

**STATUS OF BRINJAL (*Solanum melongena* L.) CULTIVATION AND
EXTENT OF PESTICIDE APPLICATION BY THE FARMERS IN
THE JESSORE REGION OF BANGLADESH**



A THESIS
BY

MD. ALI REZA
ROLL NO. MS 110802
SESSION: 2010-11

A thesis (Course No: AT -6104) Submitted to the Agrotechnology Discipline, Khulna University, Khulna, in partial fulfilment of the requirement for the degree of

MASTER OF SCIENCE (MS)
IN
HORTICULTURE

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KHULNA UNIVERSITY
KHULNA-9208
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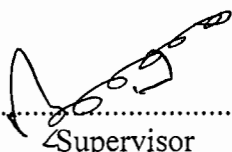
APRIL, 2014

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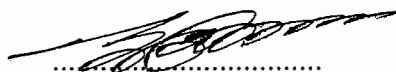
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APRIL, 2014

**DEDICATED
TO
MY BELOVED PARENTS
MD. ABDUL JALIL MOLLAH
AND
MUNNU ZAHAN**



DECLARATION

The author is hereby declared that the thesis entitled, **"STATUS OF BRINJAL (*Solanum melongena* L.) CULTIVATION AND EXTENT OF PESTICIDE APPLICATION BY THE FARMERS IN THE JESSORE REGION OF BANGLADESH"** submitted to the Agrotechnology Discipline, Khulna University, Khulna, Bangladesh in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M.S) IN HORTICULTURE**, embodies the result of a piece of bonafide research work carried out by him bearing Roll no: M.S - 110802. No part of the thesis has been submitted for any other degree or diploma.

He further declares that such help or source of information has been availed during the course of this investigation has duly been acknowledged.

Dated: 23 /04 /2014
Place: Khulna, Bangladesh

The Author

ABSTRACT

The investigation was conducted to study the status of brinjal (*Solanum melongena* L.) cultivation and extent of pesticides application by the farmers in the Jessore region of Bangladesh. Data were collected from (randomly selected) 200 brinjal growers selected from four Upazilla under Jessore district through personal interview by using an interview schedule during December 2012 to May 2013. Collected data covered total cultivable land, land suitable for brinjal cultivation, land under brinjal cultivation, types of brinjal cultivation, use of fertilizers and manures, diseases and insect infestation, intercultural operations, experience in agriculture, experience in brinjal cultivation and knowledge in vegetable cultivation to determine the status of brinjal cultivation. Besides, data were also collected on eleven selected characteristics of the brinjal growers and the problems confronted by them. Most of the farmers had small to medium sized cultivable lands. Majority of the farmers had medium to large sized lands suitable for brinjal cultivation. The highest number of farmers reported high yield of brinjal. Majority of the farmers used cow dung, urea, TSP and MoP for brinjal cultivation. Viral disease was the most incidence of disease in brinjal cultivation. Brinjal shoot and fruit borer was most commonly insect infestation. Most of farmers had medium to high experience in agriculture and brinjal cultivation and they belonged to high knowledge category in cultivation of brinjal. In the study area 72% farmers cultivated recommended brinjal varieties and 28% farmers cultivated non recommended brinjal varieties. Majority of the farmers used voliam flexi 300 SC insecticide. Four fifth (80%) farmers used over dose, 16% farmers used recommended dose and 4% farmers used low dose of insecticide. A number of thirteen problems were identified as confronted by the brinjal growers. Among the identified thirteen problems, the most common as well as very severe problems were disease infestation, insect infestation, lack on knowledge on processing of brinjal and high market price of insecticide.

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LIST OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	I
	ABSTRACT	II
	ACKNOWLEDGMENT	III
	LIST OF CONTENTS	IV
	LIST OF TABLES	V
	LIST OF FIGURES	VIII
	LIST OF APPENDICES	IX
I	INTRODUCTION	1
II	REVIEW OF LITERATURE	7
III	METHODOLOGY	11
IV	RESULTS AND DISCUSSION	24
V	SUMMARY, CONCLUSION AND RECOMMENDATION	66
	REFERENCES	72
	APPENDICES	79

LIST OF TABLES

TABLE	TITLE	PAGE
1.1	Area and Production of Rabi Brinjal by Region, 2006-07 to 2010-11	89
1.2	Area and Production of Kharif Brinjal by Rgion, 2006-07 to 2010-2011.	89
1.3	Area and Production of Rabi by Region, 2001-2002 to 2005-06	90
1.4	Area and Production of Kharif Brinjal by Region, 2001-2002 to 2005-06.	90
1.5	Area and Production of (Winter) Rabi Vegetable By Crops, 2006-07 to 2010-2011.	91
1.6	Area and Production of Kharif (Summer) Vegetables, 2006-07 to 2010-2011.	91
3.1	Distribution of population and sample of farmers in study area	12
3.2	Categories of farmers according to total cultivable land	14
3.3	Categories of farmers according to suitable land for brinjal cultivation	14
3.4	Categories of farmers according to land under brinjal cultivation	15
3.5	Categories of farmers according to their land size	19
3.6	Categories of farmers according to their annual income	19
3.7	Categories of farmers according to extension media contact	21
3.8	Problem confronted by farmers.	22
3.9	Categories of farmers according to their score of problem confrontation.	23
4.1	Distribution of farmers according to their age	24
4.2	Distribution of farmers according to level of education	25
4.3	Distribution of farmers according to their score of family size	25
4.4	Distribution of farmers according to their experience in agriculture	26
4.5	Distribution of farmers according to their experience in brinjal cultivation	27



TABLE	TITLE	PAGE
4.6	Distribution of farmers according to their annual income	27
4.7	Distribution of farmers according to their land size	28
4.8	Distribution of farmers according to their score of extension media contact	29
4.9	Distribution of farmers according to their score of organizational participation	29
4.10	Distribution of farmers according to their score of cosmopolitaness	30
4.11	Distribution of farmers according to their knowledge in brinjal cultivation	31
4.12	Distribution of farmers according to their total cultivable land	32
4.13	Distribution of farmers according to their suitable land area for brinjal cultivation	32
4.14	Land under Brinjal Cultivation by farmers in the period of 2003-12 (in hectare)	33
4.15	Brinjal Yield (tons/hectare) by the farmers in the period of 2003-12	35
4.16	Brinjal Production (tons) by the farmers in the period of 2003-12	37
4.17	Distribution of farmers according to their income from brinjal (thousand taka) 2012.	41
4.18	Distribution of farmers according to their brinjal production Cost (thousand taka) 2012.	42
4.19	Distribution of farmers according to their benefit from brinjal cultivation(thousand taka) 2012	42
4.20	Distribution of the Occupation of the farmers	43
4.21	Name of Brinjal varieties cultivated by the farmers	44
4.22	Distribution of the farmers on the basis of varieties use	49
4.23	Name of fertilizers used by the farmers	50
4.24	Inter Cultural Operation Adapted by the farmers	50
4.25	Information of consumption of food by the farmers (per person per day)	51

TABLE	TITLE	PAGE
4.26	Problem Confrontation index (PCI) in brinjal cultivation	52
4.27	Distribution of respondents according to their score of problem confrontation	53
4.28	Computed coefficient of correlation (r) between farmers problems and their selected characteristics (N=200)	54
4.29	Name of disease infestation in brinjal	55
4.30	Name of Fungicide used by the farmers	56
4.31	Distribution of Insect infestation in brinjal	57
4.32	Control measure of insect by using insecticide	59
4.33	Insecticide application by the farmers(on the basis of dose).	63
4.34	Insecticide application by the farmers (on the basis of mode of action).	64
4.35	Insecticide application by the farmers(on the basis of formulation).	64
4.36	Categories of the farmers according to frequency of insecticides application	65

LIST OF FIGURE

FIGURE	TITLE	PAGE
4.1	Land under Brinjal Cultivation (hectare in the period of 2003-12	39
4.2	Yield of Brinjal (tons/hectare) in the period of 2003-12	40
4.3	Brinjal Production (tons) in the period of 2003-12	40
4.4	BARI Begun-1 (Uttara)	45
4.5	BARI Begun-2 (Tarapuri)	45
4.6	BARI Begun-4 (Kazla)	45
4.7	BARI Begun-5 (Nayantara)	45
4.8	BARI Begun-6	46
4.9	BARI Begun-7	46
4.10	BARI Begun-8	46
4.11	BARI Begun-9	46
4.12	BARI Begun-10	47
4.13	Chaga Begun	47
4.14	Math Kumra Begun	47
4.15	Lafa	47
4.16	Makra Begun	48
4.17	Extent of use of fungicide by the farmers	57
4.18	Brinjal Shoot & fruit borer	58
4.19	Brinjal Shoot damage	58
4.20	Brinjal fruit borer	58
4.21	Brinjal Shoot & fruit borer (Adult).	58
4.22	Extent of used of insecticide by the farmers (on the basis of dose)	63
4.23	Extent of used of insecticide by the farmers (on the basis of mode of action)	64
4.24	Extent of used of insecticide by the farmers (on the basis of formulation)	65
4.25	Frequency of insecticides application	65

LIST OF APPENDICES

APPENDICES	TITLE	PAGE
I	Questionnaire	79
II	Tables on statistics of different aspects of brinjal	89
III	Map of the study area	92

CHAPTER I

Introduction

1.1 General Background

Bangladesh is a developing country crowded with the population of about 150 million in the area of 147, 570 square km. About 80 percent of her total population lives in the rural areas and 51.69 percent of the country's total labor force are engaged in agriculture (BBS, 2004). The country stands 137th among 177 Countries listed in the human development index by UNDP in 2006. Agriculture is the most dominant sector of Bangladesh economy. In terms of GDP, it contributes about 21.11% (Anonymous, 2007). High population growth rate together with slow growth in agricultural productivity adversely affect the living standard in the country.

Further, there is a tremendous pressure on cultivable land because of increasing population land fragmentation and economic hardship. There is little or no scope for bringing any new land under cultivation. To meet the existing demand of the population production per unit area must be increased. This is possible by converting single cropped area into double and triple cropped area by using improved technology in production of crops, fruits and Vegetables.

In order to get the maximum output from a limited land in a minimum time it is essential to practice intensive cultivation of quick growing Brinjal.

The Total area and production of Brinjal during the period from 2001-02 to 2010-11 are shown in Table 1. 1, 1.2, 1.3 and 1.4 (Appendix II)

Brinjal (*Solanum melongena* L.) belongs to the family Solanaceae and is a widely cultivated popular Brinjal crop throughout the entire tropical and subtropical regions of the world (Bose and Som, 1986). It is grown extensively in Bangladesh, China, Pakistan and the Philippines. It is also popular in France, Italy, USA and Mediterranean areas (Bose and Som, 1986).

It has higher calorie, iron, phosphorus and riboflavin contents than tomato (Shaha, 1989). It is grown round the year in Bangladesh, but brinjal is mainly cultivated in the rabi season. Vegetables were cultivated in 4,51,808 hectares of land and the production was 3,061,840 tons during 2010-11 in Bangladesh (BBS, 2011). Brinjal was cultivated in 66,566 hectares of land and the production was 3,39,874 tons during 2010-11 in Bangladesh (BBS, 2011). Brinjal was cultivated in 4758 hectares of land with a total production of 49555 tones only in Jessore district in 2010-11 (BBS, 2011)

which shows that Jessore is a major brinjal growing area of Bangladesh and hence Jessore district has been selected as the study area.

At present Brinjal consumption in Bangladesh is the lowest in the world except Bhutan (Hossain, 1992). It is only 30g per capita per day as against 200g recommended by the nutritionists (Hossain, 1992) where brinjal plays an important role. The per capita consumption of brinjals in SAARC countries, namely, Nepal (42g), Pakistan (69 g), Sri-Lanka (120 g) and India (135 g) is higher than that of Bangladesh (Ramphal and Gill, 1990).

It has good nutritive value containing 1.2g of protein, 0.2g fat, and 5.6 g carbohydrates per 100g of edible portion. It also contains 15mg calcium, 37mg of phosphorus, 0.4mg of iron per 100g of edible portion in addition to vitamin A, B, C, which make our diet more palatable (Tsou, 1992). Brinjal contains 92.7% moisture, 1.4 g protein, 0.3 fat, 0.3 g minerals, 4 g carbohydrates, 18 mg calcium, 16 mg magnesium, 18 mg oxalic acid, 47 mg phosphorus, 124 I.U. Vitamin A, 0.04 mg Thiamine, 0.11mg Riboflavin, 0.09 mg Nicotinic acid, 12.0 mg Vitamin C etc. (www.agridept.gov.lk)

Brinjal is attacked by 53 species of insect pests (Nayar *et al.*, 1995). Out of most serious and destructive pests, brinjal shoot and fruit borer (BSFB) causes serious damage in Bangladesh (Alam, 1969) and India (Tewari and Sandana, 1990). The damage is caused by the pest's larvae. Brinjal is susceptible to this pest from seedling to fruiting stage. The losses caused by this pest from season to season depending upon the environmental factors (Gangwar and Sachan, 1986). The damage caused by the larvae of this pest range from 1 to 90% in India (Butani and Jatwani, 1984; Kallo, 1988) and up to 46% in Bangladesh (Islam and Karim, 1991).

Pesticides play an important role in modern agriculture (Trevisan *et.al*, 2004). According to Alam *et al* (2006), over 90% of farmers applied more than 40 sprays per season (Gujrat) and 86% sprayed their crop two or three times a week (Uttar Pradesh) in India.

In Bangladesh a good number of brinjal grown throughout the year, in view of increase the income and nutritional considerations there is a great need for Brinjal production. Farmers used to grow brinjal in and around the homestead area but now-a-days a large number of farmers grow Brinjal on commercial scale because brinjal cultivation is more profitable than that of cereal crops. The weather, climate and soil of Bangladesh are very much suitable for growing Brinjal round the year.

1.2 Statement of the problem

Bangladesh primarily exports fresh brinjal and fruits as horticultural products to Middle east and European countries, Commercial cultivation of Brinjal is very much important to fulfill nutritional requirement and to earn foreign currency. In fact in commercial cultivation of brinjal farmers face many problems. If problems of brinjal growers are ascertained and surmounted Bangladeshi economy has a chance to experience a radial future. From this point of view the present research was undertaken to studies situation of Brinjal (*Solanum melongena* L.) Cultivation and Extent of pesticide Application by the farmers in the Jessore region of Bangladesh. Considering the nature of study the researcher sought information regarding following research questions.

1. What is the Situation of Brinjal cultivation?
2. What are the problems being faced by the farmers in cultivation of Brinjal?
3. What are the personal, social, economic and psychological characteristics of the Brinjal growers?
4. What is the extent of pesticide used in Brinjal cultivation?

Prosperity of agriculture is generally measured by the level of production and the extent of probability. Bangladesh is endowed with a favorable climate and soil for the production of different crops year round. Although the agro-climatic situations of Bangladesh are suitable for the cultivation of a large variety of crops but about 80 percent of the gross cropped area are at present confined to the production of rice and wheat. Since the mid sixties all the government programs have been aimed at achieving self sufficiency in food grain production. This illusive chasing towards self sufficiency in food grain production led to adverse effect on the hectareage and production of Brinjal. As a result the people of Bangladesh are suffering from severe malnutrition.

The government of Bangladesh has given emphasis on year round Brinjal production to meet the nutritional and caloric need for increasing employment opportunities and income of farmers. To make cultivation of Brinjals profitable it is necessary to involve farmers' in production, planning and ascertain problem with regard to Brinjals production.

1.3 Specific objectives of the study

The present study was under taken at Jessore Sadar Upazila, Keshabpur Upazila, Monirampur Upazila and Bagharpara Upazila of Jessore District in view of the consideration of above stated research questions the following specific objectives:

- (I) To study the socio-economic characteristic of farmers who cultivate brinjal.
- (II) To find out the status of brinjal cultivation in the Jessore region.
- (III) To identify the problems confronted by the farmers.
- (IV) To assess the extent of pesticide application in the brinjal cultivation.

1.4 Significance of the study

It is assumed that assessment of problems confronted by the farmers in cultivation of Brinjals and the other findings of the study are expected to be useful to the students, researchers and extension personnel, policy makers and farmers to establish more extensive programmers for enhancing cultivation of Brinjals.

The present study makes attempt to have an understanding of problem faced by the farmers in cultivation of Brinjals with their 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 where the physical, socio-economic and cultural 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 extensionists in removing constraints faced by the farmers in cultivation of Brinjal.

The administrators, supervisors, field workers and others who are to work in the field of Brinjal may find this study informative. This study could be helpful for Brinjal cultivation programme is one hand and motivate to consume more Brinjals and earn more foreign exchange on the other.

1.5 Limitation of the study

Considering the time, money, labor and other necessary resources available to the researcher, the following limitations have been observed throughout the study:

The study was conducted only four (4) Upazilla namely Jessore Sadar, Keshobpur, Monirampur, Bagharpara.

-Characteristics of the farmers were many and varied but only eight (8) characteristics were selected for investigation in this study.

- Population for the present study was kept confined within the heads of farm families in the study area, because they were the decision-makers in their respective families in respect of Brinjal cultivation.

The present study highlights a new dimension of research in the field of agriculture in Bangladesh, and so the researcher could not provide sufficient evidence in equipping his study report with relevant literature reviews

The study was conducted in 4 selected Upazila under Jessore district of Bangladesh. Thus the finding may not represent the real scenario of the whole district as well as the whole country due to the widespread variation in the nature and cultivation of Brinjal from one place to another and from one social system to another.



1.6 Assumption of the study

An assumption is the supposition that an apparent fact or principal is true in the light of available evidence (Goode, 1952). The following assumptions were in the mind of the researcher while undertaking the study:

- ✓ The farmers involved in the sample were capable of furnishing proper responses of the questions contained in the interview schedule.
- ✓ The interviewers were well adjusted to the social and cultural environment of the study area. Hence, the data collected by him from the farmers would be bias free.
- ✓ The responses furnished by the farmers were reliable and they truly expressed all facts concerning Brinjal cultivation and their personal, socio-economic, socio-cultural and psychological characteristics.
- ✓ Views and opinions furnished by the farmers were representative of the whole population of the study.
- ✓ The farmers have given accurate and current information.
- ✓ The interviewers were able to rate the responses of the farmers with adequate precision.
- ✓ Identified problems in the study area included all the sustainability criteria considered by the researchers and they were contributory to Brinjal cultivation and development.

1.7 Definition of some terms

Age: Age of the farmer refers to the period of time in years from his birth to the time of interview.

Education: Education refers to the ability of an individual to read and write or having formal education received up to certain standard.

Family size: Family size of a farmer was defined as the number of individuals in his family including himself, his wife, children and other dependent members. '

Farm size: It refers to the area owned by a farmer on which he carried his farming and family business, the area being estimated in terms of full benefit to the farmer.

Area under Brinjal cultivation: It refers to the area possession of a farmer on which he cultivated Brinjal during the collection of data for this study.

Annual income: Annual income refers to the total earning of a respondent himself and the members of his family from agriculture, service, business and other sources during a year. It was expressed in Taka.

Organizational participation: It refers to the involvement of respondents in different Government, Non-Government and social organization.

Extension media contact: The term "extension media contact" as used in this study, refers to ones becoming accessible to the influence of extension programme thorough different extension teaching methods or different extension change agents.

Cosmopolitaness: Cosmopolitaness is the degree to which an individual's extent of orientation outside of his own social system.

CHAPTER II

Review of Literature

The purpose of this Chapter is to review the past studies conducted by different researchers related to the present study. This study as already indicated, was undertaken to have an understanding about situation of the brinjal cultivation. As far as possible the researcher tried to review the available literature from different countries related to situation of brinjal cultivation and extent of pesticide application. Unfortunately nothing of these studies directly relates to the present study.

Very little work has been done in Bangladesh for studying the performance, problem identification and cultivation aspects of brinjal. Especially the performance of individuals in relation to their various characteristics was not studied for brinjal production and extent of pesticide application. However, available literature on brinjal production and extent of pesticide application in brinjal was extensively reviewed to search out related work carried out in Bangladesh as well as in other countries. But studies in respect of characters could not be found directly in available literature. However, expert opinions and past studies in brinjal and pesticide used in brinjal, as far as available, are reviewed in this chapter.

2.1 Status of Brinjal cultivation

Vegetables (more than 60) occupy 3% of cultivated land of Bangladesh (Ali, 1992), where brinjal is cultivated in 15% area in Kharif and 17% area in Rabi season among the vegetables. The present production of vegetable is around one million ton, 70% of which is produced during the winter (Hossain, 1992). Production of summer vegetables as well as Kharif brinjal is constrained by unfavorable weather and in winter is favoured by suitable climate. There are so many varieties of brinjal which give more yield in Rabi than Kharif season having poor fruitset under high temperature (Hoyase, 1955). Pollen of brinjal flower remains viable for three days in the winter and one day in the summer (Pal and Singh, 1943). Popova (1958) reported that pollens remain viable for 7-10 days and stigma remains receptive for 6-8 days at 86°F and 70% R.H. Therefore, seasonal fluctuation in the availability of fresh vegetables such as brinjal in the market.

It was cultivated in 66,566 hectares of land and the production was 3,39,874 tons during 2010-11 in Bangladesh (BBS, 2011).

Brinjal was cultivated in 4758 hectares of land with a total production of 49555 tones only in Jessore district in 2010-11 (BBS, 2011) which shows that Jessore is a major brinjal growing area of Bangladesh and hence Jessore district has been selected as the study area.

Among the cultivated varieties of brinjal a few of them are HYVs. Hence, the national production average (5.45 t/ha) is not satisfactory, where, the varietal yields of Islampuri is 15 t/ha (Siddique and Hossain, 1971), Nayankajal is 29 t/ha (Ahmed, 1974), Uttara 60 t/ha, Tarapuri 100 t/ha and Suktara 120 t/ha (Hossain, 1992).

2.2 Extent of the pesticide application

Nath and Chakraborty (1978) stated that the best control of fruit and shoot borer of brinjal was obtained with carbofuran (Furadan) at 6.0 kg/ha.

Doikova (1979) reported that the highest yields and best returns were produced by 20 t FYM+ 240+240: 120: 240 kg N: P₂O₅:K₂O per hectare.

The little leaf disease of brinjal is found more in the older plant (Rashid, 1976). As the plants get older the yield per plant gradually decreases.

Indian Agricultural Research Institute (IARI) developed two varieties of brinjal namely pusha purple and pusha purple round, they reported that these two varieties are resistant to brinjal shoot and fruit borer and little leaf disease, respectively.

Renuka et al. (1991) found that 100 percent of the respondents did sell their agricultural products like brinjal immediately after harvesting.

Brinjal Shoot and fruit borer (*Leucinodes orbonalis*, Guenee) is one of the most destructive insect pests of brinjal (*Solanum melongena* L.) in Bangladesh. It is phytophagous in nature and belongs to the order Lepidoptera and family Pyralidae. The genus *Leucinodes* includes three species, *Leucinodes orbonalis* Guenee, *Leucinodes diaphana* Hamps and *Leucinodes apicalis* Hamps. (Alam, 1969).

The effectiveness of 11 insecticides belonging to organ chlorine, Diazinon, Marshal, Carbamate and synthetic parathyroid groups against *L. orbonalis* on brinjal was studied in field trials in Assam, India in 1982-83. On the basis of infestation levels and yield, Fenvalerate and Permethrin @ 0.25 kg Al/ha, Decis @ 0.05 kg Al/ha and Endosulfan @ 0.75 kg Al/ha were superior to the other compounds tested (Quinalphos, Carbaryl, Dimethoate, Phosphamidon, Chlorpyrifos, Monocrotophos and Malathion) (Yein, 1985)

2.3 Studies on problem confrontation by the farmers

Raha et al. (1986) identified some common problems of cotton cultivation as perceived by the farmers in Bangladesh. Those were lack of suitable land, lack of irrigation facility, shortage of labor, shortage of cash money, lack of technical knowledge, lower price of cotton and non-availability of seed, insecticides, and fertilizers

Zinyama (1988) conducted relative investigation to find out the farmers perceptions of the constraints against increased crop production in the subsistence communal farming sector of Zimbabwe. Five of the most frequently cited, constraints were: (i) lack of money with which to purchase seasonal agricultural inputs, particularly fertilizers, (ii) lack of basic farming implements, notably the ox-driven single furrow plough, (iii) lack of draught cattle, (iv) inadequate arable land and (v) inadequate family labor or agricultural work.

Kher and Halyal (1988) administrated a research work to identify the constraints in adoption of sugarcane production technology. The most important constraint identified regarding the adoption of improved sugarcane production technology were an irregular and insufficient electricity supply, small size of holding for green manuring, inconvenience of intercropping due to weeds, high cost of farm fuel, scare irrigation facilities, absence of location specific recommendations for earthing up, lack of drought resistant varieties and lack of technical knowledge about plant protection and chemical fertilizers.

(*Hander et al.* (1990) in their study identified constraints in potato cultivation. Main constraints were ignorance about improved cultivars and cultivation practices, ignorance about scientific method of sowing, lack of guidance of marketing potato; high cost of improved cultivars, high cost of fertilizers, pesticide and irrigation, lack of enough space for storing potatoes scientifically and so on.

Biswas (1992) in his study identified farmer's problems in cotton cultivation. Non availability of quality seed in time, unfavorable and high cost of fertilizer and insecticides, lack of operating capitals, not getting fair weight and reasonable price according to grade, affects of cattle in cotton field, lack of technical knowledge, lack of storage facility, stealing from field at maturity stage and late buying of raw cotton by Cotton Development Board were identified as major problems of cotton in Jessore district.

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

Faroque (1997) found that female rural youth in Bhaluka (Mymensingh) lacked cash for buying seeds, seedlings and deprived of necessary knowledge in improved vegetable cultivation. He further added that the majority of the female rural youth faced very high (54%) problems.

Alam et al. (2000) conducted a survey on jute crops in seven districts of Bangladesh to find out the state of art in jute cultivation and found that scarcity of quality seeds; high labor wage and low market price of fiber were the major constraints of jute production.

Ismail (2001) conducted a study on problems faced by the farm youths of haor area of Upazila. Study revealed six top problems in rank order were (i) no arrangement of loan for the farm youth for fishery cultivation, (ii) lack of government program in agriculture for the farm youth, (iii) absence of loan giving agencies for establishing farm in locality, (iv) general people face problem for fishery due to government leasing of Jalmohal, (v) lack of government program for establishing poultry farm, (vi) lack of agricultural loan for the farm youth.

Przunanik (2001) made an extensive study on twenty-four problems of farm youth, at the illness relating to different problems in crop cultivation Mymensingh. Out of twenty-four problems the top four problems in rank order were: i) local NGO take high rate of interest against a loan, ii) lack of agricultural machinery and tools, iii) lack of cash and (iv) financial inability to arrange improved seeds, fertilizers and irrigation.

From the above description, it was revealed that no work has so far been done in Bangladesh and elsewhere on the situation of brinjal cultivation and extent of pesticide application.

CHAPTER III

Methodology

Research methodology is a systematic way to solve a research problem. It may be understood a sign of studying how research is done (Kothari, 1990). A researcher needs careful consideration before conducting a study. Importance of methodology in conducting any research cannot be neglected. Methodology would enable the researcher to collect valid information and to analyze properly to arrive at correct decisions. The researcher has great responsibility to clearly describe as to what sort of research design, method and procedure he would follow in collecting valid and reliable data and to analyze and interpret those to arrive at correct conclusion. The methods and procedures followed in conducting this study have discussed in this chapter.

3.1 Locale of the Study

The study was confined to some selected areas namely Jessore Sadar, Keshabpur, Monirampur & Bagharpara Upazila of Jessore district. The area has a great significant role in brinjal cultivation and production. This area produces and supplies a significant amount of brinjal, which meets the demand of local market and Jessore town area. The map of the study area has been presented in Appendix II.

The major crops of those upazilla is rice (T. Aman, B. Aman, Aus, Boro); Other major crops grown include jute, sesame, mustard, potato, wheat, brinjal, pulse and spices.

3.2 Unit of Analysis

The unit of analysis of the study was the heads of farm households of four selected Upazila. The major criteria considered for selection of farm households from the study area were:

- The farmers of these farm households were cultivators/farmers of brinjal,
- They were cultivating brinjal to fulfill their own demand and for their economic development.

3.3 Population and Sampling Design

An up-to date list of all farm household of the selected block was prepared with the help of the Sub Assistant Agriculture Officers (SAAOs) working there in. The list comprised a total of 2000 farm families. The 2000 farm households of four selected upazila of Jessore district constituted the active population of the study. To make a representative sample, 10% of the population was selected following proportionate random sampling technique. Thus, the sample size so drawn stood as 200. The distribution of the population and sampling is shown in Table 3.1.

Table 3.1: Distribution of population and sample of farmers in the study area

District	Upazila	Block	Total number of farm house holds	Sampling (%)	Number of farmers interviewed from each strata (N)
Jessore	Jessore Sadar	Churamonkati-100, Lebutala-60, Noapara-30, Bosundia-80.	540	10%	54
	Keshabpur	Biddanandakati-50, Mojidpur-50, Gowrighona-90, Mongolkot-60.	480	10%	48
	Monirampur	Ratnssorpur-70, Rohita- 20, Shamkur-90, vozgati-80	520	10%	52
	Bagharpara	Bagharpara-50, Darajhat-70, Narikelbaria-50, Roypur-60,	460	10%	46
Total			2000	10%	200

Source: Diary of Sub Assistant Agriculture Officers (SAAOs)

3.4 Preparation of Interview Schedule

An interview schedule was used as the research instrument in order to collect relevant information from the farmers. The interview schedule was carefully designed keeping the objectives of the study in mind. The interview schedule contained both open and closed form sample and direct form of questions to collect data on the selected variables. After preparation of interview schedule it was pre-tested with 10% farmers of each block of the related upazila in the district of Jessore. After pre-test, necessary correction, addition, alternation and rearrangement were made before it was run for final data collection. The interview schedule was then multiplied in its final form for collection of data. English version of the Bangla interview schedule has been seen in Appendix 1.

3.5 Data Collection

Data for this study were collected by the researcher himself through face to face interview by using interview schedule during December 2012 to May 2013. Before going to make an interview, appointments with the interviewer were made in advance with the help of the concerned Sub Assistant Agriculture Officers (SAAOs). All possible efforts were made to explain the purpose of the study to the farmers in order to get valid and pertinent information from them. The farmers of the selected areas helped investigators greatly in collecting information. The researchers also obtained cooperation from the members of the union parishad of the respective area, local leaders and school teachers during collection of data. At the beginning of the interview with any farmers, the researchers took all possible care to establish rapport with him so that he did not feel hesitate to furnish proper responses to the questions and statement in the schedule. The questions were explained whenever any farmers felt difficulty in understanding properly. Moreover, at the time of data collection, the researcher was also careful about side talking and tried to avoid that problem tactfully. After completion of the interview, each statement was checked and verified to make sure that answer to each item had been properly recorded. The researcher received full co-operation from the farmers during the time of interview. The entire process of data collection took 180 days.

3.6 Status of Brinjal Cultivation

Status of brinjal cultivation was determined based on some parameters. The parameters included:

- Land for brinjal cultivation
 - ✓ Total cultivable land
 - ✓ Suitable land for brinjal cultivation
 - ✓ Land under brinjal cultivation
- Varieties of brinjal cultivated in the farmers land
- Use of fertilizers and manures
- Intercultural operations
- Disease infestation
- Use of fungicides
- Use of insecticides
- Insect infestation
- Experience in agriculture
- Experience in brinjal cultivation
- Knowledge in brinjal cultivation

3.6.1 Total Usable Land for brinjal Cultivation

The researchers recorded information about farmer's farm where he cultivates brinjal in his field. The question to measure a) Total cultivable land, b) Suitable land for brinjal and c) land under brinjal cultivation has been shown in the item number 13 in the interview schedule (Appendix I.). Based on area of the land under for brinjal cultivation were classified into different categories as shown table 3.2, 3.3 and 3.4 .

Table 3.2 Categories of farmers according to total farm size

Categories	Score (ha)
Small	<0.20
Medium	0.20-0.40
Large	0.41-0.60
Very large	>0.60

Table 3.3 Categories of farmers according to suitable land for brinjal cultivation

Categories	Score (ha)
Small	<0.20
Medium	0.20-0.40
Large	0.41-0.60
Very large	>0.60

Table 3.4: Categories of farmers according to land under brinjal cultivation

Categories	Score (ha)
Small	<0.18
Medium	0.18-0.36
Large	0.37-0.54
Very large	>0.54

3.6.2 Varieties of brinjal Cultivated in the farmers land

The researcher categorized the brinjals in to their Varieties name, used land, Production, Used at home, Sale, Market Rate, total Income It is shown in item no 15 in interview schedule (Appendix I).

3.6.3 Use of Fertilizer and Manures

The name of different manures and fertilizers were included in interview schedule. The fertilizers and manures were urea, TSP, MoP, cow dung/compost, -gypsum, mustard oil cake, mixed fertilizer, zinc sulfate etc. It was included under item no. 19 of the interview schedule (Appendix 1).

3.6.4 Intercultural Operations

The researcher categorized the intercultural operations into weeding, irrigation, mulching, Spading, disease control, Insect Control, Artificial Pollination, Inter cropping & Sticking. On the other hand how many times and when it was done in a year and by what means it was also included in item 20 (Appendix I).

3.6.5 Diseases infestation

To know the situation about 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 at item no 21 (Appendix I) in this purpose. Here the name of the diseases with their symptoms and control measure were asked.

3.6.6 Insect infestation

The researcher collected information about insect infestation of brinjal cultivation. Researcher collected insect name, their symptoms and control measure from farmers. It appears in item no 22 (Appendix 1) in interview schedule.

3.6.7 Insecticide application

The researcher collected information about insecticide application of brinjal cultivation. The researcher collected the dose of insecticide application from farmers. It appears in item no 23 (Appendix I) in interview schedule.

3.6.7 Experience in Agriculture.

The farming experience of farmers was measured by the length covered by from his starting years in farming to the time of interview on the basis of his statement. A score of one (1) was assigned for each year of his experience. It appears on item no. 7a in the interview schedule (Appendix I).

3.6.8 Experience in brinjal Cultivation

The experience on brinjals cultivation of a farmer was measured in terms of actual years he engaged in brinjals cultivation by asking him directly. The length was measured by length covered from his starting year to the time of cultivation. A score of one (1) was assigned for each year of his experience. It appears in item no. 7b in the interview schedule (Appendix I).

3.6.9 Knowledge in brinjal Cultivation

To measure the knowledge of farmers on brinjal cultivation 10 item scale was included in interview schedule. Each farmer was asked to answer the 10 questions. Thus the whole questions comprised of 10 marks. Each farmer was given a particular number depending on the percentage of appropriateness of answer to the question. The total score obtained by a farmer was calculated by summing up the scores against each of the 10 questions. It was included under item no. 18 of interview schedule (Appendix I).

3.7 Specification and Measurement of the Variables

In survey research the Specification and Measurement of the Variables constitute an important task. A research hypothesis contains at least two elements, one dependent variable and other independent variable. The researcher keeping all these in mind took adequate care in selecting the variables of the study. Before the onset of the study, the researcher visited the study area several times and talked to the farmers intimately. Moreover, staying in the study area for sometimes, he was able to observe personal, socio-economic, socio-culture

and psychological factors of the farming community which the researcher assumed might have influenced on the behavior pattern of the farmers.

3.8 Specification and Measurement of Independent Variables

Beside on the practical knowledge, side by side an extensive review of literature and discussions with relevant expert and academicians, the researcher selected 11 different kind of characteristics of these farmers. The characteristics of farmers which were treated as independent variables for the study are age, education, family size, land size, annual income, organizational participation, cosmopolitanism, extension media contact, experience in agriculture, experience in brinjal cultivation, and knowledge. Problem confrontation was treated as dependent variable. On the basis of definition of the terms presented in earlier sections, operationalization of the variables was done which are presented below:

3.9 Characteristics of the farmers:

Personal Characteristics of the brinjal growers

- i. Age
- ii. Education
- iii. Family size

Economic Characteristics

- i. Annual income
- ii. Land size

Social Characteristics

- i. Organizational participation
- ii. Cosmopolitanism
- iii. Extension media contact
- iv. Knowledge
- v. Experience in agriculture.
- vi. Experience in brinjal cultivation.

3.9.1 Age

The age of the farmers was measured in terms of actual years from his birth to the time of interview on the basis of his statement. A score of one (1) was assigned for each year of his age. It appears at item no. 3 (Appendix 1) in

interview schedule. Based on age, the farmers were classified into three categories.

3.9.2 Education

The level of education of farmers was measured by the year of schooling. If a farmer did not know how to read and write, his education score was taken as zero (0). A score of one was given to those farmers who could sign his name only. Besides, the farmers got actual score for his every year of schooling, i.e. 1 for class one and two for class 2 and so on. Thus, the score of education of a farmer was determined from response to item no. 5 in the interview schedule (Appendix I). Based on education, the farmers were classified into different categories.

3.9.3 Family Size

Family size of farmers was measured in terms of number of family who lives under same roof and share same kitchen. The farmers were given score 1 for each member of his family. The question to measure the family size of the farmers has been presented in item no. 6 in interview schedule (Appendix i). The farmers were classified into different categories based on family size. shown in Table 3.17

3.9.4 Land Size

The land size of the farmers was computed in hectares using the following formula: $LS = A_1 + A_2 + A_3 + A_4 + A_5 + A_6 + A_7 + A_8 + A_9$

Where, LS= Land size

A_1 = Homestead & including yard.

A_2 = Homestead brinjal garden.

A_3 = Crop cultivated land.

A_4 = Fallow Land

A_5 = Land given to other on lease

A_6 = Land taken from others on lease

A_7 = Ponds

A_8 = Garden

A_9 = Others

Land size is shown in item no. 9 in the interview schedule (Appendix I). Based on education, the farmers were classified into different categories as shown in Table 3.5

Table 3.5: Categories of farmers according to their land size

Categories	Score (ha)
Land less	<0.20
Marginal	0.20-0.40
Small	0.41-1.0
Medium	1.01-3.00
Large	>3.00

3.9.5 Annual Income

Annual income of a farmer was measured in taka on the basis of his total yearly earning from agriculture and non agriculture sources including earning of members of farmers family. The yield of all crops in the preceding was noted. Then all the yields were converted into cash income according to the preventing market price. The price of other enterprise (i.e. cows, goats, poultry, fishes etc) was also added to the price. Earning of the each farmer themselves and members of the family from different sources (like service, business, and labor) were also included in calculating the income. Yearly income of all family members from farming and non-agriculture sources were added together to obtain total family income. Data obtain in response to item no. 8 in the interview schedule were used to determine the income of the farmers. The farmers were classified into different categories based on their annual income is shown in Table 3.6.

Table 3.6 Categories of farmers according to their annual income

Categories	Score (Thousand taka)
Low income	<100
Medium income	100-200
High income	201- 400
Very high income	>400

3.9.6 Organizational Participation

Organizational participation of farmers was measured on the basis of the nature of his involvement in different organizations found operating in the study area. The researcher identified different organization in the study area such as Agricultural Co-operative society, NGO, School Committee, Madrasha Committee, Mosque/Temples Committee, Bazar Committee & Sports cultural shown in the item no 11 in the interview schedule (Appendix I).

A farmer could be attached to a number of such organizations, and thus his score was determined by adding up the weighted scores for his participation in all the organizations.

3.9.7 Cosmopoliteness

Cosmopoliteness of farmers was measured in terms of his nature of visits to the ten different places external to his own social system. Following four point rating scales were used to compute the cosmopolitans score

The Cosmopoliteness score of a farmer was calculated by adding together the scores obtained for his visits to each of the eleven types of places as mentioned above. The scores of farmers could range from 6-20. Cosmo politeness was represented in the item no. 12 (Appendix 1).

3.9.8 Extension Media Contact

Extension Media Contact is defined as a person communication with different sources of information available in and out of his social system. Beside this, their level of communication were also spread to the combined discussion, participation of result demonstration, field day with other farmers and listening radio and TV program about agriculture, printing leaflet, bulletin, paper, watching poster, advertisement etc. In this study, the extension contact score was computed for each farmer on the basis of the extent of his contact with selected media as ascertained from his responses to question no.10 in interview schedule (Appendix I). A number of 13 sources were included in the interview schedule.

The frequency of contact was classified into 4 categories such as frequently, occasionally, rarely, not at all and a weight of 3, 2, 1 and 0 was assigned to these categories, respectively. The categorization procedure of the farmers based on extension media contact is presented in Table 3.7.

Table 3.7 Categories of farmers according to extension media contact

Category	Score
Low contact	<16
Medium contact	16-20
High contact	>20

3.9.9 Specification and Measurement of Dependent Variable

The problem confrontation was treated as dependent variable for this study.

Problem Confrontation

In this study, problem confrontation score was computed for each farmer as ascertained from his responses to question no. 24 (Appendix I) in the interview schedule (Appendix I).

Problem Confrontation index (PCI) in brinjal cultivation

Table 3.8 Problem confronted by farmers

SL No	Problems	Extent of severity of problems					
		Very severe 5	Severe 4	Moderately Severe 3	Negligible 2	Very Negligible 1	Not at all 0
1	Unavailability of good quality seed						
2	High rate of seed or young plant						
3	Scarcity of fertilizer or manure						
4	High cost of fertilizer or manure						
5	Impure insecticide/						
6	High market price of insecticide						
7	Disease infestation						
8	Insect infestation						
9	Low yield						
10	Natural Calamities (Flooding/ drought/ salinity/climate change)						
11	Low market price						
12	Lack of preservation/ storage facilities						
13	Lack of knowledge on processing of brinjal						

A 6 point liker type scale such as very severe, severe, moderately severe, negligible, very negligible and not at all was employed against each of the problems to determine the extent/ severity of a problem. A score 5, 4, 3, 2, 1 and 0 was assigned against each of the scale respectively. To ascertain the problem

confrontation score, all the scores obtained by a farmer against the selected 13 issues were added. Based on problem confrontation sense, the farmers were classified into three categories as shown in Table 3.8.

Table 3.9 Categories of farmers according to their score of problem confrontation.

Categories	Score
Low problem confrontation	< 40
Medium problem confrontation	40-50
High problem confrontation	>50

3.10 Severity of problem

The severity of a problem was determined based on problem confrontation index (PCI). The PCI was calculated by using following formula:

$$PCI = N_{vs} \times 5 + N_s \times 4 + N_{ms} \times 3 + N_n \times 2 + N_{vn} \times 1 + N_{na} \times 0$$

Where,

PCI= Problem confrontation index

N_{vs} = No. of respondents rated the problem as very severe

N_s = No. of respondents rated the problem as severe

N_{ms} = No. of respondents rated the problem as moderately severe

N_n = No. of respondents rated the problem as negligible

N_{vn} = No. of respondents rated the problem as very negligible

N_{na} = No. of respondents as not at all rated the problem



3.11 Data Processing and Analysis

Collected data were compiled, coded, tabulated for processing and analysis in accordance with the objectives of the study. For arriving at a meaningful conclusion, tabular presentation of data was intensively used. The SPSS 11.5 computer package program was used to analyze the data. Descriptive statistics like number, percentage, range, mean and standard deviation were used in describing selected independent variables of the study.

CHAPTER IV

Result and Discussion

Findings of the present study have been presented and discussed under the following headings

4.1 Selected characteristics of the brinjal cultivators

4.1.1 Age

The age of the farmers in the study area ranged from 24 to 70 years and the average being 42.01 years with a standard deviation of 9.58. Based on age score, the farmers were grouped into different categories as shown in Table 4.1. Most of the farmers (83%) belonged to young to middle aged group, while only about 17% of them were old aged. This leads to the understanding that the young to middle aged group of farmers are more interested in cultivation of brinjal.

Table 4.1 Distribution of farmers according to their age

Categories	Score (years)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Young aged	<35	48	24	42.01	9.58
Middle aged	35-50	118	59		
Old aged	>50	34	17		
Total		200	100	Min. 24	Max. 70

4.1.2 Education

Scores of the farmers ranged from 0 to 14 with the mean and standard deviation being 6.08 and 3.97, respectively. On the basis of education, the farmers were classified into five categories as shown in Table 4.1.2.

Table 4.2: Distribution of farmers according to level of education

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage(%)		
Illiterate	0	36	18	6.08	3.97
Primary	1-5	62	31		
Secondary	6-10	84	42		
Higher secondary	11-12	8	4		
Above Higher Secondary	>12	10	5		
Total		200	100	Min. 0	Max. 14

About two fifth (42%) of the farmers had secondary level of education followed by primary level (31%), illiterate (18%), above higher secondary level (5%) and higher secondary level (4%).

4.1.3 Family Size

The family size of the farmers ranged from 2 to 10 and mean 5.39 with standard deviation of 1.25. On the basis of their family size, the farmers were classified into three categories, which are shown in Table 4.3

Table 4.3 Distribution of farmers according to their score of family size

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Small sized family	1-4	50	25	5.39	1.25
Medium sized family	5-6	112	56		
Large sized family	>6	38	19		
Total		200	100	Min 02	Max 10

Majority (56 %) of the farmers had medium sized family compared to small (25%) and large sized family (19%). The average family size (5.39) of farmers of the study

area was lower than the national average of 5.6 (BBS, 1999). It means that the people in the study area are more conscious about their family size and population growth.

4.1.4 Experience in Agriculture

To measure the experience, the duration of involvement of the farmers in agriculture was considered. The experience of the farmers in agriculture ranged from 12 to 35 years with mean 28.50 years and standard deviation of 9.06. Based on the experience in agriculture, the farmers were grouped into different categories as shown in the Table 4.4. Most (95%) of the farmers had medium to high experience. Five percent of farmers had low experience (Table 4.4).

Table 4.4 Distribution of farmers according to their experience in agriculture

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low experience	<15	10	5	28.50	9.06
Medium experience	15-20	38	19		
High experience	>20	152	76		
Total		200	100	Min 12	Max 46

4.1.5 Experience in brinjal cultivation

To measure the experience, the duration of the farmers' involvement in brinjal cultivation was considered. The experience in brinjal cultivation of the farmers ranged from 11 to 46 years with mean 21.80 and standard deviation of 7.69. Based on the experience in brinjal cultivation the farmers were grouped into different categories shown in the Table 4.5.

Table 4.5 Distribution of farmers according to their experience in brinjal cultivation

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low experience	<12	8	4	21.80	7.69
Medium experience	12-20	100	50		
High experience	>20	92	46		
Total		200	100	Min 11	Max 46

It was found that the most of farmers (96%) had medium to high experience, followed by low (4%) experience in brinjal cultivation.

4.1.6 Annual Income

The annual income (from non-agricultural + agricultural sources) of the farmers ranged from 70 thousand taka to 910 thousand taka with the mean and standard deviation of 269.49 and 137.46, respectively. On the basis of their annual income, the farmers were classified into four categories as shown in Table 4.6.

Table 4.6 Distribution of farmers according to their annual income

Categories	Score (Thousand taka)	Farmers (N=200)		Mean	Standards deviation
		No. of farmers	% of farmers		
Low income	<100	6	3	269.49	137.46
Medium income	100- 200	44	22		
High income	201-400	126	63		
Very high income	>400	24	12		
Total		200	100	Min 70	Max 910

Data presented in table 4.6 indicate that about three fifth (63%) of the respondents had high income, followed by medium income (22%) and very high income (12%). Only 3% of respondents had low income.

4.1.7 Land Size

Land size of the farmers in the study area varied from 0.14 to 11.13 ha with an average of 1.03 ha and standard deviation of 1.23. Based on the farm size the farmers were classified into five categories as presented in the Table 4.7.

Table 4.7 Distribution of farmers according to their land size.

Categories	Score (ha)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Land less	<0.20	6	3	1.03	1.23
Marginal	0.20-0.40	12	6		
Small	0.41-1.0	118	59		
Medium	1.01-3.00	56	28		
Large	>3.00	8	4		
Total		200	100	Min .14	Max 11.13

Data presented in Table 4.7 show that the majority of the farmers (59%) had small of land followed by medium land (28%), marginal land (6%), large of land (4%) and (3%) land less respectively. Thus small farmers are more interested for brinjal cultivation.

4.1.8 Extension Media Contact

Farmers use various information sources and media to a different extent in order to receive agricultural information. Extension media contact scores of the farmers ranged from 9 to 31, with an average of 14.28 and standard deviation 3.51 Based on the computed extension media contact score, the farmers were classified into four categories as shown in Table 4.8.

Table 4.8 Distribution of farmers according to their score of extension media contact

Category	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low contact	<16	142	71	14.28	3.51
Medium contact	16-20	50	25		
High contact	>20	8	4		
Total		200	100	Min 9	Max 31

Data presented in Table 4.8 shows that majority of the farmers (71%) had low extension media contact, as compared to medium contact (25%) and high Contact (4%). Farmers exposure to a variety of information sources usually guided them to identify problems in brinjal cultivation and how to solve the identified problems.

4.1.9 Organizational participation

The scores on organizational participation of the farmers ranged from .00 to 5 with an average of 1.48 and standard deviation of 1.04. Depending on the individual participation scores, the farmers were grouped into the following categories as shown in Table 4.9.

Table 4.9: Distribution of farmers according to their score of organizational participation

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
No participation	0	22	11	1.48	1.04
Low participation	1	110	55		
High participation	>1	68	34		
Total		200	100	Min .00	Max 5

It was observed from the result that majority of the respondents (55%) had low organizational participation. However, about one tenth (11%) of the farmers had no participation and one third (34%) of the farmers had high organizational participation. It reveals that most of the farmers (89%) had low to high organizational participation.

4.1.10 Cosmopoliteness

The computed cosmopoliteness scores of the farmers ranged from 9 to 22, with an average score of 13.82 and standard deviation being 2.71. Based on the calculated scores, the farmers were categorized into three groups as shown in Table 4.10.

Table 4.10: Distribution of farmers according to their score of cosmopoliteness

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
No cosmopoliteness	<10	24	12	13.82	2.71
Low cosmopoliteness	10-19	164	82		
High cosmopoliteness	>19	12	6		
Total		200	100	Min 9	Max 22

Data presented in the above Table 4.11 indicates that most (82%) of the farmers had medium cosmopoliteness as compared to low cosmopoliteness (12%) & high cosmopoliteness (6%). It means that most of the farmers have an orientation to out of his own social system which may help them to change their attitude towards brinjal cultivation. 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.

4.1.11 Knowledge in brinjal Cultivation

The knowledge in brinjal cultivation scores of the farmers ranged from 3 to 10 with a mean and standard deviation of 9.34 and 1.72, respectively. On the basis of their knowledge in brinjal cultivation score, the farmers were classified into three categories as shown in Table 4.11.

Table 4.11: Distribution of farmers according to their knowledge in brinjal cultivation

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low knowledge	<4	10	5	9.34	1.72
Medium knowledge	4-7	20	10		
High knowledge	>7	170	85		
Total		200	100	Min 3	Max 10

It was revealing that most of the farmers (85%) belonged to high knowledge group, while about one tenth (10%) of farmers had medium knowledge and one twentieth (5%) had low knowledge in brinjal cultivation. Since, most of the farmers had high knowledge, it is logical to assume that they had high experience for identification of problem in brinjal cultivation.

4.2 Status of Brinjal cultivation

4.2.1 Total Cultivable Land

Total cultivated land scores of the farmers range from 0.11 to 10.83 ha with a mean 0.95 ha and standard deviation 1.19. On the basis of their total cultivable land the farmers were classified into four categories as presented in the Table 4.12.

Table 4.12 Distribution of farmers according to their total cultivable land

Categories	Score (ha)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Small	<0.50	64	32	.95	1.19
Medium	0.50-1.00	80	40		
Large	1.01-1.50	50	25		
Very large	> 1.50	6	3		
Total		200	100	Min .11	Max 10.83

It was found that about three fourth (72%) of the farmers had small to medium sized lands, while one fourth (25%) of farmers had large and only a few (3%) of farmers had very large sized cultivable lands.

4.2.2 Land area suitable for brinjal cultivation

Land area suitable for brinjal cultivation scores of the farmers ranged from 0.10 to 10.83 ha with a mean of 0.50 ha and standard deviation 1.071. On the basis of their land suitable for brinjal cultivation the farmers were classified into four categories as presented in the Table 4.13

Table 4.13 Distribution of farmers according to their suitable land area for brinjal cultivation

Categories	Score (ha)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage		
Small	<0.20	58	29	0.50	1.071
Medium	0.20-0.40	60	30		
Large	0.41-0.60	74	37		
Very Large	>0.60	8	4		
Total		200	100	Min 0.10	Max 10.83

It was found that majority (67%) of the farmers had medium to large sized lands, as compared to small sized lands (29%) and very large sized lands (4%) suitable for

brinjal cultivation .

4.2.3 Land under Brinjal Cultivation (hectare) by farmers in the period of 2003-12

Table 4.14: Land under Brinjal Cultivation by farmers in the period of 2003-12 (in hectare)

Categories	Score (ha)	% of farmer in									
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Small	<0.18	48	42	38	36	29	29	23	23	21	26
Medium	0.18-0.36	20	27	25	26	31	30	31	31	32	28
Large	0.37-0.54	28	20	24	25	27	28	30	29	30	36
Very Large	>0.54	4	11	13	13	13	15	16	17	17	10
Mean(ha)		0.1	0.12	0.12	0.13	0.13	0.14	0.14	0.16	0.17	0.17
S.D		0.09	0.09	0.06	0.07	0.88	0.07	0.07	0.68	0.07	0.09
Minimum(ha)		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.06	0.06
Maximum(ha)		0.28	0.30	0.30	0.32	0.70	0.34	0.40	0.54	0.60	0.61

In 2003 land under brinjal cultivation scores of the farmers range from 0.02 to 0.28 ha with a mean 0.10 ha (Table 4.14) and standard deviation .09. On the basis of their land under brinjal cultivation, the farmers were classified into four categories as presented in the Table 4.14. It was found that majority 68% of the farmers had small to medium sized lands, 4% of farmers had very large size land and 28% of farmers had large sized lands under for brinjal cultivation. In 2004 land used for brinjal cultivation scores of the farmers range from 0.02 to 0.30 ha with a mean 0.12 ha (Table 4.14) and standard deviation 0.09. On the basis of their land under brinjal cultivation the farmers were classified into four categories as presented in the Table 4.14 it was found that most of the farmers 69% had small to medium sized lands, 11% of farmers had very large size land and 20% of farmers had large sized lands under brinjal cultivation. In 2005 land used for brinjal cultivation scores of the farmers range from 0.02 to 0.30 ha with a mean 0.12 ha (Table 4.14) and standard deviation 0.06. On the basis of their land under brinjal cultivation the farmers were classified into four categories as presented in the Table 4.14 it was found that most of the farmers 63% had small to medium sized lands, 13% of farmers had very large size land and

respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 shows that the majority of farmers 44% had low yield, 30% had high yield and 26% had medium yield in brinjal. In 2006 the brinjal yield scores of the farmers ranged from 10 to 70 tons with a mean and standard deviation of 33.12 and 16.70 respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 shows that the majority of farmers 45% had low yield, 33% had high yield and 22% had medium yield in brinjal. In 2007 the brinjal yield scores of the farmers ranged from 10 to 70 tons with a mean and standard deviation of 34.61 and 17.40 respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 shows that the majority of farmers 38% had low yield, while about 36% had high yield and 26% had medium yield in brinjal. In 2008 the brinjal yield scores of the farmers ranged from 10 to 71 tons with a mean and standard deviation of 35.36 and 17.67 respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 shows that the majority of farmers 40% had high yield, 37% had low yield and 23% had medium yield in brinjal. In 2009 the brinjal yield scores of the farmers ranged from 10 to 71 tons with a mean and standard deviation of 35.94 and 18.03 respectively. On the basis of their brinjal yield score, The Farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 show that the majority of farmers 48% had low yield, while about 26% had high yield and 22% had medium yield in brinjal. In 2010 the brinjal yield scores of the farmers ranged from 10 to 72 tons with a mean and standard deviation of 36.59 and 18.17 respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 show that the majority of farmers 38% had high yield, while about 34% had low yield and 28% had medium yield in brinjal. In 2011 the brinjal yield scores of the farmers ranged from 10 to 75 tons with a mean and standard deviation of 37.27 and 18.18 respectively. On the basis of their brinjal yield score, the farmers were classified into three categories as shown in table 4.15. Data presented in table 4.15 shows that the majority of farmers 38% had high yield, while about 33% had low yield and 29% had medium yield in brinjal.

In 2012 the brinjal yield scores of the farmers ranged from 10 to 80 tons with a mean and standard deviation of 40.35 and 20.17 respectively. On the basis of their brinjal yield score, The Farmers were classified into three categories as shown in table.4.15. Data presented in table 4.15 show that the majority of farmers 48% had high yield, while about 35% had low yield and 17% had medium yield in brinjal

4.2.5. Brinjal Production (tons) by the farmers in the period of 2003-12

Table No 4.16: Brinjal Production (tons) by the farmers in the period of 2003-12

Categories	Score (ton)	% of farmers in									
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Low	<5	80	80	75	75	70	62	67	56	56	50
Medium	5-10	19	16	19	19	23	22	23	30	30	33
High	>10	1	4	6	6	7	10	10	14	14	17
Mean(ton)		3.01	3.6	4.04	4.18	4.46	4.92	5.04	5.80	6.38	6.67
S.D		12.5	2.94	3.31	3.47	3.78	3.99	4.11	4.85	5.69	5.99
Minimum(ton)		0.05	0.05	0.52	0.40	0.62	0.64	0.60	0.60	0.08	1.4
Maximum(ton)		11.6	13.2	14.3	22.6	22.4	24.14	19.6	26.46	36	80

In 2003 the brinjal Production scores of the farmers ranged from 0.5 to 11.6 tons with a mean and standard deviation of 3.01 ton and 2.50, respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers (80%) had low production, while about 1% had high production and 19% had medium production in brinjal. In 2004 the brinjal Production scores of the farmers ranged from 0.5 to 13.2 tons with a mean and standard deviation of 3.60 ha and 2.94, respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the largest number of farmers (80%) had low production, while about 4% had high production and 16% had medium production in brinjal. In 2005 the brinjal Production scores of the farmers ranged from 0.52 to 14.3 tons with a mean and standard deviation of 4.04 ha and 3.31 respectively. On the basis of their brinjal production score, the

farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 75% had low production, 6% had high production and 19% had medium production in brinjal. In 2006 the brinjal production scores of the farmers ranged from 0.40 to 22.4 tons with a mean and standard deviation of 4.18 and 3.47, respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 75% had low production, while about 6% had high Production and 19% had medium production in brinjal had low production, 7% had high production and 23% had medium production in brinjal. In 2007 the brinjal production scores of the farmers ranged from 0.62 to 22.4 tons with a mean and standard deviation of 4.46 and 3.78 respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 70% had low production, 7% had high Production and 23% had medium production in brinjal. In 2008 the brinjal production scores of the farmers ranged from 0.64 to 24.14 tons with a mean and standard deviation of 4.92 and 3.99 respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 62% had low production, 10% had high production and 22% had medium Production in brinjal. In 2009 the brinjal production scores of the farmers ranged from .6 to 19.6 tons with a mean and standard deviation of 5.04 and 4.11 respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 67% had low production, while about 10% had high production and 23% had medium production in brinjal. In 2010 the brinjal production scores of the farmers ranged from .6 to 26.46 tons with a mean and standard deviation of 5.80 and 4.85 respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 56% had low production, while about 14% had high production and 30% had medium production in brinjal. In 2011 the brinjal production scores of the farmers ranged from .08 to 36 tons with a mean and standard deviation of 6.38 and 5.69 respectively. On the basis of their brinjal production score, the farmers

were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 56% had low production, while about 14% had high production and 30% had medium production in brinjal. In 2012 the brinjal production scores of the farmers ranged from 1.4 to .80 tons with a mean and standard deviation of 6.67 and 5.99 respectively. On the basis of their brinjal production score, the farmers were classified into three categories as shown in table 4.16. Data presented in table 4.16 shows that the majority of farmers 50% had low production, while about 33% had high production and 17% had medium production in brinjal.

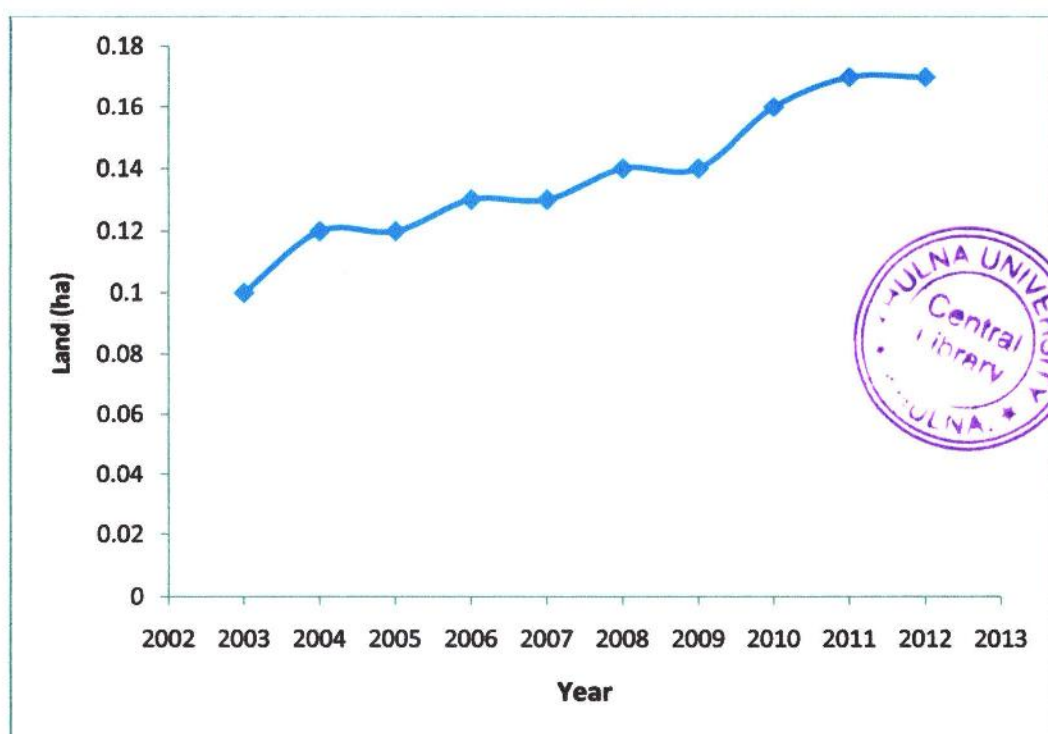


Fig: 4.1- Land under Brinjal Cultivation (hectare) in the period of 2003-12

It was revealed from (fig: 4.1) the study that the Land under Brinjal Cultivation area increased from 2003 to 2004. 2004 and 2005 are same. It was increased 2005 to 2006. 2006 and 2007 are same. Next it was increased 2007 to 2008. 2008 and 2009 are same. It was increased gradually 2009 to 2011. 2011 and 2012 are same.

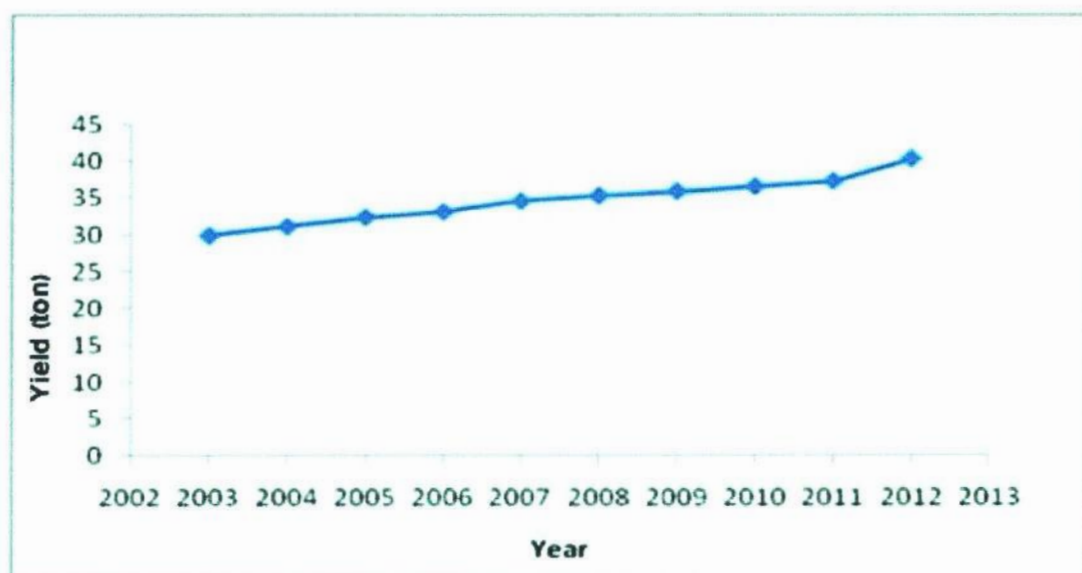


Fig. 4.2- Yield of Brinjal (tons / hectare) in the period of 2003-12

It was revealed from the study that the yield of brinjal in this area increased gradually from 2003 to 2011 with a slightly sharp increased in 2012 (fig: 4.2).

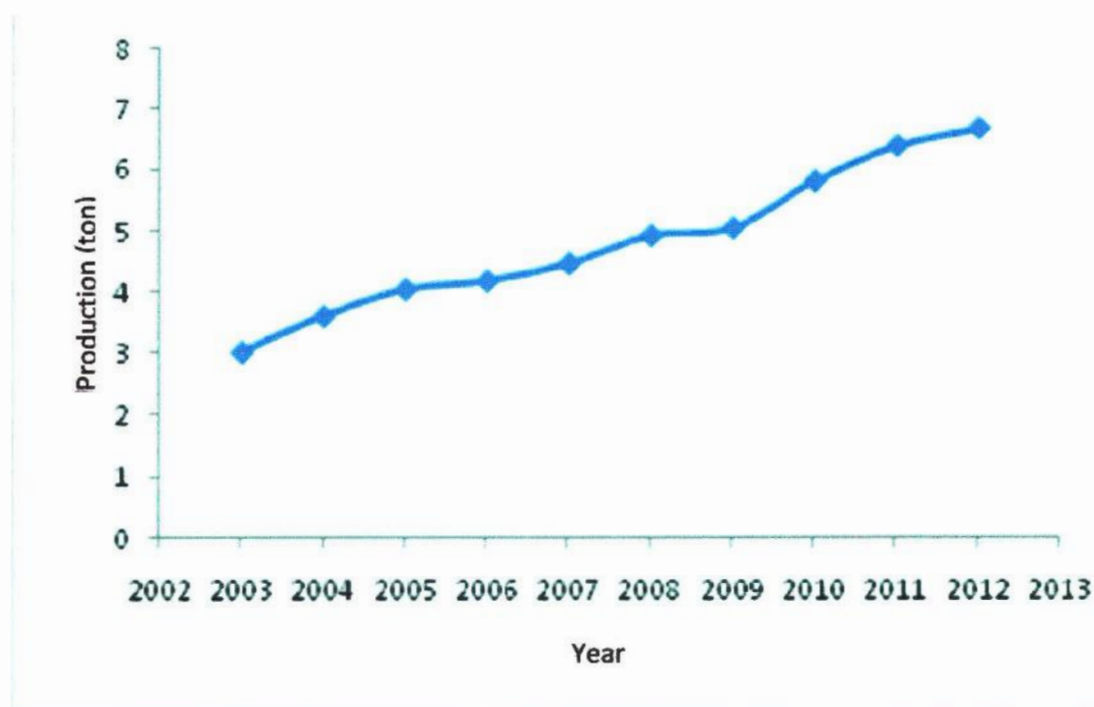


Fig. 4.3- Brinjal Production (tons) in the period of 2003-12

It was evident from the study that the production of brinjal gradually increased from 2003 to 2012.

Income (thousand taka) from brinjal, 2012

The brinjal Income scores of the farmers ranged from 20 to 740 thousand taka with a mean and standard deviation of 114.06 and 101.11, respectively. On the basis of their brinjal Income score, the farmers were classified into three categories as shown in table 4.17.

Table 4.17 Distribution of farmers according to their income from brinjal (thousand taka) 2012.

Categories	Score (thousand taka)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low Income	<50	44	22	114.06	101.11
Medium Income	50-100	70	35		
High Income	>100	86	43		
Total		200	100	Min 20	Max 740

Data presented in table 4.20 shows that the highest proportion of farmers (43%) had high income, while 35% had medium income and 22% had low income from brinjal cultivation .

Cost of brinjal production (thousand taka), 2012

Cost of brinjal scores of the farmers ranged from 4 to 150 thousand taka with a mean and standard deviation of 32.23 and 26.63, respectively. On the basis of their brinjal production cost, the farmers were classified into three categories as shown in Table 4.18.

Table 4.18: Distribution of farmers according to their brinjal production Cost (thousand taka) 2012.

Categories	Score (thousand taka)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low production Cost	<20	64	32	32.23	36.63
Medium production Cost	20-40	94	47		
High production Cost	>40	42	21		
Total		200	100	Min 4	Max 150

Data presented in table 4.20 shows that the highest proportion (47%) of the farmers had medium production cost while 32% and 21% of the respondents had low and high production cost respectively.

Benefit (thousand taka) from brinjal, 2012

Benefit from brinjal scores of the farmers ranged from 14 to 592 thousand taka with a mean and standard deviation of 82.82 and 81.46 respectively. On the basis of their brinjal benefit score, the farmers were classified into three categories as shown in table 4.19. The highest number of farmers (36%) had high benefit, while about 30% had low benefit and 34% had medium benefit from brinjal. Findings also indicate that brinjal cultivation is profitable as majority (70%) of the respondents got medium to high benefit from brinjal cultivation.

Table 4.19: Distribution of farmers according to their benefit from brinjal cultivation(thousand taka) 2012

Categories	Score (thousand taka)	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low benefit	<40	60	30	82.82	81.46
Medium benefit	40-80	68	34		
High benefit	>80	72	36		
Total		200	100	Min 14	Max 592

Occupation of the farmers

It was revealed from the study area that the most (92%) of respondents were farmers 6% of respondents were in business and 2% of respondents were employees along with farming (Table 4.20)

Table 4.20: Distribution of the Occupation of the farmers

Level of occupation	Farmers (N= 200)	
	No. of farmers	Percentage (%)
Farmers	184	92
Business	12	6
Employee	4	2
Total	N =200	100

4.2.6 Brinjal varieties cultivated by the farmers.

It was revealed from the study that highest number (30%) of farmers cultivated BARI begun- 2, 20% of farmers cultivate BARI begun-1, 6% of farmers cultivated BARI begun-4, 8% of farmers cultivate BARI begun -5, 7% of farmers cultivate BARI begun-6, 9% of farmers cultivate BARI begun-9, 2% of farmers cultivate Math Kumra begun, 3% of farmers cultivate Lafa begun, 9% of farmer cultivate Chaga Begun, 14% of farmers cultivate Makra begun. (Table: 4.21)

Table 4.21: Name of Brinjal varieties cultivated by the farmers

Name of the varieties	Farmers	
	No. of farmers	Percentage (%)
BARI begun-1(Uttara).	24	12
BARI begun -2 (Tarapuri).	60	30
BARI begun -4 (Kazla).	12	6
BARI begun -5 (Nayantara).	16	8
BARI begun -6.	14	7
BARI begun -9	18	9
Math Kumra Begun	4	2
Lafa	6	3
Chaga	18	9
Makra	28	14
Total	N=200	100

Varieties of Brinjal (Fig: 4.4 to 4.7)

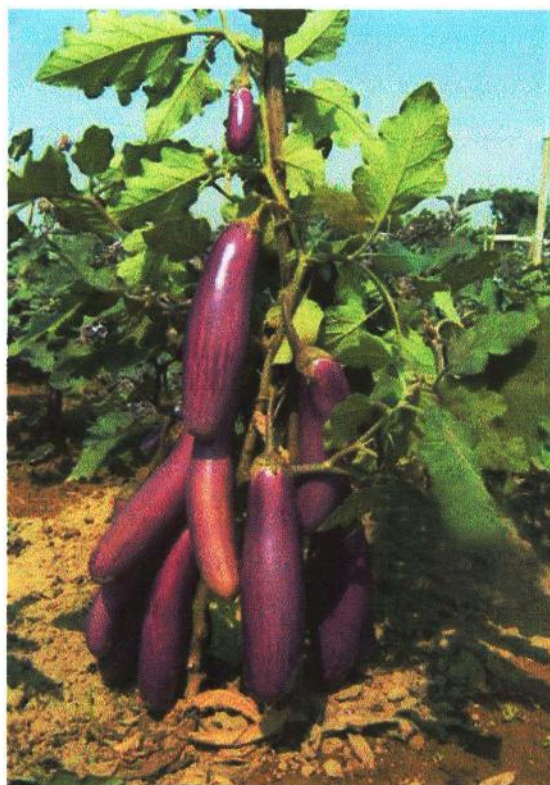


Fig: 4.4-BARI Begun-1 (Uttara)

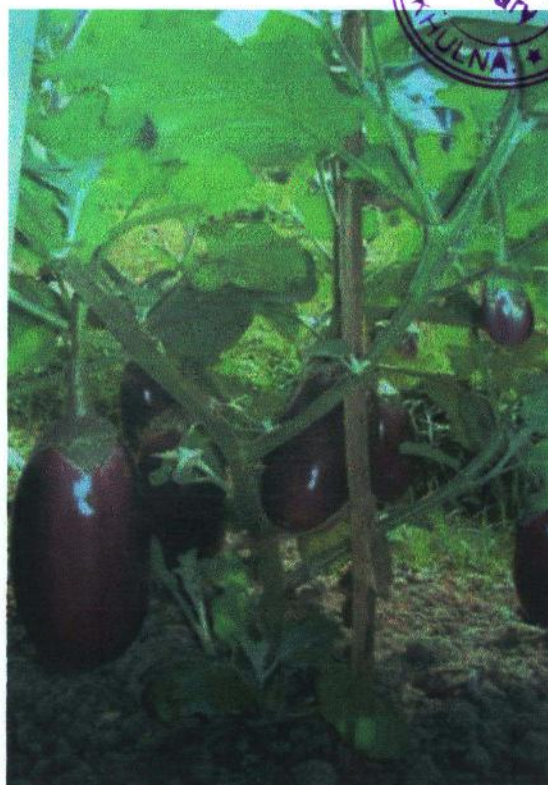


Fig: 4.5-BARI Begun-2 (Tarapuri)



Fig: 4.6-BARI Begun-4 (Kazla)



Fig: 4.7-BARI Begun-5 (Nayantara)

Varieties of Brinjal (Fig: 4.8 to 4.11)



Fig: 4.8-BARI Begun-6



Fig: 4.9-BARI Begun-7



Fig: 4.10-BARI Begun-8



Fig: 4.11-BARI Begun-9

4.2.7 Distribution of the farmers on the basis of varieties use.

It was evident from the study that most of the farmers (72%) cultivated recommended varieties & 28% of farmers cultivated non recommended varieties (Table: 4.22).

Table: 4.22 Distribution of the farmers on the basis of varieties use

Categories	Farmers (N= 200)	
	No of the farmers	Percentage (%)
Recommended varieties	144	72
Non recommended varieties	56	28
Total	200	100

4.2.8 Fertilizers used by the farmers

Data presented in Table 4.23 indicate that all (100%) of the farmers used urea in different extent (high use 80% medium use and low use 15%) followed by TSP (99%) and MoP (97%) as fertilizer. Most (90%) of the farmers used cowdung as manure followed by mustard oilcake (50%). Very few of the farmers 26% and 16% used Zinc Sulphate and Gypsum to different extent. About (35%) of the farmers used mixed fertilizer.

Table 4.23: Name of fertilizers used by the farmers

Name of the fertilizer & manure	Non user		Low user		Medium user		High user		Total	
	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)
Cow dung/ compost	20	10%	64	32%	100	50%	16	8%	200	100%
Urea	0	0%	10	5%	30	15%	160	80%	200	100%
TSP	2	1%	12	6%	58	29%	128	64%	200	100%
MOP	6	3%	26	13%	54	27%	114	57%	200	100%
Gypsum	168	84%	18	9%	10	5%	4	2%	200	100%
Zinc Sulphate	148	74%	28	14%	18	9%	6	3%	200	100%
Mustard Oil Cake	100	50%	30	15%	70	35%	10	5%	200	100%
Mixed Fertilizer	90	45%	54	27%	40	20%	16	8%	200	100%

4.2.9 Inter cultural operation adapted by the farmers

In the study area (72%) farmers practiced weeding, (99%) irrigation, (40%) mulching, (45%) spading, (65%) earthing up, (70%) sticking & (30%) inter cropping. Overlapping inter cultural operations by the farmers were shown in table: 4.26. Overlapping disease infestations were shown in Table :4.24.

Table 4.24: Inter Cultural Operation Adapted by the farmers

Name of the operation	Farmers	
	No. of the farmers	Percentage (%)
Weeding	144	72
Irrigation	188	99
Mulching	80	40
Spading	90	45
Earthing up	130	65
Stacking	140	70
Inter cropping	60	30

4.2.10 Information of consumption of food by the farmers (per person per day)

In the study area 100% farmers eat rice, 75% wheat, 30% meat, 80% fish, 81% Pulse, 78% take milk & 100% Vegetables in different extent in table : 4.25.

Table 4.25: Information of consumption of food by the farmers (per person per day)

Name of the nutrient elements	No Consumption		Low Consumption		Medium Consumption		High Consumption		Total	
	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)	No. of the farmers	Percentage (%)
Rice	0	0%	20	10%	60	30%	120	60%	200	100%
Wheat	50	25%	20	10%	108	54%	22	11%	200	100%
Meat	140	70%	18	9%	38	19%	4	2%	200	100%
Fish	40	20%	32	16%	120	60%	8	4%	200	100%
Pulse	38	19%	22	11%	130	65%	10	5%	200	100%
Milk	44	22%	66	33%	84	42%	6	3%	200	100%
Vegetables	0	0%	46	23%	134	67%	20	10%	200	100%

4.3 Problem Confrontation by the farmers

4.3.1 Problem Confrontation Index

The ranks of the study area confronted a number of 13- problems to different extent in brinjal cultivation as presented in Table 4.26.



Table:4.26 Problem Confrontation index (PCI) in brinjal cultivation

SL. No	Problems	No. of farmers						PCI	Ranks
		Extent of severity of problems							
		Very severe 5	Severe 4	Moderately Severe 3	Negligible 2	Very Negligible 1	Not at all 0		
1	Unavailability of good quality seed	12	42	142	0	2	2	656	5 th
2	High rate of seed or young plant	4	44	150	2	0	0	650	6 th
3	Scarcity of fertilizer or manure	6	52	138	2	0	2	656	5 th
4	High cost of fertilizer or manure	6	84	108	0	2	0	692	4 th
5	Impure insecticide	10	72	82	30	6	0	650	6 th
6	High market price of insecticide	18	94	74	8	2	4	706	3 rd
7	Disease infestation	164	32	4	0	0	0	960	1 st
8	Insect infestation	176	14	6	2	2	0	960	1 st
9	Low yield	8	18	150	20	4	0	606	8 th
10	Natural calamities (Flooding/drought/salinity/climate change)	16	14	42	34	92	2	422	10 th
11	Low market price	8	10	160	18	2	2	598	9 th
12	Lack of preservation/storage facilities	52	48	18	60	22	0	648	7 th
13	Lack of knowledge on processing of brinjal	164	28	4	0	4	0	948	2 nd

Data presented in table 4.26 indicated that among 13-problems confronted by the farmers insect and disease infestation, lack of knowledge on processing of brinjal, and high price of insecticide those are same of the major/severe problems.

4.3.2 Problem confrontation

The score of problem confrontation ranged from 39 to 57 with a mean of 13.82 having standard deviation of 2.72. Considering the mean and standard deviation, the farmers were categorized into low, medium and high problem confrontation categories (Table 4.27)

Table 4.27 Distribution of respondents according to their score of problem confrontation

Categories	Score	Farmers (N=200)		Mean	Standard deviation
		No. of farmers	Percentage (%)		
Low problem confrontation	<40	16	8	45.75	4.04
Medium problem "	40-50	148	74		
High problem confrontation	>50	36	18		
Total		200	100	Min 37	Max 57

It was found that about three fourth (74%) of the farmers confronted medium problem, while about one fifth (18%) confronted high problem, only a few of the farmers (8%) confronted low problem.

Table: 4.28 Computed coefficient of correlation (r) between farmers problems and their selected characteristics (N=200)

Sl.No	Independent variable (selected characteristics)	Dependent variable	Values of 'r' with 198 df (Pearson Correlation)
1	Age	Problem confrontation	0.04
2	Education		0.060
3	Family size		-0.008
4	Experience in agriculture		0.049
5	Experience in brinjal cultivation		0.139*
6	Annual income		-0.074
7	Land size		0.214**
8	Extension media contact		0.360**
9	Organizational Participation		0.127
10	Cosmopoliteness		0.154*
11	knowledge		0.005

**indicate 1% level of significance,

*indicate 5% level of significance

Among the selected 11 characteristics of the respondents only experience in brinjal cultivation, land size, extension media contact, cosmopoliteness and frequency of insecticide application showed positive significant relationship with their problem confrontation in brinjal cultivation. It means that the higher is the experience in brinjal cultivation, land size, extension media contact, cosmopoliteness and frequency of insecticide application, the higher is the ability to identify the problems.

4.4 Extent of pesticide application in brinjal cultivation by the farmers

4.4.1 Disease infestation in brinjal.

Data presented in Table 4.29 indicate that the brinjal fields of the highest proportion (45%) of the farmers brinjal crops were infested by little leaf of brinjal disease followed by wilting (35%) and, fruit rot (30%), root rot (10%) foot rot (8%) leaf spot (15%), mosaic (9%) and stem rot (16%).

Table: 4.29: Name of disease infestation in brinjal.

Name of the disease	Farmers	
	No. of the farmers	Percentage (%)
Little leaf of brinjal	90	45
Fruit rot	60	30
Root rot	20	10
Foot rot	16	8
Wilting	70	35
Leaf spot	30	15
Mosaic	18	9
Stem rot	32	16

4.4.2 Fungicide used by the farmers.

In the study area (5%) farmers used 250g acrobat 10 MZ, (30%) farmers used 250g Redomil gold MZ 68 WP, (35%) farmers used 2200 g Dithane M 45, (33%) farmers used 1500g Indofil M 45, (10%) farmers used 800g Razland 80 WP, (13%) farmers used 750g Forastin 50 WP, (12%) farmers used 500 ml Tilt 250 Ec, (40%) farmers used 800g Bavistin 68 WP, (15%) farmers used 6000g Bistaren 5G, (4%) farmers used 1500g agrithen 800 WP. Overlapping fungicides used by the farmers were shown in table : 4.30. No of respondents were 200.

The respondents ranges of the study area used different types of fungicides to different doses to control different types of diseases as presented in table 4.30.

Table 4.30: Name of Fungicide used by the farmers

Name of the fungicide	Name of the Company	Disease	Recommended dose /ha.	Farmers used dose /hec.	Farmers	
					No of Farmers	Percentage (%)
Acrobet 10 MZ (Bimathomorph & Mancozeb)	Padma oil	Leaf Spot	250g	250g	10	5%
Redomin gold MZ 68 WP (Meta laxyl & Mancozeb)	Syngenta	Any rot	250g	250g	60	30%
Dithane M 45 (Mancozeb)	Bayer	Stem rot	2200g	2200g	58	29%
Indofil M 45 (Mancozeb)	Auto	Anthracnoac	1000g	1500g	66	33%
Razland 80 WP (Mancozed)	ACI	Stem rot	1000g	800g	20	10%
Forastin 50 WP (Carbendazim)	Shetu	Sten rot	500g	750g	26	13%
Tilt 250 Ec (Propiconazol)	Syngenta	Anthracnoac	250ml	500ml	24	12%
Bavistin 68 WP (Carbendazim)	Auto	Wilting	500g	800g	80	40%
Bistaren 5G (Carbofuram)	Alfa Agro	Mosaic	4000g	6000g	30	15%
Agrithen 800 WP (Mancozeb)	Ranar	Stem rot	1000g	1500g	8	4%

Data presented in table 4.30 indicate that the highest percentage (29%) of the respondents followed recommended dose of fungicide Dithane M 45 (Mancozeb) of Bayer crop science to control stem rot of brinjal. While 30% and 5% of the respondents also followed recommended doses of fungicides such as redomin gold MZ 68 WP (meta laxyl & mancozeb) and Acrobet 10 MZ (Bimathomorph & Mancozed) of syngenta and pabma oil for any rot and leaf spot disease of brinjal

respectively. Incase of wilting anthracnose mosaic stem rot anthracnose stem rot 40%, 33%, 15%, 13%, 5% and 4% of farmers used high dose of bavistin 68 WP, indofil M 45 bistaren 5 G Forastin 50WP, tilt 250 EC and Agrithen 800 WP of Auto crop care, Auto crop care, Alfa Agor, Shetu, Syngenta and Ranar respectively. Only one tenth (10%) of the farmers used lower than recommended dose of Razland 80 WP fo ACI to control stem rot of brinjal.

4.4.3 Extent of use of fungicide by the farmers

In the study area 10% Farmers used lowdose, 30% farmers used recommended dose and majority of the farmers (60%) used over dose (fig : 4.17).

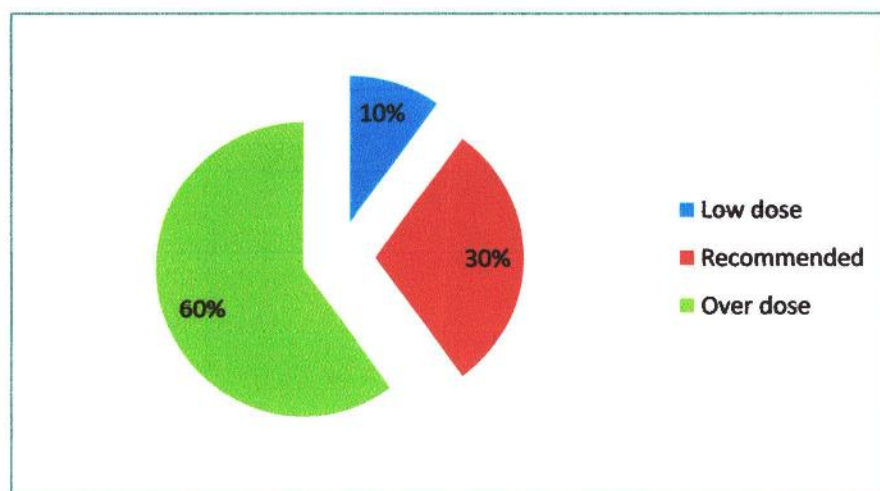


Fig 4.17 Extent of use of fungicide by the farmers

4.4.4 Insect infestation in brinjal.

In the study area majority (60%) of the farmers cited that their crops were infested by brinjal shoot & fruit borer, followed by white fly (12%) red mite (10%) and so on. (Table 4.31) Table No. 4.31: Distribution of Insect infestation in brinjal

Name of the Insect	Farmers (N=200)	
	No. of the farmers	Percentage (%)
Brinjal shoot & fruit Borer	120	60%
Red mite	20	10%
White fly	24	12%
Red ant	10	5%
Cut worm	12	6%
Aphid	8	4%
Jessid	6	3%
Total	200	100%

Brinjal Shoot & Fruit Borer (Fig: 4.18 to 4.21):

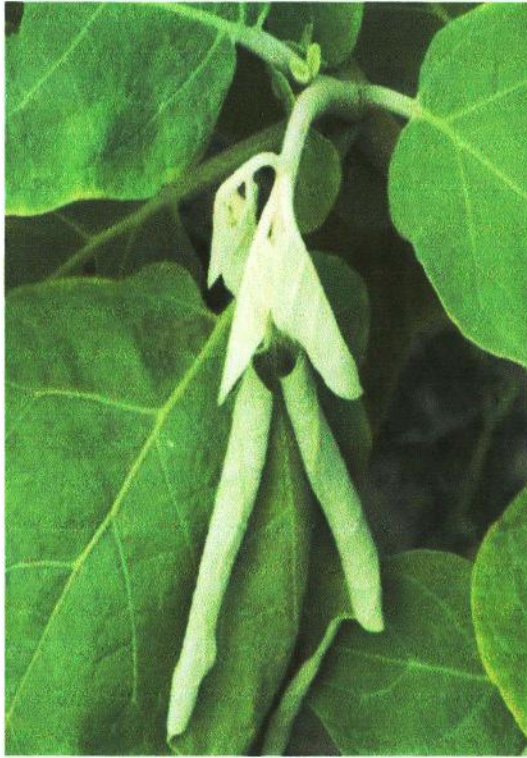


Fig: 4.18: Brinjal Shoot & fruit borer



Fig: 4.19: Brinjal Shoot damage

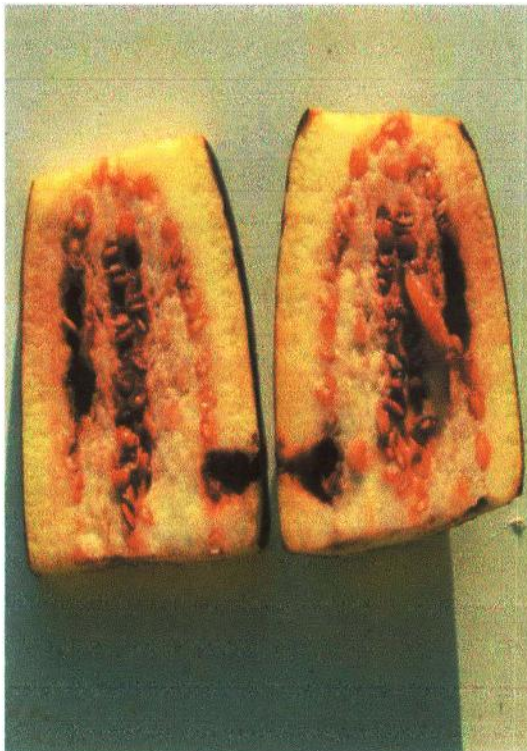


Fig: 4.20: Brinjal fruit borer

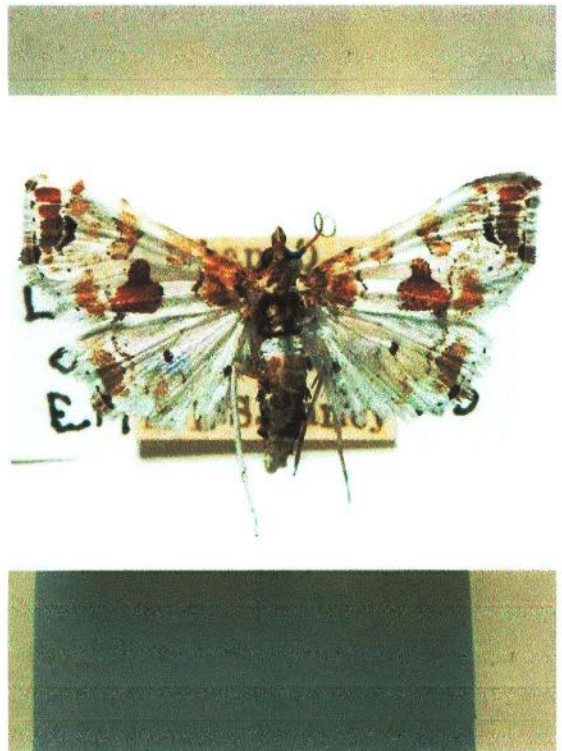


Fig: 4.21: Brinjal Shoot & fruit borer (Adult).

4.4.5 Control measure of insect by using insecticide

In the study area farmers Used Tracher 45 SC, Voliam flexi 300 SC, Proclaim 5 SG, Libsem 45 SC, Ripcord 10 EC, Coragen 18.5 SC, Saham 5 SG, Chloropyriphos 20 EC, Sumithion 50 EC, Emithion 50 EC, Cythrine 10 EC, Belt 24 WG, Virtako 40 WG, Marshal 20 EC, Corolax 20 EC, Newfuran 5 G, Pilarsufan 20 EC, Mimfuran 5 G, Suntap 50 SP, Filtap 50 SP for control of brinjal shoot & fruit borer Reeva 2.5 Ec, Regent 3 GR to control brinjal shoot & fruit borer & Cut warm; Relothrin 10 EC to control aphid, farmers used Dimethion 40 EC to Control brinjal shoot & fruit borer & aphid, farmers used Sunmectin 1.8 EC to control red ant & jessid, vertimec 018 SC to Control red mite, Calypso 240 SC, to control white fly & jesside and Admire 200 SL & Confidor 70 WG to control aphid & jessid. (Table: 4.32). Among the used insides the farmers of the study area followed recommended dose which of libsen 45 Sc ripcord 10 EC and saham 5 SG of mimpex, padma oil and intefa to control brinjal shoot and fruit borer respectively (Table 4.32). The farmer used higher dose than that of recommended in all cases except reeva 205 EC of Auto Crop care.

Table 4.32: Control measure of insect by using insecticide

Name of the insecticide	Name of the Company	Insects	Mode of action	Recommended dose /hec. (by company)	Farmers used dose /hec.
Reeva 2.5 EC (Lamda cyhalothrin)	Auto	Brinjal shoot & fruit borer, Cut warm	Contact	250ml	200ml
Tracher 45 SC. (Spinosad)	Auto	Brinjal shoot & fruit borer	Contact	200ml	300ml
Relothrin 10 EC. (Cypermethrin)	Auto	Aphid	Contact	500ml	600ml

Voliam Flexi 300 SC. (Thiamethoxam Chlorantraniliprole)	Syngenta	Brinjal shoot & fruit borer	Contact	250ml	500ml
Proclaim 5 SG. (Enamectin benzoate)	Syngenta	Brinjal shoot & fruit borer	Contact	500g	800g
Libsem 45 SC. (Spinosad)	Mimpex	Brinjal shoot & fruit borer	Contact	250ml	250ml
Ripcord 10 EC. (Cypermethrin)	Padma oil	Brinjal shoot & fruit borer	Contact	500ml	500ml
Coragen 18.5 SC. (Chlorantraniliprole)	Petrochem	Brinjal shoot & fruit borer	Contact	150ml	300ml
Saham 5 SG. (Enamectin Benzoate)	Intefa	Brinjal shoot & fruit borer	Contact	500g	500g
Chloropyriphos 20 EC. (Chloropyriphos)	Alfa Agro	Brinjal shoot & fruit borer	Contact	1000ml	1500ml
Sumithion 50 EC. (Fandrithion)	Shetu	Brinjal shoot & fruit borer	Contact	1000ml	1200ml
Emithion 50 EC.	Semco	Brinjal	Contact	1000ml	1200ml

(Fandrithion)		shoot & fruit borer			
Cythrine 10 EC. (Cypermethrin)	ACI	Brinjal shoot & fruit borer	Contact	500ml	700ml
Belt 24 WG. (Flubendiamide)	Bayer	Brinjal shoot & fruit borer	Contact	300g	500g
Virtako 50 WG. (Thiamethoxam Chlorantraniliprole)	Syngenta	Brinjal shoot & fruit borer	Contact	75g	150g
Marshal 20 EC. (Carbosulfan)	Auto	Brinjal shoot & fruit borer	Systemic	1500ml	2000ml
Regent 3 GR. (Fipronil)	Auto	Brinjal shoot & fruit borer, cut worm	Systemic	7500g	8000g
Corolax 20 EC, (Quinalphos)	Corbel	Brinjal shoot & fruit borer	Systemic	1000ml	1500ml
Dimethion 40 EC. (Dimethoate)	Shetu	Brinjal shoot & fruit borer, aphid	Systemic	1000ml	1500ml

Fura furan 5 G. (Carbofuran)	Semco	Brinjal shoot & fruit borer	Systemic	6000g	7500g
New Furan 5G. (Carbofuran)	National Agricare	Brinjal shoot & fruit borer	Systemic	6000g	7500g
Pilar sufan 20 EC. (Carbosulfan)	Semco	Brinjal shoot & fruit borer	Systemic	1500ml	2000ml
Mimfuran 5G. (Carbosulfan)	Mimpex	Brinjal shoot & fruit borer	Systemic	9900g	12000g
Sunmectin 1.8 EC. (Abamectin)	Auto	Red Ant, jessid	Contact & Systemic	600ml	500ml
Vertimec 018 SC. (Abamectin)	Syngenta	Redmite	Contact & Systemic	600ml	750ml
Suntap 50 SP. (Cartap)	Mcdonald	Brinjal shoot & fruit borer	Contact & Systemic	1200g	1500g
Filtap 50 SP. (Cartap)	National agricare	Brinjal shoot & fruit borer	Contact & Systemic	1200g	1500g
Calypso 240 SC. (Thiacloprid)	Bayer	White fly & Jessid	Contact & Systemic	400ml	800ml
Admire 200 SL.	Bayer	Aphid	Contact	250ml	500ml

(Imidochloprid)		& Jessid.	& Systemic		
Confidor 70 WG. (Imidochloprid)	Bayer	Aphid & Jessid.	Contact & Systemic	100g	250g

4.4.6 Extent of insecticide application by the farmers (on the basis of dose).

In the study area most of the farmers (80%) used over dose of insecticide and only (16%) farmers used recommended dose and a few (4%) used low dose. (Table 4.33 & Fig:4.22).

Table 4.33: Insecticide application by the farmers(on the basis of dose).

Categories (dose)	Farmers(N=200)	
	No. farmers	% of farmers
Low dose	8	4%
Recommended dose	32	16%
Over dose	160	80%
Total	200	100%

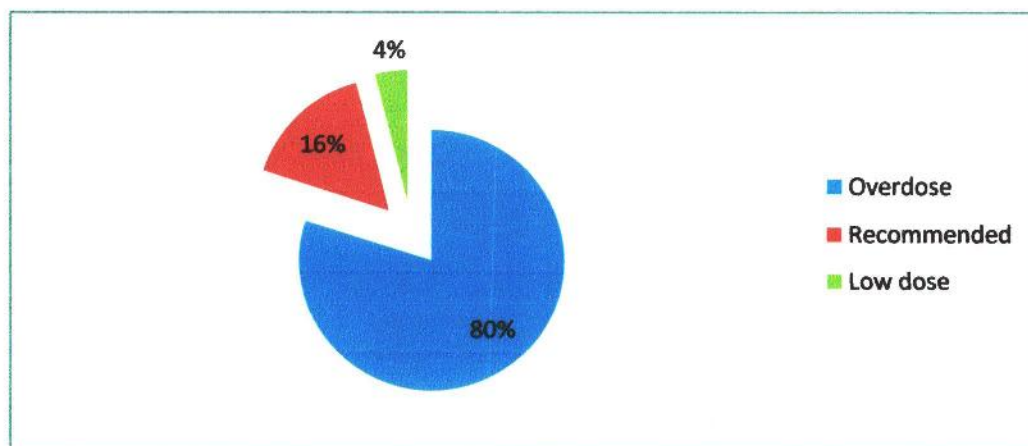


Fig 4.22 Extent of used of insecticide by the farmers (on the basis of dose)

4.4.7 Extent of used of insecticide by the farmers (on the basis of mode of action).

In the study area majority (45%) of the farmers used contact insecticides, (40%) farmers used systemic insecticides and 15% farmers used both systemic & contact insecticides (Table 4.34 & Fig: 4.23)

Table 4.34: Insecticide application by the farmers (on the basis of mode of action).

Categories (mode of action)	Farmers(N=200)	
	No. farmers	% of farmers
Contact Insecticide	90	45%
Systemic Insecticide	80	40%
Contact & Systemic Insecticide	30	15%
Total	200	100%

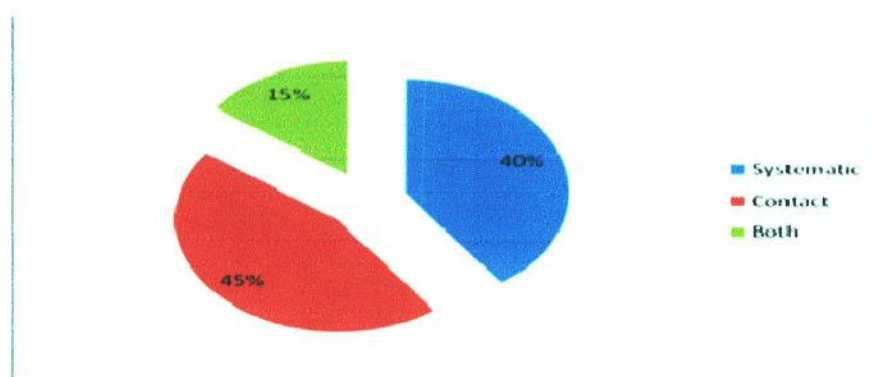


Fig 4.23: Extent of used of insecticide by the farmers (on the basis of mode of action)

4.4.8 Extent of insecticide used by the farmers (on the basis of formulation)

In the study area 63% farmers used liquid insecticides, 30% farmers used granular insecticides and 7% farmers used powdery insecticides (Table 4.35 & Fig: 4.24)

Table 4.35: Insecticide application by the farmers(on the basis of formulation).

Categories (formulation)	Farmers(N=200)	
	No. farmers	% of farmers
Liquid insecticide	126	63%
Granular insecticide	60	30%
Powder insecticide	14	7%
Total	200	100%



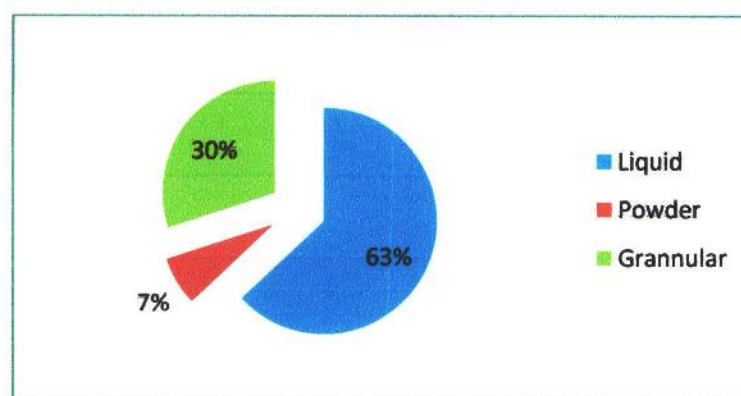


Fig 4.24: Extent of used of insecticide by the farmers (on the basis of formulation)

4.4.9 Frequency of insecticides application.

The scores of frequency of insecticides application of the farmers ranged from 60 to 155 with mean 114.17 & standard deviation of 23.08. (Table: 4.36)

4.36: Categories of the farmers according to frequency of insecticides application.

Categories	Scores	Farmers		Mean	Standard Deviation
		No of farmers	Percentage (%)		
Low frequency	<70	6	3	114.17	23.08
Medium frequency.	70-79	6	3		
High frequency.	>79	188	94		
Total		200	100	Min. 60	Max. 155

In the study area most of the farmers (94%) used insecticide in high frequency, (3%) of farmers used insecticide in low frequency and (3%) of farmers used insecticide in medium frequency. It reveals that most (94%) of the farmers used insecticide most frequency. (Table: 4.36 & fig : 4.25)

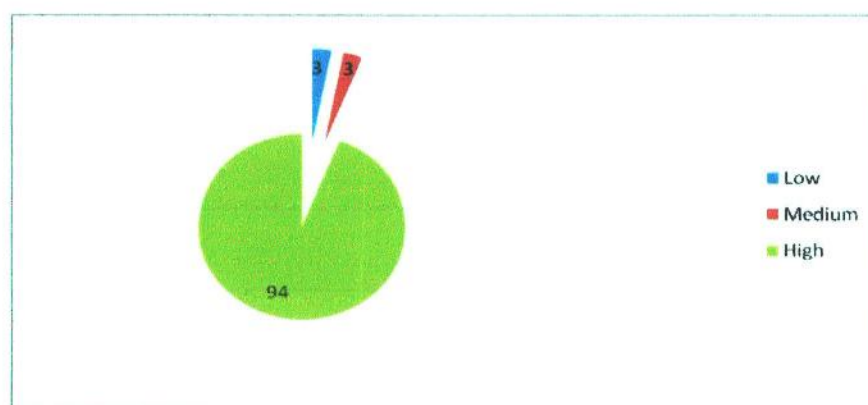


Fig 4.25: Frequency of insecticides application.

Chapter V

Summary, Conclusion and Recommendation

Summary

Bangladesh traditionally is an agro-based country. Agriculture is the backbone in the economy of Bangladesh. Brinjal constitute an important part of vegetables. Almost all the brinjal grow in Bangladesh are traditional type and are grown during summer & winter season. A study was conducted on situation of brinjal cultivation and extent of pesticide application by brinjal grower of Jessore region.

5.1 Socio Economic Characteristic of Respondents

Most of the farmers (83%) belonged to young to middle aged group, while only about 17% of them were old aged. About two fifth (42%) of the farmers had secondary level of education followed by primary level (31%), illiterate (18%), above higher secondary level about one twenty (5%) and higher secondary level about (4%). Majority 56 % of the farmers maintained medium sized family compared to small (25%) and large sized family (19%). The average family size (5.39) of farmers of the study area was lower than the national average of 5.6 (BBS, 1999). It means that the people in the study area are more conscious about their family size and population growth.

Most (95%) of the farmers had medium to high experience. About (5%) farmers had low experience. It was found that the most of farmers (96%) had medium to high experience, followed by (4%) low experience in brinjal cultivation. These findings have harmony with the findings regarding experience in agriculture. About three fifth (63%) of the respondents had high income, followed by medium income (22%) and very high income (12%). Only 3% of respondents had low income. The majority of the farmers (59%) small amount of land followed by medium land (28%), marginal land (6%), large amount of land (4%) and (3%) land less respectively. Thus small farmers are more interested to brinjal cultivation. The majority of the farmers (71%) had low extension media contact, as compared to medium contact (25%) & high Contact (4%). Farmers exposure to a variety of information sources usually guides them to identify problems in brinjal cultivation and how to solve the identified problems. It was observed from the result that majority of the respondents (55%) had low organizational participation. However, about one tenth (11%) of the farmers had no participation and one third (34%) of the

farmers had high organizational participation. It reveals that most of the farmers (89%) had low to high organizational participation. The most (82%) of the farmers had medium cosmopoliteness as compared to low cosmopoliteness (12%) & high cosmopoliteness (6%). It was revealing that most of the farmers (85%) belonged to high knowledge group, while about one tenth (10%) of farmers had medium knowledge and one twentieth (5%) had low knowledge in brinjal cultivation. Since, most of the farmers had high knowledge, it is logical to assume that they had high experience for identification of problem in brinjal cultivation. among 13-problems confronted by the farmers insect and disease infestation, lack on knowledge on processing of brinjal, high amount price of insecticide those are same of the major/severe problems. It was found that three fourth (74%) of the farmers confronted medium problem, while about one fifth (18%) confronted high problem, only a few of the farmers (8%) confronted problem. Among the selected 15 characteristics of the respondents only experience in brinjal cultivation, land size extension media contact, cosmopoliteness and frequency of insecticide application showed positive significant relationship with their problem confrontation in brinjal cultivation. It means the higher is the experience in brinjal cultivation, land size extension media contact, cosmopoliteness and frequency of insecticide application, the higher is the ability to identify the problems.

5.2 Situation of Brinjal Cultivation.

It was found that about three fourth (72%) of the farmers had small to medium sized lands, while one fourth (25%) of farmers had large and only a few (3%) of farmers had very large sized cultivable lands. The majority (67%) of the farmers had medium to large sized lands, as compared to small sized lands (29%) and very large sized lands (4%) suitable for brinjal cultivation . The majority 68% of the farmers had small to medium sized lands, 4% of farmers had very large size land and 28% of farmers had large sized lands under for brinjal cultivation in 2003. The most of the farmers 69% had small to medium sized lands, 11% of farmers had very large size land and 20% of farmers had large sized lands under brinjal cultivation in 2004. The most of the farmers 63% had small to medium sized lands, 13% of farmers had very large size land and 24% of farmers had large sized lands under brinjal cultivation in 2005. The most of the farmers 62% had small to medium sized lands, 13% of farmers had very large size land and only 25% of farmers had large sized lands under brinjal cultivation in 2006. The most of the

farmers 60% had small to medium sized lands, 13% of farmers had very large size land and 27% of farmers had large sized lands under brinjal cultivation in 2007. The most of the farmers 57% had small to medium sized lands, 15% of farmers had very large size land and only 28% of farmers had large sized lands under brinjal cultivation in 2008. The most of the farmers 54% had small to medium sized lands, 16% of farmers had very large size land and only 30% of farmers had large sized lands under brinjal cultivation in 2009. The most of the farmers 54% had small to medium sized lands, 17% of farmers had very large size land and only 29% of farmers had large sized lands under brinjal cultivation in 2010. The most of the farmers 53% had small to medium sized lands, 17% of farmers had very large size land and only 30% of farmers had large sized lands under brinjal cultivation in 2011. The most of the farmers 54% had small to medium sized lands, 10% of farmers had very large size land and only 36% of farmers had large sized lands under brinjal cultivation in 2012. It was revealed from (fig: 4.1) the study that the Land under Brinjal Cultivation area increased from 2003 to 2004. 2004 and 2005 are same. It was increased 2005 to 2006. 2006 and 2007 are same. Next it was increased 2007 to 2008. 2008 and 2009 are same. It was increased gradually 2009 to 2011. 2011 and 2012 are same. The half of farmers (50%) had low yield, 22% had high yield and (28%) had medium yield in brinjal in 2003. The largest number of farmers (45%) had low yield, while about 26% had high yield and 29% had medium yield in brinjal in 2004. The majority of farmers 44% had low yield, 30% had high yield and 26% had medium yield in brinjal in 2005. The majority of farmers 45% had low yield, 33% had high yield and 22% had medium yield in brinjal in 2006. The majority of farmers 38% had low yield, while about 36% had high yield and 26% had medium yield in brinjal in 2007. The majority of farmers 40% had high yield, 37% had low yield and 23% had medium yield in brinjal in 2008. The majority of farmers 48% had low yield, while about 26% had high yield and 22% had medium yield in brinjal in 2009. The majority of farmers 38% had high yield, while about 34% had low yield and 28% had medium yield in brinjal in 2010. The majority of farmers 38% had high yield, while about 33% had low yield and 71% had medium yield in brinjal in 2011. The majority of farmers 48% had high yield, while about 35% had low yield and 17% had medium yield in brinjal in 2012. It was revealed from the study that the yield of brinjal in this area increased gradually from 2003 to 2011 with a slightly sharp increased in 2012

(fig: 4.2). The highest proportion of farmers (43%) had high income, while 35% had medium income and 22% had low income from brinjal cultivation. The highest proportion (47%) of the farmers had medium production cost while 32% and 21% of the respondents had low and high production cost respectively. The highest number of farmers (36%) had high benefit, while about 30% had low benefit and 34% had medium benefit from brinjal. Findings also indicate that brinjal cultivation is profitable as majority (70%) of the respondents got medium to high benefit from brinjal cultivation. The most (92%) of respondents were farmers 6% of respondents were in business and 2% of respondents were employees along with farming (Table 4.23) The highest number (30%) of farmers cultivate BARI begun- 2, 20% of farmers cultivate BARI begun-1, 6% of farmers cultivate BARI begun-4, 8% of farmers cultivate BARI begun -5, 7% of farmers cultivate BARI begun-6, 9% of farmers cultivate BARI begun-9, 2% of farmers cultivate Math Kumra begun, 3% of farmers cultivate Lafa begun, 9% of farmer cultivate Chaga Begun, 14% of farmers cultivate Makra begun. The most of the farmers (72%) cultivated recommended varieties & 28% of farmers cultivated non recommended varieties. All (100%) of the farmers used urea to different extent (high use 80% medium use and low use 15%) followed by TSP (99%) and MoP (97%) as fertilizer most (90%) of the farmers used cowdung as manure followed by mustard oilcake (50%). Very few of the farmers 26% and 16% used $ZnSO_4$ and ZYPSUM to different extent. About (35%) of the farmers used mixed fertilizer. In the study area (72%) farmers practiced weeding, (99%) irrigation, (40%) mulching, (45%) spading, (65%) earthing up, (70%) sticking & (30%) inter cropping. The majority of the farmers (71%) had low extension media contact.

5.3 Problem confrontation by the farmers

Data presented in table 4.26 indicated that among 13-problems confronted by the farmers insect and disease infestation, lack of knowledge on processing of brinjal, and high price of insecticide those are same of the major/severe problems. It was found that about three fourth (74%) of the farmers confronted medium problem, while about one fifth (18%) confronted high problem, only a few of the farmers (8%) confronted low problem. Among the selected 11 characteristics of the respondents only experience in brinjal cultivation, land size, extension media contact, cosmopolitaness and frequency of insecticide application showed positive significant relationship with their problem confrontation in brinjal cultivation. It means that the

higher is the experience in brinjal cultivation, land size, extension media contact, cosmopolitaness and frequency of insecticide application, the higher is the ability to identify the problems.

5.4 Extent of pesticides application.

The brinjal fields of the highest proportion (45%) of the farmers were infested by little leaf disease followed by wilting (35%) and, fruit rot (30%), root rot (10%) foot rot (8%) leaf spot (15%), mosaic (9%) and stem rot (16%). (29%) of the respondents followed recommended dose of fungicide Dithane M 45 (Mancozeb) of Bayer crop science to control stem rot of brinjal. While 30% and 5% of the respondents also followed recommended doses of fungicides such as redomin gold MZ 68 WP (metalaxyl & mancozeb) and Acrobet 10 MZ (Bimathomorph & Mancozed) of syngenta and pabma oil for any rot and leaf spot disease of brinjal respectively. Incase of wilting anthracnose mosaic stem rot anthracnose stem rot 40%, 33%, 15%, 13%, 5% and 4% of farmers used high dose of bavistin 68 WP, indofil M 45 bistaren 5 G Forastin 50WP, tilt 250 EC and Agrithen 800 WP of Auto crop care, Auto crop care, Alfa Agor, Shetu, Syngenta and Ranar respectively. Only one tenth (10%) of the farmers used lower than recommended dose of Razland 80 WPO of ACI to control stem rot of brinjal. 10% Farmers used lowdose, 30% farmers used recommended dose and majority of the farmers (60%) used over dose of fungicide. The most (94%) of the farmers (94%) used insecticide in high frequency, (3%) of farmers used low frequency of insecticide application & (3%) of farmers used medium frequency of insecticide application. It is revealed that most of the farmers (94%) used insecticide most frequency.

Conclusion

It can be concluded from the result of the study area about three fourth (72%) of the farmers had small to medium sized cultivable lands. The majority (67%) of the farmers had medium to large sized lands suitable for brinjal cultivation.

The most of the farmers (54%) had small to medium sized land under brinjal cultivation in 2012. The highest number (30%) of farmers cultivated BARI begun -2 in 2012. The highest (48%) of farmers had high yield in 2012.

Insect and disease infestation, lack on knowledge on processing of brinjal, high amount price of insecticide those are same of the major/severe problems. Experience in brinjal cultivation, land size, extension media contact and cosmopolitaness had positive significant relationship with their problem. The highest number of farmers (36%) had high benefit in (2012).

The highest number (40%) of farmers applied Bavistin 68 WP fungicide. The majority (60%) of the farmers applied over dose fungicide. The majority 60% of the farmers are infested by brinjal shoot & fruit borer. The most (80%) of the farmers applied over dose of insecticide. The most (94%) of the farmers used insecticide in high frequency.

Recommendation

- ◆ Farther research should be taken to collect more information about the status of brinjal varieties, insect pests and diseases.
- ◆ Research should be undertaken considering specific disease to know definite causes and to design effective management techniques.
- ◆ Research should be undertaken considering specific insect to know its nature of damage and to design effective management techniques.
- ◆ Research should be undertaken considering specific pesticide of control specific disease and insect and to design effective management techniques
- ◆ Training programme of the farmers could be taken be the respective organization for insect pest disease identification and their control.



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APPENDIX - I

AGROTECHNOLOGY DISCIPLINE

KHULNA UNIVERSITY

KHULNA

**STATUS OF BRINJAL (*Solanum melongena* L.) CULTIVATION AND
EXTENT OF PESTICIDE APPLICATION BY THE FARMERS IN
THE JESSORE REGION OF BANGLADESH**

(English version of the Bangla interview schedule)

Farmer Id:

Please provide information regarding the following aspects

1. Name of the farmer :

Father's Name :

2. Address : Village :

PostOffice :

Block :

Union :

Upazilla :

District :

3. Age :

Years :

4. Profession :

5. Educational Qualification :

Please mention your educational qualification

(a) Can not read and write.

(b) Can sign name only

(c) Class passed.

6. Family size (number):

Please mention your family member

SL. No.	Name of the family member	Age	Relation	Educational qualification

7. Experience in farming .

a) Involved in Agriculture years.

b) Involved in brinjal Cultivation years.

8. Annual income.

Please state your annual income according to following structure.

SL. No.	Source of income	Corresponding value (Taka)
1.	Agriculture (Fieldcrops, Vegetables, Fruit, Spices, etc.)	
2.	Domestic animal	
3.	Foreign currency	
4.	Fish	
5.	Business	
6.	Others	
	Total	

9. Land Size

Please give the following information according to the following structure:

SL. No.	Description of land according to use	Local unit(Decimal)	Hectare
1.	Home stead area including yard		
2.	homestead vegetable garden		
3.	Crop cultivated land		
4.	Follow land		
5.	Land given to others as lease		
6.	Land taken from others as lease		
7.	Ponds		
8.	Garden		
9.	Others		
	Total		

10. Extension media contact:

Please indicate the extent your contact with the following extension media

SL. No.	Extension media / programme name	Contact measure			
		Frequently	Occasionally	Rarely	Not at all
1.	Agricultural Extension officer				
2.	Fisheries officer				
3.	Other extension officer				
4.	Sub assistant agricultural officer				
5.	NGO worker				
6.	Business man (fertilizer)				
7.	Group discussion				
8.	Participation in Result Demonstration				
9.	Field day				
10.	Listening radio programme on agriculture				
11.	Watching TV programme on agriculture				
12.	printed materials bulletin, leaflets, newspaper etc.				
13.	Poster, advertisement on agriculture in newspaper.				

11. Organization Participation.

Please indicate your nature of participation in different organizations.

SL. No.	Name of the organization	Not related at all	Nature of the participation		
			General member	Executive member	President/ secretary
1	Agricultural Co-operative society				
2	NGO Society				
3	School Committee				
4	Madrasha Commitee				
5	Mosque/Temples Committee				
6	Bazar Committee				
7	Sports cultural				

12. Cosmopoliteness.

State the frequency of your own visit outside of your own locality.

SL. No.	Place of visit	Extent of visit			
		Frequently	occasionally	Rarely	Not at all
1	Friends and relatives house				
2	Other Village				
3	Own union				
4	Other union				
5	Own Upazila Sadar				
6	Other upazila sadar				
7	Own District sadar				
8	Other District Sadar				
9	Capital City				
10	Out of country				

13. (a) Your total cultivable land hectare
 (b) Land suitable for brinjal cultivable hectare.
 (c) Land under brinjal cultivation hectare.
 (d) Land suitable for brinjal cultivation in homestead area hectare.
 (e) Land under brinjal cultivation in homestead hectare.

14. Status of brinjal cultivation last ten years

Year	Situation of brinjal cultivation			sale condition of brinjal		consumption of brinjal (kg/year)
	Used land (Decimal)	Yield/Decimal (kg)	Market rate (Taka/kg)	Amount of sold brinjal	Total money	

15. Give the name of different brinjal varieties under cultivation.

SL. No	Varieties of brinjal	Used land (Decimal)	Production (kg/decimal)	Yield (t/d)	Having at home(kg)	Sale (kg)	Market Rate (Taka)	Total Income/Decimal (Taka)

16. Brinjal Production and income.

- (a) Your brinjal production kg/year
- (b) Sale kg/year
- (c) Having kg/year
- (d) Income from brinjal taka/year.
- (e) Investment in brinjal cultivation taka/year.
- (f) Brinjal Cultivation: Benefit/Loss

17. Status of nutrient elements

Having food per person per day

Rice (g)	Wheat (g)	Meat (g)	Fish (g)	Pulse (g)	Milk (ml)	Vegetable (g)	Others

18. Knowledge on brinjal cultivation

Please answer the following question

SL. No	Questions	Total Marks	Obtained Marks
a	What is the amount of brinjal seed needed per acre?	1	
b	What is the distance plant to plant and line to line?	1	
c	What is the starting time of winter brinjal Cultivation?	1	
d	What is the starting time of summer brinjal Cultivation?	1	
e	Mention two varieties of brinjal?	1	
f	What the planting time of brinjal?	1	
g	Mention two harmful insects of brinjal?	1	
h	Mention one harmful disease of brinjal?	1	
i	Before how many days will you not apply insecticide?	1	
j	What is the yield of brinjal per decimal?	1	
	Total	10	

19. Fertilizer and Manure application

Give information about fertilizer application in brinjal

SL. No	Name of the fertilizer	Yes	No	Kg or g Per decimal	Time of application
1	Cowdung/FYM/Compost				
2	Urea				
3	TSP				
4	MoP				
5	Zypsum				
6	Znso ₄				
7	Other				

20. Intercultural operation

Please provide information on intercultural operation done in brinjal field

SL. No	Name of Operation	How many times.	When	Applying time
1	Weeding			
2	Irrigation			
3	Mulching			
4	Spading			
5	Disease Control			
6	Insect Control			
7	Artificial Pollination			
8	Inter cropping			
9	Sticking			
10	Other			

21. Disease infestation

What kinds of diseases attacked in your brinjal field?

SL. No	Name of the disease	Symptom	Control measures		
			When	By what means	Doze per decimal

22. Insect infestation

What kinds of insect attacked on your brinjal?

SL. No	Name of the insect	Sympton	Control measures taken		
			When	By what means	Doze per decimal

23. Application insecticide:

SL. No	Name of the insecticide	Control measures			
		When	Doze	How days interval	insecticides application how days before harvesting

24. Problem Confrontation index (PCI) in brinjal cultivation

Please indicate the extent of problem you confronted in brinjal cultivation

SL. No	Problems	Extent of severity of problems					
		Very severe 5	Severe 4	Moderately Severe 3	Negligible 2	Very Negligible 1	Not at all 0
1	Unavailability of good quality seed						
2	High rate of seed or young plant						
3	Scarcity of fertilizer or manure						
4	High cost of fertilizer or manure						
5	Impure insecticide/inact-ive insecticide						
6	High market price of insecticide						
7	Disease infestation						
8	Insect infestation						
9	Low yield						
10	Natural Calamities (Flooding/drought/salinity/climate change)						
11	Low market price						
12	Lack of preservation/storage facilities						
13	Lack of knowledge on processing of brinjal						

Thank you for your nice co-operation

Date: .

Signature of researcher

APPENDIX-II

Table: 1.1 : Area and Production of Rabi Brinjal by Region, 2006-07 to 2010-2011.

(Area in acres and production in metric tons)

Region	2006-07		2007-08		2008-09		2009-2010		2010-2011	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Bandarban	330	715	293	680	286	616	288	623	288	663
Chittagong	4010	11740	3991	11465	4018	11490	3994	11349	4022	11434
Comilla	2565	9290	2489	8665	2564	7668	2480	7379	2464	7387
Khagrachhari	810	1800	791	1697	802	1710	801	1712	813	1768
Noakhali	3010	6865	2973	6470	3181	6783	3138	6714	3069	6596
Rangamati	2900	6755	2500	5462	1620	3883	1407	3366	1243	3008
Sylhet	1890	2840	2093	5243	2008	4982	2019	5133	2019	5132
Dhaka	5660	15425	5250	15446	5132	15833	5383	17341	5097	15372
Faridpur	2065	4005	2097	4319	2201	5271	2203	5835	2261	5324
Jamalpur	7860	31095	8532	28423	8407	26925	9052	28568	9020	28315
Kishoreganj	1850	5985	2046	5408	2005	5293	2007	5280	2012	5283
Mymensingh	2420	7225	2436	5486	2160	6438	2163	6281	2186	6265
Tangail	2125	11255	2459	14009	2438	13136	2474	13372	2402	12635
Barisal	2650	5970	2654	5933	1742	3880	1690	2757	1682	3367
Jessore	6740	30620	6592	21966	6103	22222	6120	22200	6182	21484
Khulna	3075	11855	2956	11420	3042	12103	2792	9716	2757	12326
Kushtia	2865	9030	3555	9736	3505	10546	3497	11224	3599	11675
Patuakhali	445	460	421	407	415	382	406	369	411	366
Bogra	2820	9065	2814	9374	2766	8732	2650	8713	2614	8209
Dinajpur	4135	10330	4223	9748	4268	9585	4220	8939	4281	8425
Pabna	2460	7960	2760	9558	2744	9741	2793	10227	2876	10408
Rajshahi	3875	10770	3805	11690	4142	13254	4558	15816	4578	17414
Rangpur	4645	11055	4784	12677	4827	13316	4912	13268	4874	12643
Bangladesh	71205	222110	72514	215282	70376	213789	71047	216182	70750	215490

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Table: 1.2 Area and Production of Kharif Brinjal by Region, 2006-07 to 2010-2011.

(Area in acres and production in metric tons)

Region	2006-07		2007-08		2008-09		2009-2010		2010-2011	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Bandarban	335	720	321	667	320	672	325	662	321	623
Chittagong	1090	3770	1023	4017	1043	3279	1004	1919	956	2160
Comilla	785	1375	884	1600	902	1609	904	1796	964	1811
Khagrachhari	575	1465	587	1543	603	1610	617	1320	640	1380
Noakhali	240	315	263	344	289	393	287	352	279	353
Rangamati	5030	9445	4816	9203	4106	7530	3203	6515	587	1643
Sylhet	1040	2045	760	1653	516	1444	583	1588	4541	8024
Dhaka	4025	5245	4424	6007	4555	7959	4819	8745	2049	4479
Faridpur	2000	4560	1777	3346	1955	4198	1967	4425	1468	3612
Jamalpur	1260	2850	1449	3606	1469	4131	1430	4068	739	2163
Kishoreganj	425	720	576	838	531	1164	516	1345	495	1199
Mymensingh	1570	3845	1518	3596	1492	3787	1465	3371	1474	3399
Tangail	1230	1785	1250	2015	1333	3069	1355	3550	1400	3709
Barisal	490	660	464	590	514	637	586	726	904	1014
Jessore	6290	26380	6234	29733	5715	28171	5802	29080	5571	28071
Khulna	2155	7145	2495	9473	2477	10399	2461	10229	2541	9780
Kushtia	2775	8905	2896	10485	2999	9231	3064	9438	3151	9891
Patuakhali	25	30	23	25	24	31	24	32	35	36
Bogra	1810	5560	1922	6016	1943	6648	1810	6158	1616	5519
Dinajpur	2265	5000	2812	7296	2867	7403	2876	3797	2906	7440
Pabna	2575	6115	2611	5052	2576	4952	2575	5606	2565	6056
Rajshahi	3035	6700	3299	8232	3436	8544	3407	9321	3417	10210
Rangpur	2990	6295	3013	7393	3072	6918	3297	7437	3321	7782
Bangladesh	44015	110910	45417	122730	44737	123779	44377	125080	44268	124384

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Area and production of different winter vegetables by region are shown in following tables:

Table: 1.3 Area and Production of Rabi Brinjal by Region, 2001-2002 to 2005-06.

Region	2001-02		2002-03		2003-04		2004-05		2005-06	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Bandarban	670	2355	615	2275	610	2265	580	2155	330	900
Chittagong	7710	24835	7785	25420	8140	26600	7540	24730	4540	13370
Coxila	6510	19100	6520	19220	6465	18860	6250	17260	5550	18045
Khagrachhari	740	1310	705	1235	765	1615	805	1705	820	1830
Noakhali	6135	14455	6145	13545	6120	14270	5995	12390	3495	8060
Rangamati	7150	15300	7250	15275	7330	15495	6420	15825	3700	9090
Sylhet	5150	14710	5145	14785	4875	10800	4715	10715	2715	4070
Dhaka	7090	16805	6780	14285	6795	17390	5650	14330	5685	16275
Faridpur	2575	6430	2490	6400	2465	6415	2460	6430	2090	5645
Jamalpur	7770	24640	8480	23445	9105	25550	8720	26885	8230	27760
Kishoreganj	2105	7475	1740	5165	1775	5250	1785	5165	1795	6315
Mymensingh	2340	5970	2335	5875	2320	6150	2340	6710	2380	7555
Tangail	2435	5735	2225	5640	2115	4820	2020	4525	1995	7500
Barisal	3590	6640	3670	6670	3740	6030	3690	6240	3390	6020
Jessore	4540	12285	4570	12440	4300	11750	4810	14905	5400	19490
Khulna	4920	14520	4885	14505	4765	13865	4760	11875	3615	11805
Kushna	2150	6365	1965	5170	2205	6065	2520	5860	2655	8190
Patuakhali	1600	1410	1815	1545	1835	1735	1815	1670	815	840
Bogra	3260	10680	3185	10560	3140	10390	2915	9980	2540	7440
Dinajpur	3160	5080	3225	5645	3375	5870	3495	6115	3875	9350
Pabna	3225	8985	2905	7800	2980	8005	3480	8935	3265	11000
Rajshahi	2930	7520	2845	7290	2840	7880	2960	7015	3735	10230
Rangpur	12570	31515	12980	31540	14570	11025	14525	8395	4490	8340
Bangladesh	100800	264305	100260	26335	92690	240095	90255	229850	77665	214050

Source: 2006 Statistical Yearbook of Bangladesh

Table: 1.4 Area and Production of Kharif Brinjal by Region, 2001-2002 to 2005-06.

Region	2001-02		2002-03		2003-04		2004-05		2005-06	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Bandarban	640	1645	405	905	350	805	355	775	345	745
Chittagong	740	2450	810	2710	970	3390	1115	4115	1050	3290
Coxila	1645	2985	1660	2910	1610	2835	605	720	990	1795
Khagrachhari	530	995	480	900	505	1115	505	1375	565	1380
Noakhali	520	780	520	800	545	820	580	800	345	405
Rangamati	5445	8800	5510	9015	5610	9460	5600	9390	5335	10975
Sylhet	1365	2885	1290	2860	1285	2955	1200	2080	630	1100
Dhaka	6435	6255	6175	6030	6365	6320	6180	5845	5230	6330
Faridpur	2490	4555	2475	4700	2515	5240	2030	4490	1965	4745
Jamalpur	1425	3210	1495	3305	1585	3500	1675	3540	1550	3170
Kishoreganj	1105	2705	1135	2715	1170	2580	1195	1840	885	1650
Mymensingh	2885	6425	2890	6145	3005	7180	3065	6760	2530	6000
Tangail	2225	3430	2220	3380	2260	3445	2015	2065	1635	2055
Barisal	520	640	470	585	450	585	440	570	465	610
Jessore	4750	14700	4820	14505	4975	14400	5145	16175	6225	23985
Khulna	3505	6505	3505	6860	3495	6900	3660	8440	2815	8925
Kushna	2165	7020	2215	7400	2230	7000	2235	6330	2355	7725
Patuakhali									25	30
Bogra	2175	5365	2170	5325	2305	5970	2315	5810	1925	5750
Dinajpur	2280	4860	2110	4925	2170	4805	2215	5170	2190	5020
Pabna	1440	2800	1590	3140	1530	2980	1515	2655	2170	4680
Rajshahi	3470	7275	3540	7365	3720	8320	3780	8590	3470	7780
Rangpur	7085	17800	7010	17610	7020	17670	5010	12440	3525	7215
Bangladesh	54840	114085	54495	114190	55670	118275	52435	109975	48220	115340

Source: 2006 Statistical Yearbook of Bangladesh

Table 1.5 Area And Production Of Winter Vegetable By Crops, 2006-07 to 2010-2011.*(Area in acres and production in metric tons)*

Name of Crops	2006-07		2007-08		2008-09		2009-2010		2010-2011	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Rabi Brinjal	71205	222110	72514	215282	70376	213789	71047	216182	70750	215490
Cauli flower	36605	143206	39137	156483	39933	153226	41211	160040	40901	168238
Cabbage	37760	182685	40094	211097	40791	205627	41182	219958	39015	206851
Water gourd	31910	117120	33021	125949	34176	131716	34446	134359	35278	137301
Rabi Pumpkin	30715	103840	32259	107214	32933	116014	34908	124534	33847	122747
Tomato	47960	136935	48538	143058	50470	150720	58854	190213	61213	232459
Radish	62585	235815	68058	267048	65480	257371	66954	259743	65384	256711
Beans	38175	82980	38519	82872	40213	88386	40992	88581	42760	94756
Palong Sak	18375	38205	19258	44030	19809	42898	20215	45251	19959	43193
Lalsak	22760	37415	24733	41189	24350	41583	24877	44329	25118	42810
Carrot	2745	9855	2850	10430	3109	11380	3496	14075	3423	15021
Laushak	13660	20445	13954	22403	13715	22549	13959	22816	13830	23026
Other winter vegetables	19335	33095	18823	33906	18692	33159	19310	35190	18936	35078
Total :	433790	1363706	451758	1460961	454047	1468418	471451	1555271	470414	1593681

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Table 1.6: Area and Production of Kharif (Summer) Vegetables, 2006-07 to 2010-2011.*(Area in acres and production in metric tons)*

Name of Crops	2006-07		2007-08		2008-09		2009-2010		2010-2011	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Pumpkin	23670	77595	26081	82520	27505	92519	27424	92900	27602	95420
Brinjal	44015	110910	45417	122730	44737	123779	44377	125080	44268	124384
Patal	23510	68415	24048	70367	24558	72473	24749	78084	24655	83246
Lady's' finger	23180	38715	24171	38508	24969	40462	25204	42366	25570	43212
Jhinga	20985	36595	22340	40995	22780	41610	23039	44064	23563	45942
Karala	19635	34445	21240	39648	21688	40127	22143	41419	22793	45097
Arum	48840	156725	52566	179866	56539	209048	58736	224546	59402	238645
Chalkumra	16240	44380	19355	52660	21077	57308	22527	62673	23418	64898
Cucumber	16750	32480	17930	36740	17891	43902	18935	55152	19030	48448
Barbati	13820	18590	14139	19844	14468	21348	1488	21178	15347	22259
Puisak	19105	52195	21276	55339	21937	63001	22604	66705	23255	66994
Chichinga	13475	24430	14485	216934	15193	29211	15741	30339	16245	31426
Danta	22450	56715	24933	75115	25100	65177	25463	65987	25845	67358
Other Kharif Vegets.	-	-	17755	39040	18551	34777	17766	32142	20997	37327
Kakrol	9140	17415	10600	22121	10620	22992	11215	24564	11202	14141
Dundal	8375	15430	8381	14807	8124	14642	8318	15250	8389	15290
Kachurlati	15980	35870	16528	36004	16610	36890	17008	38502	16750	38461
Sajna	149	18250	112	17369	98	19014	19014	23025	19014	23025
Katcha Papaya	425	153284	1599	168928	4952	192949	192949	204221	192949	204221
Green Banana	32590	321585	33917	301065	30319	218840	27818	156965	25258	158365
Total	372334	1314024	1170248	1630600	427716	1440069	626917	1445162	645552	1468159

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