CONSTRAINTS FACED BY THE BADC CONTRACT GROWERS IN QUALITY SEED POTATO PRODUCTION

BY

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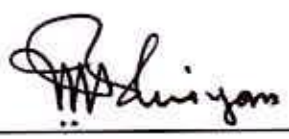

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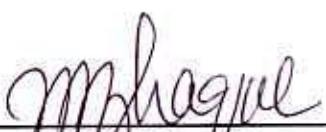

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Certificate

This is to certify that the thesis entitled, **Constraints Faced by The BADC Contract Growers in Quality Seed Potato Production** submitted to the faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE in AGRICULTURAL EXTENSION**, embodies the result of a piece of bona fide research work carried by **Md. Mijanur Rahaman, Roll No. 00834, Registration No. 00834** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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Dedicated to My Beloved Parents

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The Author

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CONSTRAINTS FACED BY THE BADC CONTRACT GROWERS IN QUALITY SEED POTATO PRODUCTION

ABSTRACT

The main purpose of the study was to determine the constraints faced by the Bangladesh Agricultural Development Corporation (BADC) contract growers in quality seed potato production and to explore the relationships between the selected characteristics of the contract growers and their constraints faced in quality seed potato production. The study was conducted in four selected villages namely, Shobsar and Dadpur of Bargachi union in Paba upazila and Kalaipara and Gondogwali of Geopara union in Puthia upazila under Rajshahi district respectively. Data were collected from 100 BADC contract growers by using a pre-tested interview schedule during the period from April 20 to May 20, 2008. A three point rating scale was developed to measure the dependent variables of the study. Pearson Product Moment Correlation Coefficient (r) test was used to ascertain the relationships between the concerned independent and dependent variables of the study. Correlation analysis indicates that age, farm size and annual income of the BADC contract growers had no significant relationship with their constraints faced in quality seed potato production. On the other hand, education, knowledge on potato cultivation, extension communication and social participation of the BADC contract growers had significant negative relationship with their constraints faced in quality seed potato production. The study revealed that 66 percent of the respondents faced medium constraints in quality seed potato production. On the other hand 33 percent faced low constraints and only 1 percent faced high constraints. In this study, 6 (six) aspects of constraints were selected to measure the extent of constraints faced by the BADC contract growers in quality seed potato production. According to the descending order of Constraints Facing Index (CFI) the selected constraints were (i) constraints faced related to manures and fertilizers, (ii) constraints faced related to preservation and marketing of potatoes, (iii) constraints faced related to quality seed potatoes, (iv) constraints faced related to diseases and insects (v) constraints faced related to irrigation and (vi) constraints faced related to capital.

Chapter 1
Introduction

CHAPTER 1

INTRODUCTION

1.1 General Background

Bangladesh is predominantly an agricultural country, and about 80 percent of her populations live, directly or indirectly, on income derived from agriculture. It has a very rich alluvial soil and moderate climate congenial to the growth of various agricultural crops throughout the year. Economy of this country is almost entirely dependent on agriculture that supplies raw materials for industrial production and food-stuff for human and animal consumption.

Bangladesh, though an agricultural country, can not produce enough food to feed her own population and has to import lakhs of tons of food grains each year. Such imports cost huge amount of foreign exchange which causes serious drainage of her economy. Two reasons are mainly responsible for the unfavourable food situation in Bangladesh. Firstly, the population is growing at an alarming rate and secondly, the rate of agricultural production per hectare is deplorably low. In fact, Bangladesh is one of the thickly populated regions in the world. Rice is the staple food crop in Bangladesh. But increase in the production of rice has not been able to keep pace with the increase in population.

In spite of dominance of agriculture in the national economy, Bangladesh is facing chronic food shortage due to rapid growth of population and has to import on an average 1.5 million tons of food grains in each year (BBS, 2002). The present rice and wheat production are not sufficient to meet the increasing requirements of calories for the growing population of the country. In this regard, potato can play an important role as an alternative and multipurpose food crop of Bangladesh.

Potato is the leading vegetable crops in the world which occupy the top most position after rice and wheat both in respect of production and consumption

(Thompson and Kelly, 1957). Potato is produced in 132 countries out of 193 independent countries of the world. At present, at least 40 countries eat potatoes as a staple food (Islam, 1987).

The importance of potato in the economy of Bangladesh can hardly be over emphasized. Besides, potato is the main source of important nutrients, but the production of potato has not been able to keep pace with the increased demand with the population growth. A comparative picture of area, population and yield per hectare of potato in Bangladesh along with the major potato producing countries are shown in Table 1.1.

Table 1.1 Area, production and yield per hectare of potato in different countries of the world in 2000

Country	Area ('000 hectares)	Production ('000 metric tons)	Yield (kg/ha)
Bangladesh	149 F	1702 F	11250
India	1300 F	23500 F	18077
Pakistan	110	1868	16915
Japan	98 F	2963 F	30328
Netherlands	18 F	8200 F	24809
Germany	302	12633	41832
UK	165	6648	40289
France	169	6652	39385
USA	547	23404	42788
Australia	41 F	2327 F	32126

Source: FAO, 2002; F = FAO estimate

In spite of greater potentiality of potato production, the farmers of Bangladesh are not free from constraints in the field of cultivating potato. Their cultivation

technique is almost traditional; they use mainly local varieties and to some extent of modern varieties of seed. As there is little scope for increasing cultivating area but there is a great scope for increasing per unit production. To increase production of food crops in this country, we need both vertical and horizontal expansions. The possibilities of horizontal expansion of major food crops are very limited due to the scarcity of land. Vertical expansion by introducing new varieties which is feasible and economical will reduce the per unit production cost, resulting in the availability of the produces at cheaper prices. At present vertical expansion of rice and wheat has reached a high level. But there is ample scope for the vertical expansion of potato production through selection of suitable varieties, using appropriate technologies and high quality seeds. The area and production of potato in Bangladesh during 2007-08 were 0.5 million hectares and 8 million metric tons respectively (BBS, 2006). The trend in the production of potato and gradual increase in the per hectare yield of potato crop remained static at around 5.95 metric tons up to 1960. The increase of yields to 15.25 metric tons per hectare in the recent years is mainly due to use of quality seeds of modern variety and appropriate production technologies. Presently the supply of quality seed potatoes both private and public sector is about 5 percent of the national demands (BBS, 2006). To raise the average per hectare yield of potato from 15.25 to 20.00 metric tons, it is necessary to increase the production and supply of quality seed potatoes.

Constraints faced by the farmers may vary from one farmer to another depending on the influence of various factors. Behavior of an individual is greatly influenced by his characteristics. It is, therefore, likely that the constraints faced by the farmers in quality seed potato production might be influenced by their personal, economic, social and psychological characteristics. An understanding of the constraints in quality seed potato production by the BADC contract growers and its relationship

with their various characteristics will be greatly helpful for planning and execution of programs by Bangladesh Agricultural Development Corporation (BADC). But little effort has been made to undertake systematic investigation in this respect. These facts indicate the need for conducting a research study entitled "Constraints Faced by the BADC Contract Growers in Quality Seed Potato Production".

1.2 Statement of the Problem

In the light of the foregoing discussion the researcher undertook a research problem entitled "Constraints faced by the BADC contract growers in quality seed potato production." The purpose of this study was to have an understanding of the problems faced by the farmers in respect of seed potato production activities. The study also explored relationship of the selected characteristics of the farmers with their constraints faced in quality seed potato production for a clearer insight.

In this connection, the following research questions were raised out for solution.

1. What are the constraints faced by the BADC contract growers and to what extent?
2. What is the present level of constraints faced by the BADC contract growers on quality seed potato production activities?
3. From which do the major constraints of quality seed potato production arise?
4. What are the personal, economic and social characteristics of the BADC contract growers?
5. To what extent these characteristics of the BADC contract growers are related with their constraints faced on quality seed potato production activities?

1.3 Specific Objectives

Following specific objectives were formulated to give proper direction to the study:

1. To identify and describe the extent of constraints faced by the BADC contract growers in relation to quality seed potato production.

2. To determine and describe some selected characteristics of the BADC contract growers, the selected characteristics included: age, education, farm size, annual income, knowledge on potato cultivation, extension communication, and social participation.

3. To explore the relationship between selected characteristics of the BADC contract growers and their constraints faced in relation to seed potato production activities.

4. To find out the rank order of constraints faced by the BADC contract growers.

1.4 Scope and Limitations of the Study

In order to conduct the research in a meaningful and manageable way considering the time, money and other necessary resources available to the researcher, it became necessary to impose certain limitations stated below:

1. The study was confined to the BADC contract growers of two upazilas, viz., "Paba and Puthia" of Rajshahi district.

2. Population for the study was kept confined within the BADC contract growers because they were the selected farmers and also were directly associated with quality seed potato production activities.

3. There are many crops being cultivated in the study area. However, quality seed potatoes were considered for this study.

4. There are many problems which may arise in crop production activities. But, only some selected problems related quality seed potato production have been taken into consideration.

5. Characteristics of the farmers are many and varied. However only few selected characteristics of the farmers were selected for investigation in this study.

6. For information about the study, the researcher was dependent on data furnished by the selected farmers of the study area.

The findings of present study will be particularly applicable to the farmers of two selected unions namely Borogachi and Geopara. However the findings may also have general implication for other areas of the country where the physical, socio-economic and cultural conditions do not differ much from those of the study area.

1.5 Assumptions of the Study

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

1. The responses furnished by the respondent farmers were valid, reliable and free from bias.
2. The respondents included in the sample were capable of furnishing proper responses to the questions as contained in the interview schedule.
3. Information furnished by the selected farmers included in the sample were the representative views and opinions of the whole population of the study area.
4. The researcher himself was adjusted to the social and cultural environment of the study area.

1.6 Definition of Important Terms

Age: Age of a respondent farmer referred to the period from his birth to the time of interview.

Education: Education referred to the formal education on the basis of years of schooling (i.e., highest class passed) of a respondent.

Farm size: Farm size of a farmer was defined as the total area on which he carried farming operations, the area being estimated in terms of full benefit to him.

Annual income: It referred to the total annual earnings of the respondent farmer and his family members from agriculture, livestock, fisheries and other accessible sources (business, service, daily labour etc.).

Extension communication: It referred to a respondent farmer's contact with different information sources and extension personnel for transfer of technologies.

Social participation: Social participation of a respondent farmer referred to his participation in various social institutions within his life period.

Knowledge on potato cultivation: It referred to the extent of understanding of a respondent farmer about different facts, information, causes and effects related to potato cultivation.

Constraints: Constraints of an individual was defined as the consciousness of difficulties faced by a participating farmer. It referred to the problem faced by a respondent farmer during the period of production and marketing of quality seed potato.

Farmer: Contract growers of BADC were referred as farmers.

Chapter 2
Review of Literature

CHAPTER 2

REVIEW OF LITERATURE

The purpose of the study is to describe the researches conducted in line of the major focus of this study. The researcher searched reviews in different thesis, journal and other publications intensively. But relevant review of literature related to constraints faced on quality potato seed production was only a few. However, the available literatures in connection with this study are briefly discussed in this chapter. Literature having relevance to the present study has been reviewed in two sections. The first section deals with the literature on problem faced by the growers in producing various crops and the second section deals with the review of studies of relationship of selected characteristics of the farmers with their problems.

2.1 Studies on the Constraints Faced by the Farmers in Different Aspects of Agriculture

King (1980) showed that the problems of cotton development project in Gambia were dominated by three main factors that were: (1) low yield, (2) high labour input (3) the relative price paid to the farmers for groundnut and cotton. There were no technical reasons why cotton could not be grown.

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

Arya and Shah (1984) conducted a study in the mid-Himalayan Region of Uttar Pradesh of India to find out the existing and potential level of food production and main constraints on the adoption of new technology for rainfed agriculture. The

main constraint identified were (1) small and skewedly distributed holdings, (2) fragmented and scattered holdings, (3) shortage of labour, (4) lack of availability of inputs and funds and (5) lack of education, training and extension especially for women.

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

Zinyama (1988) conducted a relative observation to find out the farmers' perception of the constraints against increased crop production in the subsistence communal farming sector of Zimbabwe. Five of the most frequently cited constraints were (1) lack of money with which to purchase seasonal agriculture inputs, particularly fertilizer (2) lack of basic farming implements, notably the ox driven single furrow plough (3) lack of draught cattle, (4) inadequate arable land and (5) inadequate family labour for agricultural work.

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

Ramachandran and Sripal (1990) identified different constraint in adopting of dry land technology for rainfed cotton in Kamaraz district, Tamilnadu, India. They found that farmers faced constraints which included insufficient rainfall susceptibility of pest and diseases, lack of experience, unavailability of inputs in

time, lack of knowledge, in sufficient livestock, risk due to failure of monsoon , high cost etc.

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

Freeman and Breth (1994) conducted a study on productivity of agricultural systems in the West African savanna. The study showed several constraints in farming practices such as intensified land use, fallow period decline and crop cultivation spreading ecologically fragile lands. In the absence of appropriate resource management technologies, those practices inevitably led to degradation of the resource base with important implication with soil productivity, household food security and rural poverty.

Gumisiriza *et al.* (1994) showed several constraints of wheat production in Uganda. Those were: traditional farming practices, unavailability or lack of improved cultivars, information and technology transfer, rust and foliar diseases and ineffective communication between research stations.

Alam *et al.* (2000) conducted a survey on jute crops in seven districts in Bangladesh and found that scarcity of quality seeds, high labour wage and low market price of fiber were the major constraints of jute production.

Ismail (2001) conducted a study on problem faced by the farm youth of haor area of Mohongonj Upazila. The study revealed six top problems in rank order which were: (1) no arrangement of loan for the farm youth for fishery cultivation, (2) lack of government programs in agriculture for the farm youth, (3) absence of loan giving agencies for establishing farm in locality, (4) general people face problem

for fishery due to government leasing of Jalmohal, (5) lack of government programs for establishing poultry farm and (6) lack of agricultural loan for the farm youth.

Pramanik (2001) made an extensive study on 24 problems of farm youth in Mymensingh district relating to different problem in crop cultivation .Out of 24 problems the top 4 problems in rank order were: (1) local NGOs take high rate of interest against a loan, (2) lack of agricultural machinery and tools, (3) lack of cash and (4) financial inability to arrange improved seeds, fertilizer and irrigation.

2.2 Studies on the Relationship between Selected Characteristics of the Farmers and their Constraints Faced

Studies on the relationship between selected characteristics of the farmers and their constraints faced were insufficient. Due to unavailability of relevant studies the following studies were mentioned below as they had some similarity.

2.2.1 Age and constraints faced

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraints in banana cultivation. Similar findings were obtained by Rahman (1996) in his respective study.

Kashem (1977) conducted study on the farmers of Barakhata Union under Rangpur district and determined the relationship between age of farmers and their problem confrontation. He found no relationship between age of the farmers and their problem confrontation.

Hossain (1985) in a study found that there was no relationship between the age of the farmers and their problem confrontation. Similar findings were obtained by Rahman (1995), Rashid (1999), Pramanik (2001), Ahmed (2002) and Salam (2003) in their respective studies.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem confrontation in selected agricultural production activities.

2.2.2 Education and constraints faced

Kashem (1977) in his study found a significant negative relationship between education of the farmers and their problem confrontation.

Haque (2001) found a significant negative relationship between education and problem confrontation of the Farmers Field School (FFS) farmers in practising IPM.

Islam (1987) in his study found a significant and negative relationship between education of the farmers and their problem confrontation on artificial insemination. Similar findings were obtained by Mansur (1989), Rahman (1995), Haque (1995), Rahman (1996), Karim (1996), Faroque (1997), Pramanik (2001), Ahmed (2002), Hossain (2002), Bhuiyan (2002) and Salam (2003) in their respective studies.

2.2.3 Farm size and constraints faced

Rashid (2003) found that farm size of the rural youth had no relationship with problem confrontation in selected agricultural activities.

Hoque (2001) revealed that significant positive relationship existed between farm size and problem confrontation of the FFS farmers in practising IPM.

Hossain (1985) in his study found a significant relationship between borga farm size of the farmers and their problem confrontation.

Kashem (1977) found a significant negative relationship between borga farm size of the farmers and their problem confrontation.

2.2.4 Annual income and constraints faced

Hossain (1985) found a significant relationship between income and problem confrontation of the farmers.

Islam (1987) reported that the relationship between income and artificial insemination problem confrontation was negatively significant.

Raha (1989) found in his study that income of the farmers had no significant relationship with their irrigation problem confrontation.

Saha (1983) found in his study a negative relationship between income of the farmers and their poultry problem confrontation.

Kashem (1977) in his study examined the relationship between income of the farmers and their problem confrontation. Though the relationship was not statistically significant, the data indicated an appreciable negative trend between the two variables.

2.2.5 Knowledge and constraints faced

Saha (1983) in a study on poultry problem confrontation reported that the relationship between poultry knowledge and poultry problem confrontation was negative.

Raha (1989) reported from his study that farmers' knowledge in irrigation of modern boro rice had no significant relationship with their irrigation problem confrontation. Anwar (1994), Karim (1996), Rashid (1999), Ismail (2001), Salam (2003), and Rashid (2003) found similar findings in their respective studies.

2.2.6 Extension communication and constraints faced

Rahman (1995) in his study concluded that extension contact of the farmers had significant negative relationship with their faced problem in cotton cultivation. Similar findings were obtained by Rahman (1996), Faruque (1997), Pramanik (2001), Hossain (2002), Bhuiyan (2002) and Salam (2003) in their respective studies.

The study of Ismail (2001) revealed that there was no significant relationship between extension contact of the farmers and their agricultural problem confrontation. Similar findings were obtained by Hoque (2001) in study.

Raha (1989) Found that extension contact of the farmers had no significant relationship with irrigration problem confrontation. However, the relationship showed a tendency in the negative direction.

2.2.7 Social participation and constraints faced

Rahman (1995) found in his study that there was no relationship between the social participation of the farmers and their faced constraints in cotton cultivation.

Rashid (1975) concluded in his study that social participation of the farmers had no significant relationship with their agricultural problem confrontation.

Ali (1978), Saha (1983), and Sarker (1983) found in their studies that social participation of the farmers had a significant negative relationship with the agricultural constraints faced. On the other hand Islam (1987) and Raha (1989) found no significant relationship with their agricultural constraints faced.

2.3 Conceptual Framework of the Study

It is evident from the past studies that every occurrence or phenomenon is the outcome of a number of variables, which may or may not be interdependent or interrelated with each other. In other words, no single variable can contribute wholly to a phenomenon. Variables together are the cause and the phenomenon is effect and thus, there is cause-effect relationship every where in the universe.

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while framing the structural arrangement for the dependent and independent variables. This study was concerned with the constraints faced by the farmers on quality potato seed production activities. Thus the constraints faced on potato seed production activities were the main focus of the study and constituted the

dependent variable. The characteristics of the farmers were considered as the independent variables. It is not possible to deal with all characteristics in a single study. It was therefore, necessary to limit the characteristics, which include age, education, farm size, annual income, knowledge on potato cultivation, extension communication, and social participation. Again, in order to have a clear understanding of the nature of constraints, the dependent variable was considered from the view of a number of aspects such as: problem on quality potato seeds, problem on manures and fertilizers, problem on irrigation, problem on diseases and insects, problem on preservation & marketing facilities of produced potatoes, problem on agricultural credit facilities.

Based on this discussion and review of literature the conceptual model of this study has been formulated and shown in the Figure 2.1.

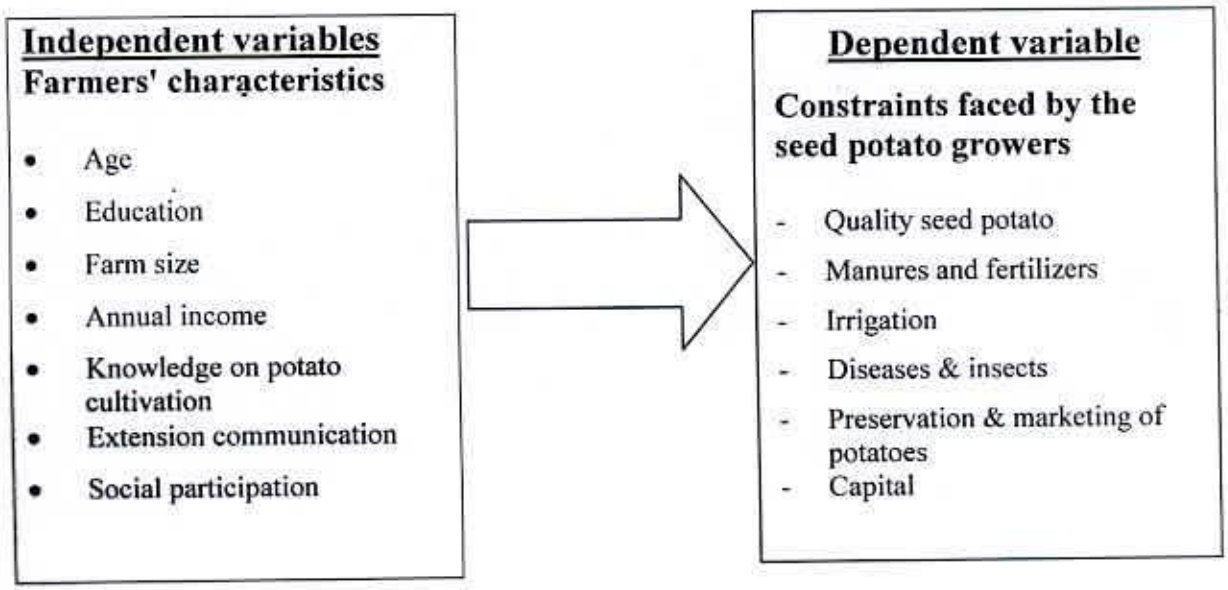


Fig. 2.1 A Simple Conceptual Framework for the Study

Chapter 3
Methodology

CHAPTER 3

METHODOLOGY

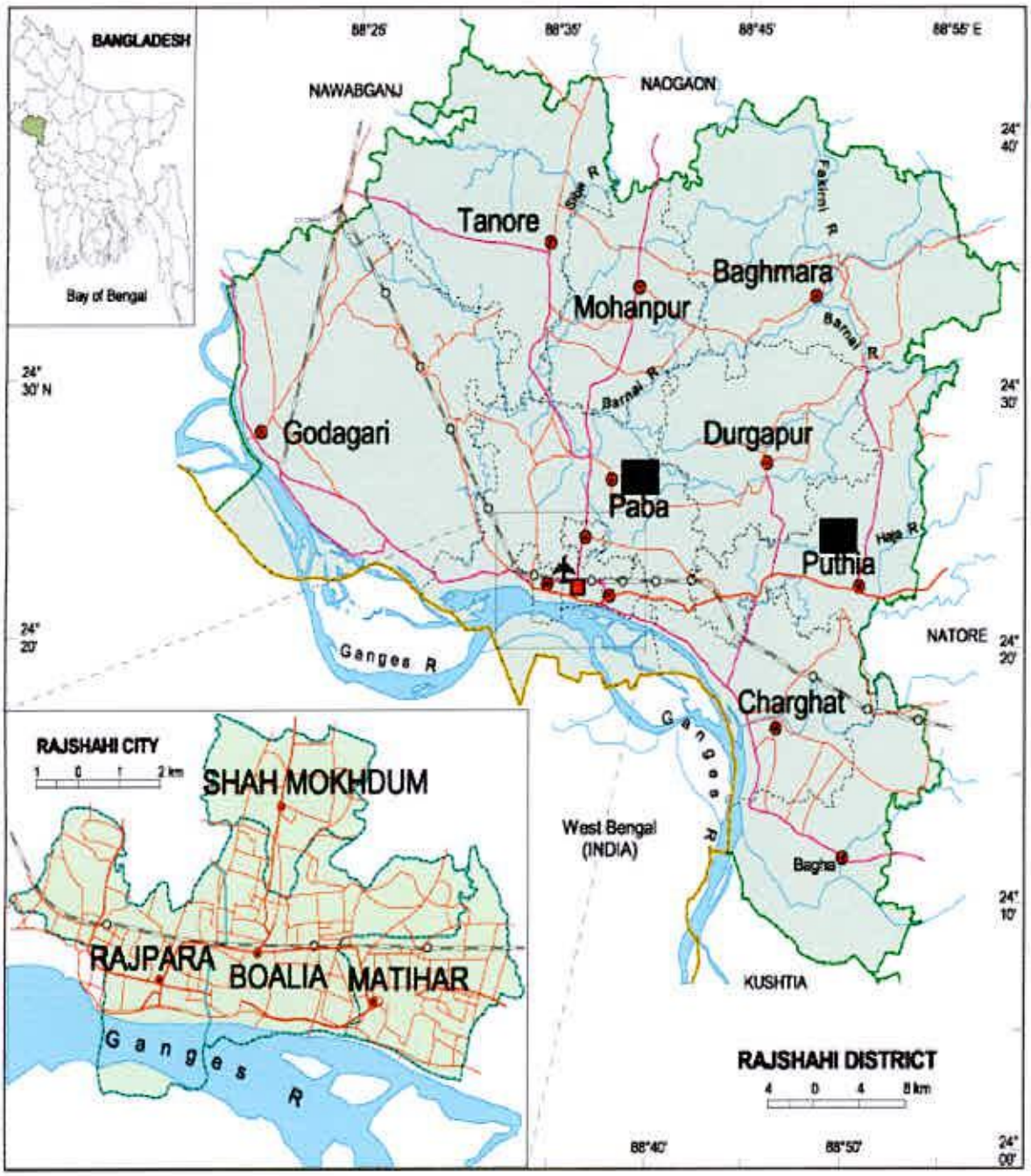
In any scientific research, methodology plays an important role. Appropriate methodology enables the researcher to collect valid and reliable information and to analyze the information properly in order to arrive at correct conclusions. The methods and procedures followed in conducting this study have been described in this chapter.

3.1 Locale of the Study

Four villages where most of the BADC contract growers lived were selected for conducting the study namely, Shobsar and Dadpur of Bargachi union in Paba upazila and Kalaipara and Gondogwali of Geopara union in Puthia upazila under Rajshahi district. The site is far away from Rajshahi upazila sadar. Agriculture was the major occupation in the study area and the area had well accessibility through road and water ways. For clarity of understanding, one map of Rajshahi district showing Paba upazila and Puthia upazila and other two maps of Paba upazila and Puthia upazila showing the study area have been presented in figures 3.1, 3.2 and 3.3 respectively.

3.2 Source of Data

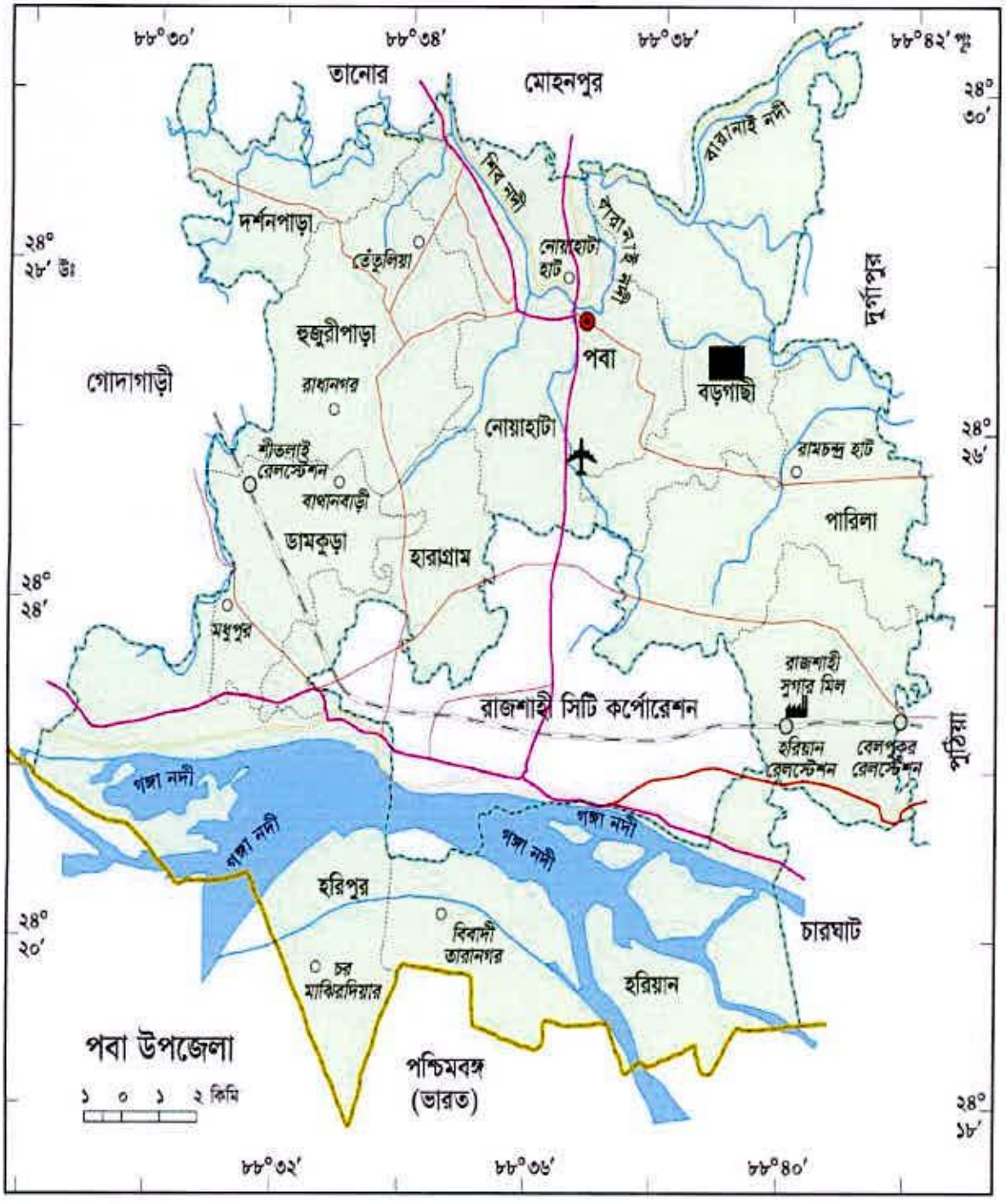
The study was aimed at the farmers who were directly involved in potato seed production activities under the contract grower system with BADC. The researcher prepared a list of all the farmers who were engaged as contract growers for quality potato seed production of Paba and Puthia upazila under Rajshahi district. The total number of farmers under contract was 280. These contract growers constituted the population for this study. However, data were collected from a sample rather than the whole population. Out of those farmers, 36 percent of them were selected at random from each village by using random selection method. One hundred farmers were selected as the sample for this study. However, a reserve list of 10 farmers



Legend:

■ **The selected upazilas**

Fig. 3.1. A map of Rajshahi district showing the selected upazilas



Legend:

Bargachi

Fig. 3.2. A map of Paba upazila showing the study area

Legend:

■ **Geopara**

Fig. 3.3 A map of Puthia upazila showing the study area

was prepared. The farmers included in the reserve list were supposed to be used in case of any absence of farmers included in the original sample during collection of data. Village-wise distribution of the farmers constituting the population, sample and those included in the reserve list are shown in Table 3.1.

Table 3.1 Distribution of the Farmers Constituting the Population, Sample and those Included in the Reserve List

Name of upazila	Name of union	Name of village	Total population	No. of farmers included in the sample	No. of farmers included in reserve list
Paba	Bargachi	Shobsar	66	24	2
		Dadpur	72	26	3
Puthia	Geopara	Kalaipara	77	28	3
		Gondogwali	63	22	2
Total			278	100	10

3.3 Instrument for Data Collection

An interview schedule was used as the data gathering instrument for this study. The researcher prepared an interview schedule keeping the objectives of the study in view. The interview schedule contained both open and closed form of questions. Simple and direct questions and some scales were included in the schedule to get information regarding the problem conformation of the respondent farmers and their selected characteristics.

The interview schedule was prepared in Bangla for easy understanding on the part of respondents. The draft interview schedule was pre-tested in field situation before using the same for final data collection. Necessary corrections, additions, alternations and adjustment were made in the interview schedule on basis of the experience gained during pre-test in the study area. The interview schedule was then cyclostyled in its final form for collection of data. An English version of the interview schedule may be seen at Appendix-A.

3.4 Selection of Variables of the Study

A variable is any characteristic which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). A well organized hypothesis usually contains at least two important elements, viz. an independent variable and a dependent variable. The researcher selected the dependent and independent variables through extensive review of literature, discussion with academicians, experts and researchers. However, 7 selected characteristics of the farmers were selected as independent variables. These were: age, education, farm size, annual income, knowledge on potato cultivation, extension communication and social participation. On the other hand, constraints faced by the BADC contract growers in quality potato seed production was the only dependent variable of the study.

3.5 Measurement of Independent Variables

3.5.1 Age

The age of a potato seed grower was measured in terms of actual years from his birth to the time of interview. For example, the actual age of a BADC contract grower is 35. So, the age score of that contract grower is 35.

3.5.2 Education

Education was measured in terms of years of of a respondents:op production activities was the only dependent variable.n from the respondents. Besides the people i schooling completed by the respondent. If a respondent did not know how to read and write, his education score was given as zero. If a respondent did not know how to read and write but could sign his name only then he got a score of 0.5. Besides a person got actual score for his number of years of schooling i.e. 1 for class one, 2 for class two and so on.

3.5.3 Farm size

Farm size of a potato seed grower was measured by summating land owned by him or land taken or given for share cropping or land taken on lease or mortgage. The

unit of farm size was expressed in hectare. The farm size of the respondent was computed by using the following formula:

$$Fs = A_1 + A_2 + A_3 + (A_4+A_5)/2 + A_6$$

Here,

Fs = Farm Size

A_1 = Homestead

A_2 = Own land under own cultivation

A_3 = Own pond and own garden

A_4 = Own land given borga to others

A_5 = Land taken borga from others

A_6 = Land taken lease from others

3.5.4 Annual income

Annual income was measured by summating total earnings of a respondent and his family members dependent upon him from agriculture, livestock, fisheries and other sources (service, business etc.) in the previous year. Annual income of an individual was expressed in '000 taka.

3.5.5 Knowledge on potato cultivation

Knowledge on potato cultivation of a respondent was measured by asking 20 questions related to different components of agriculture. It was measured in scores. The total assigned score for all the questions was 40. The score of each question was equal. A full score of 2 was assigned for each correct answer, 1 for partially correct answer and 0 (zero) for the wrong answer. However, for correct responses to all the questions, a respondent could get a total score of 40, while for wrong responses to all the questions he could get 0 (zero); where 0 (zero) indicating no knowledge on potato cultivation and 40 indicating high knowledge on potato cultivation.

3.5.6 Extension communication

Extension communication was measured by assessing to one's extent of exposure to different extension teaching methods. It was measured by computing an extension communication score using Likert Scale. Extension communication score of a respondent was determined by summating the scores obtained for all the 12 selected extension media under serial no. 6 of the interview schedule.

ECS = Summation of 10 (Ten) Extension Media Score

Here,

ECS = Extension Communication Score

The extension communication scores of the respondents could range from 0 to 36; where 0 (zero) indicating no extension communication and 36 indicating high extension communication.

3.5.7 Social participation

Social participation of a respondent was measured on the basis of the nature of his involvement with social organization and duration of involvement holding different positions like ordinary member, executive member, executive officers. The researcher identified seven social organizations in the study area as shown in item no. 7 in the interview schedule.

For computing social participation score, the following formula was used.

$$\text{Social participation score} = \Sigma P \times D$$

Where,

P = Participation sub-score
D = Duration sub-score

Participation sub-score was assigned in the following manner for activities of an individual respondent.

Nature of participation	Sub-score assigned
No participation	0
Participation as ordinary member	1

Participation as executive committee member	2
Participation as executive officer	3

Duration sub-score was assigned in the following manner:

Duration of participation	Sub-score assigned
Up to 2 years	1
3-4 years	2
Above 4 years	3

Social participation score of a respondent was obtained by multiplying the participation sub-score by the corresponding duration sub-score and then added together.

3.6 Measurement of Dependent Variable

As mentioned earlier, constraints faced by the farmers in quality seed potato production was the dependent variable of this study. Three-point rating scale was used to determine constraints faced in potato seed production activities. The scale contained 60 items of constraints faced by the farmers in quality potato seed production activities based on 6 major components, while each component contained 10 items. Each respondent was asked to express his opinion against each item based upon 3 responses such as high, little and not at all stated in the interview schedule. Each opinion was assigned score as 2,1 and 0 (Zero) respectively. Thus the score obtained from each component could range from 0 to 20.

Therefore, the possible overall constraints faced score in quality potato seed production of a respondent could range from 0 to 120, while 0 indicating no constraints faced in quality potato seed production and 120 indicating high constraints faced in quality potato seed production.

3.7 Hypothesis of the Study

A hypothesis is a proportion which can be put to a test to determine its validity (Goode & Hatt, 1952). It may seem contrary to or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test. Hypothesis may be broadly classified into two types, namely, research hypothesis (H_1) and null hypothesis (H_0). In the present study it was hypothesized that farmers' 7 selected characteristics had either positive or negative relationship with the constraints faced in quality potato seed production. For statistical advantage, the following major null hypothesis was tested:

There is no relationship between farmers' 7 selected characteristics (independent variables) and their constraints faced in quality potato seed production (dependent variable), while the selected characteristics include: age, education, farm size, annual income, knowledge on potato cultivation, extension communication, and social communication.

3.8 Collection of Data

Data were collected personally by the researcher himself through face to face interview. Interview was usually conducted in respondents' house during their leisure period. Desired rapport was established by the researcher with the respondent. However, if any respondent failed to understand any question, the researcher took necessary care to explain the matter. No serious difficulty was faced in data collection. Rather, the researcher received an excellent cooperation from the respondents. Besides the people in the community rendered possible assistance especially by informing the respondents for interview in advance and locating the house of respondents. Data collection began on April 15, 2008 and continued until May 15, 2008.

3.9 Data Processing and Analysis

3.9.1 Compilation of data

After completion of the field survey, data from all the interview schedules were coded and compiled in accordance with the objectives of the study. In this process,

all the responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative data by means of suitable scoring wherever necessary. The responses to the questions in the interview schedules were transferred to master sheet to facilitate tabulation.

3.9.2 Categorization of data

For describing the different characteristics and their constraints faced by the respondents were classified into several categories. These categories were developed by considering the nature of distribution of data, general norms prevailing in the social system, possible scores system, mean method and mean and standard deviation method. The procedure for categorization of data in respect of different variables was discussed while describing those variables in Chapter 4.

3.9.3 Statistical analysis

Statistical measures such as number, percentage, range, rank order, mean and standard deviation were used in describing the independent and dependent variables of the study. For clarity of understanding tables were also used for presenting the data. Pearson's Product Moment Correlation Co-efficient (r) was used to explore the relationships between selected characteristics of the respondents and their constraints faced in quality seed potato production.

Throughout the study, five percent (0.05) level of significance was used to reject any null hypothesis. If the computed value of coefficient of correlation (r) was equal to or greater than tabulated value at designated (5%) level of significance for the relevant degrees of freedom, then the null hypothesis was rejected and it was concluded that there was significant relationship exist between the concerned variables.

Besides, when the computed value of coefficient of correlation (r) was found to be smaller than the tabulated value at the designated (5%) level of significance for the relevant degrees of freedom, then the null hypothesis could not be rejected and hence it was

Chapter 4
Results and Discussion

CHAPTER 4

RESULTS AND DISCUSSION

Purpose of this Chapter was to describe the results of the present study and discuss the findings. The study investigated constraints faced by the farmers on quality seed potato production activities and related matters. In accordance with the objectives of the study, presentation of the findings has been made in the following three sections.

Section 1: Selected Characteristics of the BADC contract growers

Section 2: Constraints Faced by the BADC contract growers

Section 3: Relationship between the selected characteristics of the BADC contract growers and constraints faced by them

4.1 Selected Characteristics of the BADC contract growers

In the present study, 7 characteristics of the farmers were selected for investigation. The characteristics included: age, education, farm size, annual income, knowledge on potato cultivation, extension communication, and social participation. The salient features of the different characteristics have been presented in Table 4.1.

Table 4.1 Salient Features of the Selected Characteristics of the BADC contract growers

Sl. No.	Characteristics	Measuring units	Range		Mean value	Standard deviation
			Possible scores	*Observed scores*		
1	Age	Years	Unknown	20-58	38.38	8.09
2.	Education	Year of schooling	Unknown	0-15	5.39	4.29
3.	Farm size	Hectare	Unknown	0.04-6.46	0.86	.99
4.	Annual income	Taka ('000)	Unknown	36-2714	253.34	350.92
5.	Knowledge on potato cultivation	Assigned scores	0-40	10-30	21.28	4.15
6.	Extension communication	Assigned scores	0-36	10-28	17.48	3.47
7.	Social participation	Assigned scores	Unknown	0-4	0.79	0.98

4.1.1 Age of the farmers

Age of the respondent farmers ranged from, 20-58 years and the average was 38.38 with a standard deviation of 8.09. This indicates that the study group was moderately heterogeneous in terms of age level. On the basis of their age, the farmers were classified into three categories that have been presented in Table 4.2.

Table 4.2 Classification of the farmers according to their age

Categories according to age (years)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Young (up to 35)	34	34	38.38	8.09
Middle aged (36-50)	62	62		
Old (above 50)	4	4		
Total	100	100		

Analysis of data contained in Table 4.2 reveals that the highest proportion (62 percent) of the farmers was in the middle aged category, while 34 percent belonged to the young category. Only 4 percent of the farmers were in the old category. It shows that 96 percent of the farmers belonged to the young and middle aged categories. The percentage of middle aged seed potato growers seems to be higher than other age group. Seed potato cultivation needs more sophisticated technology and careful application. It is not possible for the old aged farmers. So, in this study reasonably it was found that an overwhelming majority is (96%) of potato seed growers ranged from young to middle aged.

4.1.2 Education of the farmers

Education score of the respondent farmers ranged from 0 to 15 years of schooling having an average 5.39 with a standard deviation of 4.29. On the basis of their education the respondents were classified into five categories that have been presented in Table 4.3.

Table 4.3 Classification of the farmers according to their education

Categories according to education (schooling years)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Illiterate (0)	10	10	5.39	4.29
Can sign only (0.5)	20	20		
Primary level (1-5)	21	21		
Secondary level (6-10)	40	40		
Above secondary (above 10)	9	9		
Total	100	100		

Data furnished in Table 4.3 indicate that 40 percent of the farmers had secondary level of education, while 21 percent had primary education and only 9 percent had above secondary level of education. It was found that 10 percent of the farmers were illiterate and 20 percent of them could sign only. It was revealed from the data that a total of 70% respondents had functional education definitely higher than national average (67%). Potato seed production is a complex process. This needs effective functional education and training as well.

4.1.3 Farm size of the farmers

Farm size score of the respondents ranged from 0.04-6.46 hectares with a mean of 0.86 ha and a standard deviation of 0.99. The farmers were classified into four categories, according to the DAE classification as presented in Table 4.4.

Table 4.4 Classification of the farmers according to their farm size

Categories according to farm size (hectare)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Marginal (up to 0.20)	7	7	0.86	0.99
Small (0.21-1.00)	67	67		
Medium (1.01-3.00)	22	22		
Large (above 3.00)	4	4		
Total	100	100		

Data presented in Table 4.4 indicate that 67 percent of the farmers had small farm size, while 4 percent had large farm, 22 percent had medium farm and 7 percent

had marginal farm. In Rajshahi division farm size is supposed to be higher than other parts of the country. But the mean indicates that it is not. However, there is no landless farmer among the respondents. Marginal farmers of the study area was found to be almost double than the DAE statement.

4.1.4 Annual income of the farmers

Annual income score of the respondent farmers ranged from 36 to 2714 with a mean of 253.34 and a standard deviation of 350.92. The farmers were classified into three categories on the basis of their annual income that have been presented in Table 4.5.

Table 4.5 Classification of the farmers according to their annual income

Categories according to family income (taka '000)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low income (up to 150)	51	51	253.34	350.92
Medium income (151-300)	25	25		
High income (above 300)	24	24		
Total	100	100		

Data presented in Table 4.5 indicate that the highest proportion (51 percent) of the farmers had low annual income compared to 25 percent and 24 percent having medium annual income and high annual income respectively. The mean income was found to be eight times higher than national per capita income. That is potato growers had high income. This high income influenced them to grow seed potato.

4.1.5 Knowledge on potato cultivation

Knowledge on potato cultivation scores of the farmers ranged from 10-30 against the possible range of 0-40. The average score and standard deviation were 21.28 and 4.15 respectively. Based on the knowledge on potato cultivation scores, the farmers were classified into three categories, namely poor knowledge, moderate knowledge and good knowledge that have been presented in Table 4.6.

Table 4.6 Classification of the farmers according to their knowledge on potato cultivation

Categories according to agricultural knowledge (score)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Poor knowledge (up to 15)	7	7	21.28	4.15
Moderate knowledge (16-25)	74	74		
Good knowledge (above 25)	19	19		
Total	100	100		

Data presented in the Table 4.6 revealed that 74 percent of the farmers had moderate knowledge, 7 percent had poor knowledge and 19 percent had good knowledge on potato cultivation. That is, an overwhelming majority (93%) of potato growers had knowledge on potato cultivation ranged from medium to high. Moreover, it could be said that the respondents farmers had long experience in potato cultivation and as a result they accumulated more knowledge on potato cultivation.

4.1.6 Extension communication of the farmers

The scores of the farmers regarding extension communication ranged from 10-28 against possible range 0 to 36 with an average of 17.48 and a standard deviation of 3.47. On the basis of their extension communication scores, the farmers were classified into three categories that have been presented in Table 4.7.

Table 4.7 Classification of the farmers according to their extension communication

Categories according to extension communication (score)	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low communication (up to 15)	24	24	17.48	3.47
Medium communication (16-22)	66	66		
High communication (above 22)	10	10		
Total	112	100		

Data presented in the table 4.7 indicate that majority (66 percent) of the farmers had medium extension communication as compared to 24 percent having low extension communication and 10 percent had high extension communication. However, more than three fourth had medium to high extension communication. In

fact potato growers need many sorts of information from seed collection to potato seed production including marketing. To achieving this information they communicate with SMS, SAAO, input dealers, radio and TV program, ideal and progressive farmers and also with neighbors and relatives. There is an established generalization that more the contact with information sources more the information achieved. So, it could be concluded that quality potato seed growers of the study area had good extension communication.

4.1.7 Social participation of the farmers

The social participation scores of the farmers ranged from 0 to 4 against possible ranged 0 to 21 with an average of 0.79 and a standard deviation of 0.98. On the basis of social participation scores, the farmers were classified into four categories namely, no participation, low participation, medium participation and high participation as shown in Table 4.8.

Table 4.8 Classification of the farmers according to their social participation

Categories according to social participation (score)	Farmers		Mean	Standard deviation
	Number	*Percent*		
No participation (0)	50	50	0.79	0.98
Very low participation (1-2)	48	48		
Low participation (4)	2	2		
Total	100	100		

Social participation brings an individual in contact with others where they can exchange ideas, experience and information among the other members of the society. Data revealed in Table. 4.7 indicate that almost all the respondents (98%) had no (50%) to very low (48%) social participation and only 2 percent had low social participation. It could be concluded that potato seed growers were not unsocial but due to their pre occupation they could not maintain high social contact. However, their extension communication was found to be satisfactory and presumably their social participation also would be alike.

4.2 Constraints Faced by the Farmers in Quality Seed potato Production

Constraints faced by the farmers in quality seed potato production activities were the main focus of this study. In this study, 'constraints faced' referred to extent of problem faced by the farmers in six selected aspects namely, problem on quality seed potato, problem on manures and fertilizers, problem on irrigation, problem on diseases and insects, problem on preservation & marketing facilities of produced potatoes, problem on agricultural credit facilities. For having a clear understanding of the overall constraints faced by the farmers on quality seed potato production activities, one needs to have an idea about their faced problems in each of the six selected aspects.

4.2.1 Constraints faced related to quality seed potatoes

The observed scores of constraints faced related to quality seed potatoes ranged from 0-12 against the possible scores being 0-20. The average score was 4.65 with a standard deviation of 2.36. On the basis of constraints faced related to quality seed potatoes, the farmers were classified into four categories as presented in Table 4.9.

Table 4.9 Classification of the farmers according to their constraints faced related to quality seed potatoes

Categories according to constraints faced related to quality seed potatoes	Farmers		Mean	Standard deviation
	Number	*Percent*		
No constraints (0)	2	2	4.65	2.36
Low constraints (1-4)	42	42		
Medium constraints (5-8)	52	52		
High constraints (above 8)	4	4		
Total	100	100		

Data presented in the Table 4.9 indicate that the highest proportion (52 percent) of the farmers had faced medium constraints related to quality seed potatoes as compared to 42 percent and 4 percent having faced low constraints and high constraints respectively. On the other hand, only 2 percent of the farmers faced no constraints at all. Constraints on quality seed potato were not so severe. It is evident

from the obtained score. The seed potato growers of Rajshahi division are trained and skilled in seed potato production.

4.2.2 Constraints faced related to manures and fertilizers

The observed scores of constraints faced related to manures and fertilizers ranged from 0-17 against the possible scores being 0-20. The average score was 12.24 with a standard deviation 2.97. On the basis of constraints faced related to manures and fertilizers, the farmers were classified into three categories as presented in Table 4.10.

Table 4.10 Classification of the farmers according to their constraints faced related to manures and fertilizers

Categories according to constraints faced related to manures and fertilizers	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low constraints (up to 7)	3	3	12.24	2.97
Medium constraints (8-13)	75	75		
High constraints (above 13)	22	22		
Total	100	100		

Data presented in the Table 4.10 indicate that all the farmers faced constraints on fertilizer crises. The highest proportion (75 percent) of the farmers had faced medium constraints related to manure and fertilizers compared to 3 percent faced low constraints and 22 percent faced high problem respectively.

In Bangladesh, all crop growers including seed potato growers commonly face fertilizer crises. It is evident from the Table 4.10 that fertilizer crises in Rajshahi division was found to be severe. Unless government take especial initiative and farmers use self-made organic manures this problem will ever exist.

4.2.3 Constraints faced related to irrigation

The observed scores of constraints faced related to irrigation ranged from 2-15 against the possible scores of 0-20. The average score was 6.95 with a standard

deviation 2.82. On the basis of constraints faced related to irrigation the farmers were classified into three categories as presented in Table 4.11.

Table 4.11 Classification of the farmers according to their constraints faced related to irrigation

Categories according to constraints faced related to irrigation	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low constraints (up to 7)	62	62	6.95	2.82
Medium constraints (8-13)	36	36		
High constraints (above 13)	2	2		
Total	100	100		

Data presented in the Table 4.11 indicate that the highest proportion (62 percent) of the farmers had faced low constraints related to irrigation as compared to 36 percent having faced medium constraints and only 2 percent having faced high constraints respectively. It is evident from the Table 4.11 that irrigation problem in Rajshahi division especially for potato growers are not so severe. Somehow farmers can manage irrigation problem. However, government organizations like BADC should come forward to solve irrigation problems.

4.2.4 Constraints faced related to insects and diseases

The observed scores of constraints faced related to insects and diseases ranged from 2-20 against the possible scores being 0-20 having an average of 7.10 with a standard deviation 3.17. On the basis of constraints faced related to insects and diseases, the farmers were classified into three categories as presented in Table 4.12.

Table 4.12 Classification of the farmers according to their constraints faced related to insects and diseases

Categories according to constraints faced related to insects and diseases	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low constraints (up to 7)	61	61	7.10	3.17
Medium constraints (8-13)	35	35		
High constraints (above 13)	4	4		
Total	100	100		

Data presented in the Table 4.12 indicate that the highest proportion (61 percent) of the farmers had faced low constraints related to insects and diseases as compared to 35 percent having faced low constraints and only 4 percent having faced high constraints respectively. It is evident from the data in the Table 4.12 that insect and diseases created no severe problem in the study area except a few (4%), who faced high constraints. In 2009 late blight of potato caused a serious problem all over the country. However, if BADC, DAE and other concerned organizations help farmers providing training on control of insects and diseases, farmers will be able face problem successfully.

4.2.5 Constraints faced related to preservation and marketing of seed potatoes

The observed scores of constraints faced related to preservation and marketing of seed potato s ranged from 5-16 against the possible scores of 0-20 having an average of 9.67 with a standard deviation 2.01. On the basis of constraints faced related to preservation and marketing of potatoes, the farmers were classified into three categories as presented in Table 4.13.

Table 4.13 Classification of the farmers according to their constraints faced related to preservation and marketing of seed potatoes

Categories according to constraints faced related to preservation and marketing of seed potato s	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low constraints (up to 7)	15	15	9.67	2.01
Medium constraints (8-13)	82	82		
High constraints (above 13)	3	3		
Total	100	100		

Data presented in the Table 4.13 indicate that the highest proportion (82 percent) of the farmers had faced medium constraints related to preservation and marketing of seed potatoes as compared to 15 percent having faced low constraints and 3 percent having faced high constraints respectively. It is evident from the data in the Table 4.13 that all the farmers faced severe problem in marketing of seed potato. In fact an overwhelming majority (85%) had to face this problem severely. The respondent farmers were contract growers of BADC. So, BADC can not deny its responsibility of creating marketing opportunity of those contract growers.

4.2.6 Constraints faced related to capital

The observed scores of constraints faced related to capital ranged from 0-11 against the possible scores of 0-20 having an average of 3.63 with a standard deviation of 2.73. On the basis of constraints faced related to capital, the farmers were classified into three categories as presented in Table 4.14.

Table 4.14 Classification of the farmers according to their constraints faced related to capital

Categories according to constraints faced related to capital	Farmers		Mean	Standard deviation
	Number	*Percent*		
No constraints (0)	14	14	3.63	2.73
Low constraints (1-7)	76	76		
Medium constraints (8-11)	10	10		
Total	100	100		

Data presented in the Table 4.14 indicate that the highest proportion (76 percent) of the farmers had faced low constraints related to capital as compared to 10 percent having faced medium constraints. On the other hand, 14 percent of the farmers had faced no constraints related to capital at all. Analyzing the obtained score it was found that respondents farmers had no so much capital problem. The concerned organizations should come forward to solve this problem.

4.3 Overall constraints faced by the farmers in quality seed potato production

Computed overall constraints faced by the BADC contract growers ranged from 23-85 against the possible range of 0-120. The average score was 44.89 with a standard deviation of 9.77 as presented in Table 4.15.

Table 4.15 Classification of the farmers according to their overall constraints faced by the farmers

Categories according to overall constraints faced by the farmers	Farmers		Mean	Standard deviation
	Number	*Percent*		
Low constraints (up to 40)	33	33	44.89	9.77
Medium constraints (41-80)	66	66		
High constraints (above 80)	1	1		
Total	100	100		

Table 4.15 revealed that 66 percent of the respondent farmers faced medium constraints in quality seed potato production. On the other hand 33 percent faced low constraints and only 1 percent faced high constraints. However, the overall constraints faced by the BADC contract growers in quality seed potato production has been diagrammatically shown in Fig. 4.1.

It was found in the individual constraint analysis that respondent seed potato growers experienced low to medium constraints except a few 'no constraints'. Almost similar results were found in overall constraints analysis. The data in the Table 4.15 revealed that 99% of the respondents had low to medium constraints.

Only one percent experienced high constraints. It could be concluded that constraints high or low matters equally and rapid actions should be taken to mitigate the constraints.

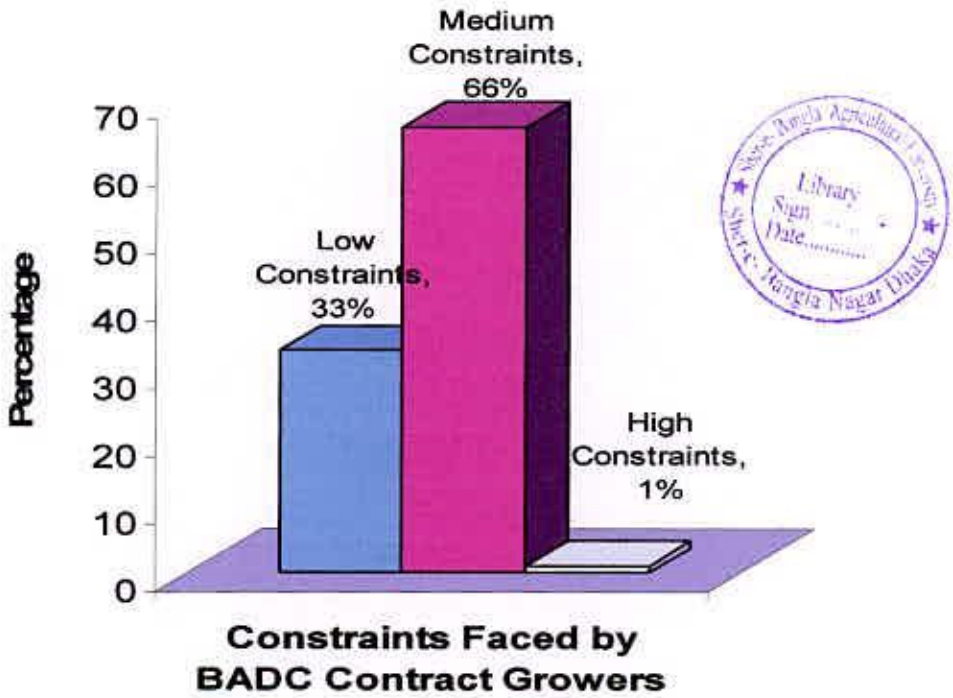


Figure 4.1: Bar graph showing constraints faced by BADC contract growers

4.4 Relationship between the Selected Characteristics of the BADC Contract Growers and their Constraints Faced in Quality Seed Potato Production

The purpose of this section is to examine the relationships of seven selected characteristics of the BADC contract growers with their constraints faced in quality seed potato production. The seven characteristics of the farmers included: age, education, farm size, annual income, knowledge on potato cultivation, extension communication and social participation. Each of the characteristics constituted the independent variables, while constraints faced by the BADC contract growers in

quality seed potato production were the dependent variable of the study. To explore the relationships between the selected individual characteristics of the farmers and their constraints faced in quality seed potato production, Pearson's product moment co-efficient of correlation (r) has been used. Five percent and one percent level of probability were used as the basis for rejection of null hypotheses. The computed values of 'r' were compared with relevant tabulated values for 98 degrees of freedom at the designated level of probability in order to determine whether the relationships between the concerned variables were significant or not.

The summary of the results of the correlation analysis has been presented in Table 4.16 showing the relationship between seven characteristics of the farmers and their constraints faced in quality seed potato production. For clarity of understanding Appendix-B may be seen.

Table 4.16 Co-efficient of correlation showing relationship between the selected characteristics of the farmers and their constraints faced in quality seed potato production

N =100

Dependent variable	Independent variables (selected characteristics of BADC contract growers)	Observed correlation co-efficient (r) value with 98 degrees of freedom
Constraints faced by the BADC contract growers in quality seed potato production	• Age	-0.081^{NS}
	• Education	-0.237*
	• Farm size	-0.016^{NS}
	• Annual income	-0.123^{NS}
	• Knowledge on potato cultivation	-0.433**
	• Extension communication	-0.263**
	• Social participation	-0.255*

^{NS} = Not significant
* = Significant at 0.05 level of probability
** = Significant at 0.01 level of probability

Tabulated value,
0.196 at 0.05 level of probability
0.256 at 0.01 level of probability

4.4.1 Relationship between age of the farmers and their constraints faced in quality seed potato production

Relationship between age of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between age of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.081 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= −0.081) was found to be smaller than the tabulated value (r= 0.196) with 98 degrees of freedom at 0.05 level of probability.*

b) *The null hypothesis could not be rejected.*

c) *The relationship between the concerned variables was not significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that age of the farmers had no significant relationship with their constraints faced in quality seed potato production. This meant that age of the farmers was not an important factor in facing constraints in quality seed potato production. However, comparatively younger farmers could face constraints in quality seed potato cultivation.

4.4.2 Relationship between education of the farmers and their constraints faced in quality seed potato production

Relationship between education of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between education of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.237 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.237) was found to be larger than the tabulated value (r= 0.196) with 98 degrees of freedom at 0.05 level of probability.*

b) *The null hypothesis was rejected.*

c) *The relationship between the concerned variables was significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that education of the farmers had a significant and negative relationship with their constraints faced in quality seed potato production. This meant that the farmers having more education were likely to face lesser constraints. Educated persons are supposed to have more extension contact and training and as a result they can combat the constraint scientifically and effectively.

4.4.3 Relationship between farm size of the farmers and their constraints faced in quality seed potato production

Relationship between farm size of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between farm size of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variable was found to be -0.016 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.016) was found to be smaller than the tabulated value (r= 0.196) with 98 degrees of freedom at 0.05 level of probability.*

b) *The null hypothesis was accepted.*

c) *The relationship between the concerned variables was not significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that farm size of the farmers had no significant relationship with their constraints faced in quality seed potato production. This implies that farm size of the farmers does not have much influence on their constraints faced in quality seed potato production.

4.4.4 Relationship between annual income of the farmers and their constraints faced in quality seed potato production

Relationship between annual income of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between annual income of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.123 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.123) was found to be smaller than the tabulated value (r= 0.196) with 98 degrees of freedom at 0.05 level of probability.*

b) *The null hypothesis was accepted.*

c) *The relationship between the concerned variables was not significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that annual income of the farmers had no significant relationship with their constraints faced in quality seed potato production. This implies that annual income of the farmers does not have any influence on their constraints faced in quality seed potato production.

4.4.5 Relationship between knowledge on potato cultivation of the farmers and their constraints faced in quality seed potato production

Relationship between cosmopoliteness of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between knowledge on potato cultivation of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.433 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.433) was found to be larger than the tabulated value (r= 0.256) with 98 degrees of freedom at 0.01 level of probability.*

b) *The null hypothesis was rejected.*

c) *The relationship between the concerned variables was significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that knowledge on potato cultivation of the farmers had a negatively significant relationship with their constraints faced in quality seed potato production. This implies that farmers having higher knowledge on potato cultivation were likely to face have lower level of constraints in quality seed potato production. Seed potato growers having higher knowledge in potato cultivation are supposed to know what are constraints to be faced and how to mitigate them.

4.4.6 Relationship between extension communication of the farmers and their constraints faced in quality seed potato production

Relationship between extension communication of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between extension communication of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.263 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.263) was found to be larger than the tabulated value (r= 0.256) with 98 degrees of freedom at 0.01 level of probability.*

b) *The null hypothesis was rejected.*

c) *The relationship between the concerned variables was significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that extension communication of the farmers had a negatively significant relationship with their constraints faced in quality seed potato production. This implies that farmers with higher extension communication were likely to face lower level of constraints faced in quality seed potato production. All the respondents farmers were contract-seed potato growers registered with BADC. So, both farmers and BADC extension agents had contact with each other at the time of need which resulted lower level of constraints faced by farmers.

4.4.7 Relationship between social participation of the farmers and their constraints faced in quality seed potato production

Relationship between social participation of the farmers and their constraints faced in quality seed potato production was determined by testing the following null hypothesis: "There is no relationship between social participation of the farmers and their constraints faced in quality seed potato production".

The calculated value of the co-efficient of correlation between the concerned variable was found to be -0.255 as shown in Table 4.17. The following observations were made regarding the relationship between the two variables under consideration.

a) *The computed value of 'r' (r= -0.255) was found to be larger than the tabulated value (r= 0.256) with 98 degrees of freedom at 0.01 level of probability.*

b) *The null hypothesis was rejected.*

c) *The relationship between the concerned variables was significant.*

d) *The relationship showed a negative trend between the concerned variables.*

Based on the above findings, the researcher concluded that social participation of the farmers had a negatively significant relationship with their constraints faced in quality seed potato production. This implies that farmers having higher social participation faced lower level of constraints in quality seed potato production.

4.5 Constraints Facing Index (CFI)

Constraints of quality seed potato production were compared by calculating Constraint Facing Index (CFI) and were arranged in a rank order. For this purpose, a Constraint Facing Index (CFI) was computed for each of the six dimensions by using the following formula as used by Mansur (1989) and Raha (1989).

Constraints Facing Index (CFI) = $P_n \times 0 + P_l \times 1 + P_m \times 2 + P_h \times 3$

Where,

P_n = Percentage of BADC contract growers having no constraint facing

P_l = Percentage of BADC contract growers having low constraint facing

P_m = Percentage of BADC contract growers having medium constraint facing

P_h = Percentage of BADC contract growers having high constraint facing

Percent of the respondents facing no, low, medium and high constraints were described earlier in 4.2.1 to 4.2.6 sections. Constraint Facing Index (CFI) for any one of the selected dimensions could range from 0 to 300 where '0' indicated no constraint facing and '300' indicated high constraint facing.

However, Constraint Facing Index for the selected six dimensions of quality seed potato production ranged from 140 to 219. Comparative rank orders of the six selected dimensions have been shown in Table 4.17 on the basis of the obtained Constraints Facing Index (CFI) score.

Table 4.17. Rank order of constraints faced by BADC contract growers with observed score according to descending order

Sl. No.	Statements	Percentage of the respondents				CFI	Rank order
		No (0)	Low (1)	Medium (2)	High (3)		
1.	Constraints faced related to manures and fertilizers	0	3	75	22	219	1st
2.	Constraints faced related to preservation and marketing of potatoes	0	15	82	3	188	2nd
3.	Constraints faced related to quality seed potatoes	2	42	52	4	158	3rd
4.	Constraints faced related to diseases and insects	0	61	35	4	143	4th
5.	Constraints faced related to irrigation	0	62	36	2	140	5th
6.	Constraints faced related to capital	14	76	10	0	96	6th

1. The rank order Table 4.17 shows that constraints faced related to manure and fertilizer ranked top the list. The main fact is that BADC could not supply the adequate amount of fertilizer to its registered farmers. Moreover, BADC supply only TSP and MOP fertilizer to its member farmers. But the farmers required other fertilizer such as Urea, Mg-fertilizer etc.

2. Constraints faced related to preservation and marketing of potatoes occupied 2nd position. In Rajshahi division, there are limited numbers of cold storage. Therefore, the farmers could not store the seed potato in cold storage in time. A huge amount of seed potato remains damaged due to unavailability of cold storage. So, BADC should take necessary actions to mitigate the constraints immediately.

3. The rank order Table 4.17 reveals that constraints faced related to quality seed potatoes and constraints faced related to diseases and insects ranked 3rd and 4th positions respectively. Although, BADC support their farmers to produce quality seed potatoes production but some times unfavorable environment conditions such as heavy dew, fog, drizzling caused serious damaged to produce quality seed potato. Because pathogens (e.g. *Phytophthora infestans*) are more active in this conditions.

4. The rank order Table 4.17 reveals that constraints faced related to irrigation occupied 5th position among the constraints. Although, BADC officers monitor the whole seed potato production program including irrigation but BADC could not provide irrigation water as per farmers' demand.

5. The rank order Table 4.17 reveals that constraints faced related to capital occupied 6th position among the constraints. BADC contract farmers could not purchase adequate amount of fertilizers from BADC appointed dealers as per their demand. That's why, they have to buy fertilizer from the market. But market price of the fertilizer is too high than that of BADC fixed price. However, it could be concluded that constraints faced related to capital was not a serious problem.

All those constraints should be mitigated by the combined efforts of BADC authorities and contract growers.

Chapter 5

Summary, Conclusion and Recommendation

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Selected characteristics of the farmers

Findings in respect of the 7 selected characteristics of the farmers are summarized below:

Age: The highest proportion (62 percent) of the farmers was in middle aged category, while 34 percent belonged to the young category. Only 4 percent of the farmers were in the old category.

Education: Majority (40 percent) of the farmers had secondary level of education, while 21 percent had primary education and only 9 percent had above secondary level of education. It was found that 10 percent of the farmers were illiterate and 20 percent of them could sign only.

Farm size: Majority (67 percent) of the farmers had small farm size, while 4 percent had large farm, 22 percent had medium farm and 7 percent had marginal farm.

Family income: The highest proportion (51 percent) of the farmers had low annual income compared to 25 percent and 24 percent having medium annual income and high annual income respectively.

Knowledge on potato cultivation: Majority (74 percent) of the farmers had moderate knowledge, 7 percent had poor knowledge and 19 percent had good knowledge on potato cultivation.

Extension communication of the farmers: Majority (66 percent) of the farmers had medium extension communication compared to 24 percent having low extension communication and 10 percent had high extension communication.

Social participation of the farmers: Half (50 percent) of the total respondents had no social participation at all while 44 percent had low social participation, 4 percent had medium social participation and only 2 percent had high social participation.

5.1.2 Constraints Faced by the BADC Contract Growers in Quality Potato Seed Production

Computed overall constraints faced by the BADC contract growers ranged from 23-85 against the possible range of 0-120. The average score was 44.89 with a standard deviation of 9.77. The highest (66 percent) of the respondents faced medium constraints in quality seed potato production. On the other hand 33 percent faced low constraints and only 1 percent faced high constraints.

The seven selected constraints were not equal in respect of constraints facing indices. The components in which the farmers had faced relatively high constraints in descending order were: constraints faced related to quality seeds potato, constraints faced related to preservation & marketing of potatoes, constraints faced related to diseases & insects, constraints faced related to capital, constraints faced related to manures & fertilizers and constraints faced related to irrigation.

5.1.3 Relationship between the selected characteristics of the BADC contract growers with their constraints faced in quality potato seed production

Seven null hypotheses were formulated to explore the relationship between the selected characteristics of the BADC contract growers and their constraints faced in quality seed potato production. For testing each of the hypotheses the co-efficient of correlation (r) test was used.

Correlation analysis indicated that age, farm size and annual income of the BADC contract growers had no significant relationship with their constraints faced in quality seed potato production. Hence, the null hypotheses concerning these three variables were accepted by the researcher. On the other hand education, knowledge on potato production, extension communication and

social participation of the BADC contract growers had significant negative relationship with their constraints faced in potato production. Hence, the null hypotheses concerning these three variables were accepted by the researcher.

5.2 Conclusions

Conclusions drawn on the basis of findings of this study and the interpretation of their meaning in the light of other relevant facts are presented below:

1. It was revealed that more than fifty percent farmers were illiterate, could sign only or had primary level of education. There existed a negatively significant relationship between farmers' education and their constraints faced. Therefore, it may be concluded that illiterate farmers will continue to face constraints in quality seed potato production activities, if suitable steps are not taken to remove illiteracy among the farmers. That is only the literate farmers could face constraints in potato cultivation.

2. It was found that an overwhelming majority (94 percent) of the farmers had social participation ranged from no social participation category to low social participation category. Farmers' social participation had negatively significant relationship with their constraints faced. One would, therefore, conclude that a very large proportion of the farmers will continue to face constraints in quality seed potato production activities, if suitable motivational steps are not taken to raise their social participation.

3. It was concluded that an overwhelming majority (90 percent) of the farmers had medium to low extension communication, while there was a negatively significant relationship between extension communication of the farmers and their constraints faced. Therefore, it may be concluded that a very large majority of the farmers will continue to face constraints, if suitable steps are not taken to strengthen extension communication activities among the farmers.

4. It was identified in the study area that majority (81 percent) of the farmers had poor to moderate knowledge on potato cultivation, while there was a negatively significant relationship between knowledge on potato cultivation of the farmers and their constraints faced. One would, therefore, conclude that an effort to improve knowledge on potato cultivation of the farmers would be helpful for minimizing their constraints faced in quality seed potato production.

5.3 Recommendations

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

5.3.1 Recommendations for Policy Issues

The following recommendations for policy implication are made in view of the need for solving the constraints faced by seed potato growers:

1. Quality potato seed production activities should be supported by adequate arrangement for supply of necessary commodities and services at fair price from convenient source. Concern authority of BADC should ensure these facilities to the seed potato growers so that their seed potato production activities are not hampered by different constraints.

2. It is necessary for effective seed potato production program to provide functional literacy to the farmers so that at least they can read and write and can perform useful works in connection with his farm, home and community. Mass literacy program should be launched in the study area by education department.

3. In view of the great importance of agriculture related social organizations in solving agricultural problems, it is recommended that the DAE and NGOs should make utmost effort to set up various agriculture related social organizations in the rural areas and to encourage the farmers to participate in them.

4. Extension communication is necessary for reducing constraints in crop production activities specially quality seed potato production activities of the farmers. It is, therefore, recommended that DAE should take appropriate and suitable steps so that the farmers can easily come in contact with different extension media.

5. Higher agricultural training exposure seems to increase their agricultural knowledge and minimize their constraints faced in agricultural activities. Therefore, it is highly recommended that the BADC & DAE should take steps so that farmers can get more opportunity to receive training and increase their efficiency in seed potato production activities.

5.3.2 Recommendation for Further Studies

Recommendations for further studies are provided below:

1. The present study was conducted on the population of the potato farmers of two villages of Paba and Puthia upazila of Rajshahi district. Findings of the study need to be verified by undertaking similar research in other potato growing zones of the country.

2. This study investigated the relationships of seven selected characteristics of the farmers with their constraints faced in quality seed potato production. But potato growers' constraints faced might be affected by other personal, social, psychological, cultural and situational factors of the farmers also. It is, therefore, recommended that further study should be conducted involving other characteristics in this regard.

3. Relationships of seven characteristics of the farmers with their constraints faced in quality potato seed production activities were investigated in this study. Further research should be undertaken for exploring relationships of other characteristics of the farmers with their constraints faced in quality potato seed production activities.

4. Farmers' characteristics namely, age, farm size and annual income were not significantly related with their constraints in quality potato seed production activities. Further research should be conducted to verify those findings.

5. In addition to constraints faced in quality potato seed production activities, the farmers also faced other problems such as social, economic, housing, sanitation, health and domestic. All these problems affect the performance of the farmers. There is need for undertaking research on the various problems of the farmers which affect their performance.

Chapter 6

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DEPARTMENT OF AGRICULTURAL EXTENSION AND INFORMATION SYSTEM
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An Interview schedule for a research study entitled

CONSTRAINTS FACED BY THE BADC CONTRACT GROWERS IN QUALITY SEED POTATO PRODUCTION

No. of Respondent : .....
Name : .....
Village/Mahallah : .....
Union : .....
Thana/Upazila : .....
District : .....

(Please mention answer to the following questions. Provided information will be kept confidentially)

1. Age

How old are you?

.....year.

2. Level of Education

Mention your level of education.

a) No education

b) Can sign only

b) Studied up to..... class.

3. Farm Size

Furnish your area of lands according to use.

Sl. No.	Type of Land Use	Area	
		Local unit (bigha)	*Hectare*
1.	Homestead		
2.	Own land under own cultivation		
3.	Own pond and garden		
4.	Own land given borga to others		
5.	Land taken borga from others		
6.	Land taken on lease from others		
Total area			

4. Annual Income

(a) How much money did you earn from the following agricultural sources in the previous year?

Sl. No.	Name of the product	Total Production (local unit)	Price/Unit (Tk.)	Total Price (Tk.)
1.	Paddy			
2.	Wheat			
3.	Potato			
4.	***Summer vegetable***			
	• Lady's finger			
	• Biter gourd			
	• Data			
	• Ripped gourd			
	• Pointed gourd			
	Winter vegetable			
	• Cauliflower			
	• Cabbage			
	• Tomato			
	• Bottle gourd			
	• Brinjal			
	Other (specify)			
5.	• Mango			
	• Jack fruit			
	• Banana			
	• Litchi			
	• Pineapple			
	• Others			
6.	Duck (egg & ducks)			
7.	Poultry (egg & chickens)			
8.	Goat (milk & meat)			
9.	Cattle (milk, cowdung, meat)			
10.	Fisheris			
11.	Others (specify)			
	Total amount			

(b) How much money did you receive from the sources other than agriculture in the previous year?

i. Job ---------- Taka

ii. Business ---------- Taka

iii. Income of other family members ---------- Taka

iv. Others ---------- Taka

Total amoûnt = Taka

Total Income 6 (a) + 6 (b) = ... Taka

5. *Knowledge on potato cultivation practices*

Please answer to the following questions:

S1. No	Questions	Full Score	Score Obtained
1.	What do you know about potato cultivation practices?	2	
2.	What is the function of Urea in potato cultivation'?	2	
3.	What is the function of T.S.P in potato cultivation'?	2	
4.	What is the function of M.P. in potato cultivation?	2	
5.	What is the purpose of using cowdung in potato cultivation?	2	
6.	What is the function of good potato seeds?	2	
7.	What do you mean by potato seed treatment'?	2	
8.	What is the seed rate of potato (per bigha)?	2	
9.	What distance should be maintained from seed to seed in potato cultivation?	2	
10.	Name of two improved varieties of potato.	2	
11.	What is the optimum sowing time of potato seeds'?	2	
12.	Name two diseases of potato.	2	
13.	What are the symptoms of late blight of potato?	2	
14.	Name two insects of potato.	2	
15.	What are the ways of preserving potato seeds?	2	
16.	Name two fungicides to control late blight.	2	
17.	When irrigation is needed in potato cultivation?	2	
18.	What kind of soil is suitable for potato cultivation?	2	
19.	When earthing-up is needed in potato cultivation'?	2	
20.	Why the water hyacinth is used in potato	2	
	Total	40	

6. *Extension Communication*

Mention your nature of communication with the following media:

S1. No.	Media	Nature of Communication			
		Regularly (score-3)	*Occasionally (score-2)*	*Rarely (score-1)*	*Never (score-0)*
1.	DD, BADC	> 4 times/year	3-4 times/year	1-2 times/year	0 time/year
2.	AD/DAD, BADC	> 8 times/year	6-8 times/year	1-5 times/year	0 time/year
3.	AEO, DAE	> 4 times/year	3-4 times/year	1-2 times/year	0 time/year

4.	SAAO, DAE	> 8 times/year	6-8 times/year	1-5 times/year	0 time/year
5.	Fertilizer/Seed/Pesticide Dealer/ NGO Worker	> 8 times/year	6-8 times/year	1-5 times/year	0 time/year
6.	Agriculture related program in Radio	> 8 times/ month	5-8 times/ month	1-4 times/ month	0 time/ month
7.	Agriculture related in Television	> 3 times/ month	2-3 times/ month	1-2 times/ month	0 time/ month
8.	Result Demonstration	>4 times/life	3-4 times/life	1-2 times/life	0 time/ month
9.	Ideal Farmers	>4 times/life	3-4 times/life	1-2 times/life	0 time/ month
10.	Friends	> 4-7 times/ month	1-3 times/ month	1-3 times/ month	0 time/ month
11.	Neighbors	> 12 times/ month	7-12 times/ month	1-6 times/ month	0 time/ month
12.	Relatives	>12 times/ month	7-12 times/ month	1-6 times/ month	0 time/ month
Total					

7. Social Participation

Please indicate the nature of participation with the following organizations:

Sl. No.	Name of Organization	Nature of Participation				Duration of Participation
		Not Involved	*Ordinary Member*	*Executive Member*	*Executive Officer*	
1.	Union Parisad					
2.	Krishak Samabay Samittee					
3.	Youth Club					
4.	Mosque committee					
5.	School/College Committee					
6.	Market committee					
7.	Others (specify)					
	Total					

8. Constraints Faced

(a) Indicate the degree of constraints faced by you in respect of quality potato seed.

Sl. No.	Constraints	Extent of Constraints		
		Much	*Little*	*Not at all*
1.	Lack of knowledge about quality potato seed			
2.	Non availability of quality potato seed			

3.	High price of quality potato seed			
4.	No potato seed market nearby			
5.	Low germination percentage of improved potato seed			
6.	Misuse of power of authority in the distribution of quality potato seed			
7.	Poor quality of the potato seed obtained from BADC			
8.	Non availability of printed instructions about quality potato seed			
9.	Quality potato seeds take longer time to harvest			
10.	Unavailability of cold storage to preserve quality potato seed for a long time			

8. (b) Indicate the degree of constraints faced by you in respect of fertilizer use in potato cultivation.

S1. No.	**Constraints**	**Extent of Constraints**		
		High	***Little***	***Not at all***
1.	Non availability of fertilizer			
2.	High cost of fertilizer			
3.	No training on fertilizer use			
4.	Doubt about the recommended dose of fertilizer			
5.	Adulteration of fertilizer			
6.	No conduction of result demonstration showing effectiveness of use of fertilizer			
7.	Insect infestation due to fertilizer use			
8.	Deteriorating land due to fertilizer use			
9.	Difficulties in effectiveness of fertilizer due to lack of irrigation			
10.	Lack of knowledge about optimum time and appropriate amount of fertilizer use			

8. (c) Indicate the extent of constraints faced by you in respect of applying irrigation in potato cultivation.

Sl. No,	Constraints	Extent of Constraints		
		Much	*Little*	*Not at all*
1.	Lack of surface water			
2.	Non availability of irrigation appliances			
3.	No deep tube well			
4.	No shallow tube well			
5.	Lack of irrigation channel			
6.	Increase of fuel cost			
7.	Facing frequent repairing cost			
8.	Non availability of tube well mechanics			
9.	Lack of workshop for making spare parts			
10.	Lack of knowledge on recommended time of irrigation during potato cultivation			

8. (d) Indicate the extent of constraints faced by you in respect of pest and disease attack in potato cultivation.

Sl. No.	Constraints	Extent of Constraints		
		High	*Little*	*Not at all*
1.	Non availability of pesticide in time			
2.	Inability to purchase pesticide due to high price			
3.	Adulteration of pesticide			
4.	Lack of knowledge to select the appropriate pesticide			
5.	Selling expired pesticides by corrupted dealers			
6.	Lack of sprayer for applying pesticides			
7.	Lack of facilities to repair the equipments			
8.	Inability to apply pesticides as per recommended way			
9.	Lack of necessary training regarding control of pest and disease			
10.	Lack of extension workers' activities in pest and disease control			

8. (e) Indicate the extent of constraints faced by you in respect of preservation and marketing of cultivated potatoes.

Sl. No.	Constraints	Extent of Constraints		
		High	*Little*	*Not at all*
1.	Inadequate potato purchaser			
2.	Transport problem in potato marketing			
3.	Market price of potato falls due to huge production and low preservation facility			
4.	Potato growers often do not getting their expected selling price			
5.	Lack of cold storage to preserve potato			
6.	Lack of training to preserve potato by local process			
7.	Non availability of printed materials about potato preservation			
8.	Decrease of potato weight when preserve potato for a long time			
9.	Attack of fungal disease when potato is preserved by local process			
10.	Lack of necessary advises from extension worker to preserve potato			

8. (f) Indicate the extent of constraints faced by you in respect of credit facilities in potato cultivation.

Sl. No.	Problems	Extent of Problem		
		High	*Little*	*Not at all*
1.	Not availability of credit in time			
2.	Interest of loan is too high			
3.	Using middle man to get loan			
4.	Giving bribes to corrupt officials			
5.	Inadequacy of credit against the demand			
6.	Complex formalities			
7.	Lack of cooperation of credit providing			
8.	Disinterest in getting loan when land mortgage is a pre-requisite			
9.	Difficulty in getting loan due to joint ownership of lands			
10.	Difficulty in getting loan when group formation is a pre-requisite			

Signature of Interviewer
Date:

APPENDIX - B

Correlation matrix of among the variables of the study (N = 100)

VARIABLES	*X1*	*X2*	*X3*	*X4*	*X5*	*X6*	*X7*	*Y*
X1	1							
X2	-.210*	1						
X3	-.032 NS	.295**	1					
X4	-.113 NS	.332**	.798**	1				
X5	.117 NS	.194 NS	.198*	.186 NS	1			
X6	.111 NS	.107 NS	.160 NS	.160 NS	.279**	1		
X7	.084 NS	.310**	.131 NS	.183 NS	.374**	.092 NS	1	
Y	-.081 NS	-.237*	-.016 NS	-.123 NS	-.433**	-.263**	-.255*	1

NS = Correlation is not significant
** = Correlation is significant at 0.05 level*
*** = Correlation is significant at 0.01 level*

X1 = Age
X2 = Level of Education
X3 = Farm Size
X4 = Annual Income
X5 = Knowledge on potato cultivation
X6 = Extension communication
X7 = Organizational Participation
Y = Constraints faced in quality seed potato production