PRODUCTION PERFORMANCE OF MANGO IN DINAJPUR DISTRICT OF BANGLADESH (A CASE STUDY AT SADAR UPAZILLA)

MD. JAHANGIR ALAM

শেরেবাংলা কৃষি বিশ্ববিদ্যালয় গ্রন্থাগার
সংযোজন নং 151 (02) Hort.
স্মারক তারিখ 16/03/11

DEPARTMENT OF HORTICULTURE
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207

JUNE 2009

PRODUCTION PERFORMANCE OF MANGO IN DINAJPUR DISTRICT OF BANGLADESH (A CASE STUDY AT SADAR UPAZILLA)

BY

MD. JAHANGIR ALAM

শেরেবাংলা কৃষি বিশ্ববিদ্যালয় গ্রন্থাগার
সংযোজন নং 151 (02) Hort.
স্বাক্ষর তারিখ 16/03/11

Reg. No. 07-02628

A Thesis
Submitted to the Department of Horticulture
Sher-e-Bangla Agricultural University, Dhaka
In partial fulfillment of the requirements
for the degree
of

MASTER OF SCIENCE (MS)

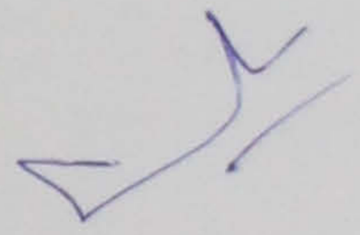
IN

HORTICULTURE

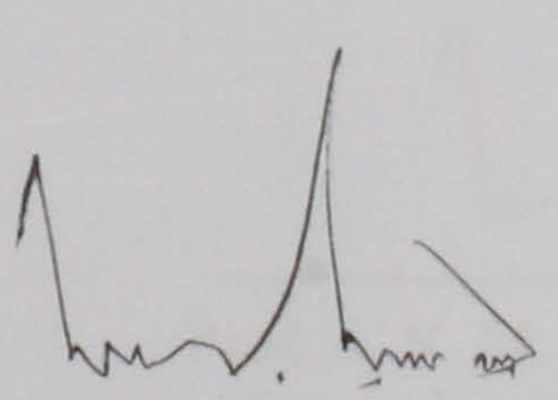
SEMESTER: JANUARY-JUNE, 2009

APPROVED BY:

Prof. A. K. M. Mahtab Uddin
Department of Horticulture
SAU, Dhaka.
Supervisor



Prof. Md. Ruhul Amin
Department of Horticulture
SAU, Dhaka.
Co-Supervisor



Prof. A. K. M. Mahtab Uddin
Chairman
Examination Committee

DEPARTMENT OF HORTICULTURE
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka-1207
PABX: +88029144270-9, Fax: +88029112649, Web: www.sau.edu.bd

Memo No: SAU/HORT./(09)/ Date :

CERTIFICATE

This is to certify that the thesis entitled **"PRODUCTION PERFORMANCE OF MANGO IN DINAJPUR DISTRICT OF BANGLADESH (A CASE STUDY AT SADAR UPAZILLA)"** submitted to the Faculty of **AGRICULTURE**, Sher-e-Bangla Agricultural University, Dhaka, in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE in HORTICULTURE,** embodies the result of a piece of bonafide research work carried out by **MD. JAHANGIR ALAM, Registration No. 07-02628** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated: 30.6.2009

Dhaka, Bangladesh

Prof. A. K. M. Mahtab Uddin
Supervisor & Chairman
Department of Horticulture
Sher-e-Bangla Agricultural University
Dhaka-1207

Dedicated to
My
Beloved Parents
Md.Rahmat Ali & Jahanara Begum
who laid the foundation of my success

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar, Dhaka

ACKNOWLEDGEMENT

The author would like to express with utmost humble gratitude and endless praises to Almighty Allah, Who enabled the author to complete the study and writing up the thesis successfully.

He has much pleasure to express his heartfelt respect, deep sense of gratitude, immense indebtedness and deep appreciation to honourable teacher and supervisor ***A. K.M. Mahtab Uddin,*** *Professor, Department of Horticulture, Sher-E-Bangla Agricultural University, Dhaka, for his kind help for preparation of the thesis including data analysis and worthy guidance, valuable suggestions, constructive criticism, encouragement and continuous supervision throughout the study work and preparation of the thesis.*

His heartiest gratefulness and thanks to thesis co-supervisor ***Md. Ruhul Amin****, Professor, Department of Horticulture, Sher-E-Bangla Agricultural University, Dhaka for his special and caring co-operation.*

The author extends his gratefulness to all the teachers of the Horticulture department, Sher-E-Bangla Agricultural University, Dhaka for their valuable advice, suggestions and constructive criticisms.

He expresses special gratitude and thanks to Md. Shah Alam, Upazila Agriculture Officer (UAO) and Md. Abdur Rashid & Md. Ansar Ali, Sub Assistant Agriculture Officers (SAAO), Sadar, Dinajpur for their co-operation and kind help for collection of data with a view to prepare the thesis.

The author explicits his heartiest thankfulness and indebtedness to all the respondents of the study area who co-operated the author by giving valuable information during collection of data.

He also expresses his gratefulness to ***Dr. Md. Abdul Mannan****, Professor, Agrotechnology Discipline, Khulna University, Khulna,* ***Milton Kumar Ghosh and Francis Halder****, my dear friends and Md. Anisuzzaman (Simul), student of AEIS, SAU, Dhaka, who helped him for preparing the thesis.*

He expresses his boundless gratitude to his parents and other members of his family whose sacrifices, inspiration, and continuous blessings opened the gate and paved the way for higher studies.

The author *June 2009*

PRODUCTION PERFORMANCE OF MANGO IN DINAJPUR DISTRICT OF BANGLADESH (A CASE STUDY AT SADAR UPAZILLA)

BY

MD. JAHANGIR ALAM

ABSTRACT

A study was conducted to identify the status of mango production, mango varieties produced, problems confronted by the growers and to explore their relationship with some selected characteristics. Data were collected from randomly selected 105 mango growers from eight selected villages of sadar upazila under Dinajpur district through personal interview during March to August, 2008. Data were collected on age, education, farm size, land used in mango production, annual income, experience and knowledge on mango production, varieties and number of mango trees and so on. Relationship between the selected characteristics and dependent variables was done by Pearson's product moment co-efficient of correlation. In the study, 30 germplasm of mango were identified. *Baramashi droop* was found as the only year round variety. Gopalbhog holds the first position (15.90 %) according to rank of recognized mango varieties based on their availability in respondents' farm. About three fourths (77.10 %) and more than the same (70.50 %) of the respondents had medium mango production and income respectively. Majority (75.20 %) of the growers confronted medium problems. Cent percent of the respondents certified that Dinajpur district is profitable in respect of mango production.

CONTENTS

ITEMS		PAGE
	ACKNOWLEDGEMENT	I
	ABSTRACT	II
	CONTENTS	III
	LIST OF TABLES	VII
	LIST OF FIGURES	IX
	LIST OF APPENDICES	X
	ABBREVIATION AND ACRONYMS	XI
CHAPTER 1	**INTRODUCTION**	1
	1.1 General background	2
	1.2 Rationale of the study	
	1.3 Objectives of the study	2
	1.4 Scope of the study	3
	1.5 Limitations of the study	3
	1.6 Assumptions of the study	4
CHAPTER 2	**REVIEW OF LITERATURE**	5
	2.1 Studies related to mango production by the growers	5
	2.2 Relationship between dependent and following selected characteristics of the growers	8
	2.2.1 Age	8
	2.2.2 Educational qualification	8
	2.2.3 Family size	9
	2.2.4 Farm size and land used in mango production	10
	2.2.5 Experience in mango production and in agriculture	10
	2.2.6 Annual income	11
	2.2.7 Extension media contact	12
	2.2.8 Organizational participation	12
	2.2.9 Cosmopoliteness	13
	2.2.10 Agricultural knowledge	14
CHAPTER 3	**METHODOLOGY**	15
	3.1 Locale of the study	15
	3.2 Sampling of the respondents	15
	3.3 Instrument for collection of data	18
	3.4 Data collection	18
	3.5 Data coding and tabulation	19
	3.6 Selection of dependent and independent variables	19
	3.7 Measurement of variables	20

Sher-e-Bangla Agricultural University Library

CONTENTS (Contd.)

	3.7.1 Measurement of independent variables	20
	3.7.1.1 Age	20
	3.7.1.2 Educational qualification	20
	3.7.1.3 Family size	21
	3.7.1.4 Farm size	21
	3.7.1.5 Land used in mango production	21
	3.7.1.6 Annual family income	22
	3.7.1.7 Experience in agriculture	22
	3.7.1.8 Experience in mango production	22
	3.7.1.9 Extension media contact	22
	3.7.1.10 Organizational participation	22
	3.7.1.11 Cosmopoliteness	23
	3.7.1.12 Knowledge on mango production	23
	3.7.2 Measurement of dependent variables	23
	3.7.2.1 Annual mango production	23
	3.7.2.2 Annual income from mango production	24
	3.7.2.3 Mango varieties produced	24
	3.7.2.4 Problem confrontation in mango production	24
	3.7.3 Varietal status of mango	25
	3.7.3.1 Local mango germplasm	25
	3.7.3.2 Information about year round mango varieties	25
	3.7.3.3 Use of manures and fertilizers	25
	3.7.3.4 Intercultural operation done in mango plants	26
	3.7.3.5 Insects and diseases infestation	26
	3.7.3.6 Propagation of mango trees	26
	3.7.3.7 Fruit and flower dropping	26
	3.8 Data processing and Analysis	27
	3.8.1 Compilation of data	27
	3.8.2 Categorization of data	27
	3.8.3 Statistical technique	27
CHAPTER 4	**RESULTS AND DISCUSSION**	28
	4.1 Selected characteristics profile of the mango growers	28
	4.1.1 Age	29
	4.1.2 Education	30
	4.1.3 Family size	30
	4.1.4 Farm size	30
	4.1.5 Land used in mango production	31
	4.1.6 Annual family income	31
	4.1.7 Experience in mango production	32
	4.1.8 Experience in agriculture	32
	4.1.9 Extension media contact	32
	4.1.10 Organizational participation	33

CONTENTS (Contd.)

4.1.11 Cosmopoliteness	33
4.1.12 Knowledge on mango production	33
4.2 Dependent variables	34
4.2.1 Annual mango production	34
4.2.2 Annual income from mango production	35
4.2.3 Mango varieties produced in the study area	35
4.2.4 Problem confrontation in mango production	35
4.3 Status of mango production	36
4.3.1 Production status in other than homestead area	36
4.3.1a Total cultivable land size	36
4.3.1b Fruit cultivable land size	37
4.3.1c Fruit cultivated land size	37
4.3.2 Production status in homestead area	38
4.3.2a Fruit cultivable land in homestead area	38
4.3.2b Fruit cultivated land in homestead area	39
4.3.2c Mango cultivated land in homestead area	39
4.3.3 Production status with relative measurements	40
4.3.3a Annual mango sale	40
4.3.3b Annual expenditure for per mango tree	41
4.3.3c Weight of per fruit	41
4.3.4 Varietal status of mango	42
4.3.4a Status of recognized mango varieties	42
4.3.4b Local mango germplasm	44
4.3.5 Status of year round mango varieties	44
4.3.5a Quantitative status of year round mango varieties	44
4.3.5b Varietal status of year round bearing of mango trees	45
4.3.6 Management status of mango trees	45
4.3.6a Fertilizer usage	45
4.3.6b After care of mango trees	46
4.3.7 Propagation of mango trees	46
4.3.8 Problems in mango production	47
4.3.8a Insect and disease infestation status	47
4.3.8b Disease infestation of mango	47
4.3.8c Insects infestation of mango	48
4.3.8d Dropping of fruits and flowers	49
4.3.8e Causes of dropping of fruits and flowers	49
4.3.8f Treatments to protect the flower and fruit dropping	49
4.3.9 Profit from mango production	50
4.4 Relationship between the selected characteristics of the mango growers and dependent variables	50

CONTENTS (Contd.)

	4.4.1 Relationship between selected characteristics of the mango growers and annual mango production	52
	4.4.2 Relationship between selected characteristics of the mango growers and annual income from mango production	53
	4.4.3 Relationship between selected characteristics of the mango growers and mango varieties produced	53
	4.4.4 Relationship between selected characteristics of the mango growers and problem confrontation in mango production	54
CHAPTER 5	**SUMMARY AND CONCLUSION**	56
	5.1 Summary of findings	56
	5.1.1 Dependent variables	56
	5.1.2 Selected characteristics of the mango growers	57
	5.1.3Relationship between the selected characteristics of the farmers with their dependent variables	58
	5.2 Conclusion	59
	5.3 Recommendations	61
	5.4 Recommendations for further study	62
	BIBLIOGRAPHY	63
	APPENDICES	68
	Appendix- I	68
	Appendix- II	77

LIST OF TABLES

TABLE	PARTICULARS	PAGE
3.1	Categories of the respondents according to their educational qualification	20
3.2	Categories on amount of annual mango production	23
3.3	Category of annual income from per hectare mango production	24
3.4	Category of number of mango varieties produced	24
4.1	Selected characteristics profile of the mango growers	28
4.2	Dependent variables	34
4.3	Classification of the respondents according to total cultivable land size	36
4.4	Classification of the respondents according to fruit cultivable land size	37
4.5	Classification of the respondents according to fruit cultivated land size	38
4.6	Classification of the respondents according to fruit cultivable land in homestead area	38
4.7	Classification of the respondents according to fruit cultivated land in homestead area	39
4.8	Classification of the respondents according to mango cultivated land in homestead area	40
4.9	Classification of the respondents according to the annual mango sale from per hectare production	40
4.10	Classification of the respondents according to the annual expenditure for per mango tree	41
4.11	Classification of the respondents according to the weight of per fruit	42
4.12	Ranking status of recognized mango varieties based on their availability in respondents' farm	43
4.13	Classification of the respondents based on number of local mango germplasm available in their farm	44
4.14	Classification of the respondents based on number of year round mango trees available in study area	44
4.15	Classification of the respondents based on year round varieties available in the study area	45
4.16	Percentage of fertilizer use	45
4.17	After care of mango trees practiced by the respondents	46
4.18	Classification of the respondents based on propagation practices for mango in the study area	46
4.19	Rank order of the problem confrontation by the growers in mango cultivation	47

Sher-e-Bangla Agricultural University Library

LIST OF TABLES (Contd.)

TABLE	PARTICULARS	PAGE
4.20	Classification of the respondents based on insects and diseases infestation status	47
4.21	Classification of the respondents based on diseases infestation of mango	48
4.22	Classification of the respondents based on insects infestation of mango	48
4.23	Response on dropping of fruits and flowers	49
4.24	Classification of the respondents based on causes of dropping of fruits and flowers of mango in the study area	49
4.25	Classification of the respondents based on treatments to protect the flower and fruit dropping	50
4.26	Co-efficient of correlation showing relationship between selected characteristics of the mango growers and dependent variables in mango production (N=105)	51

LIST OF FIGURES

FIGURE		PAGE
3.1	A Map of Dinajpur district showing sadar Upazila, the study area	16
3.2	A Map of sadar Upazila of Dinajpur district showing the study area	17
3.3	Conceptual Framework of the independent and dependent variables of the study	19

LIST OF APPENDICES

APPENDICES		PAGE
I	An English Version of the Interview Schedule	68
II	Correlation matrix showing the interrelationships among the entire variables	77

ABBREVIATION AND ACRONYMS

%	→	Percent
BAU	→	Bangladesh Agricultural University
Contd.	→	Continued
et al	→	At elli (and others)
etc	→	Et cetera
g	→	Gram (unit of weight)
Ha	→	Hectare
HSTU	→	Hajee Mohammad Danesh Science and Technology University
kg	→	Kilogram
MP	→	Muriate of Potash
NS	→	Not Significant
PHT	→	Postharvest Technology
SAU	→	Sher-E-Bangla Agricultural University
Std.	→	Standard Deviation
Tk	→	Taka
TSP	→	Triple Super Phosphate

CHAPTER 1
INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 General Background

Mango (*Mangifera indica*) is the favourite fruit in Bangladesh and has been repeatedly acclaimed as the King of Fruits. (Ahmed, 1994). Mango belongs to the family Anacardiaceae is a tropical to sub-tropical fruit, originated in the Indian sub-continent (Indo-Burma region) in the prehistoric times. It is the most important economic and delicious fruit. It has been cultivated for more than 4000 years (Candole, 1984). Mango is a commercial horticultural crop in many countries of South-East Asia, India, Pakistan, Philippines, Malaysia, Thailand, Burma, Srilanka and Java. The main mango producing countries of world are India, Pakistan, Mexico, Brazil, Haiti, the Philippines and Bangladesh. Mango ranks third among the tropical fruit grown in the world with a tropical fruits production of 25 million tons (Anonymous, 2007). India, the largest producer that alone produces 15.5 million tons mango followed by Brazil, Pakistan, Mexico, the Philippines, Indonesia, Haiti, China, Bangladesh, Sudan, Srilanka and Cuba (Bhuiyan, 2008). The present per capita mango production in various countries is approximately: India-11.94 kg, Philippines- 10.30 kg, Mexico- 8.70 kg, Tanzania- 8.20 kg, Pakistan- 6.70 kg, Zaire- 4.70 kg, Brazil- 3.90 kg, Indonesia- 3.0 kg and Bangladesh- 1.30 kg. In Bangladesh, mango ranks first in terms of area and third in production. Bangladesh produces 240,000 tons of mangoes per annum from 68.60 thousand hectares of land (BBS, 2008).

Another study says that Mango trees occupy the largest area in Bangladesh but its production position is third among the fruits grown in Bangladesh. At present (BBS, 2009), Bangladesh produces 242,000 tons of mango annually from 65 thousand hectares of land at the rate of 3.72 tons per hectare. But According to FAO, mango production in 1969-1970 in Bangladesh (The then East Pakistan) amounted to an average of 424,000 tons per annum (BBS, 2009). The main reason for the decline in mango production is due to the lack of proper cultural

management practices and general neglect. But this low yield may be increased through the proper scientific cultural management practices.

1.2 Rationale of the Study

The Northern and North-western parts of Bangladesh are well known for better mango production (Bhuiyan, Roy & Ganguly, 1999). Dinajpur is one of the districts of these parts. A good percentage of farmers in this district depend on mango production as the major source of income but no study was conducted on mango production as well as on growers in this area. This is why study was conducted in the district.

1.3 Objectives of the Study

1.To find out the status of mango production in the study area.

2.To find out the mango varieties produced by the growers in the study area.

3.To determine the extent of problems confronted by the mango growers in the study area.

4.To explore the relationship between the selected characteristics of mango growers with dependent variables.

The selected characteristics are:

I. Age
II. Education
III. Family size
IV. Farm size
V. Land used in mango production
VI. Annual family income
VII. Experience in mango production
VIII. Experience in agriculture
IX. Extension media contact
X. Organizational participation
XI. Cosmopoliteness
XII. Knowledge in mango production

Dependent variables are:

I. Annual mango production
II. Annual income from mango production
III. Mango varieties produced
IV. Problem confrontation in mango production

1.4 Scope of the study

The present study was undertaken with a view to have an understanding about the status of mango production, mango varieties produced, problems confronted by the grower and to explore their relationship with some selected characteristics.

The findings of this study will be particularly applicable to the farmers of the respective study area. The findings may also have applicability to other areas of the country when the physical conditions are mostly similar with those of the study area. However, the findings of the study will be helpful for the specialist of different organizations and planners, policy makers and horticulturists to deal with mango production.

The administrators, supervisors, field workers and others who are to work in the field of mango may find this study informative. This study could be helpful for commercial mango production programme in one hand and motivative to the authority to reduce hazards cause decline in mango production and source of earning money and reducing poverty.

1.5 Limitations of the study

The present study was designed with a view to have an understanding about the status of mango production, mango varieties produced, problems confronted by the grower and to explore their relationship with some selected characteristics. Considering the time, money and other necessary resources available to the researcher and also to make the study meaningful and manageable the researcher had to impose certain limitations as follows:

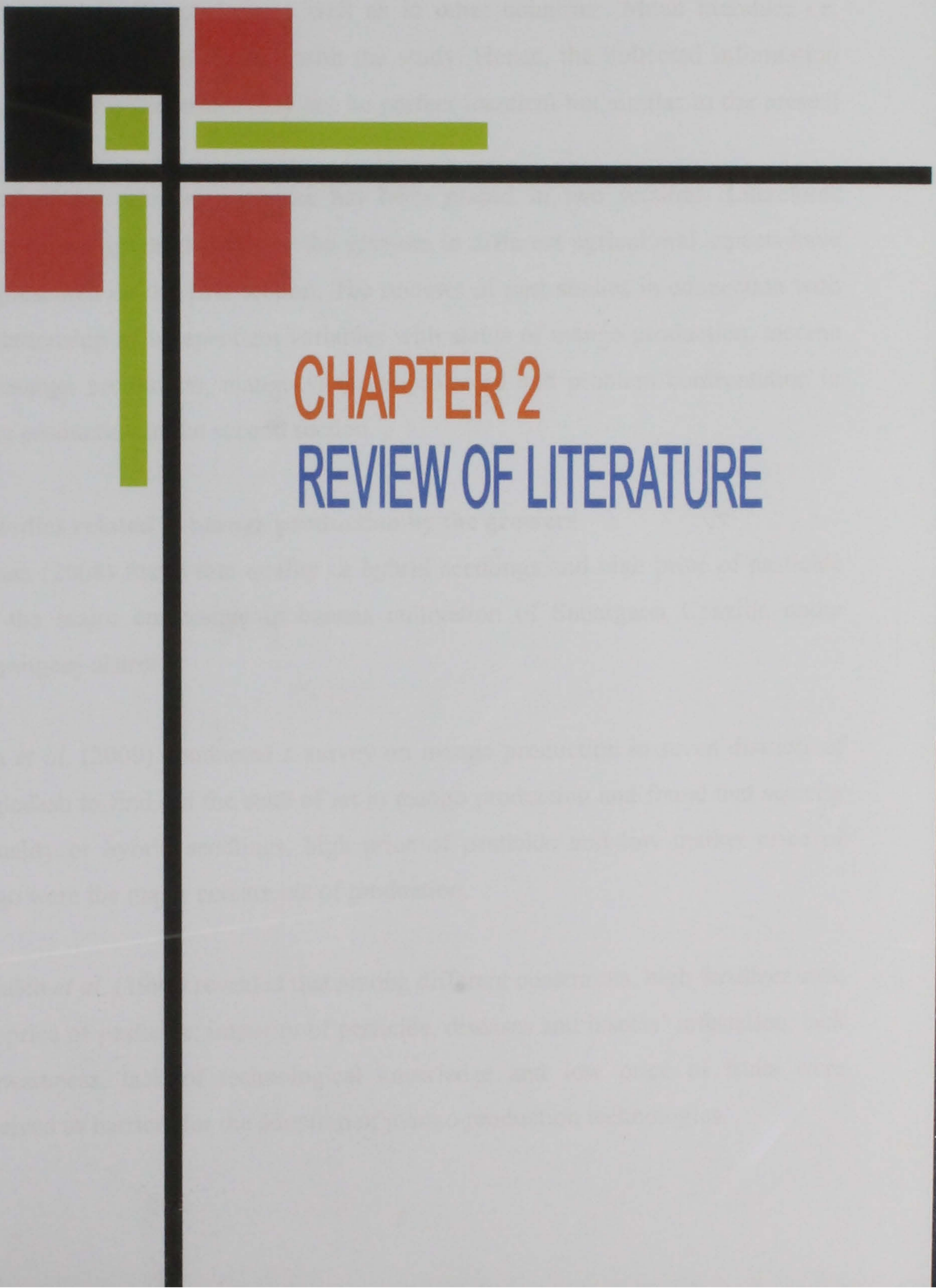
1. The study was confined to eight villages namely Kashba, Ulipur, Nashipur, Ghugudanga, kawga, Basherhat, Gobindapur and Gopalgonj of sadar upazila under Dinajpur district i.e. the Northern and North-Western region of Bangladesh.
2. The study was confined mainly to status of mango production, mango varieties produced and problems confronted by the grower.
3. Out of many characteristics of mango growers only twelve characteristics were selected for investigation in this study.
4. For information about the study, the researcher was depended on the data furnished by the selected respondents during data collection.
5. The respondents for data collection were kept limited within the heads of farm families.
6. Various problems in adopting mango production were likely to be confronted by the growers. However, only 18 problems have been considered for investigation in his study.

1.6 Assumptions of the study

An assumption is the supposition that an apparent factor or principle is true in the light of the available evidence (Goode, 1945). In this study the researcher has the following assumptions in mind.

1. The growers selected for this study were capable of furnishing proper response to the questions included in the interview schedule.
2. The researcher was well adjusted to the environment of the study area. Hence, the data collected were free from any bias.
3. The responses furnished by the respondents were reliable. They expressed the truth about their conversations and opinions.
4. Views and opinions furnished by the mango growers included in the sample were the representatives' views and opinions of the objectives.

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar Dhaka



CHAPTER 2
REVIEW OF LITERATURE

CHAPTER 2
REVIEW OF LITERATURE

The purpose of this chapter is to review of literatures having relevance of this study. The researcher extensively reviewed the available literature to search out related works in Bangladesh as well as in other countries. Much literature i.e. studies were not found dealing with the study. Hence, the collected information through review of literature may not be perfect identical but similar to the present study.

Review of the relevant literature has been placed in two sections. Literatures relating to mango production by the growers in different agricultural aspects have been presented on the first section. The reviews of past studies in connection with the relationship of independent variables with status of mango production, income from mango production, mango varieties produced and problem confrontation in mango production in the second section.

2.1 Studies related to mango production by the growers

Rahman (2008) found that quality or hybrid seedlings and high price of pesticide were the major constraints in banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Alam *et al.* (2000) conducted a survey on mango production in seven districts of Bangladesh to find out the state of art in mango production and found that scarcity of quality or hybrid seedlings, high price of pesticide and low market price of mango were the major constraints of production.

Muttaleb *et al.* (1997) revealed that among different constraints, high fertilizer cost, high price of pesticide, impurity of pesticide, diseases and insects' infestation, lack of awareness, lack of technological knowledge and low price of fruits were perceived as barriers for the adoption of mango production technologies.

Hasan *et al.* (1995) observed that almost two-thirds (64.15%) of the respondents had medium problem confrontation compared to 18.82 percent who had high problem confrontation and 1.98 percent had low problem confrontation on organizational problems in Rajshahi district.

Akanda *et al.* (1994) revealed that majority of the farmers (80.95%) had high problem confrontation compared to 16.19 percent having medium and 2.69 percent having low problem confrontation on mango production in Rangpur district.

Biswas (1993) in his study identified farmer's problems in fruit production. unavailability and high cost of fertilizer, high price of pesticides, impurity of pesticides, diseases and insects infestation, lack of awareness, lack of technological knowledge and low price of fruits, lack of operating capital, lack of storage facility, stealing from field at maturety and immature stage.

Talukder (1991) conducted a survey in 6 mango producing upazila of chapainowabgonj district. They found that low market price of mango and high price of pesticides and fungicides and impurity of them were considered as the major constraints to mango production.

Chander and Sharma (1990) in their study identified constraints in mango production. Main constraints were ignorance about improved cultivars and ignorance about scientific method of cultivation, lack of guidance of marketing mango, high cost of improved cultivars, high cost of fertilizers, pesticide and so on.

Parkinson (1989) identified constraints in mango production in Thailand. The main constraints were, shortage and processing of mango. Inconsistent quality of lint, high cost of production, inadequate credit for farmers and uncertainty of price to the farmers.

Saha (1989) in his research on the economic study of mango marketing in Rajshahi district found that unsatisfactory and inefficient transportation media were the main reasons for the mango spoilage. Production of mango is always threatened with great risk and uncertainty in the study area due to lack of proper and adequate marketing system in the production period.

Rashid and Mahboob (1987) reported that the highest proportion (46 percent) of the farmers had high problem confrontation. While about one-third (33 percent) had medium problem confrontation and less than one-forth (21 percent) had low problem confrontation. It was generally observed that, the greater the problem faced by an individual in any work, the less was the progress in that work. It is, therefore, likely that the agricultural problem confrontations of the farmers will have adverse effect on their progress in farming.

Marothia (1983) conducted a study to find out the constraints in the adoption of the mango production technologies in two villages in Raipur Block, Madhya Pradesh, India. The findings revealed that the majority of farmers still adopt a partial package of recommendations mainly due to high cost of inputs financial limitations and risk of production failure. Inadequate supportive input facilities were found to be responsible for the slow adoption of mango technology.

King (1980) observed that problem of mango production improvement project in Gambia were dominated by three main factors; 1) Moderate yield 2) High rate of diseases and insects infestation and 3) High price of pesticides and fungicides.

Rahman (1979) found that one of the greatest problems faced by the farmers in the hill was the marketing of the produce particularly of the perishable like pineapple, banana etc.

2.2 Relationship between dependent and following selected characteristics of the growers

2.2.1 Age

Rahman (2008) found that age of the farmers had no significant relationship with their constraints faced but significant relationship with production and income in banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and production, income and constraints faced in banana cultivation. Similar findings were obtained by Rahman (1995) in his respective study for pineapple cultivation.

Karim (2001) conducted a study on relationships of selected characteristics of mango growers with their problem confrontation and found that age had no significant relationship with their problem confrontation.

Rahman (1995) in his study on constraints faced by farmers in pineapple cultivation found that there was no significant relationship between age of the farmers and their problem confrontation. Shahidullah (1987) found similar finding.

Hossain (1985) in his study found that there was no relationship between age of the landless labourers and their problem confrontation. Saha (1983), Kashem (1977), Rashid (1975) Nath (1974) also reported similar findings.

2.2.2 Educational qualification

Nahid (2005) conducted a study and found that there was very high significant negative relationship between education of the sugarcane growers and production, income and constraints faced in sugarcane production.

Karim (2001) in his study found that education of the farmers had negative significant relationship with their problem confrontation.

Sher-e-Bangla Agricultural University Library

Rahman (1995) found that the education of the farmers had significant negative effect on their faced constrain in pineapple cultivation. The findings indicated that the higher the education of the farmers, the lower was their faced constrained. Mansur (1989), Islam (1987), Kashem (1977) obtained similar findings.

Raha (1989) in his study found that education of the farmers had no significant relationship on their irrigation problem confrontation. Similar finding was obtained by Ali (1978) and Rashid (1975).

2.2.3 Family size

Rahman (2008) found that family size of the farmers had no significant relationship with production, income and constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Nahid (2005) conducted a study and found that there was no significant relationship between family size of the sugarcane growers and production, income and constraints faced in sugarcane production.

Salam (2003) in his study found a positive significant relationship between family size and their constraint in adopting environmental friendly farming practices.

Rahman (1995) found that there is no significant relationship between family size of the pineapple growers and their problem confrontation. He also found negative tendency between concerned variable.

Haque (1995) found that there was no significant relationship between family size and mango production and problem confrontation. Similar findings were obtained by Rashid (1975), Hossain (1991) and Ahmed (1994) in their respective studies.

2.2. 4 Farm Size and Land used in mango production

Rahman (2008) found that farm size of the farmers had no significant relationship with their constraints faced but significant relationship with production amount as well as income in Banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Nahid (2005) conducted a study and found that there was a high significant negative relationship between total farm size and problem confrontation but significant relationship with production and income in sugarcane production.

Karim (2001) conducted a study and found no relationship between farm size of the farmers and their problem confrontation. Rashid *et al.* (1987) obtained similar finding in his study.

Rahman (1996) found that the farm size of the respondents had a negative significant relationship with their problem confrontation in mango production. Similar findings were obtained by Hossain (1985), Islam (1987), Mansur (1989), Rahman (1995), Ismail (2001) and Ahmed (2002) in their respective studies.

Rahman (1995) found that the farm size of the farmer had a significant negative influence on their faced problems in pineapple cultivation. Similar findings were obtained by Hossain (1985), Islam (1987), Mansur (1989), Rahman (1996), Ismail (2001) and Ahmed (2002) in their respective studies.

Hossain (1985) found harbourage farm size of the landless labourers had a significant relationship with their problem confrontation, the problem confrontation was higher in borga farming than no borga farming category.

2.2.5 Experience in mango production and agriculture

Rahman (2008) found that experience in production had significant relationship with production amount as well as income but negatively significant relationship

with constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Anwar (2008) found that there is a significant relationship between experience and amount of banana production and income in Kolaroa upazila under Satkhira district.

Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the sugarcane growers and their problem confrontation in sugarcane production.

Saha (1989) found that training experience of the youth had no relationship with their problem confrontation.

2.2.6 Annual Income

Rahman (2008) found that annual family income of the farmers had high significant relationship with production amount and number of varieties produced but had insignificant relationshipwith constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj distrct. Aziz (2006) found the same.

Karim (2001) found that the annual income of the farmer had significant negative relationship with their problem confrontation.

Rahman (1996) conducted a study and found negative significant relationship with their problem confrontation in mango production. Similar finding was obtained by Islam (1987).

Raha (1989) found that the income of the farmers had no significant relationship on their irrigation problem confrontation, but relationship showed a positive tendency.

Hossain (1985) in his study found a significant relationship between income and problem confrontation of the landless labourers.

Rashid (1975) in his study found that there was no relationship between income of the farmers and their agricultural problem confrontation. Though the relationship was not significant, relevant data indicated a considerable negative trend between income of the farmers and their agricultural problem confrontation of the farmer.

2.2.7 Extension media contact

Rahman (2008) found that extension media contact of the farmers had significant relationship with production amount and income but no significant relationship with constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

Farouque (1997) studied on female youth and observed that extension contact of female rural youth had a significant negative relationship with their problem confrontation in selected issues. Findings of Pramanik (2001) were similar to that of Farouque.

2.2.8 Organizational participation

Rahman (2008) found that organizational participation of the farmers had significant relationship with production amount and income but no significant relationship with constraints faced in banana cultivation of Sunargaon Upazilla under Narayangonj district.

Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the sugarcane growers and their problem confrontation in sugarcane production.

Karim (2001) found that Organizational participation of the farmers had significant negative relationship with their problem confrontation.

Rahman (1995) concluded in his study that there was no relationship between the organizational participation of the farmers and their faced problems in pineapple cultivation.

Raha (1989) and Islam (1987) found that there was no significant relationship between the organizational participation of the mango farmers and their problem in confrontation Sadar upazila of Chuadanga district. Rashid (1975) found similar finding.

Mansur (1989) in his study indicated that organizational participation of the mango farmers had a significant negative relationship with their problem confrontation in Birol upazila of Dinajpur district. Rahman (1995), Sarker (1983), Saha (1983) and Ali (1978) also found similar findings in their respective studies.

Karim (1974) found a consistent negative trend between organizational participation of the union assistant and their problem confrontation, the relationship between the two variables was not statistically significant.

2.2.9 Cosmopoliteness

Nahid (2005) conducted a study and also found that cosmopoliteness of the farmers had significant relationship with production amount and income but negatively significant relationship with problem confrontation in in sugarcane production.

Pramanik (2001) found that the cosmopoliteness of the farm youth had negative correlation with their fruit (mango) production, health and recreational problems.

Hossain (1991) conducted a study on the adoption behaviour of contract mango growers in sadar Upazila of Dinajpur district. In his study, he observed that cosmopoliteness of the contract mango growers had a little but no significant contribution on the adoption, of improved farm practices.

2.2.10 Agricultural knowledge

Rahman (2008) found that agricultural knowledge of the farmers had significant relationship with production amount and income but negatively significant relationship with constraints faced in banana cultivation of Sunargaon Upazilla under Narayangonj district.

Nahid (2005) conducted a study also found that agricultural knowledge of the farmers had significant relationship with production amount and income but negatively significant relationship with constraints faced in sugarcane production.

Karim (2001) indicated in his study that agricultural knowledge of the mango growers had significant negative relationship with their problem confrontation Rahman (1995) also found similar findings in his study.

Rahman (1995) in his study found that the knowledge in pineapple cultivation of the farmers had a significant negative effect on their faced constraints. Similar findings were obtained by Mansur (1989) and Sarker (1983) in their respective study.

Raha (1989) and Islam (1987) found that there was no significant relationship between the organizational participation of the farmers and their problem confrontation. Rashid (1975) found similar finding.

Karim (1974) found a consistent negative trend between organizational participation of the union assistant and their problem confrontation, the relationship between the two variables was not statistically significant.

CHAPTER 3
MATERIALS AND METHODS

CHAPTER 3
METHODOLOGY

Research is a systematic investigation for some pertinent information on a specific topic. Importance of methods and procedures in conducting any research can hardly be over emphasized. Keeping this in mind the researcher took utmost care for using proper methods in all aspects of this investigation. The methods and procedures used in conducting this research are presented below:

3.1 Locale of the study

Sadar upazila under Dinajpur district was selected for conducting this investigation because it was an intensive mango production area. The study was conducted in eight villages Kashba, Ulipur, Nashipur, Ghugudanga, kawga, Basherhat, Gobindapur and Gopalgonj which are well known as highly mango produced area of the sadar upazila under Dinajpur district i.e. the Northern and North-Western region of Bangladesh. (Map of the locale, Fig.3.1 & 3.2)

3.2 Sampling of the respondents

A list of the farmers who have mango plants was collected with the help of the Sub Assistant Agriculture Officer (SAAO) of the Department of Agriculture Extension (DAE) of Dinajpur sadar. A total number of 105 respondents were selected randomly out of 448 mango growers. The list comprised Kashba-71, Ulipur-67, Nashipur-60, kawga-55, Ghugudanga-52, Basherhat-45, Gobindapur-46 and Gopalgonj-52 Thus, the 448 farm households of eight selected villages constituted the active population of the study.

Figure 3.1: A Map of Dinajpur district showing sadar Upazila, the study area

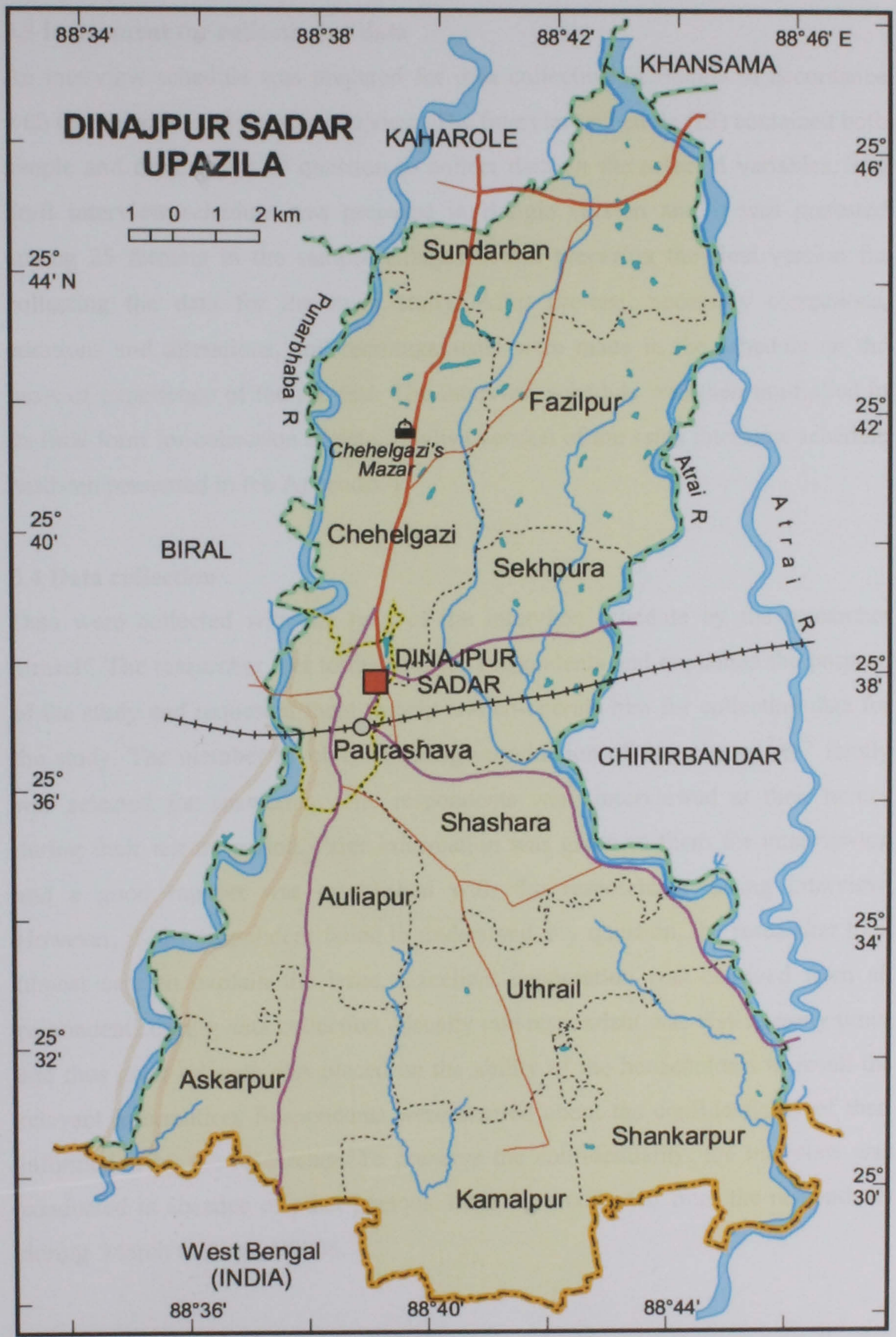


Figure 3.2: A Map of Sadar Upazila of Dinajpur district showing the study area

3.3 Instrument for collection of data

An interview schedule was prepared for data collection in Bangla in accordance with the objectives of the study in view. The Interview schedule (IS) contained both simple and direct form of question to collect data on the selected variables. The draft interview schedule was prepared in Bangla version and it was pretested among 25 farmers in the sample villages before preparing the final version for collecting the data for the main study. After pre-test, necessary corrections, additions and alterations, and rearrangements were made in the schedule on the basis of experience of the pre-test. The interview schedule was then multiplied in its final form for collection of data. English version of the same interview schedule has been presented in the Appendix-I.

3.4 Data collection

Data were collected with the help of the interview schedule by the researcher himself. The researcher met to the selected respondents and explained the purpose of the study and requested them to help and co-operate him for collecting data for the study. The member involved in mango production of the respondents' family was selected for answering. The respondents were interviewed at their homes during their leisure period. Prior information was given to them for interviewing and a good rapport was established with the respondents during interview. However, if any respondent failed to understand any question, the researcher took utmost care to explain the issue. Excellent cooperation was obtained from all respondents during data collection. Usually one respondent was visited many times and thus great reliance was placed on the ability of the householders to recall the relevant information. Respondents were assured about the confidentiality of their information by the researcher. To preserve the confidentiality, the interview was conducted in absence of other persons. Data were collected from the respondents during March to August'2008.

3.5 Data coding and tabulation

After completion of survey all the interview schedules were compiled for its data processing. At the beginning of the data processing all the qualitative data were converted into quantitative form by means of suitable code and score whenever necessary. Local units were converted into standards units. In several instances, indices and scales were constructed through the simple accumulation of scores assigned to individual or pattern of attributes. Indices and scales are considered the efficient instrument for data reduction and analysis.

3.6 Selection of dependent and independent variables

The following four (4) were main focus of this study and considered as the dependent variables as the four dimensions of production performance of mango. The researcher also selected following twelve (12) independent variables.

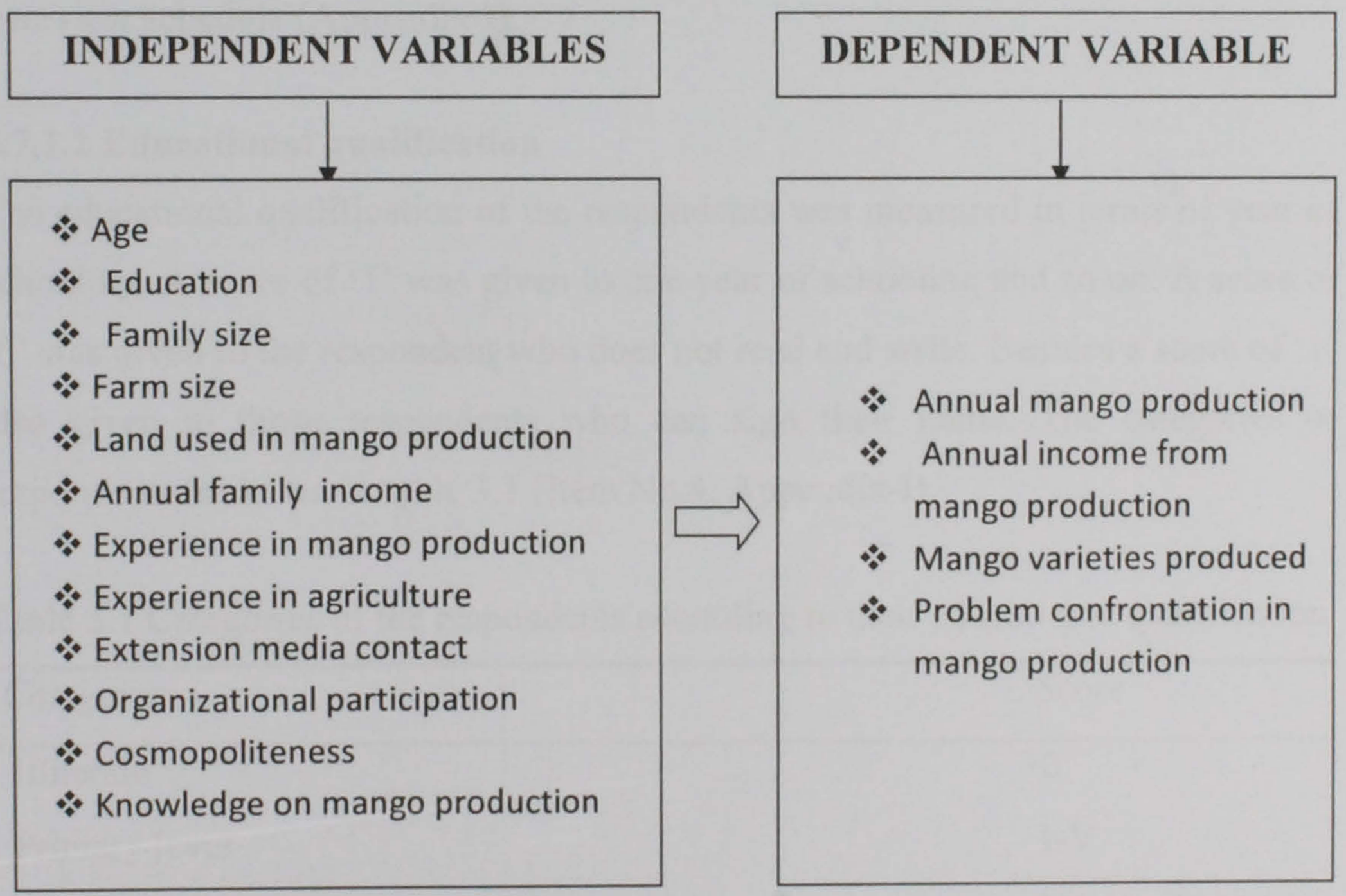


Fig: 3.3 Conceptual framework of the independent and dependent variables of the study

The selection and measurement of variables constitute a significant task in the scientific research. In this connection the researcher went through the past related literature as far as available. He also discussed with the departmental teachers and

concerned researchers of the relevant fields. He also carefully noticed the various characteristics of the farmers of the study. Availability of time, money community under study area and other resources were also kept in view in selecting the variables.

3.7 Measurement of variables

3.7.1 Measurement of independent variables

The procedures followed in measuring the independent characteristics are briefly discussed below:

3.7.1.1 Age

The age of a respondent was measured in terms of actual years from his birth to the time of interview on the basis of his response. It is located to item number 3 of the interview schedule (Appendix-I).

3.7.1.2 Educational qualification

The educational qualification of the respondents was measured in terms of year of schooling. A score of '1' was given to one year of schooling and so on. A score of '0' was given to the respondent who does not read and write. Besides a score of '1' also given to those respondents who can sign their name. The categories of respondents is shown in table 3.1 (Item No.4, Appendix-I).

Table 3.1 Categories of the respondents according to their educational qualification

Categories	*Score*
Illiterate	0
Primary level	I-V
Secondary level	V1-X
Higher secondary level	X1-XII
Graduate and above	XIII

3.7.1.3 Family size

The family size of the respondents was determined on the basis of the number of members in his family including himself, his wife, children and other dependents, living under same roof and sharing same kitchen. The question to measure the family size of the respondents has been presented in the item number 5 of the interview schedule (Appendix-I).

3.7.1.4 Farm size

The farm size refers to the total amount of land under the profession of the respondents get benefit. The question to measure land size of the respondents was shown in the item number 8 of interview schedule (Appendix-I).

Farm size of a respondent was measured in terms of hectares by using the following formula:

$$\text{Farm size} = A_1 + A_2 + \frac{1}{2}(A_3 + A_4) + A_5 + A_6 + A_7$$

Where,

A_1 = Area under homestead

A_2 = Area under own cultivation

A_3 = Area given to others on borga

A_4 = Area taken from others on borga

A_5 = Area taken from others on lease

A_6 = Area given to others on lease

A_7 = Others

According to farm size they were divided into five groups. (Table 3.4)

3.7.1.5 Land used in mango production

The total amount of land under mango production was measured under this title. The question to measure land size of the respondents was shown in the item number 12(d) of interview schedule (Appendix-I).

3.7.1.6 Annual family income

The yearly income referred to the income of a respondent earned from different sources, viz. agriculture, business, share market investment, fish, fruit, and others. The question to measure monthly income of the respondents was shown in the item number 7 of interview schedule (Appendix-I).

3.7.1.7 Experience in agriculture

Experience in agriculture was measured on the basis of years, the respondent involved in agricultural work. One score was assigned for each year of experience. The item is mentioned at number 6(a) of the interview schedule (Appendix-I).

3.7.1.8 Experience in mango production

Experience in mango production was measured on the basis of years, the respondent involved in mango production. One score was assigned for each year of experience. The item is mentioned at number 6(b) of the interview schedule (Appendix-I).

3.7.1.9 Extension media contact

Extension media contact is defined as a person's communication with different sources of information available in and out of his social system. A 4 points scale (Item no. 9, Appendix-I) such as "frequently"(3), "occasionally"(2), "rare"(1), and "not at all"(0) were used to determine the extent of Extension media contact of the respondents.

3.7.1.10 Organizational participation

Relationship of respondents with different organizations was referred to his participation in different associations or organizations. The different organizations enlisted in the interview schedule were government organization, non-government organization, government nursery, private nursery, mosque committee, NGO sommittee, school committee, madrasa committee, market committee, cultural and sports organizations etc, (Item No.10: Appendix-I). A 4 points scale such as

"Executive officer"(3), "Executive member"(2)," General member "(1), and "not related at all"(0) were used to determine the extent of Organizational Participation.

3.7.1.11 Cosmopoliteness

Cosmopoliteness is defined as a person's orientation to outside his own social system. A 4 points scale (Item no. 11: Appendix-I) such as "frequently"(3), "occasionally"(2), "rare"(1), and "not at all"(0) were used to determine the extent of cosmopoliteness.

3.7.1.12 Knowledge on mango production

To determine the knowledge of the respondents about fruit cultivation, a series of question (15 questions) were asked to each of the respondents. An equal, weight of one was assigned to each question (Item no 21: Appendix-I).

3.7.2 Measurement of dependent variables

Annual mango production, annual income from mango production, mango varieties produced and problems confrontation in mango production were the dependent variables of the study. Their measurement categorization is separately shown below.

3.7.2.1 Annual mango production

The quantity of per hectare annual mango production was expressed in ton. (Item no 15(a), Appendix-I). The categories on amount of mango production is shown in table 3.2

Table 3.2 Categories on amount of annual mango production

Categories	*Quantity of mango production (Ton)*
Low	< 7
Medium	7-10
High	> 10

3.7.2.2 Annual income from mango production

Annual income from per hectare mango production (Item no 15(c), Appendix-I).was expressed in taka categorized according to the table 3.3

Table 3.3 Category of annual income from per hectare mango production

Categories	*Categorized range (Taka)*
Low	Up to 200000
Medium	200001-250000
High	250001-500000

3.7.2.3 Mango varieties produced

Number of recognized and local mango varieties is categorized into low, medium and high which are possessed by the respondents in the following scales:

Table 3.4 Category of number of mango varieties produced

Categories	*Categorized range (Number of varieties)*
Small	1-10
Moderate	11-20
Large	>20

3.7.2.4 Problem confrontation in mango production

The respondents were asked about the problems they faced during the cultivation on mango. An item was prepared in the interview schedule (Item no.23; Appendix-I). The problems obtained from them were categorized into 6 types viz. very severe, severe, moderately severe, moderate, negligible, not at all.

Problem Confrontation Index (PCI) was measured for each problem-item with help of the following formula:

$$\mathbf{PCI = P_{vs} \times 5 + P_s \times 4 + P_{ms} \times 3 + P_m \times 2 + P_{ng} \times 1 + P_n \times 0}$$

Where,

PCI = Problem Confrontation Index

$\mathbf{P_{vs}}$ = No. of respondents confronted very severe problem

$\mathbf{P_s}$ = No. of respondents confronted severe problem

$\mathbf{P_{ms}}$ = No. of respondents confronted moderately severe problem

$\mathbf{P_m}$ = No. of respondents confronted moderate problem

$\mathbf{P_{ng}}$ = No. of respondents confronted negligible problem

$\mathbf{P_n}$ = No. of respondents confronted no problem at all

3.7.3 Varietal status of mango

3.7.3.1 Local mango germplasm

The researcher collected information about the local germplasm of mango trees. The information included size of mango fruits, degrees of sweetness, number of trees, age, fruiting age, how many times it bear fruit in a year and when, production per plant in number of fruit and their weight (Item No. 13(b), Appendix-I).

3.7.3.2 Information about year round mango varieties

The researcher collected information about the year round germplasm of mango. The information included name of the germplasm, number of trees, age, fruiting age, how many times it bear fruit in a year and when, production per plant in number of fruit and their weight (Item no 14: Appendix-I)

3.7.3.3 Use of manures and fertilizers

The name of different manures and fertilizers were included in the interview schedule. The fertilizers and manures were urea, TSP, MP, cow dung, farm yard manure, compost, Gypsum, Zink sulphate etc.(Item No. 16 of Appendix-I)

3.7.3.4 Intercultural operation done in mango plants

The researchers categorized the intercultural operation in to weeding, irrigation, mulching, spading, insect and disease control, fruit thinning, pruning and training, inter cropping and others. On the other hand how many times and when it was done in a year and by what means it was done. (Item No. 17 of Appendix-I)

3.7.3.5 Insect and disease infestation

To know the situation about insect and disease infestation information were collected by asking question about the symptoms and their control measures they adopted. An item was prepared in the interview schedule (Item No.18, Appendix-I) in this purpose. Here the name of the disease and insects with their symptoms and control measures were asked. All the name of the diseases and insects were compiled from the interview schedule.

3.7.3.6 Propagation of mango trees

The respondents were asked about the propagation of mango trees. They were asked about the mode of propagation, time of propagation, number of propagules produced per year and percentage of their success (Item No. 19, Appendix-I).

3.7.3.7 Fruit and flower dropping

The respondents were asked about the flower and fruit dropping, their comments about the dropping and the preventive measures taken by them. (Item No. 20, Appendix-I).

Study conducted on the following causes of dropping

1. Diseases
2. Insects
3. Nutrient deficiency
4. Water deficiency

3.8 Data processing and analysis

3.8.1 Compilation of data

Collected data from the farmers were compiled, coded tabulated and analyzed in accordance with the objectives of the study. In this process, all the response in the interview schedule was given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative ones by means of suitable scoring whenever necessary. The response to the questions in the interview schedule was transferred to a master sheet to facilitate tabulation.

3.8.2 Categorization of data

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

3.8.3 Statistical technique

The analysis was performed using SPSS (Statistical Package for Social Sciences) computer package. Descriptive analysis such as range, number, percentage, mean, standard deviation and rank order were used whenever possible. Pearson's product Moment Co-efficient of Correlation (r) was used in order to explore the relationship between the concerned variables. Throughout the study, at least five-percent (0.05) level of probability was used as basis of rejecting a null hypothesis.

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar, Dhaka

CHAPTER 4

RESULTS AND DISCUSSION

CHAPTER 4

RESULTS AND DISCUSSION

In this chapter the findings of this study are presented and results have been discussed in relation to the present findings and also to those found in other studies. The study investigated the production performance of mango (*Mangifera indica*) at sadar upazila under Dinajpur district of Bangladesh. In accordance with the objectives of the study, presentation of the findings has been made in four sections of this chapter.

Section 4.1: Selected characteristics of the mango growers.

Section 4.2: Dependent variables.

Section 4.3: Status of mango production.

Section 4.4: Relationship between the selected characteristics of the mango growers and dependent variables.

Table 4.1 Selected characteristics profile of the mango growers

SL. No.	Selected characteristics	Measuring unit	Observed range	Categories	Respondents		Mean	SD
					Number	Percent		
1	Age	Year	21-56	Young (<25)	8	7.60	39.55	8.88
				Middle aged (25-50)	80	76.20		
				Old (>50)	17	16.20		
2	Education	Years of schooling	0-13	Illiterate (0)	20	19.00	6.19	4.216
				Primary level (1-5)	40	38.10		
				Secondary level (6-10)	28	26.70		
				Higher Secondary level 11-12	14	13.30		
				Graduate and above (>12)	3	2.90		
3	Family size	No. of members	0-9	Small family (0-2)	22	21.00	3.74	1.743
				Medium family (3-5)	70	66.60		
				Large family ≥6	13	12.40		
4	Farm size	Hectare	0.187-3.5	Land less (<0.02)	0	0.00	1.58	0.869
				Marginal (0.02-0.20)	5	4.80		
				Small land holder (0.21-1.0)	21	20.00		
				Medium land holder (1.01-3.00)	67	63.80		
				Large land holder (>3)	12	11.40		

Table 4.1 Selected characteristics of the mango growers (Continued)

SL. No.	Selected characteristics	Measuring unit	Observed range	Categories	Respondents		Mean	SD
					Number	Percent		
5	Land used in mango production	Hectare	0.186-3.19	Small (Up to 0.20)	8	7.60	1.53	0.845
				Moderate (0.21-1.00)	27	25.70		
				Moderately large (1.01-2.80)	63	60.00		
				Large (>2.80)	7	6.70		
6	Annual family income	Taka	190000-721000	Low (Up to 200000)	16	15.20	351.69	177.970
				Medium (200001-300000)	14	13.40		
				High (300001-500000)	56	53.30		
				Very high (> 500000)	19	18.10		
7	Experience in mango production	Year	4-32	Low (<10)	15	14.30	15.08	5.452
				Medium (10-20)	67	63.80		
				High (>20)	23	21.90		
8	Experience in agriculture	Year	5-40	Very low (<10)	6	5.70	20.08	8.337
				Low (10-15)	29	27.60		
				Medium (16-25)	40	38.10		
				High (26-30)	14	13.40		
				Very high (>30)	16	15.20		
9	Extension media contact	Score	8-27	Low (<10)	7	6.70	14.85	5.522
				Medium (10-15)	58	55.20		
				High (>15)	40	38.10		
10	Organizational participation	Score	0-2	Not at all (0)	54	51.40	0.69	0.788
				Low (1)	30	28.60		
				High (>1)	21	20.00		
11	Cosmopoliteness	Score	5-26	Low (<15)	47	44.80	14.84	4.133
				Medium (15-20)	50	47.60		
				High (>20)	8	7.60		
12	Knowledge on mango production	Score	7-16	Low (≤ 7)	12	11.40	12.15	2.731
				Medium (8-10)	22	21.00		
				High (>10)	71	67.60		

4.1.1 Age

The observed age of the respondents ranged from 21 to 56 years and the average was 39.55 years with a standard deviation of 8.880. On the basis of age, the respondents were classified into three categories as presented in table 4.1

Data presented in the table 4.1 showed that the highest proportions of the respondents (76.20%) were middle aged followed by the old aged (16.20%) and

only 7.60% of respondents were young. It is evident that middle-aged peoples are interested in mango production.

4.1.2 Education

The observed education of the respondents ranged from 0 to 13 years of schooling and the average was 6.19 with a standard deviation of 4.216. On the basis of general education, the respondent were classified into five categories as presented in table 4.1

Data contained in the table 4.1 showed that the majority (38.10 %) of respondents were in the primary level followed by secondary level (26.70 %) and illiterate (19 %). The lowest proportions of respondents (2.9 %) were graduate and above. About 13.3 % respondents were of Higher Secondary level. The literacy percentage of the study area is under national average. But the trend of literacy percentage is becoming higher as the Secondary level indicates the second highest percentage.

4.1.3 Family size

The observed family size of the respondents ranged from 0 to 9 members with a mean and standard deviation 3.74 and 1.743 respectively. Categories and distribution of the respondents on the basis of family size is shown in table 4.1

Data presented in the table 4.1 indicated that most of the respondents (66.6 %) had medium family size (3-5 members) followed by small family size (0-2 members) with 21 % of respondents. Only 12.4 % of the respondents had large family size (≥ 6 members). So, from the tabulated data it is clear that in the study area people like to live together in joint family. It was also revealed that most of the respondents having medium sized family were engaged in mango production.

4.1.4 Farm size

The observed farm size of the respondents ranged from 0.187 to 3.50 hectares. The average farm size of the respondents was 1.58 ha which is greater than the national average (0.81 hectare) and standard deviation (Std.) was 0.869. On the basis of farm size the growers were classified into five categories as shown in table 4.1

Data shown in the table 4.1 indicated that most of respondents (63.80 %) were medium land holder having 1.01-3.00 ha of land followed by 20 % of respondents which were small land holder having 0.21-1.0 ha of land, 4.80 % were marginal land holder having 0.02-0.20 ha and only 11.40 % were large land (>3ha) holder. No landless (<0.02 ha) were found.

4.1.5 Land used in mango production

The observed land used in mango production of the respondents ranged from 0.186-3.19 hectares with a mean of 1.53 ha and standard deviation of 0.845. On the basis of mango production land the respondents were classified into four categories as shown in table 4.1

Data shown in the table 4.1 indicated that majority (60%) of respondents had moderately large sized (1.01-2.80 ha) of lands followed by 25.70 % of respondents having moderate sized (0.21-1.00 ha) of lands and only 6.70 % had large sized (>2.80 ha.) of lands. So it could be concluded that the respondents of the study area were very much adaptive for mango production.

4.1.6 Annual family income

The observed annual family income (includes all income sources, Chapter 3) of the respondents ranged from Tk. 190000 to 721000. The annual mean family income of the respondents was 351.69 and standard deviation was 177.97. On the basis of annual family income the respondents were classified into five categories as shown in table 4.1

Data shown in the table 4.1 indicated that most of the respondents (53.30 %) had high income ranging from Tk. 300001-500000 followed by 18.10 % of respondents that having very high income (> 500000 taka). 15.20 % of respondents had low income (Up to Tk. 200000) and only 13.40 % of the respondents had medium income (Tk. 2,00001-3,00000).

Annual family income of the growers is a vital factor for farming enterprise. In this study most of the growers having high income probably possessed more positive benefit from using improved production technology.

4.1.7 Experience in mango production

The observed experience in mango production of the respondents ranged from 4 to 32 years with a mean and standard deviation of 15.08 and 5.452 respectively. On the basis of experience in mango production, the respondents were classified into three categories as shown in table 4.1

Data shown in the table 4.1 indicated that the highest percent of respondents (63.80 %) had medium experience (10-20 years) followed by the respondents (21.90 %) having high (>20 years) experience. Rest 14.30 % of respondents had low experience (<10 years).

4.1.8 Experience in agriculture

The observed experience in agriculture of the respondents ranged from 5 to 40 years with a mean and standard deviation of 20.08 and 8.337 respectively. On the basis of experience in agriculture, the respondents were classified into five categories as shown in table 4.1

Data shown in the table 4.1 indicated that most of the respondents (38.10 %) had medium experience (16-25 years) followed by the respondents (27.60%) having low experience (10-15 years). More than one-sixth (15.20 %) of respondents had high experience (>30 years) and only 5.70 % of respondents had very low experience (<11 years)

4.1.9 Extension media contact

Farmers use various information sources and media to a different extent in order to receive production information.The observed of extension media contact of the respondents ranged from 8 to 27 scores. The average and standard deviation were 14.85 and 5.522 respectively. On the basis of extension media contact scores, the respondents were classified into three categories as shown in table 4.1

Deliberate analysis of the data presented in table 4.1 showed that the highest percentage (55.20 %) of the respondents had medium extension media exposure or contact as compared to 6.70 % had low media exposure and 38.10 % had high

extension media contact. Growers' exposure to a variety of information sources usually guides them to identify problems in mango production.

4.1.10 Organizational participation

The observed organizational participation of the respondents ranged from 0-2 years with a mean and standard deviation of 0.69 and 0.788 respectively. On the basis of organizational participation, the respondents were classified into three categories as shown in table 4.1

Analysis of the data presented in table 4.1 showed that majority (51.40 %) of the respondents had no participation at all. However, 28.60 % of the respondents had low participation. Only 20% of the respondents had high participation.

4.1.11 Cosmopoliteness

The observed cosmopoliteness of the respondents ranged from 5-26 scores with a mean and standard deviation of 14.84 and 4.133 respectively. On the basis of cosmopoliteness, the respondents were classified into three categories as shown in table 4.1

The data presented in the table 4.1 indicated that majority (47.60 %) of the respondents had medium cosmopoliteness as compared to 44.80 % had low cosmopoliteness and it means that most of the respondents have more or less orientation to out of his own social system which might help them in order to improve mango production.

Cosmopoliteness enhances the opportunity for an individual to have himself to contact with outside information sources. It is, therefore, possible that an individual with substantial cosmopoliteness would have an augmented possession of accumulated knowledge, experience and problem solving means.

4.1.12 Knowledge on mango production

The observed knowledge on mango production of the respondents ranged from 7-16 scores with a mean and standard deviation of 12.15 and 2.731 respectively. On

the basis of knowledge, the respondents were classified into three categories as shown in table 4.1

Deliberate analysis of the data presented in the table 4.1 showed that most of the respondents (67.60 %) had high knowledge while 21 % of the respondents had medium and 11.40 % had low knowledge on mango production. That means the mango grower of the study area belongs to high knowledge group which added them extra advantages.

Table 4.2 Dependent variables

SL. No.	Selected characteristics	Measuring unit	Observed range	Categories	Respondents		Mean	SD
					Number	Percent		
1	Annual mango production	Ton	5.89-15	Low (< 7)	11	10.50	8.11	1.577
				Medium (7-10)	81	77.10		
				High (> 10)	13	12.40		
2	Annual income from mango production	Taka	178000-500000	Low (Up to 200000)	4	3.80	240.22	46.372
				Medium (200001-250000)	74	70.50		
				High (250001-500000)	27	25.70		
3	Mango varieties produced in the study area	No. of varieties	4-26	Small (1-10)	34	32.40	12.59	4.959
				Moderate (11-20)	62	59.00		
				Large (>20)	9	8.60		
4	Problem confrontation in mango production	Score	29-58	Low (< 30)	7	6.70	41.93	7.874
				Medium (30-50)	79	75.20		
				High (>50)	19	18.10		

4.2.1 Annual mango production

The observed per hectare annual mango production of the respondents ranged from 5.89-15 tons with a mean and standard deviation of 8.11 and 1.577 respectively. On the basis of per hectare annual mango production, the respondents were classified into three categories as shown in table 4.2

Data shown in the table 4.2 indicated that majority (77.10 %) of respondents involved in mango production had medium (7-10 ton) production followed by high

production (> 10 ton) with 12.40 % of respondents. Low production (<7 ton) was only for few percent (10.50 %) of respondents.

4.2.2 Annual income from mango production

The observed annual income from per hectare mango production of the respondents ranged from Tk. 178000 to 500000 with a mean and standard deviation of 240.22 and 46.372 respectively. On the basis of annual income from per hectare mango production, the respondents were classified into five categories as shown in table 4.2

Data shown in the table 4.2 indicated that majority of respondents (70.50 %) had medium income (tk. 200001-250000) from mango production followed by 25.70 % of respondents having high income (Tk.250001-500000). Only 3.80 % of respondents had low (Tk. Up to 200000).

4.2.3 Mango varieties produced in the study area

The observed mango varieties produced of the respondents ranged from 4-26 in number with a mean and standard deviation of 12.59 and 4.959 respectively. On the basis of number of mango varieties produced, the respondents were classified into three categories as shown in table 4.2

Data shown in the table 4.2 indicated that majority of respondents (59 %) had moderate number (11-20) of mango varieties followed by 32.40 % of respondents having 1-10 varieties. Only 8.60 % of respondents had large (>20) number of varieties. From these analyses it is clear that growers of the study area are adapted with a lots of mango varieties.

4.2.4 Problem confrontation in mango production

The observed scores that were obtained by the Problem Confrontation Index (PCI) formula to calculate problem confrontation status in mango production ranged from 29 to 58 with a mean and standard deviation of 41.93 and 7.874 respectively. On the basis of overall problem confrontation scores, the growers were classified into three categories as shown in table 4.2

Data presented in the table 4.16 indicated that majority (75.20 %) of the growers confronted medium problem while 18.10 % of them confronted high problem and only 6.70 % of growers faced low problem. These analyses indicate that the desired level of mango production will not be achieved if the different problems confronted by the growers are not solved by the concern authority.

4.3 Status of mango production

4.3.1 Production status in other than homestead area

4.3.1a Total cultivable land size

The observed range of total cultivable land size of the respondents was from 0.187-3.200 hectares with a mean and standard deviation of 1.56 and 0.848 respectively. On the basis of total cultivable land size, the respondents were classified into five categories as shown in table 4.3

Table 4.3 Distribution of the respondents according to total cultivable land size

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
Very small	0.187-3.200	Up to 0.20	5	4.80	1.56	0.848
Small		0.21-0.50	10	9.50		
Moderate		0.51-1.00	11	10.50		
Moderately large		1.01-2.80	68	64.70		
large		> 2.80	11	10.50		
Total			**105**	**100**		

Data presented in the table 4.3 indicated that majority percent (64.70%) of the respondents had moderately large sized (1.01-2.80 ha) of lands followed by 10.50 % of respondents having both large (>2.80 ha) and moderate sized of lands

individually. Only 9.50 % had small (0.21- 0.50 ha.) and 4.80 % had very small sized (Up to 0.20 ha.) of land.

4.3.1b Fruit cultivable land size

The observed range of fruit cultivable land size of the respondents was from 0.186-3.200 hectares with a mean and standard deviation of 1.55 and 0.844 respectively. On the basis of fruit cultivable land size, the respondents were classified into four categories as shown in table 4.4

Table 4.4 Distribution of the respondents according to fruit cultivable land size

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
Small	0.186-3.200	Up to 0.20	7	6.70	1.55	0.844
Moderate		0.21-1.00	24	22.80		
Moderately large		1.01-2.80	66	62.90		
large		> 2.80	8	7.60		
Total			**105**	**100**		

Data presented in the table 4.4 indicated that majority percent (62.90 %) of the respondents had moderately large sized (1.01-2.80 ha) of lands followed by 22.80 % of respondents having moderate sized (0.21-1.00 ha) of lands. Only 7.60 % of respondents had large (> 2.80 ha.) and 6.70 % of respondents had small sized (Up to 0.20 ha.) of lands.

4.3.1c Fruit cultivated land size

The observed range of fruit cultivated land size of the respondents was from 0.186-3.190 hectares with a mean and standard deviation of 1.54 and 0.843 respectively. On the basis of fruit cultivated land size, the respondents were classified into four categories as shown in table 4.5

Table 4.5 Distribution of the respondents according to fruit cultivated land size

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
Small	0.186-3.190	Up to 0.20	8	7.60	1.54	0.843
Moderate		0.21-1.00	25	23.80		
Moderately large		1.01-2.80	65	61.90		
large		> 2.80	7	6.70		
Total			**105**	**100**		

Data presented in the table 4.5 indicated that majority percent (61.90 %) of the respondents had moderately large sized (1.01-2.80 ha) of lands followed by 23.80 % of respondents having moderate sized (0.21-1.00 ha) of lands. Only 6.70 % of respondents had large (> 2.80 ha.) and 7.60 % of respondents had small sized (Up to 0.20 ha.) of land.

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar, Dhaka

4.3.2 Production status in homestead area

4.3.2a Fruit cultivable land in homestead area

The observed range of fruit cultivable land size in homestead area of the respondents was from 0.000-0.040 hectares with a mean and standard deviation of 0.01 and 0.009 respectively. On the basis of fruit cultivable land size in homestead area, the respondents were classified into three categories as shown in table 4.6

Table 4.6 Distribution of the respondents according to fruit cultivable land in homestead area

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
No land	0.000-0.040	0.00	26	24.80	0.01	0.009
Small		0.001-0.01	45	42.80		
Large		>0.01	34	32.40		
Total			**105**	**100**		

Data presented in the table 4.6 indicated that majority percent (42.80 %) of the respondents had small sized (0.001-0.01 ha) of lands followed by 32.40 % of respondents having large sized (>0.01 ha) of land. About 24.80 % of the respondents had no land for the definite purpose.

4.3.2b Fruit cultivated land in homestead area

The observed range of fruit cultivated land size in homestead area of the respondents was from 0.000-0.030 hectares with a mean and standard deviation of 0.01 and 0.008 respectively. On the basis of fruit cultivated land size in homestead area, the respondents were classified into three categories as shown in table 4.7

Table 4.7 Distribution of the respondents according to fruit cultivated land in homestead area

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
No land	0.000-0.030	0.00	42	40.00	0.01	0.008
Small		0.001- 0.01	46	43.80		
Large		>0.01	17	16.20		
Total			**105**	**100**		

Data presented in the able 4.7 indicated that majority percent (43.80 %) of the respondents had small sized (0.001-0.01 ha) of lands followed by 40 % of respondents having no land and only 16.20 % of the respondents had large sized of (>0.01) land used for fruit production.

4.3.2c Mango cultivated land in homestead area

The observed range of mango cultivated land size in homestead area of the respondents was from 0.000-0.010 hectares with a mean and standard deviation of 0.002 and 0.004 respectively. On the basis of mango cultivated land size in homestead area, the respondents were classified into two categories as shown in table 4.8

Table 4.8 Distribution of the respondents according to mango cultivated land in homestead area

Categories	Observed range (Hectare)	Categorized range (Hectare)	Respondents		Mean	Standard deviation
			Number	Percent		
No land	0.000-0.010	0.00	84	80.00	0.002	0.004
Small to medium		0.001- 0.01	21	20.00		
Total			**105**	**100**		

Data presented in the table 4.8 indicated that majority percent (80 %) of the respondents had used no land for mango production followed by 20 % of respondents having small to medium sized of lands used for mango production.

4.3.3 Production status with relative measurements

4.3.3. a Annual mango sale

The observed range of annual mango sale from per hectare production of the respondents was from 5.89-15 tons with a mean and standard deviation of 8.11 and 1.577 respectively. On the basis of annual mango sale from per hectare production, the respondents were classified into three categories as shown in table 4.9

Table 4.9 Distribution of the respondents according to the annual mango sale from per hectare production

Categories	Observed Range (Ton)	Categorized range (Ton)	Respondents		Mean	Standard deviation
			Number	Percent		
low	5.89-15	< 7	11	10.50	8.11	1.577
Medium		7-10	81	77.10		
High		> 10	13	12.40		
Total			**105**	**100**		

Data shown in the table 4.9 indicated that majority (77.10 %) of respondents involved in mango production had medium (7-10 ton) annual sale followed by high

sale (> 10 ton) with 12.40 % of respondents. Low sale (<7 ton) was only for few percent (10.50 %) of respondents.

4.3.3b Annual expenditure for per mango tree

The observed annual expenditure range per mango tree was from Tk.80-250 with a mean and standard deviation of 156.67 and 40.231 respectively. On the basis of annual expenditure for per mango tree, the respondents were classified into three categories as shown in table 4.10

Table 4.10 Distribution of the respondents according to the annual expenditure for per mango tree

Categories	Observed Range (Taka)	Categorized range (Taka)	Respondents		Mean	Standard deviation
			Number	Percent		
low	80-250	≤ 100	10	9.50	156.67	40.231
Medium		101-200	84	80.00		
High		201-300	11	10.50		
Total			**105**	**100**		

Data shown in the table 4.10 indicated that majority (80 %) of the respondents involved in mango production had medium expenditure (Tk.101-200) for per mango tree followed by 10.50 % of respondents with high expenditure (201-300). Very poor percent 9.50 % of respondents had low (≤ 100 taka) expenditure. The above analyses explore that the growers were very caring about their production.

4.3.3c Weight of per fruit

The observed weight range of per mango was from 150-750 g. On the basis of weight of per fruit, the respondents were classified into six categories as shown in Table 4.11

Table 4.11 Distribution of the respondents according to the weight of per fruit

Categories	Observed range (gm)	Categorized range (gm)	Respondents	
			Number	Percent
Very low	150-750	<200	7	6.70
Low		201-250	7	6.70
Moderate		251-350	13	12.40
Moderately high		351-500	21	20.00
High		501-700	37	35.20
Extra high		>700	20	19.00
Total			**105**	**100**

The table 4.11 showed that weight of individual mango fruit was markedly varied. The maximum percent of (35.20 %) of the respondents had high weighed fruits (501-700 g) followed by 20 % and 19 % of the respondents having moderately high (351-500 g) and extra high (>700 g) weighed fruits.

4.3.4 Varietal status of mango

4.3.4a Status of recognized mango varieties

Thirty (30) recognized mango varieties were cultivated by the growers of my study area. Their percentages are shown in the table 4.12 which indicated the status of the varieties. Gopalbhog ranked 1st as it occupied the highest percentage (15.90 %) out of total mango varieties which is followed by Mishribhog (15.70 %) which ranked 2nd, Mishribhog (Moshokortia) (10 %) which ranked 3rd, Langra (Hazipuri) (9.90 %), Surjapoori (8 %), Fazli (6.60 %) etc.

Table 4.12 Ranking status of recognized mango varieties based on their availability in respondents' farm

Mango Varieties	Percentage	Ranking Status
Gopalbhog	15.90	*1st*
Mishribhog	15.70	*2nd*
Mishribhog (Moshokortia)	10.00	*3rd*
Langra (Hazipuri)	9.90	*4th*
Surjopoori	8.00	*5th*
Fazli	6.60	*6Th*
Fukulbiyan	4.90	*7th*
Green Shaheber Brindabuni	4.50	*8th*
Ashwina	3.10	*9th*
Mohonbhog	2.80	*10th*
Kufpuri	1.60	*11th*
Chini Fazli	1.40	*12.5th*
Kalua Gopalbhog	1.40	*12.5th*
Darika fazli / Bandiguri	1.30	*14.5th*
Surma Fazli	1.30	*14.5th*
Kadua Fazli	1.20	*17th*
Jethua Mishribhog	1.20	*17th*
Amrapali (BARI Aam-3)	1.20	*17th*
Mallika	1.10	*19th*
Chatapara	0.80	*21.5th*
Vaduria	0.80	*21.5th*
Dilsad	0.80	*21.5th*
Shaheb Khawka	0.80	*21.5th*
Bou fushlani	0.70	*24.5th*
Rajbhog	0.70	*24.5th*
Ruier mura	0.60	*26th*
Hilshapetti	0.50	*27.5th*
Dudh shagor	0.50	*27.5th*
Benison	0.40	*29th*
Baramashi droop	0.30	*30th*

4.3.4b Local mango germplasm

Local mango germplasm are categorized based on their number belonged by the growers (table 4.13). The farm of most of the respondents (85.70 %) was not provided with local mango germplasm while only 14.30 % had grown small to medium number of (1-6) local mango germplasm.

Table 4.13 Distribution of the respondents based on number of local mango germplasm available in their farm

Categories	Range (Germplasm number)	Respondents	
		Number	Percent
Not at all	0	90	85.70
Small to medium	1-6	15	14.30
Total		**105**	**100**

4.3.5 Status of year round mango varieties

4.3.5a Quantitative status of year round mango varieties

Year round mango varieties are categorized as presented in table 4.14. Majority of the respondents (77.20 %) had no year round mango varieties in their farm while 11.40 % had both large (6-10) and small (1-5) number of year round mango trees.

Table 4.14 Distribution of the respondents based on number of year round mango varieties available in study area

Categories	Range (No. of trees)	Respondents	
		Number	Percent
No tree	0	81	77.20
Small	1-5	12	11.40
Large	6-10	12	11.40
Total		**105**	**100**

4.3.5b Varietal status of year round bearing mango trees

Varietal status of year round bearing mango is shown in the Table 4.15. The only year round mango variety is *Baramashi droop* which is belonged to 100 % of the respondents having (24 growers) year round bearing trees.

Table 4.15 Distribution of the respondents based on year round varieties available in the study area

Varieties	**Respondents**	
	Number	**Percent**
Baramashi droop	24	22.80
Total	**24**	**100**
No year round varietal trees	81	77.20
Grand total	**105**	**100**

4.3.6 Management status of mango trees

4.3.6a Fertilizer usage

It was observed that all of the respondents (100%) used cow dung and compost to the mango trees while 95.20 % used Urea and TSP individually. MP, Gypsum and Zinc sulphate were used by 94.30%, 50.50 % and 65.70 % of the respondents respectively (Table 4.16)

Table 4.16 Percentage of fertilizer use

Fertilizer	**Citation Number**	**Percentage**
Urea	100	95.20
TSP	100	95.20
Compost	105	100
Cow dung	105	100
MP	99	94.30
Zinc sulphate	69	65.70
Gypsum	53	50.50

4.3.6b After care of mango trees

It was found that maximum percentages of the respondents did not practice any intercultural operations in their mango farm (Table 4.17). Most (53 %) of the respondents practised spading 1-2 times and 47 % did it for 3-4 times. 51 % of respondents practised pruning and training. 47 % irrigated their trees for 3-4 times. Mulching and inter cropping were completely avoided by 98 % and 58% respectively.

Table 4.17 After care of mango trees practiced by the respondents

Operations	1-2 times (%)	3-4 times (%)	Not at all (%)
Irrigation	43	47	10
Inter cropping	35	7	58
Mulching	2	0	98
Spading	53	47	0
Fruit thinning	44	33	23
Pruning and training	51	3	46
Weeding	46	35	19

4.3.7 Propagation of mango trees

Propagation of mango trees was practiced by 68.60 % of the respondents because a significant number of respondents (33.40 %) did not practise propagation (Table 4.18). Of them 42.80 % practised seed propagation followed by Grafting (25.80 %).

Table 4.18 Distribution of the respondents based on propagation practices for mango in the study area

Propagation method	Respondents	
	Number	Percent
Grafting	27	25.80
Seed	45	42.80
No propagation	33	31.40
Total	**105**	**100**

4.3.8 Problems in mango production

On the basis of Problem Confrontation Index (PCI) formula (Chapter 3), out of the 16 problems, insects and diseases infestation was identified as the major problem followed by dropping of fruits and flowers. The observed problem confrontation index of the problems ranged from 15 to 431. 1st, 2nd and 3rd ranked problems with their PCI are shown below (Table 4.19)

Table 4.19 Rank order of the problem confrontation by the growers in mango cultivation

SL. No.	Problem items	PCI	Rank order
1	Insect and disease infestation	431	1st
2	Dropping of fruits and flowers	413	2nd
3	Scarcity of better varieties/ Seedling/ grafts etc.	399	3rd

For the major problems status, causes and solutions are discussed below.

4.3.8a Insect and disease infestation status

It was found from the survey that majority of the growers (62.90 %) emphasized on diseases infestation (Table 4.20).

Table 4.20 Distribution of the respondents based on insect and disease infestation status

Infestation	Respondents	
	Number	Percent
Diseases infestation	66	62.90
Insects infestation	39	37.10
Total	**105**	**100**

4.3.8b Disease infestation of mango

The diseases of mango had been presented in table 4.21. From the survey it was found that the mango plants were mostly (48.50 %) attacked by Anthracnose which is followed by 25.70 % of Powdery mildew and 12.40 % of Sooty mould.

Table 4.21 Distribution of the respondents based on disease infestation of mango

Disease type	Respondents	
	Number	Percent
Anthracnose	51	48.50
Powdery mildew	27	25.70
Sooty mould	13	12.40
Die-back	7	6.70
Stem end rot	7	6.70
Total	**105**	**100**

4.3.8c Insect infestation of mango

The occurrence of insect infestation had been shown in the table 4.22. Most of the respondents (39 %) reported that their plants are attacked by hopper which is followed by fruit fly (23.80 %), stem borer (14.30 %), leaf cutting weevil (10.50 %) and others.

Table 4.22 Distribution of the respondents based on insect infestation of mango

Insects type	Respondents	
	Number	Percent
Fruit fly	25	23.80
Stem borer	15	14.30
Hopper	41	39.00
Gall insects	6	5.70
Leaf cutting weevil	11	10.50
Fruit weevil	3	2.90
Defoliator	2	2.00
Spider mite	1	0.90
Termite	1	0.90
Total	**105**	**100**

4.3.8d Dropping of fruits and flowers

The occurrence of dropping of fruits and flowers has been shown in table 4.23. From the table it was evident that all (100%) of the respondents said that the dropping of fruits and flowers is a common problem.

Table 4.23 Response on dropping fruits and flowers

Occurrence of dropping	Yes	No
Flower	100%	-
Fruit	100%	-

4.3.8e Causes of dropping fruits and flowers

The causes of flower and fruit dropping had been shown in the table 4.24. It was found that the main cause of fruit and flower dropping was diseases (41.90 %) and then insects (37.10 %). The other causes they mentioned were water deficiency and nutrient deficiency were same in percentage (10.50 %).

Table 4.24 Distribution of the respondents based on causes of dropping of fruits and flowers of mango in the study area

Causes	Respondents	
	Number	Percent
Diseases	44	41.90
Insects	39	37.10
Nutrient deficiency	11	10.50
Water deficiency	11	10.50
Total	**105**	**100**

4.3.8f Treatments to protect the flower and fruit dropping

The treatments for the protection of flowers and fruits dropping had been shown in table 4.25. Most of the respondents (90.50 %) took protective or curative measures for controlling the dropping of fruits and flowers. Fungicides were used by 41.90 % of respondents followed by insecticides (37.10 %).

Table 4.25 Distribution of the respondents based on treatments to protect the flower and fruit dropping

Causes	Respondents	
	Number	Percent
Inter cultural operation	12	11.50
Insecticide	39	37.10
Fungicide	44	41.90
Not at all	10	9.50
Total	**105**	**100**

4.3.9 Profit from mango production

All (100%) of the respondents reported that mango production is profitable in Dinajpur district. None indicated mango production as a non profitable enterprise.

4.4 Relationship between the selected characteristics of the mango growers and dependent variables

The purpose of this section was to examine the relationship between twelve (12) selected characteristics of the mango growers and four (4) dependent variables in mango production. The 12 selected characteristics of the mango growers included age, education, family size, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, extension media contact, organizational participation, cosmopoliteness and knowledge on mango production. Each of the characteristics constituted the independent variables while annual mango production, annual income from mango production, mango varieties produced and problem confrontation in mango production were the dependent variables. To explore the relationship between the selected individual characteristics of the growers and their dependent variables, Pearson's product moment co-efficient of correlation (r) was used. Five percent level of probability was used as the basis for rejection of a null hypothesis. The computed values of `r` were compared with relevant tabulated values for 103 degrees of freedom at the designated level of probability in order to determine whether the relationships

between the concerned variables were significant or not and other status of significance.

The summary results of the correlation analysis have been presented in table 4.26 showing the relationship between concerned variables in mango production.

Table 4.26 Co-efficient of correlation showing relationship between selected characteristics of the mango growers and dependent variables in mango production (N=105)

Dependent Variables / Independent Variables	Annual mango production	Annual income from mango production	Mango varieties produced	Problem confrontation in mango production
Age	0.144 NS	0.181 NS	0.372**	0.635**
Education	0.148 NS	0.090 NS	0.299**	-0.214*
Family size	-0.180 NS	-0.181 NS	0.321**	0.420**
Farm size	0.539**	0.509**	0.766**	0.433**
Land used in mango production	0.573**	0.547**	0.760**	0.431**
Annual income	0.451**	0.419**	0.756**	0.442**
Experience in mango production	0.270**	0.290**	0.547**	0.719**
Experience in agriculture	0.122 NS	0.159 NS	0.342**	0.651**
Extension media contact	0.215*	0.271**	0.347**	-0.567**
Organizational participation	0.062 NS	0.071 NS	0.159 NS	0.356**
Cosmopoliteness	-0.083 NS	-0.100 NS	-0.167 NS	-0.083 NS
Knowledge on mango production	0.304**	0.335**	0.416**	0.707**

NS= Not significant
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar, Dhaka

4.4.1. Relationship between selected characteristics of the mango growers and annual mango production

According to the table 4.26, the following observations are made regarding the relationship.

a) The relationships of annual mango production respectively with age, education, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, Extension media contact organizational participation and knowledge on mango production showed a tendency in the positive direction.

b) The relationships of annual mango production respectively with family size and cosmopoliteness showed a tendency in the negative direction.

c) The relationship of annual mango production with extension media contact (-0.215*) was found significant as the co-efficient of correlation (r) of the variable was found larger than the tabulated value with 103 degrees of freedom at 0.05 level of probability.

d) The respective relationships between annual mango production and farm size (0.539**), land used in mango production (0.573**), annual income (0.451**), experience in mango production (0.270**), knowledge in mango production (0.304**) were found significant as the co-efficient of correlation (r) of these variables were found larger than the tabulated value with 103 degrees of freedom at 0.01 level of probability.

e) The relationships of annual mango production respectively with age, education, family size, and experience in agriculture, organizational participation and cosmopoliteness were found insignificant.

4.4.2 Relationship between selected characteristics of the mango growers and annual income from mango production

According to the table 4.26, the following observations are made regarding the relationship.

a) The relationships of annual income from mango production respectively with age, education, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, extension media contact, organizational participation and knowledge on mango production showed a tendency in the positive direction.

b) The relationships of annual income mango from production respectively with family size, and cosmopoliteness showed a tendency in the negative direction.

c) The relationships of annual income mango from production respectively with farm size (0.509**), land used in mango production (0.547**), annual income (0.419**), experience in mango production (0.290**), extension media contact (0.271**) and knowledge in mango production (0.335**) were found significant as the co-efficient of correlation (r) of these variables were found larger than the tabulated value with 103 degrees of freedom at 0.01 level of probability.

d) The relationships of annual income mango from production respectively with age, education, family size and experience in agriculture, organizational participation and cosmopoliteness were found insignificant.

4.4.3 Relationship between selected characteristics of the mango growers and mango varieties produced

According to the table 4.26, the following observations are made regarding the relationship.

a) The relationships of number of mango varieties produced respectively with age, education ,family size, farm size, land used in mango production, annual income,

experience in mango production, experience in agriculture, extension media contact, organizational participation, knowledge on mango production showed a tendency in the positive direction.

b) The relationship of number of mango varieties produced with cosmopoliteness showed a tendency in the negative direction.

c) The relationships of number of mango varieties produced respectively with age (0.372**), education (0.299**) ,family size (0.321**), farm size (0.766**), land used in mango production (0.760**), annual income (0.756**), experience in mango production (0.547**), experience in agriculture (0.342**), extension media contact (0.347**) and knowledge in mango production (0.416**) were found larger than the tabulated value with 103 degrees of freedom at 0.01 level of probability.

d) The relationships of number of mango varieties produced respectively with organizational participation and cosmopoliteness were found insignificant.

4.4.4 Relationship between selected characteristics of the mango growers and problem confrontation in mango production

According to the table 4.26, the following observations are made regarding the relationship.

a) The relationships of problem confrontation in mango production respectively with age, family size, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, organizational participation and knowledge on mango production showed a tendency in the positive direction.

b) The relationships of problem confrontation in mango production respectively with education, extension media contact and cosmopoliteness showed a tendency in the negative direction.

c) The relationship between problem confrontation in mango production and education (-0.214*) was found significant as the co-efficient of correlation (r) of this variable was found larger than the tabulated value with 103 degrees of freedom at 0.05 level of probability.

d) The relationships of problem confrontation in mango production respectively with age (0.635**), family size (0.420**), farm size (0.433**), land used in mango production (0.431**), annual income (0.442**), experience in mango production (0.719**), experience in agriculture (0.651**), extension media contact (-0.567**), organizational participation (0.356**)and knowledge in mango production (0.707**) were found significant as the co-efficient of correlation (r) of these variables were found larger than the tabulated value with 103 degrees of freedom at 0.01 level of probability.

e) The relationship between problem confrontation in mango production and cosmopoliteness was found insignificant.

CHAPTER 5

SUMMARY AND CONCLUSION

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Summary of findings

Data were collected from 105 randomly selected respondents of eight selected villages of Sadar upazila under Dinajpur district. Data were collected by using an interview schedule from the farmers during the March to August, 2008. Pearson's product moment co-efficient of correlation test was used to explore the relationship between concerned variables. The major findings of the study are summarized below:

5.1.1 Dependent variables

Annual mango production

Majority (77.10 %) of respondents involved in mango production had medium (7-10 ton) production with a mean and standard deviation of 8.11 and 1.577, respectively.

Annual income from mango production

Most of the respondents (70.50 %) had medium income (tk. 200001-250000) from mango production with a mean and standard deviation of 240.22 and 46.372, respectively.

Number of mango varieties produced in the study area

Majority of respondents (59 %) had moderate number (11-20) of mango varieties with a mean and standard deviation of 12.59 and 4.959, respectively.

Problem confrontation in mango production

Majority (75.20 %) of the growers confronted medium problem with a mean and standard deviation of 41.93 and 7.874, respectively.

5.1.2 Selected characteristics of the mango growers

Age

The highest proportions of the respondents (76.20%) were middle aged with a mean & standard deviation of 39.55 and 8.880, respectively.

Education

The majority (38.10 %) of respondents were in the primary level with a mean & standard deviation of 6.19 and 4.216, respectively.

Family size

Most of the respondents (66.6 %) had medium family size (3-5 members) with a mean and standard deviation 3.74 and 1.743, respectively.

Farm size

Most of the respondents (63.80 %) were medium land holder having 1.01-3.00 ha of land with a mean and standard deviation 1.58 and 0.869, respectively.

Land used in mango production

Majority (60%) of respondents had moderately large sized (1.01-2.80 ha) of lands with a mean 1.53 and standard deviation of 0.845.

Annual family income

Most of the respondents (53.30 %) had high income ranging from Tk. 300001-500000 with a mean 351.69 and standard deviation of 177.97.

Experience in mango production

The highest percent of respondents (63.80 %) had medium experience (10-20 years) with a mean and standard deviation of 15.08 and 5.452, respectively.

Experience in agriculture

Most of the respondents (38.10 %) had medium experience (16-25 years) with a mean and standard deviation of 20.08 and 8.337, respectively.

Extent media contact

The highest percentage (55.20 %) of the respondents had medium extension media exposure with a mean and standard deviation of 14.85 and 5.522, respectively.

Organizational participation

Majority (51.40 %) of the respondents had no participation at all with a mean and standard deviation of 0.69 and 0.788, respectively.

Cosmopoliteness

Majority (47.60 %) of the respondents had medium cosmopoliteness with a mean and standard deviation of 14.84 and 4.133, respectively.

Knowledge on mango production

Most of the respondents (67.60 %) had high knowledge with a mean and standard deviation of 12.15 and 2.731, respectively.

5.1.3 Relationship between the selected characteristics of the farmers with their dependent variables

Relationship had shown between twelve (12) selected characteristics of the mango growers and four (4) dependent variables. The Pearson product moment correlation (r) showed that farm size, land used in mango production, annual income, experience in mango production, extension media contact and knowledge in mango production respectively had significant relationship with annual mango production and annual income mango from production individually.

It was also found that age, education ,family size, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, extension media contact and knowledge in mango production respectively had significant and organizational participation and cosmopoliteness respectively had insignificant relationship with number of mango varieties produced.

Pearson product moment correlation (r) again showed that age, education ,family size, farm size, land used in mango production, annual income, experience in

mango production, experience in agriculture, extension media contact, organizational participation and knowledge in mango production respectively had significant and cosmopoliteness had insignificant relationship with problem confrontation in mango production.

5.2 Conclusion

Conclusions were drawn on the basis of findings of this study and their logical interpretation of findings and other relevant facts were stated below:

1. For mango production, highest proportion (60%) of respondents had moderately large sized (1.01-2.80 ha) of land which were almost entire (1.01-3.00 ha) of the farm size though mango cultivated land in homestead area were negligible and had no effect on total production.

2. Majority (77.10 %) of respondents involved in mango production had medium (7-10 ton) production and high production percentage was also so sound with 12.40 % of respondents (>10 ton). Production per hectare for some growers reached up to 15 tons. So, it may be concluded that, the study area bears a better mango production sign.

3. Highest proportions of the respondents (76.20%) were middle aged men as well as medium (1.01-3.00 ha) land holder who had primary level of educational qualification, medium (3-5) sized family, medium experience both in mango (10-20 years) production and in agriculture (16-25 years), medium extent media contact, no organizational participation, medium cosmopoliteness and high (>10 score) knowledge in mango production.

4. Most of the respondents (53.30 %) had high annual family income ranging from Tk. 300001-500000. But majority of respondents (70.50 %) had medium income (Tk. 200001-250000) from mango production followed by 25.70 % of respondents having high income (Tk.250001-500000). Majority (77.10 %) of respondents involved in mango production had medium (7-10 ton) annual sale.

5. Thirty (30) recognized mango varieties were cultivated by the growers in the study area. Of them Gopalbhog, Mishribhog & Mishribhog (Moshokortia) ranked 1st (15.90 %), 2nd (15.70 %) and 3rd (10 %) respectively. Most of the respondents (90 % & 77.20% respectively) had no local mango germplasm and year round mango trees.

6. Majority (75.20 %) of the growers confronted medium problems. From 16 listed problems, insect and disease infestation was identified as the major problem followed by dropping of fruits and flowers.

7. The findings indicate that farm size, land used in mango production, annual income, experience in mango production, extension media contact and knowledge in mango production respectively had significant relationship with annual mango production and annual income from mango production individually. That means the growers having higher these characteristics, the higher are the annual mango production and annual income from mango production.

8. The findings indicate that age, education, family size, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, extension media contact and knowledge in mango production respectively had significant relationship with number of mango varieties produced Hence, it is concluded that the growers having higher these characteristics, the higher become the number of mango varieties produced.

9. The findings indicate that age, family size, farm size, land used in mango production, annual income, experience in mango production, experience in agriculture, organizational participation and knowledge in mango production respectively had significant relationship with problem confrontation in mango production. So, the above characteristics are proportional to problem confrontation in mango production.

10. The findings indicate that education and extension media contact had individual negatively significant relationship with problem confrontation in mango production. Therefore, it is concluded that education and extension media contact are inversely proportional to problem confrontation in mango production.

11. The findings indicate that age, education and organizational participation respectively had positively and family size and cosmopoliteness respectively had negatively insignificant relationship with annual mango production and annual income from mango production respectively. Cosmopoliteness had negatively insignificant relationship with number of mango varieties produced and problem confrontation in mango production individually. Organizational participation had positively insignificant relationship with number of mango varieties produced.

5.3 Recommendations

Recommendations based on both the findings and conclusions of the study are presented below:

1. Mango has a high demand in local and foreign markets and its production is highly profitable. The farmers in the study area confronted medium problems in mango production. So, Government, concern GOs and NGOs should take necessary steps to minimize the problem confrontation of the farmers.

2. The education of the growers is essential for any development programme. It is necessary for creating awareness about any improved production technologies. To increase the level of education of the growers, Government, concern GOs and NGOs should take proper steps.

3. To increase the annual income and production, mango growers need financial support in time. GOs, NGOs and concerned authority should take proper steps to reduce the financial problem of the farmers.

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar Dhaka

4. Growers confronted various problems during the whole production season. So, proper contact with extension personnel is necessary for reducing problem in mango production. The DAE, Horticulture Centre and non-government organizations should strengthen their services to the farmers to overcome their problem confrontation in mango production.

5. The agriculture officers and SAAO should also help the farmers for better production techniques and improved information so that the growers could increase their production and sell their products at a higher price.

6. Training exposure and organizational participation of the growers in mango production seem to increase production and income as well as minimize problem confrontation. Therefore, it is recommended that the Govt. and other NGOs should take steps, so that farmers can get more opportunity to receive training and organizational participation and other related practices.

5.4 Recommendations for further study

The present study was investigated with a view to have an understanding about the status of mango production, socioeconomic condition of the mango growers, number of varieties produced & problems confronted by them and to explore their relationships with some selected characteristics.

The following future studies should be undertaken, covering more dimensions in related matters-

1. The study was conducted on the farmers of eight villages of sadar upazila under Dinajpur district. Similar studies may be undertaken in other parts of the country to verify the findings of the present study.

2. The study investigated relationship of the farmers with only four dependent variables in mango production. Further research should be undertaken for exploring relationship of other characteristics of the farmers with other dependent variables.

3. The study investigated only sixteen problems related to mango production. So it is required to investigate other problems related to mango production.

BIBLIOGRAPHY

BIBLIOGRAPHY

Ahmed, A.K.M.A. 1994. Production Technology of Mango. Horticultural Research Centre, BARI, Joydebpur, Gazipur 1701, Bangladesh. pp. 122

Akanda, M.G.R., M.A. Kashern and M.M. Rahman, 1994. Problems Confrontation of The Farmers in Mango Cultivation Regarding Plant Protection Measures. Bangladesh Journal of Extention Education, 9: 133-137.

Alam. A.T.M, M.R. Choudhury and M.A. Choudury, 2000. Mango Production at Farmers level: Practice and Problems. Bangladesh Journal of Training and Development, 13 (1&2):.229-236.

Anonymous, 2007. Handbook of Agriculture, New Delhi, pp. 301.

Anwar, A.B. 2008. A Study on Banana Production Activities in Three Selected Villages of Mymensingh District, Unpublished *Ph.D. (Ag. Ext. Ed.) Thesis,* Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.pp 34

BBS. 2008. Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics, Ministry of Planning. Government of the Peoples Republic of Bangladesh. pp.53-61.

BBS. 2009. Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics, Ministry of Planning. Government of the Peoples Republic of Bangladesh. pp.73-79.

Bhuiyan, A.J, A.K.Roy and A.K.Ganguly, 1999. Fruit Tree Management and Improvement; A Technical Research Manual. Local Initiatives for Farmers' Training (LIFT), A Project of CARE, Bangladesh. pp. 7.

Bhuiyan, M.A.J. 2002. Banana Cultivation. In: Fruit Production Manual. Horticultural Research Development Project (FAO/UNDP Project: BGD/2002/029). pp. 101-276.

Bhuiyan, M.A.J. 2008. Mango (*Mangifera indica).* In: Fruit Production Manual. Horticultural Research Development Project (FAO/UNDP/ASDB Project: BGD/87/025). pp. 1-286.

Biswas, P.R. 1993. An Economic Analysis of Mango Production in Some Selected Areas of Jessore District. M.Sc. (Ag. Ext. Ed.) thesis, Bangladesh Agricultural University, Mymensingh. pp. 51-62.

Candole, A.D. 1984. Origin of Cultivated Plants. Vegal Paul Trench and Co., London. pp 1-67.

Chander, S.H.N. and L.P. Sharma, 1990. Knowledge, Adoption and Constraints Analysis of Mango Production Technology. Indian Journal for Extension Education, XW (1&2): 94-98.

Faroque, M.G. 1997. Participation of Female Rural Youth in Selected Homestead Activities in Two Selected Villages of Bhahika Upazila under Mymensingh District. M.Sc.(Ag.Ex.Edu.) thesis, Bangladesh Agricultural University, Mymensingh. pp. 42-51.

Goode, C.V. 1945. Dictionary of Education. New York: Mc Graw Hill Book Company, Inc.

Hasan, F., M.A. Kashern and M.R. Haider. 1995. Organizational Problem Confrontation of the Block Supervisors in Supervising Result Demonstration. Bangladesh Journal of Extension Education,10(1 &2): 51-57.

Hossain, A.M.S. 1985. A Study on the Landless Labours in Bhabukhali Union of Mymensingh district. M. Sc. Thesis. Bangladesh Agricultural University, Myrnensingh, pp. 18-27.

Hossain, M.A. 1991. Adoption Behavior of Contract Mango Growers in Sadar Upazila of Faridpur district. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp.35-41.

Ismail A.S.M. 2001. Problem Confrontations on Fruit Production in the Agricultural Farms in a selected Area of Sadar Upazila Under Jhinaidah District. M. Sc. Thesis, Bangladesh Agricultural University, Mymensingh. pp.45-61.

Karim M.A. 1974. Relationships of Selected Economic, Social and Psychological Characteristics of the Union Assistants of Mymensingh. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 44-48.

Karim, M.L. 2001. Relationships of Selected Characteristics of Mango Growers with Their Problem Confrontation. M. Sc. Thesis. Bangladesh Agricultural University, Mymensingh. pp. 12-17

Kashem, M.A. 1977. A Study on the Landless Labours of Barakhata Union of Rangpur District. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 17-21.

King, W.J. 1980. Mango in Gambia Report 25 October. Planted Fruit Plant on the Plants Development Administration, No. 51. p 21.

Marothia, DX. 1983. Constraints Analysis of Farm Level Adoption of Mango Production Technology in Raipur District, Madhya Pradesh, Rural Development Abstracts, 8(2): 132.

Muttaleb, M.A., M.A. Hossain, and M.A. Rashid. 1997. Adoption level and its Constrains to Selected Recommended Mango Production Technology. Bangladesh Journal of Training and Development, 11 (1 &2): 101-108.

Nahid, M.M.H. 2005. Problems Confrontation of the Sugarcane Growers in Sugarcane Production. *M.S. (Ag. Ext. Ed.) thesis,* Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh. pp .16

Nath, S.R. 1974. Relationships of Selected Personal Characteristics of the Union Assistants of Myrnensingh District with their problem confrontation. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 13-18.

Parkinson, J. 1989. Mango Production in Thiland. Technical Report No.28, Mango Development Board, Thailand. pp. 451-499.

Pramanik, N.K. 2001. Mango Cultivation Problems of the Farm Youth in a Selected Block of Muktagacha Upazila under Myrnensingh District. M.Sc. thesis, Bangladesh Agricultural University, Mymensingh. pp. 41-45.

Raha, A.K. 1989. Problem of the Farmers in the Mango Cultivation of Modem Varieties in Two Selected Blocks of Rajshahi District. M. Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 78-81.

Rahman, A. 1979. Problems and Prospects of Hill Fanning Technologies in Bangladesh. Fruit Journal, pp 302-347.

Rahman, M.F. 1995. Problem Confrontation by the Pineapple Growers in a Selected Area of Tangail District M. Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp.32-36.

Rahman, M.F. 1996. Farmers Problems in Mango Cultivation in Saltia Union Under Gaforgaon Thana of Mymending District. *M.S. (Ag. Ext. Ed.) thesis,* Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh. pp.42

Rahman, M.H. 2008. Farmers Problems in Banana Cultivation in Myrnensingh District. M. Sc. thesis. Bangladesh Agricultural University, Myrnensingh. pp.13-17.

Rashid, M.H. 1975. Agricultural Problems of the Farmers in Madhupur Union of Tangail District. M. Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 53-60.

Rashid, M.H. and S.G. Mahboob. 1987. Agricultural Problems of the Farmers. Bangladesh Journal of Extension Education. 2(2): 24-25.

Saha, D.K.1989. An Economic Study of Pineapple Marketing at Madhupur Upazila under Tangail District. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh. pp. 18-21.

Salam, M.A. 2003. Constraints Faced by the Farmers in Adopting Environmentally Friendly Farming Practices. *M.S. (Ag. Ext. Ed.) thesis,* Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh. pp.61

Shahidullah, M. 1987. The Production and Marketing Behaviour of the Poultry Farmers in Boira Union of Mymensingh District. M.Sc. thesis. Bangladesh Agricultural University, Mymensingh, pp. 45-48.

Talukder, I. 1991. On Farm Survey in 6 Mango Growing Upazila of Chapainowabgonj District. Bangladesh Journal of Extension Education, 6: 65-71.

APPENDICES

APPENDIX I

(English version of the interview schedule)

Department of Horticulture
Sher-E-Bangla Agricultural University
Dhaka 1207

An interview schedule for a research study entitled:

PRODUCTION PERFORMANCE OF MANGO IN DINAJPUR DISTRICT OF BANGLADESH (A CASE STUDY AT SADAR UPAZILLA)

Sample no----------

Date----------

1. Name of the respondents---------

   Father's name----------

2. Address:

   Village---------- Post office---------- Block----------

   Union---------- Upazila---------- District----------

3. Age of the respondents……years.

4. Educational qualification:

a) Can not read and write
b) Can sign only
c) ……class passed.

5. Please describe your family members according to the following structure:

SL. No.	Name of the members	Age	Relationship with the respondents	Educational qualification

6. Experience in farming

a) Involved in agriculture.....years

b) Involved in mango cultivation.....years

7. Please state your annual family income according to the following structure

SL. No.	Source of income	Amount of land (decimal)	Production	Value (taka)
1.	Agriculture			
2.	Domestic animal			
3.	Fruit			
4.	Fish			
5.	Business			
6.	Others			
	Total			

8. Farm size

SL. No.	Type of land use	Local unit	hectare
(a)	Area under homestead		
(b)	Area under own cultivation		
(c)	Area given to others on borga		
(d)	Area taken from others on borga		
(e)	Area given to others on lease		
(f)	Area taken from others on lease		
(g)	Others (Fallow land, ponds etc)		
Total farm size			

9. Extension media contact

SL. No.	Extension worker / programme name	Contact measure			
		Frequently	Occasionally	Rarely	Not at all
1	Any officer of Department of Agriculture Extension (DAE)				
2	Other Extension officer				
3	SAAO				
4	NGO worker				
5	Businessman(fertilizer)				
6	Group discussion				
7	Participation in Result Demonstration				
8	Field day				
9	Listening radio programme on agriculture				
10	Watching TV programme on agriculture				
11	Printed materials, bulletin, leaflets, newspaper etc				
12	Poster, advertisement on agriculture in newspapers				

10. Please indicate your nature of participation in different organization

SL. No.	Name of the organization	Not related at all	Related			
			General member	Executive member	Executive officer	Duration
1	KSS					
2	NGO sammittee					
3	School committee					
4	Madrasha committee					
5	Mosques & Temple committee					
6	Bazzar committee					
7	Sport& Cultural organization					

11. State the frequency of your visit outside your own locality (cosmopoliteness)

SL. No.	Places of visit	Nature of visit			
		Frequently	Occasionally	Rarely	Not at all
1.	Friends, relatives & other persons home				
2.	Other village				
3.	Own union				
4.	Other union				
5.	Own upazila sadar				
6.	Others upazila sadar				
7.	Own district sadar				
8.	Others district sadar				
9.	Capital city				
10.	Out of country				
11.	Others (please specify)				

12. a) Total cultivable land..... ha
b) Land suitable for fruit cultivation..... ha
c) Land used for fruit cultivation ..... ha
d) Land used for mango cultivation ..... ha
e) Land suitable for fruit cultivation in homestead area..... ha
f) Land used for fruit cultivation in homestead area..... ha
g) Land used for mango cultivation in homestead area..... ha

13. Please mention the mango varieties in your garden?

a) Recognized varieties:

SL. No.	Variety	Number of trees	Characteristic features	Number of fruit bearing trees			Production (Kg /Tree)
				Number	Age	From when it is bearing	

13 (b) Information about local mango varieties

SL. No.	Variety	Characteristic features	Number of trees	Number of fruit bearing trees			Production (Kg /Tree)
				Number	Age	From when it is bearing	
1	Large	Very sweet					
2.		Sweet					
3.		Medium sweet					
4.		Less sweet					
5.		Less sour					
6.		Medium sour					
7.		Sour					
8.		Very sour					
9	Medium	Very sweet					
10		Sweet					
11		Medium sweet					
12		Less sweet					
13		Less sour					
14		Medium sour					
15		Sour					
16		Very sour					
17	Small	Very sweet					
18		Sweet					
19		Medium sweet					
21		Less sweet					
22		Less sour					
23		Medium sour					
24		Sour					
25		Very sour					

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar Dhaka

14. Information about year round variety bearing of mango

SL. No.	Age	From when it is bearing	From when it is bearing as year round variety	How many times it bears fruit in a year	When	Production per plant	
						Number	Weight (kg)
1.							
2.							
3.							
4.							
5.							
6.							
7.							

15. a) Yearly mango production.....Ton.
b) Sale..... Ton
c) Yearly income from mango production..... Tk.
d) Expenditure for each mango plant.....Tk.
e) Mango production is profitable: Y/N

16. Do you use fertilizer in your mango trees? Yes /no

If the answer is yes then:

SL. No.	Name of the fertilizer	Yes	No	Dose per plant	When it was applied
1.	Cow dung/ FYM/Compost				
2.	Urea				
3.	T.S.P.				
4.	M.P.				
5.					
6.					

17. Please provide information on intercultural operation done in mango tree?

SL. No.	Name of operation	How many times	When	By what
1.	Weeding			
2.	Irrigation			
3.	Mulching			
4.	Spading			
5.	Disease control			
6.	Insect/pest control			
7.	Fruit thinning			
8.	Pruning & training			
9.	Inter cropping			
	Others			

18. What kinds of disease and insects attack your mango trees?

SL. No.	Name of the diseases/insects	Symptoms of attack	Control measures		
			When	By what means	Dose per plant
1.					
2.					
3.					
4.					
5.					
6.					

19. Do you propagate mango trees?

SL. No.	Mode of propagation	When	Number	Percent of success
1.	Seed			
2.	Grafting			
3.	No propagation			

20. Information about fruits and flower dropping of mango trees:

a) Does flower drop from mango trees? Yes/No
b) Does fruit drop from mango trees? Yes/No
c) Why it drops?
d) What preventive measures do you take against fruit/flower dropping?

Sl. No	Preventive measures	Treatments	Media	How many times	When

21. Knowledge of the growers on mango production:

Please answer the following questions (1 mark for every question):

a) What kind of propagating material is batter, seed / graft/ layer? Why?
b) What types of grafting is done for mango tree?
c) Name two recognized mango cultivars?
d) Which is the suitable time for planting mango seedlings?
e) What is done immediately after planting?
f) What is the fertilizer dose for mango tree?
g) When pruning is done?
h) What is the flowering season of mango?
i) What is the ripening time of mango?
j) What is the duration from flowering to harvesting of mango?
k) Which vitamin is high in mango?
l) Eating of mango is essential : Y/N
m) Name two insects of mango.
n) Name two diseases of mango.
o) What measures should be taken to control insects attack?

Sher-e-Bangla Agricultural University
Library
Sher-e-Bangla Nagar Dhaka

22. Problems confrontation of mango cultivation

SL. No.	Problems	Very Severe (%)	Severe (%)	Moderately Severe (%)	Less severe (%)	Negligible (%)	Not at all (%)
1	Scarcity of better variety/ Seedling/ grafts						
2	High price of planting materials						
3	Unavailability of fertilizer						
4	High price of fertilizer						
5	Impurity of pesticides						
6	High price of pesticides						
7	Disease/ Insects infestation						
8	Low fruiting in the trees						
9	Alternate bearing						
10	Dropping of flowers and fruits						
11	Fruit is too sour to sale						
12	Low market price						
13	Thief problem						
14	Lack of fruit preservation						
15	Lack of fruit processing						
16	Natural calamities						

Thank you, for your co-operation.

Signature

APPENDIX- II

Correlation matrix showing the interrelationships among the entire variables

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	Y_1	Y_2	Y_3	Y_4
X_1	1															
X_2	-.381**	1														
X_3	.668**	-.226*	1													
X_4	.231*	.386**	.210*	1												
X_5	.235*	.381**	.215*	.996**	1											
X_6	.237*	.400**	.217*	.987**	.980**	1										
X_7	.707**	-.309**	.438**	.476**	.477**	.484**	1									
X_8	.861**	-.331**	.502**	.186	.192	.197*	.769**	1								
X_9	-.503**	.045	-.452**	-.222*	-.230*	-.222*	-.584**	-.561**	1							
X_{10}	.562**	.260**	.465**	.116	.112	.127	.395**	.481**	-.212*	1						
X_{11}	-.184	.137	-.194*	.005	.015	-.030	-.212*	-.271**	.109	-.243*	1					
X_{12}	.638**	.103	.459**	.322**	.329**	.312**	.759**	.652**	-.651**	.313**	.012	1				
Y_1	.144	.148	-.180	.539**	.573**	.451**	.270**	.122	.215*	.062	-.083	.304**	1			
Y_2	.181	.090	-.181	.509**	.547**	.419**	.290**	.159	.271**	.071	-.100	.335**	.947**	1		
Y_3	.372**	.299**	.321**	.766**	.760**	.756**	.547**	.342**	.347**	.159	-.167	.416**	.458**	.429**	1	
Y_4	.635**	-.214*	.420**	.433**	.431**	.442**	.719**	.651**	-.567**	.356**	-.083	.707**	-.200*	-.223*	.457**	1

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

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

X_1= Age
X_2= Education
X_3= Family Size
X_4= Farm Size
X_5= Land used in mango production
X_6= Annual Income
X_7= Experience in mango production
X_8= Experience in agriculture
X_9= Extension media contact
X_{10}= Organizational participation
X_{11}= Cosmopoliteness
X_{12}= Knowledge on mango production
Y_1= Annual mango production
Y_2= Annual income from mango production
Y_3= Mango varieties produced
Y_4= Problem confrontation in mango production