bangladesh Development of Studies*. XV (4): 18-30.

Katuruzzaman, M., Islam, S. M. F., Shiblee, S. M. A., Kibria, M. G., Begum, M. A. A. and Ray, S. K. (2001). Adoption Level of Wheat Technology and the Growers Knowledge Gap in Bangladesh. *Pakiswn J. Bio. Sci.* 4(1): 1-6.

Kaur, M. R. (1988). An Evaluation Study of Women Development Programme Under Indo- German Dhauhadhar Project Palampur District Kumgra, H.P. Thesis Abstract. Harayana Agricultural University, Hissar, India. Thesis Abstract. 16(4): 258.

Khan, M. A. (l996). A study on Tribal Farmers of Dantewada Block of Bastar District M.P. with reference to Adoption of selected Agricultural Technologies. M. Sc. (Ag) Thesis. 1GKV. Raipur.

Khan, M. M. J. (1996). The Effectiveness of Farmers Primer on Growing Rice in Knowledge Change of the Farmers in Shakhipur Thana. M. Sc. (Ag. Extn. Edu.) Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Khan, M. S. I. (2004). Farmers' Knowledge of Maize Cultivation in Tilli Union. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Myniensingh.

Kirar, B. S. and Mehta, B.K. (2009). Extent of Knowledge of Tribal Farmers about Rice Production Technologies. *Indian Res. J. Ext. Edu*. 9(1):32-35.

Mamun, M. A. A. (2018). Farmers' Knowledge Gap on Using Agrochemicals in Potato Cultivation. M.S. (Agricultural Extension & Information System) Thesis. Department of Agricultural Extension & Information System, Shr-e-Bangla Agricultural University, Dhaka, Bangladesh.

Manjunatha, L. (1980). A Comparative Study of The Knowledge Level and Adoption Behaviour of Trained and Untrained Farmers in Ghata Probha Command Area, Karantaka State. The Thesis Abstract (1983). Haryana Agricultural University, Hisar, India. 9(1-4):18.

Manjunatha. B. N. and Channegowda, M. B. (l995). Awareness of New Post Harvest Technology among Farmers in Groundnut Crop. *Indian J. Ext. Edu.,* (l-4):113.

Nasrin, S. (2015). Farmers' knowledge on pesticide application in vegetable cultivation. M.S. Thesis. Dept. of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.

Nikhade, D. M., Bhople, R. S. and Kate, N. M. (1995). Adoption Gap among Small and Big Cotton Growers. *Indian J. Ext. Edu.* XX 1(1-4): 120-123.

Pal, S. K. and Islam, K. M. M. (1993). An assessment of knowledge gap on SIP [Spaced transplanting] cane of sugareane growers at Mongalbari suhzone under Joypurhat Sugar Mills. *Bangladesh J. Sugarcane*, 12-15: 31-35.

Pandey, P. K. (2010). Level of Knowledge and Existing Knowledge Gap towards Rice Production Technology among the Rice Grower Farmers of Chhattisgarh. BVAAI. 18(1)

Parveen, S. (1995). Awareness of Farm Women on Environmental Degradation due to the Use of Some Selected Modern Agricultural Technologies. Al. S (Ag. Extn. Edu.) Thesis. Department of Agricultural Extension Education. Bangladesh Agricultural Universit, Mymensingh.

Prakash, S.V. N. Tripathi and Mishra, V. (2004). Technological Gap in Rice Production technology. *Indian Res. J. Ext. Edu.* 4(1 & 2):244-247

Raha, A. K. (1989). Deep Tube well Irrigation Problems of the Farmers in Cultivation of Boro Paddy in two selected Blocks of Muktagacha Upazila undert Mymensingh District. M. S (Ag. Extn. Edu.) Thesis. Department of Agricultural Extension & Teachers' Training. Bangladesh Agricultural University, Mymensingh.

Rahman, M. A. (2015). Farmers' Knowledge and Attitude Regarding Cultivation of Salt Tolerant Variety (BRRI dhan 47) of Rice. M.S. Thesis. Dept. of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.

Rahman, M. Z., Islam, K. M. M. and Maududul, K. M (1992). Technological Gap among the Wheat Growers of Sadar Thana under Kurigram District. *Bangladesh. J. Ext. Edu*. 7 (1&2): 55-62.

Rahman, M. S. (2004). Extent and Level of Knowledge of Farmers on I-WV Boro Rice Cultivation Practices. 41. S (Ag. Exin. Edit.) Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Roy, K. K. (2006). Farmers' Knowledge on Boro Rice Cultivation in Some Selected Areas of Dinajpur District. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Saha, B. (2003). A Comparative Analysis of Farmers' Communication Exposure and Knowledge in Rice and Poultry Farming. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University. Mymensingh.

Saha, M. (2001). Farmers' Knowledge on Improved Practices of Pineapple Cultivation. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University. Mymensingh

Sana, M. C. (2003). Farmers' Knowledge of Shrimp Cultivation in Assasuni Upazila under Satkhira District. MX (Ag. Extn. Edu.) Thesis. Department

of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Sarker, M. R. A. (2002). Farmer's knowledge and Attitude towards BRRI Dhan-29 Variety of Rice. M. Sc. (Ag. Extn. Edu.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University. Mymensingh.

Singh, S. and Lall, A.C. (2001). Studies on Technological Gaps and Constraints in Adoption of Weed Management Practices for Rice-Wheat Cropping System. *Indian. J. Weed. Sci.*, 33(3&4)

Singh, S. P., Hudda, R. S. and Verma, H. K. (1991). Knowledge gap of Citrus Growers. Indian Journal of Extension Education. XXVII (1&2): 117-120.

Singh, T. and Kherde, R. I. (1998). Relationship Analysis between Selected Independent Variables and Technological Gap in Western Dry Region. Journal of Dairying Food and Home Sciences. 17 (3-7): 229-232.

Tanushree, M. (2015). Farmers' Knowledge, Attitude and practice regarding Strawberry Cultivation. M.S. Thesis. Dept. of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.

Townsand, T. C. (1953). Introduction to Experiment Methods. International Student Edition, New York: McGraw-Hill Book Company. Inc.

Venugopal, M. K. (1977). Evaluation of Rice Training Program Conducted at Indo Japancsc Agricultural Extension Training Centre, Mandhya, Karnaltaka Stale. Thesis Abstract, Haryana Agricultural University. 3(1-3): 14-15.

Vidyashanker, P. N. (1987). A Study of different Characteristics of Seed Growers of Bangladesh Districts. Thesis Abstract 11(4): 256. Directorate of Publication, Haryana Agricultural University, Hissar, India.

APPENDIX-A

AN ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

Dhaka, Bangladesh

An interview schedule for a research study entitled

"KNOWLEDGE GAP IN THE USE OF SUGARCANE PRODUCTION TECHNOLOGIES AMONG THE FARMERS OF JHENAIDAH DISTRICT"

Serial No:

Respondent Name:

Village:

Union:

Upazila:

District:

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

1. Age: How old are you?

Ans:.....years.

2. Education: Please mention your level of education.

a. I cannot read or write ……

b. I can sign only ……

c. I have studied up to class ……

3. Farm size: Please indicate the area of land under your possession:

Sl No.	**Types of land use**	**Land area**	
		Local unit	**Hectare**
1.	Homestead area		
2.	Own land under own cultivation		
3.	Given to others as borga		
4.	Taken borga from others		
5.	Taken lease from others		
6.	Others (Pond, Orchard etc.)		
	Total		

4. Farm size for sugarcane cultivation

How much land did you allot for wheat cultivation last year? Ans:……. ha.

5. Annual family income:

Please indicate the income of your family from different sources in the last year.

Sl. No.	**Sources of income**	**Value (TK)**
1.	Crops:	
	a) Rice	
	b) Wheat	
	c) Jute	
	d) Vegetables	
2.	Livestock	
3.	Poultry	
4.	Fisheries	
5.	Others (please specify)	
Total		

6. Income from sugarcane cultivation

How much did you earn from sugarcane cultivation in the last year?

Sl. No.	Name of the product	Cost per unit (tk.)	Total cost (tk.)	Total production (local unit)	Price/unit (tk.)	Total price (tk.)	Net income (tk.)
1.	Sugarcane						
2.	Setts						

7. Sugarcane cultivation experience:

How long have you engaged with sugarcane cultivation? Ans:……years

8. Agricultural Training:

Have you received any training on cultivation? Ans: (Yes) (No)

If yes, please give the following information:

Sl. No.	**Name of the Training**	**Sponsoring Organization**	**Duration (Days)**
1.			
2.			
3.			
Total			

9. Extension Media contact:

Please indicate your extent of contact with following media:

SI. No	Communication media	Extent of communication				
		Regularly **(4)**	Frequently **(3)**	Occasionally **(2)**	Rarely **(1)**	Not at all **(0)**
1	Friend/Neighbor					
2	Sub Assistant Agricultural officer (SAAO)					
3	Upazila Agriculture Officer/Additional					

	Agriculture Officer/Agriculture Extension Officer					
4	NGO Worker(s)					
5	Local leader					
6	Agricultural input dealer(s)					
7	Other govt. extension worker (e.g. BRDB's field officer etc.					
8	Participation in group discussion					
9	Participation in demonstration meeting (Result & method demonstration)					
10	Participation in Field Day/Farmers Rally					
11	Listening agricultural program					
12	Watching agricultural related program					
13	Reading agricultural magazine (Krishi Katha/Leaflet/ Booklets etc.)					
14	Observing agricultural folksongs, fair etc.					

10. Problem Faced in Sugarcane Cultivation

Please mention problems you usually faced in sugarcane cultivation

Sl. No.	**Problems**	**Opinion on extent of problem**			
		High (3)	**Medium (2)**	**Low (1)**	**Not at all (0)**
1.	High price of HYV setts				
2.	Theft of sugarcane from field				
3.	Lack of necessary capital				
4.	Quality setts is not available				
5.	High price of fertilizers				
6.	Lack of sufficient insecticides				
7.	Low price of produced sugarcane				
8.	Inadequate technical advice from extension workers				
9.	Insufficient government price fixation				
10.	Lick of subsidy				
Total					

11. Knowledge Gap in the use of sugarcane cultivation technologies

Please mention the practiced technologies of sugarcane cultivation

SI. no	**Technologies**		**Recommended doses/rate/ time**	**Used dose or time by farmer**		**Gaps**		
					No (0)	Low (1)	Medium (2)	High (3)
1.	Seed rate		6-7 ton/ha (Conventional method) 3-5 ton/ha (Spaced transplanting)					
2.	Sowing time		September to October					
3.	Fertilizer	Urea	245-250 kg/ha					
		TSP	190-200 kg/ ha					
		MP	135-140 kg/ ha					
		Gypsum	142-150 kg/ ha					
		Zinc sulphate	7.5 kg/ ha					
4.	Timing of irrigation		10-20 DAS					
			50-55 DAS					
			90-95 DAS					
	Total							

Thank you for your co-operation.

Date:…… Signature of interviewer