CONSTRAINTS FACED BY THE FARMERS IN CASSAVA CULTIVATION

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This to certify that the thesis entitled, **"CONSTRAINTS FACED BY THE FARMERS IN CASSAVA CULTIVATION"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in AGRICULTURAL EXTENSION** embodies the result of a piece of *bonafide* research work carried out by **MD. MOKHDUM AZAM MASHRAFI,** Registration No. 04-01355 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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ABSTRACT

The main objectives of this study were to determine and describe the constraints faced by the farmers in cassava cultivation and explore the relationships between the selected characteristics of farmers and constraints faced by them in cassava cultivation. Ten villages of Modhupur Upazilla under Tangail district was selected as the study area. Appropriate scales were developed in order to measure the concerned variables. A statistical software package named SPSS was used to analyze the data and Karl Pearson's Correlation Co-efficient were used to test the relationships between the independent and dependent variables. Majority (86.2%) of the farmers faced medium constraints compared to 12% facing low constraints and only 1.8% facing high constraints in cassava cultivation. Farm size, cassava cultivation area, annual family income, annual income from cassava cultivation, cassava cultivation knowledge and extension contact of the respondents had significant negative relationships with their constraints faced in cassava cultivation. Other variables namely age, education and family size of the respondents had no significant relationship with their constraints faced in cassava cultivation. Based on descending order of Constraint Faced Index (CFI) lack of cassava storage facility ranked first followed by higher interest rate of credit and lack of sufficient labor facility. Lack of sufficient irrigation facilities ranked last.

CHAPTER I

INTRODUCTION

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INTRODUCTION

1.1 General background

Most of the people of our country directly or indirectly are involved with various types of agricultural activities. Various types of crops are producing in our country to meet up our demand. In our country, the major crops are rice, wheat, jute, potato etc. These crops are very important for our food security. Cassava is not a major crop. But it may play an important role for daily requirement of food. It depends on its demand and use. If we produce and use commercially and on a large scale, it may be a demandable crop in our country. Cassava (*Manihot esculenta*), also called yuca or manioc, is a woody shrub of the Euphorbiaceae (spurge family) native to South America. Cassava is extensively cultivated as an annual crop in tropical and subtropical regions for its edible starchy tuberous root, a major source of carbohydrates. Nigeria is the world's largest producer of cassava.

Bangladesh is a developing country crowded with the population of about 140 million in the area of 1, 47, 570 square km. Agriculture plays the vital role in capital formation. About 86 % of her total population lives in the rural areas and directly and indirectly depend on agriculture for their livelihood (BBS, 2009). About 64 % of her population are engaged in agriculture and related activities (BBS, 2009). It is the dominant sector of Bangladesh economy. Agriculture related sector contributes to as much as 26% of Gross Domestic Product (GDP) of the country (BBS, 2009). Again it also supplies raw materials for industrial production and food stuff for human and animal consumption.

Cassava (*Manihot esculenta* Crantz.) is one of the important food crops of the tropics for the weaker section of the farming community. It provides enormous food security to weaker section. It has the potentiality of producing high amount

of food and high calorific yield per unit area. It is also known for adaptability to wide variations of soils, climate and environments. In spite of many favorable traits, it is surprising to note that there is a considerable decline in the area of cassava in India over the last three decades, the area was 0.39 million ha during 1975 and has declined to 0.24 million ha in 1991 (Anantharaman and Ramanathan, 1999) registering a negative growth rate of 5%. The present area of cassava in India is 0.24 million ha. The plight in Kerala is still worse with greater magnitude in the area reduction from 0.32 million ha in 1971 to 0.13 million ha 2004 (FAO, 2005). The world cassava production is shown in Table 1.1.

Table 1.1 World cassava production

Country	**Production (000 ton)**			
	2006	**2007**	**2008**	**2009**
Nigeria	45721	34410	42770	45000
Congo, Dem. Rep. of	14989	15004	15020	15036
Ghana	9638	9650	9700	10000
Angola	8810	8800	8900	9000
Mozambique	6765	5039	8400	9200
Tanzania, United	6158	6600	6700	6500
Uganda	4926	4456	4942	4500
Malawi	2832	3239	3700	4000
Madagascar	2359	2400	2405	2000
Other Africa	15251	15354	15923	16233
Africa	**117449**	**104952**	**118461**	**121469**
Brazil	26639	26541	26600	26000
Paraguay	4800	5100	5300	5400
Colombia	1363	1288	1444	1500
Other (Latin	3509	3500	3680	3706
Latin America	**36311**	**36429**	**37024**	**36606**
Thailand	22584	26411	25156	30088
Indonesia	19987	19988	20269	20500
Viet Nam	7783	7985	8300	8600
India	7620	8429	8959	9200
China, mainland	7500	7875	8300	8700
Cambodia	2182	2215	3604	3275
Philippines	1757	1871	1941	2200
Other Asia	1053	1108	1102	1151
Asia	**70465**	**75882**	**77631**	**83715**
Oceania	**258**	**272**	**275**	**280**
WORLD	**224 483**	**217 536**	**233 391**	**242 069**

Source: FAO, 2010

In Bangladesh, cassava has historically been considered a vegetable under the name shimul alu (kapok potato). Cassava's nutritional, commercial and other values, however are either unknown or underestimated. Its total production is so low that it has yet to find a place in the annual official production figures of crops. Unofficial estimates put the production at about 5,000 ton/yr.

Cassava is grown in upland areas mainly by Garo tribal people and their nontribal neighbors, in the former districts of Mymensingh, Tangail, and Sylhet. It is used as a vegetable, often to go with daal (a pulse), but it is never used as a replacement for rice. In Rajshahi and Kushtia, cassava is used to a large extent in sericulture. It is also used as a fence around gardens where the roots are harvested once a year and young leaves are consumed as protein rich vegetable. Cassava is sometimes considered to be a type of 'hunger bank' for poor people as it is a source of carbohydrates during periods of food shortages.

The cassava plant is grown for its roots which are used as food. Cassava has the ability to grow on poor soils where other crops do not grow well. Cassava is also a suitable crop to grow when there is drought. Because cassava roots can be stored in the ground for up to 24 months, and some varieties for up to 36 months, harvest may be delayed until market, processing, or other conditions are favorable. The cassava plant is used mainly for food for human consumption. It can also be used as animal food. In many homes cassava provides a source of food and supplies energy. It can be made into flour for porridge of Ugali or roasted or boiled. Cassava leaves are also consumed as a green vegetable, which provides protein and vitamins A and B (FAO, 2009).

In spite of dominance of agriculture in the national economy, Bangladesh is facing chronic food shortage due to rapid of 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 in the country. In this regard,

cassava can play an important role as an alternative and multipurpose food crop of Bangladesh. The actual and potential role of agricultural sector in the economy of Bangladesh is indeed, enormous, considered from multidimensionality of it activities. The causes may be due to the fact that agriculture as a whole remains to be traditional with its century old cultural practices. That is why yield of the crops are one of the world's lowest. The present rice production is not sufficient to meet the increasing requirement of calories for the growing population in the country. In this regard cassava can play an important role as an alternative and multipurpose food crop of Bangladesh. It is also an important cash crop of the country.

Cassava was introduced to most parts of Asia in the late 18^{th} and early 19^{th} centuries. Some of the locations for the early arrival of cassava were in India, Java and the Philippines. Most of these introductions were done by European explorers, who in turn had obtained cassava from South America. By the time cassava was introduced to various parts of Asia, it had already been a major commodity of trade between South America and Europe for over a century.

Cassava can grow and produce high yields in areas where maize and other crops will not grow or produce well. It can tolerate drought and can be grown on soils with a low nutrient capacity, but responds well to irrigation or higher rainfall regions and to the use of fertilizers. Cassava is highly flexible in its management requirements, and has the potential of high-energy production per unit area of land.

The crop has long been used as a famine reserve and food security crop. Because cassava has no definite maturation point, harvesting may be delayed until market, processing or other conditions are more favourable; this flexibility means cassava may be field stored for several months or more. Cassava is, therefore, highly acceptable in the rural areas.

Cassava is the third-largest source of carbohydrates for meals in the world (Phillips, 1984 and Claude and Denis, 1990). Cassava is classified as sweet or bitter depending on the level of toxic cyanogenic glucosides; improper preparation of bitter cassava causes a disease called konzo. Nevertheless, farmers often prefer the bitter varieties because they deter pests, animals, and thieves (Linley *et al.*, 2002)

In Bangladesh marketing of perishable crop like potato, cassava is affected by its nature, climates conditions, availability of transportation facilities, nature and size of market demand and the efficiency of information system (FAO, 2005). The preservation and storage facilities in cassava marketing in Bangladesh are inadequate and unsatisfactory both in the rural and urban areas. It is desirable to have storage in a good condition but with the present storage facilities only 15 % of total cassava produced in the country can preserved (Hossain, 2004).

The importance of cassava in the economy of Bangladesh can hardly be over emphasized. Besides cassava is the main source of important nutrients, but the production of cassava has not been able to keep pace with the increased demand with the population growth. Hence it is necessary to conduct a research study on the constraints faced by the farmers in cassava cultivation in Bangladesh.

Therefore, the purpose of the study was to have an understanding of the constraints faced by the cassava growers of selected area. It was anticipated that such a study would discover the causes of the constraints related to cultivation, marketing, processing and storing of cassava as well as help in cultivating an effective measure for cassava cultivation all over the country.

1.2 Statement of the Problem

With a view to have an understanding of the farmer's constraints in cassava cultivation, the researcher undertook the investigation the "Constraints faced by the farmers in cassava cultivation". In spite of greater potentially of cassava cultivation the farmers of Bangladesh are not free from constraints in the field of cultivating cassava. The farmers cassava cultivation technique are almost traditional. They faced several problems in production and marketing. Agricultural marketing is the crux of the problem of agricultural improvement in Bangladesh. Each country and each product have unique marketing problems. In Bangladesh marketing of perishable crop like cassava is affected by its nature, climatic conditions, availability of transportation facilities, nature and size of market demand and the efficiency of information system. The preservation and storage facilities in cassava marketing in Bangladesh are inadequate and unsatisfactory both in the rural and urban areas. A sizeable share of the produce is spoiled because of the lack of adequate storage facilities. If cassava is not stored properly it causes enormous damage due to sprouting, water loss and rottening. The damage constraints are more critical at the farm level. Most of the farmers in Bangladesh fail to overcome their constraints. The farmers are compelled to sell major part of their produce immediately after harvesting at a very low price, mainly because of not even temporary storage accommodation being available to them.

Therefore, constraints in cultivation of cassava influenced by their personal, economic, social characteristics. The researcher have an essential understanding of the cassava cultivation constraints faced by the growers and its relationship with their various characteristics for effective planning and execution of increasing cassava cultivation in Bangladesh. So the study has been taken to get the answers of the following questions:

a) What are the constraints faced by the farmers in cassava cultivation?
b) What relationships exist between the constraints faced by the cassava farmers and their selected characteristics?

1.3 Specific Objectives of the Study

The specific objectives of this study were as follows:

1. To determine the extent of constraints faced by the farmers in cassava cultivation
2. To describe some selected characteristics of the farmers
3. To explore the relationships between the constraints faced by the farmers in cassava cultivation and their selected characteristics

1.4 Scope and Limitations of the Study

The study was undertaken with a view to have an understanding of the constraints faced by the farmers in cultivation of cassava. In order to conduct the research in a meaningful and manageable way it becomes necessary to impose some limitation in regard to certain dimensions of the study. Considering the limitation of time, money and other resources available to the researcher, the following limitations have been observed throughout the study.

1. The study was confined to Madhupur upazila under Tangail district.
2. Population for the study was kept confined within the heads of the farm families because they were the decision makers in their respective families and also to those who were directly associated with the cassava cultivation.
3. There were various dimensions in cassava cultivation and many sorts of constraints connected with this issue. It was not possible for the researcher to include all aspects of cassava cultivation constraints in a single study. In this study the researcher considered only 17 selected constraints by the farmers in cassava cultivation.
4. Collection of all relevant data was limited to cassava growing farmers in the study area.
5. Relationships of the constraints in cassava cultivation could be studied with the various characteristics of the farmers but only 9 characteristics of the farmers were considered for this study.

1.5 Assumptions of the Study

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

1. The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.

2. The responses furnished by the respondents were reliable. They express the truth while passing their opinions and providing information.

3. The views and opinions furnished by the cassava farmers included in the sample were the representative views and opinions of all the cassava farmers of the study.

4. The researcher who acted as interviewer was well adjusted to the social and cultural environment of the study area. Hence, the respondents furnished their correct opinions without hesitation.

1.6 Hypothesis of the Study

Defined by Goode and Hatt (1952), a hypothesis is, " a proportion which can be put to a test to determine its validity. It may be seen contrary to, or in accord with a common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test". In studying relationships between variables research hypothesis are formulated which anticipated relationships between the variables. However, for statistical test, it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables. If a null hypothesis is rejected on the basis of statistical test, it is assumed that there is a relationship between the concerned variables.

The following null hypotheses were formulated to examine the relationships of the selected characteristics of the farmers with their constraints faced in cassava cultivation.

1. There was no relationship between age of the farmers and their facing of constraints in cassava cultivation.
2. There was no relationship between the education of the farmers and their facing of constraints in cassava cultivation.
3. There was no relationship between the family size of the farmers and their facing of constraints in cassava cultivation.
4. There was no relationship between the farm size of the farmers and their facing of constraints in cassava cultivation.
5. There was no relationship between cassava cultivation area of the farmers and their facing of constraints in cassava cultivation.
6. There was no relationship between annual family income of the farmers and their facing of constraints in cassava cultivation.
7. There was no relationship between annual income from cassava cultivation of the farmers and their facing of constraints in cassava cultivation.

8. There was no relationship between cassava cultivation knowledge of the farmers and their facing of constraints in cassava cultivation.

9. There was no relationship between extension contact of the farmers and their facing of constraints in cassava cultivation.

1.7 Definition of Terms

Age: Age of a respondent was defined as the period of time from his birth to the time of interview. It was measured in term of actual in years.

Education: Education of an individual farmer was defined as the formal education received up to a certain level from an educational institute at the time of interview. Education was measured in terms of actual years of successful schooling.

Family size: Family size of the farmers was defined as the total persons of the family including their child exist to the time of interview. It was measured in number.

Farm size: Farm site of the respondents refers to the area owned by a farmer on which he carries his farming and family business, the area being estimated in terms of full benefit to the farmers. A farms was considered to have full benefit from the cultivated area either owned by him or obtained on lease from others and half benefit from the area which was either cultivated him on borga or given others for cultivation on borga basis.

Annual family income: Annual family income was defined as total earning of a farmer and the members of his family from farming and other sources (business, services etc) during a year. In fact, it was gross family income and was expressed in thousand taka.

Cassava cultivation knowledge: Usually cassava cultivation knowledge of an individual is judged by ascertaining his extent of understanding and skills on different aspects of agriculture. However, in this study cassava cultivation knowledge deals with only on cassava cultivation.

Extension contact: The term extension contact was used to refer one's exposure to various extension communication media or extension teaching sources.

Cassava cultivation: Cassava cultivation included the different stages of cassava cultivation such as harvesting, processing, conservation and marketing of cassava.

Constraints in cassava cultivation: Constraints of cassava cultivation refers to different hindrances as perceived by the farmers in cultivating cassava.

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review the researches conducted in line of the study. Little work had been done in Bangladesh in this matter. However, the investigator of this study had come across related studies conducted in other countries. Literature having relevance to the present study has been reviewed in two sections. The first section deals with the literature on the constraints faced by the farmers in cultivating cassava and the second deals with the conceptual framework of the study.

2.1 Constraints Faced by Farmers in Cassava Cultivation

Shukla (1976) estimated losses in yield of cassava roots in Tanzania and found variation from 50% to 80% depending on the susceptibility of cassava varieties.

Sharma (1979) found that animal and tractor-drawn single disc ploughs and moulboard ploughs used to harvest cassava. Further work on the machine led to the development of a single-row harvester with two gangs of reciprocating Power Take Off (P.T.O.) driven diggers, which digs on two opposite sides of the ridge from the furrow bottom in order to uproot the cassava root cluster.

Nyango (1980) found in a study that for cassava bacterial blight (CBB) disease was sporadic in nature. In Tanzania, the disease was very much widely distributed in the 1970 s.

Msabaha (1988) found that lack of adequate planting materials is a constraint to expanding cassava land area. There was no institution in Tanzania responsible for multiplication and distribution of the improved varieties of cassava. He also stated that cassava was known to be an easy crop to cultivate. Most farmers thus tend not to manage the crop properly.

Msabaha (1990) also found in study that cassava green mites (Mononychellus sp.) were first reported in the country in 1972 at Ukerewe islands at present cassava green mites have spread throughout the country. It was noted that mite population density is highest during the driest periods; and high humidity conditions tends to suppress major outbreaks and damage.

Raya *el al.* (1993) undertook a survey between 1992 and 1993 to establish the distribution of Cassava Mosaic Virus Disease (CMD) in the country showed that, CMD is widely distributed all over the country with much incidence along the coastal belt of Indian Ocean and the Lake zone. The two areas mentioned above have higher CMD may be due to long establishment of the crop. Another reason of the persistence of the disease is due to the continuous use of affected planting materials by farmers It was noted that CMD was mostly transmitted through cutting infection (81%) and only 19% by whitefly vector.

According to Roots Tubers Annual Report (1994) most of the time, cassava is planted into exhausted soils. Recent studies have established that infertile soil produce cassava storage roots yields less by 40% and the same trend was observed in cassava shoot yield.

COSCA (1996) conducted Surveys throughout the major growing areas in Tanzania showed that CMD was next to cassava green mite in spread its symptoms in about 70% of the villages. Further, it was revealed that shortage of planting materials was generally a constraint in dry areas where biomass production was usually low in comparison with moist areas; and when new materials such as improved varieties are being introduced for the first time.

In COSCA studies it was noted that the cassava production cash income was higher in villages which had easy access to markets or to production credit (COSCA, 1996).

Lema and Hemskeerk (1996) found in a study that there is limited knowledge of the extension personnel shortage of extension personnel, topped with severe logistical problems in most regions where cassava is grown. Inadequate transport makes it impossible for the extensionist to cover a number of villages. Poor farmer research extension linkages and lack of integrated research approach have sometimes led researchers to come up with messages which are not farmer problem oriented.

Tran Van Son (1996) found following two of the major constraints to cassava technology transfer in Vietnam:

1) Lack of financial resources and facilities from the government to support the cassava technology transfer work. Although the Ministry gives some financial support and tries to create favorable conditions for the extensionists to transfer new technologies, this support was still inadequate.
2) Farmers were very poor, especially those living in the midlands and mountainous regions, where root and tuber crops are important food crops. Few farm inputs are available for the application of new technologies for intensive farming of root and tuber crops. The farmers were willing to participate in extension programs, but the achievements of these programs depended greatly upon the suitability of the new technology to the conditions of poor farmers.

According to Tshiunza (1996) the amount of labour used in field production of cassava differs between African countries with the highest in Nigeria and lowest in Côte d'Ivoire. Farmers allocate more labour to all farm operations, except land clearing, in high- than in low- population density areas.

Wilson (1998) stated that non-availability of input on time was considered as one of the major constraint. Farmers need planting materials; fertilizers etc. for

cassava cultivation, which farmers feel are not available in time. Poor avenues for alternate use of cassava were mentioned as the other important constraint.

Legg (1999) stated that during the 1990s, an epidemic of an unusually severe form of cassava mosaic virus disease (CMD) has expanded to cover virtually all of Uganda, and substantial areas in the neighboring countries of Kenya, Tanzania, Sudan and the Democratic Republic of Congo. Losses in the generally sensitive local cassava cultivars have been so great that a common farmer response to the problem has been the temporary abandonment of cassava cultivation.

Hoang Kim *et. al.* (2000) stated the existing situation of cassava production, processing and marketing in Vietnam and the problems confronting the development of cassava production in Vietnam. Four main constraints in cassava production in Vietnam were:

1) Unstable prices and lack of markets;
2) Low cassava yield in remote areas due to a limited adoption of new varieties and appropriate technologies;
3) Low soil fertility in most cassava growing areas; and
4) Limited diversification of products in processing.

Gbaguidi-Darboux (2001) stated that the losses, after harvest of cassava are estimated to more than 50%. Cassava root deteriorates very quickly after harvest, and only the transformations including a final drying (chips, "gari", "lafou") permit to conserve this raw material.

Nweke (2002) found in a study that promoting cassava worldwide as food for both man and animal would not be difficult, but the modern harvesting and processing has some engineering constraints causing technical, resource, socioeconomic and organizational challenges, processing and export.

According to Sarker (2002) high fluctuation of price and uncertain market was also identified as a constraint which was listed on 9th position. Fluctuation in price varied widely for cassava tubers before and after harvesting season. Lack of producer organizations, lack of traditional markets, lack of knowledge about the application of plant protection chemicals and non-availability of plant protection equipments were some of the other constraints mentioned with lesser importance. The present cassava processing methods are not good enough, and are highly labor-intensive and expensive. Manual processing requires a minimum of four person-days to peel and wash, and 23 person-days to chip one tonne of fresh cassava roots, translating to approximately US$65 to prepare a ton of flour. In contrast, the cost of processing cassava into flour could be approximately US$16/t with machine.

Gondwe *et al.*, (2003) conducted a study to determine the economic impact of cassava brown streak virus disease (CBSD) on the farmers in Malawi. Three surveys were carried out: a CBSD incidence survey in May 2001, CBSD severity survey in September 2001 and a follow-up survey in February 2002. Data were collected on cultivar of cassava, age of the plant, CBSD leaf chlorosis, CBSD root necrosis, proportion of necrotic roots on total yield, yields of diseased plants versus apparently healthy plants in the same field, and the effects of CBSD on uses of leaves, stems and roots. CBSD was widespread in the low altitude areas along the shore of Lake Malawi and 40% of the crop in these areas was affected. It was more prevalent in the northern areas along the shore of Lake Malawi from Nkhata Bay to Karonga than in the south of Nkhata Bay. CBSD, however, was not well known to either farmers or extension workers. They ascribed symptoms of the disease to heavy rainfall and water logging. The disease spread in farmers' fields through harvesting practices. Farmers selected plants with filled roots for harvest and thus removed the healthier plants first. The more affected plants may remain in the field until the rainy season and they become the seed stock. The disease caused 18-25% yield loss.

According to Agbetoye (2003) making cassava production competitive both at the domestic level and for export to world market requires wide research and investments into processing machine designs and development, among others. Improved processing, storage and packaging technologies to extend shelf life will go a long way toward helping the world to maintain food security; this would contribute to increasing cassava root availability and reliability, which can provide self sufficiency and also allow export to areas of the world where food is not available.

Agbetoye (2003) also stated that the most difficult operation in cassava production is cassava harvesting. Cassava is harvested by hand by raising the lower part of stem and pulling the roots out of the ground, then removing them from the base of the plant. The problems militating against the development of a mechanical harvester for cassava are:

1) The indeterminate shape and geometry of the tubers in the soil at the time of harvesting makes the design of digging blades difficult.
2) The depth of growth of the tubers in the soil. At the time of harvesting, there is need to dig the soil to depths of between 0.25 and 0.30 m and handling about 500 kg of soil to harvest one plant of cassava. The tubers perish easily, especially when bruised or cut by harvesting blades. Desiccation of the soil during the dry season is detrimental to efficient harvesting of tubers. Yet tubers are harvested at any time of the year. The nature of the soil, especially in the forest areas, includes the presence of tree roots, stumps and rock outcrops. Small farm holdings and fragmentation of farmlands may not be able to afford the high power requirement of a harvester. Presently, there is no commercially available cassava harvester in Nigeria.

Matthews *et al.* (2004) examines that the relationship between farmers' knowledge about improved cassava production technologies and adoption in Imo State. Data were collected from 450 randomly selected respondents with the aid of a

questionnaire. Findings of the study revealed a significant relationship between knowledge about improved cassava production technologies and adoption.

Poubom *et al.* (2005) conducted a survey of farmers' views on cassava pests in 61 locations in four cassava-producing agro-ecological zones in Cameroon. Farmers in all zones considered vertebrates, grasshoppers and cassava root rot as their most important pest and disease constraints. Weeds, although cited in all zones, received relatively low ratings. In most cases, root rot occurred after cassava reached maturity, and farmers recognized the importance of timely harvesting to control crop losses. Cassava diseases such as cassava mosaic disease (CMD), cassava anthracnose disease (CAD), and cassava bacterial blight (CBB), although recognized, were not considered as serious constraints.

According to Zomahoun (2005) it was evident from the results that the drying was the second constraint in cassava ships production after the harvest. This constraint of drying was due, according to producers, to the lack of adequate conditions of drying. About 87% and 68% of persons interviewed sustained respectively that the non efficient drying was one of the important reasons of loss of traditional ships during storage. Besides, the storekeepers and the consumers prefer to by cassava ships with white colour, very dry, without powder, unsweetened and with big size. These technical and socioeconomic results were exploited for design a semi industrial drier.

Ezedinma *et al.* (2006) showed in an experiment that cassava production and utilization must be given prime attention in food policy. Even though farmers have not yet attained the desired technical efficiency in cassava production as a result of weak access to external inputs such as fertilizers and herbicides.

The Thai Tapioca Trade Association (2007) identified marketing as a constraints for cassava production. Farmers thought that cassava production is high and price of produced cassava was low; the major constraints were: difficulties in transportation, lack of support from the government, lack of research and extension services.

Essono *et al.* (2008) conducted a questionnaire-based survey carried out during a 3 month period, from January to April 1998, in 45 villages belonging to three locations (Yaoundé, Mbalmayo, and Ebolowa) of southern Cameroon. The survey was aimed at collecting constraints and processing practices related information from farmers growing cassava and transforming it into chips. Five principal components accounting for 72.75% of the total variations were associated with the data set collected in Yaoundé and Mbalmayo. An equal number expressing 78.2% of the overall variance was likewise obtained at Ebolowa. For a number of reasons such as traditional patterns of nutrition, market purposes, the relative proximity with the nearest city, these components suggested that storage methods and production constraints were differently perceived by the respondents.

Murugan (2010) conducted a study among the Cassava growers in Salem district to assess and identify the constraints influence the low yield and reasons for area shrinkage. It was found that, among the several constraints marketing constraints like exploitation by middle man (88.33 per cent), malpractices in Point scale fixation (86.66 per cent), lack of regulated market (83.33 per cent) low price for tubers due to fluctuations in price (80.00 per cent) followed by production constraints like mosaic and tuber rot diseases (83.33 per cent), labour scarcity (80.00 per cent) un availability of quality planting materials (73.33 per cent) and lack of short duration varieties (68.33 per cent) were the major constraints expressed by many of the cassava growers.

Peter *et al.* (2010) revealed that cassava was a very important food crop that was capable of providing food security. However, a lot of problems prevent the development and use of modern equipment for its production. Most of the cassava produced still comes from peasant farmers who depend on manual tools for their field operations and these farmers have made Nigeria the world's largest producer of the crop. Reasons for the low success recorded in the mechanization of cassava harvesting and processing were traced, and the attempts that have been made in the recent past by various engineers in Nigeria researching towards achieving

mechanized harvesting and processing of cassava are well explained. The machinery required for cassava production in Africa, the development of new machines, and the need for more research and development in harvesting and processing machineries, which can reduce poverty worldwide and make food available and accessible for all, were also discussed. Research efforts made and the challenges facing the engineers, farmers, scientists and food processors towards achieving mechanical harvesting and processing of cassava were presented. Breeding a cassava variety with a regular shape for easy mechanization was one solution that could help the engineers worldwide.

2.2 Conceptual Framework of the Study

This study was conducted with the constraints faced by the farmers in cassava cultivation. Thus the constraints in cassava cultivation were the dependent variable and the selected characteristics of the cassava farmers were considered as the independent variables. Constraint of an individual may be affected through interacting forces of many characteristics in his surroundings. It was therefore, necessary to limit the characteristics, which include: (i) age, (ii) education, (iii) family size, (iv) farm size, (v) cassava cultivation area, (vi) annual family income, (vii) annual income from cassava production, (viii) cassava cultivation knowledge and (ix) extension contact.

Again, in order to have a clear understanding of the nature of cassava cultivation constraint, the dependent variable was considered from the view of a number of dimensions. These dimensions included: (1) sufficient supply of seedling, (2) high cost of seedling, (3) lack of knowledge on insect and diseases control, (4) lack of cassava storage facility, (5) unavailability of pesticide, (6) lack of necessary technical advice from extension worker, (7) lack of sufficient credit, (8) higher interest rate of credit, (9) weed infestation, (10) lack of sufficient labor facility, (11) lack of sufficient irrigation facility, (12) high production cost, (13) low benefit from cassava cultivation, (14) difficulty to procure cassava from field, (15) difficult to make suitable as food, (16) low price of produced cassava and (17) high cost of pesticide.

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

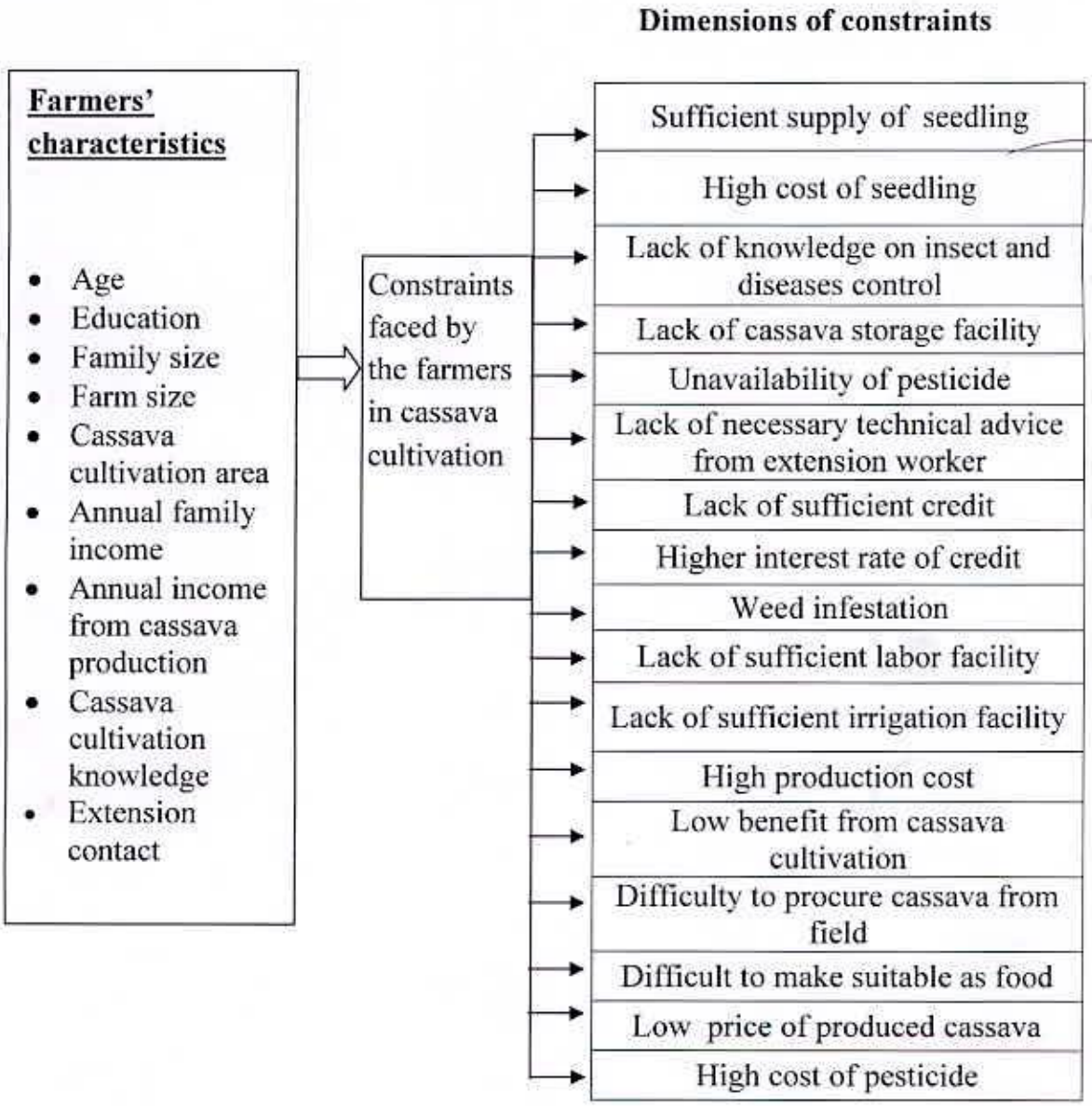

Figure 2.1 Conceptual framework of the study

CHAPTER III

METHODOLOGY

CHAPTER III

METHODOLOGY

Methods and procedures used in conducting research need very careful consideration. Methodology should be such that it enables the research to collect the valid information and to analyze the same property to arrive at correct decisions. The methods and procedures followed in conducting this research are described below:

3.1 Locale of the study

Madhupur upazila under Tangail district was selected as the area for this research work. The map of the area of Tangail district and Madhupur upazila are shown in the Figure 3.1 and 3.2 respectively. Cassava was cultivated in 52 villages of Madhupur Upazilla. Ten villages out of the 52 villages were selected randomly as the locale of the study.

3.2 Population

There are 138 cassava cultivators in the selected 10 villages which constituted the population of the study.

3.3 Sample

By taking 80% of the population of each village, a total of 108 cassava farmers were selected randomly as the sample of the study. Rest 30 cassava farmers were listed in the reserve list of the sample. The population, sample and reserve list of the study are shown in Table 3.1.

Table 3.1 Distribution of population, sample and reserve list of the study

SL. No.	Name of the villages	Number of cassava farmers		Reserve list
		Population	Sample	
1	Gilakaisa	13	10	3
2	Ponamari	15	12	3
3	Kazai	16	13	3
4	Joynagachi	12	9	3
5	Bejuria	11	8	3
6	Kakraguli	13	10	3
7	Jalabaza	18	15	3
8	Katajani	14	11	3
9	Kondoria	12	9	3
10	Horindhora	14	11	3
Total		138	108	30

Figure 3.1 Map of Tangail District Showing Madhupur Upazilla

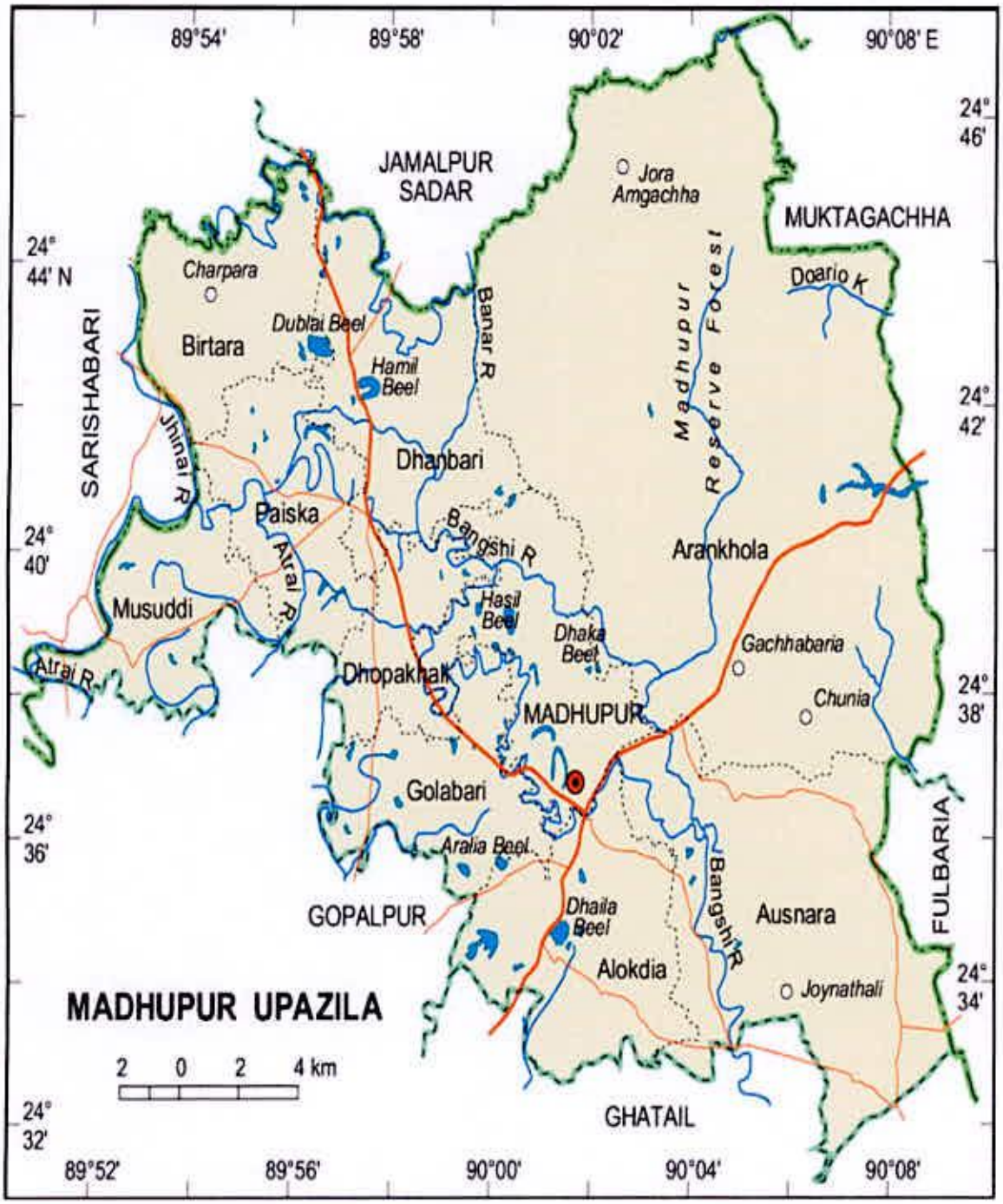

Figure 3.2 Map of Madhupur upazilla

3.4 Instrument for Collection of Data

In a research study, preparation of an interview schedule for collection of information is done with very careful consideration. Keeping these facts in mind, the researcher prepared an interview schedule with utmost care for collecting data from the respondents. An English version of the interview schedule may be seen in Appendix-A. Objectives of the study were kept in view while preparing the interview schedule.

The interview schedule continued both open and closed form questions. Scales are developed for computing suitable scores in respect of constraints in the cultivation of the cassava farmers. The rough interview schedule was pretested by administering the same on several cassava farmers of Madhupur upazila under Tangail district. The pretest was helpful to find out gaps and to locate faulty questions and statements. An alterations and adjustments were made in the schedule on the basis of experience of the pretest. The interview schedule was then multiplied in its final form for collection of data.

3.5 Variables of the Study

In social research, the selection and measurement of variables constitute an important task. In this connection, the researcher looked into the literature to widen his understanding about the nature and scope of the variables involved in the research studies. The hypothesis of a research, while constructed properly, contains at least two important elements, an independent variable and a dependent variable. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationships to an observed phenomenon Townsend (1953). A dependent variable is that factor which appears, disappears or varies as the experimenter introduces, removes or varies the independent variables. The dependent variable is often called the criterion or predicted variable, where as the independent variables is called the treatment, experimental or antecedent variable (Dalen, 1977).

3.6 Selection of Dependent and Independent Variables

Constraints faced by the cassava farmers were the main focus of this study and it was considered as the dependent variable. Constraints faced by the farmers in cassava cultivation was the selected dependent variable.

For selection of independent variables the researcher went through the past related literature as far as available. He discussed with the teacher, experts in the relevant fields and research fellows in agricultural extension and related disciplines. He also carefully noticed the various characteristics of the farmers of the study. Availability of time, money and other resources were also kept in view in selecting the variables. Characteristics of the cassava farmers like age, education, family size, farm size, cassava cultivation area, annual family income, and annual income from cassava production, cassava cultivation knowledge and extension contact were selected as the independent variables of the study.

3.7 Measurement of Variables

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

3.7.1 Measurement of Independent Variables

It was pertinent to follow a methodological procedure for measuring the selected variables in order to contact the study in accordance with the objectives already formulated. The procedures for measuring the independent variables are described below:

3.7.1.1 Age

Age of a respondent was measured in terms of actual years from his birth to the time of interview. A score of one (1) was assigned for each year of age. No fraction of year was considered.

3.7.1.2 Education

Education was measured in terms of grades of education (school/college) completed by an individual. It was expressed in terms of year of schooling. A score of one (1) was assigned for each year of successful schooling completed. For example, if a respondent passed the S.S.C examination, his education score was assigned10, if he passes the final examination of class six, his education score was given as 6. If a respondent did not know how to read and write, his education score was given as '0' (zero). A score of 0.5 (half) was given to that respondent who could sign his name only.

3.7.1.3 Family size

Family size of an individual was measured in terms of counting total number of members of his/her family. A score of one (1) was assigned for each member. For example, if a respondent exist only himself in his family the score was given as 1, if another one is with him, his score was given as 2.

3.7.1.4 Farm size

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

Farm size = $A_1 + A_2 + {}^1/_2 (A_3 + A_4) + A_5$

Where, A_1= homestead area of the respondent (own house)

A_2= Own land under own cultivation

A_3= Area taken on borga system

A_4= Area given to others on borga system

A_5= Area taken from others on lease

3.7.1.5 Cassava cultivation area

The land size under cassava cultivation was considered to measure cassava area of the respondents. It was expressed in hectare.

3.7.1.6 Annual family income

Annual family income of a respondent was measured on the basis of total yearly earning from agriculture and other sources (service, business, daily labor etc.) by the respondent himself and other members of his/her family. For calculation of income score, one (1) score was assigned for one thousand taka yearly income.

3.7.1.7 Annual income from cassava production

Annual income from cassava production of a respondent was measured on the basis of yearly earning only from cassava production. For calculation of income from cassava cultivation, one (1) score was assigned for one thousand taka income.

3.7.1.8 Cassava cultivation knowledge

Cassava cultivation knowledge score of a respondent was measured by asking him 20 questions on different aspect of cassava cultivation. A score of 2 was assigned to each correct question so an individual could get 2 for correct answer and 0 for no or wrong answer to each question. Partial score were assigned for partial correct answer. Thus, the cassava cultivation knowledge of the respondents could range from 0 to 40, 0 including poor knowledge and 40 indicating high knowledge on cassava cultivation.

3.7.1.9 Extension Contact

The extension contact of a respondent was measured with five selected extension media. A scale was developed arranging the weights 0, 1, 2, 3 and 4 for the responses as not at all, rarely, occasionally, often and regularly respectively. Thus, extension contact score of the respondents could range from 0 to 20, here 0 indicating no extension contact and 20 indicating very high extension contact.

3.7.2 Measurement of Dependent Variable

Constraints faced by the cassava farmers of the dependent variable of the study. It was measured by constructing a scale of seventeen selected items. Each cassava

farmer was asked to indicate the extent of constraints faced by him against the 17 selected items. By indicating one of the four alternative responses such severe, moderate, little, and not at all constraints and weights were assigned to these responses as 3, 2, 1 and 0 respectively. So the constraints faced scores of the respondents ranged from 0 to 51 where 0 indicating no constraints and 51 indicating highest constraints in cassava cultivation.

For measuring comparative severity of the constraints items, Constraints Faced Index (CFI) was used. The measuring procedure of CFI is discussed in chapter IV while comparing the severity of items.

3.8 Collection of Data and Data Processing and Analysis

The researcher collected data from the sample farmers through interview schedule. Before starting collection of data, the researcher met with the Sub Assistant Agriculture Officer of different blocks and Chairmans of different union parishad in order to explain the objectives of the study and requested them to provide necessary help and co-operation in collection of data. The union parishad members and the local leaders of the area were also approached to render essential help. As a result of all these a good working atmosphere was created in the study area which was very helpful for collection of data by the researcher.

Data for this study were collected from the respondents of 10 villages by using the prepared interview schedule by the researcher himself. Before going to the respondents for interview they were informed earlier, so that they would be available in their respective area. The interviews were held individually in the house or farms of the respective respondent.

No serious problems were faced by the researcher in collecting data. It was not possible to collect from six farmers out of the selected 108 sample. They were not available for interview at the time of interviewing. The researcher collected data

from the six cassava farmers using the reserve list. Collection of data took 30 days from the 25th October to 25th November, 2009.

After complete of field survey the collected data coded, compiled, tabulated and analysis in accordance with the objectives. Qualitative data were quantified by means of suitable scoring technique and local units were converted into standard units. The statistical measures such as number and percentage distribution were used for describing the variables. The responses of the respondent contained in the interview schedule were transferred to a master sheet in order to entering data in the computer. SPSS computer package was used for processing and analysis of data.

3.9 Data Analysis and Statistical Treatment

Data collected from the respondents were complied, tabulated and analyzed in accordance with the objectives of the study. The statistical measures used in describing the selected dependent and independent variables were frequency distribution, range, mean, percentage, standard deviation and rank order. Tables and bar graphs were used in presenting data for clarification of understanding.
Categories were developed in respect of each of the selected characteristics of the respondents and constraints faced by them in cassava cultivation based on nature of the data and mode of categorization prevailing in the social system. Procedures for categorization have been discussed while describing the grower's characteristics in chapter IV.

In order to explore the relationships between the constraints of the farmers and the selected independent variables, Co-efficient of correlation (r) was measured. Five percent (0.05) level of significance was used as a basis for rejecting any null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

CHAPTER IV

RESULTS AND DISCUSSION

The findings of the study are presented in this chapter with logical interpretations according to the objectives of the study.

4.1 Characteristics of the Farmers

The selected characteristics of the farmers were: age, education, family size, farm size, cassava cultivation area, annual family income, annual income from cassava cultivation, cassava cultivation knowledge, extension contact. Profile of these characteristics of the respondents such as measuring unit, possible range and observed range are presented in Table 4.1.

Table 4.1 Characteristics profile of the respondents

Sl. No.	Characteristics	Measuring unit	Range	
			Possible	Observed
01	Age	Year	Unknown	25-70
02	Education	Score	Unknown	0-10
03	Family size	Number	Unknown	2-9
04	Farm size	Hectare	Unknown	0.36-3.92
05	Cassava cultivation	Hectare	Unknown	0.12-1.45
06	Annual family income	Thousand taka	Unknown	60.03-372.75
07	Annual income from cassava cultivation	Thousand taka	Unknown	8.57-70.95
08	Cassava cultivation knowledge	Score	0-40	9-36
09	Extension contact	Score	0-20	1-16

4.1.1 Age

Age of the respondents varied from 25 to 70 years, the average being 41.61 years with the standard deviation of 7.85. The respondents were classified into three categories on the basis of their age (Table 4.2).

Table 4.2 Classification of the farmers according to their age

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Young	Up to 35 years	23	21.3	41.61	7.85
Middle-aged	Above 35 to 48 years	62	57.4		
Old	Above 48	23	21.3		
Total		108	100		

Data represented in Table 4.2 indicate that 57.4 percent being middle aged as compared to 21.3 percent of the respondents were young and 21.3 percent being old. Therefore, it could be said that decision regarding the farming practices in the study area was, expected to be considerably influenced by the middle aged farmers.

4.1.2 Education

The level of education of the respondents ranged from 0-10 in accordance with the average and standard deviation 2.94 and 3.15 respectively. On the basis of, their education, the farmers were classified into five categories shown in Table 4.3.

Table 4.3 Classification of the farmers according to their education

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
No education	Unable to read and write	25	23.1	2.94	3.15
Can read only	Can sign only	30	27.8		
Primary education	Class I to V	33	30.6		
Secondary education	Class VI to S.S.C.	20	18.5		
Total		108	100		

Data shown in the Table 4.3 indicate that 30.6 percent farmers had primary education, 27.8 percent farmers could sign their name, 23.1 percent farmers had no education and 18.5 percent farmers had Secondary education.

Education helps the farmers to face the adverse condition and adjust with unfavorable condition through reading leaflets, booklets, books and other printed materials. The findings of this study, however, indicate that 23.1 percent of the farmers had no schooling, who is supposed to face a great difficulty in adjusting with the unfavorable condition regarding in the cassava cultivation. Such consideration indicates the need for improving literacy level among the farmers for adjusting the adverse condition in cassava cultivation.

4.1.3 Family size

Family size of the respondents ranged from 2 to 9 with a mean of 5.72 and standard deviation of 1.43. On the basis of their family size, the farmers were classified into three categories as shown in Table 4.4.

Table 4.4 Classification of farmers according to their family size

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Small	2-4 members	16	14.8	5.72	1.43
Medium	5-7 members	82	75.9		
Large	Above 7 members	10	9.3		
Total		108	100		

Data presented in the Table 4.4 showing that above three-fourth (75.9 percent) of the respondents had to medium family size compared to 14.8 percent had small family size and only 9.3 percent had large family size. The findings indicate that 85.2 percent of the cassava farmers had medium to large family size.

4.1.4 Farm Size

Farm size of the respondents ranged from 0.36 hectare to 3.92 hectare with a mean of 1.44 and standard deviation of 0.79. On the basis of their farm size, the farmers were classified into three categories as shown in Table 4.5.

Data presented in the Table 4.5 demonstrate that highest proportion (58.4 percent) of the farmers had medium farm compared to 37.0 percent having small farm and only 4.6 percent had large farm. The findings indicate that overwhelming majority 95.4 percent farmers had small to medium farm size.

Table 4.5 Classification of farmers according to their farm size

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Small farm	Up to 1 ha	40	37.0	1.44	0.79
Medium farm	Above 1 to 3 ha	63	58.4		
Large farm	Above 3 ha	5	4.6		
Total		108	100		

4.1.5 Cassava cultivation area

Cassava cultivation area of the respondents varied from 0.12 to 1.45 hectare, the average being 0.36 ha with standard deviation of 0.22. The respondents were classified into three categories on the basis of their cassava cultivation area (Table 4.6).

Table 4.6 Classification of farmers according to Cassava cultivation area

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Small farmer	Up to 0.25 ha	49	45.4	0.36	0.22
Medium farmer	Above 0.25 to 1 ha	57	52.7		
Large farmer	Above 1 ha	2	1.9		
Total		108	100		

Data furnished in Table 4.6 specify that above half 52.7 percent had medium cassava cultivation area compared to 45.4 percent being small area and only 1.9 percent being large cassava cultivation area. Therefore, it could be said that the choice of cassava cultivation regarding the farming practices in the study area was expected to be considerably influenced by the small and medium farmers.

4.1.6 Annual family income

Annual family income of the farmers ranged from 60.03 to 372.75 thousand taka. The mean was 163.67 taka and standard deviation was 64.63. On the basis of annual family income, the respondents were categorized into three classes as shown in Table 4.7.

Table 4.7 Classification of cassava farmers according to their annual family income

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Small income	Up to 120	31	28.7	163.67	64.63
Medium income	121 to 300	72	66.7		
High income	Above 300	5	4.6		
Total		108	100		

Data offered in Table 4.7 that two third (66.7 percent) of the respondents had medium income followed by 28.7 percent and 4.6 percent low and high family income respectively. Generally higher income gives an individual better position to take risk in the society. This can reduce the problems faced by them.

4.1.7 Annual income from cassava cultivation

Annual income from cassava cultivation of the respondents ranged from 8.57 to 70.95. The mean was 19.16 taka and standard deviation was 12.43. On the basis of annual income from cassava cultivation, the respondents were categorized into three classes as shown in Table 4.8.

Table 4.8 Classification of cassava farmers according to their income by cassava cultivation

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Low income	Up to 13	28	25.9	19.16	12.43
Medium income	Above 13 to 25	65	60.2		
High income	Above 25	15	13.9		
Total		108	100		

Data shown in Table 4.8 presented that the highest proportion (60.2 percent) of the respondents had medium income from cassava cultivation while low income and high income from cassava cultivation were observed from 25.9 and 13.9 percent respondents respectively.

Generally, higher income encourages one's integrity to achieve better performance and to show his individual better status in the society. Therefore, the higher income might be increased the risk taking capacity of the farmers in cassava cultivation.

4.1.8 Cassava Cultivation knowledge

Computed scores of the farmers about cassava cultivation knowledge ranged from 9 to 36 against the possible range of 0 to 40 with a mean of 25.21 and standard

deviation of 4.54. On the basis of cassava cultivation knowledge, the respondents were classified into three categories as shown in Table 4.9.

Table 4.9 Classification of cassava farmers according to their cassava cultivation knowledge

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Poor knowledge	Up to 13	4	3.7	25.21	4.54
Moderate knowledge	14 to 26	74	68.5		
High knowledge	Above 26	30	27.8		
Total		108	100		

Data contained in Table 4.9 showing that most of farmers (68.5 percent) had moderate knowledge compared to 27.8 percent and 3.7 percent high and low knowledge in cassava cultivation respectively.

4.1.9 Extension Contact

Computed extension contact score of the respondents ranged from 1 to 16 against the possible range of 0 to 20 with an average of 10.69 and standard deviation of 3.27. Based on the extension contact score, the respondents were classified into three categories as shown in Table 4.10.

Table 4.10 Classification of the cassava farmers according to their extension contact

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Low extension contact	Up to7 score	11	10.2	10.69	3.27
Medium extension contact	8 to 14 score	80	74.1		
High extension contact	Above 14 score	17	15.7		
Total		108	100		

Data presented in Table 4.10 indicating the about three-fourth (74.1%) of the farmers had medium extension contact followed by 15.7 percent and 10.2 percent had high and low extension contact respectively.

The findings of this study indicated that the majority (84.3%) of the farmers in the study area had low to medium extension contact.

4.2 Constraints Faced by the Farmers in Cassava Cultivation

Tabulated scores of constraints faced by the farmers in cassava cultivation ranged from 10 to 40 against the possible range of 0 to 51 with an average of 23.18 and standard deviation of 4.40. Based on the constraints faced in cassava cultivation scores, the respondents were classified into three categories as shown Table 4.11.

Table 4.11 Classification of the respondents according to their constraints faced in cassava cultivation

Categories	Basis of categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Low constraints facing	1 to 17	13	12.0	23.18	4.40
Medium constraints facing	18 to 34	93	86.2		
High constraints facing	Above 34	2	1.8		
Total		108	100		

Data contained in Table 4.11 indicating the overwhelming majority (86.2%) of the farmers faced medium level of constraints compared to 12 percent low and 1.8 percent high level of constraints in cassava cultivation.

Therefore, it could be concluded that the constraints in cassava cultivation of the farmers in the study area should be needed to reduced for successful cassava cultivation.

4.3 Relationship of the selected characteristics of the farmers with their constraints facing in cassava cultivation

Co-efficient of correlation was computed in order to explore the relationship between the selected characteristics of the cassava farmers and their constraints faced in cassava cultivation.

The computed values of Co-efficient of correlation '(r)' showing the relationship of nine characteristics of the farmers with their faced constraints in cassava cultivation have been presented in Table 4.12. Co-relation co-efficient among all the variables may be seen in the correlation matrix in appendix-B.

Table 4.12 Results of the correlation analysis between the selected characteristics of the farmers and their constraints faced in cassava cultivation (N=108)

Farmers characteristics	Values of 'r' with 106 df	Table value	
		At 0.05 level	At 0.01 level
Age	-0.084^{NS}	0.192	0.251
Education	-0.023^{NS}		
Family size	-0.117^{NS}		
Farm size	-0.521**		
Cassava cultivation area	-0.400**		
Annual family income	-0.432**		
Annual income from cassava cultivation	-0.442**		
Cassava cultivation knowledge	-0.203*		
Extension contact	-0.201*		

^{NS} Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.3.1 Relationship between age of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between age of the farmers and their constraints in cassava cultivation was found to be 0.084 as shown in Table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly the computed value of 'r' ('r'= -0.084) was found to be smaller than the table value ('r'=0.192) with 106 degrees of freedom at 0.05 level of probability. Thus, statistically the relationship was not significant.

Based on the above findings, the null hypothesis could not be rejected and hence, the investigator concluded that there was no significant relationship between age of the farmers and their constraints faced in cassava cultivation.

4.3.2 Relationship between education of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between education of the farmers and their constraints in cassava cultivation was found to be -0.023 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.023) was found to be smaller than the table value ('r'=0.192) with 106 degrees of freedom at 0.05 level of probability. Thus, statistically the relationship was not significant.

Based on the above findings, the null hypothesis could not be rejected and hence, the investigator concluded that there was no significant relationship between education of the farmers and their constraints faced in cassava cultivation.

4.3.3 Relationship between family size of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between family member of the farmers and their constraints in cassava cultivation was found to be -0.117 as shown in Table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.117) was found to be smaller than the table value ('r'=0.192) with 106 degrees of freedom at 0.05 level of probability. Thus, statistically the relationship was not significant.

Based on the above findings, the null hypothesis could not be rejected and hence, the investigator concluded that there was no significant relationship between family member of the farmers and their constraints in cassava cultivation.

4.3.4 Relationship between farm size of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between Farm size of the farmers and their constraints faced in cassava cultivation was found to be -0.521 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.521) was found to be larger than the table value ('r'=0.251) with 106 degrees of freedom at 0.01 level of probability. Thus, statistically the relationship was significant at 0.01 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between farm size of the farmers and their constraints faced in cassava cultivation. This

indicated that higher the farm size of the farmers, lower was their constraints faced in cassava cultivation.

4.3.5 Relationship between land area under cassava cultivation of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between agricultural knowledge of the farmers and their constraints faced in cassava cultivation was found to be -0.400 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly the computed value of 'r' ('r'= -0.400) was found to be larger than the table value ('r'=0.251) with 106 degrees of freedom at 0.01 level of probability. Thus, statistically the relationship was significant at 0.01 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between land area under cassava cultivation of the farmers and their constraints faced in cassava cultivation. This indicated that the farmers having more land area under cassava cultivation, faced lower constraints in respect of cassava cultivation.

4.3.6 Relationship between annual family income of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between total annual income of the farmers and their constraints faced in cassava cultivation was found to be -0.432 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.432) was found to be larger than the

table value ('r'= 0.251) with 106 degrees of freedom at 0.01 level of probability. Thus, statistically the relationship was significant at 0.01 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between total annual income of the farmers and their constraints faced in cassava cultivation. This indicated that higher the total annual family income of the farmers, lower was their constraints faced in cassava cultivation.

4.3.7 Relationship between annual income from cassava cultivation of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between Annual income by cassava production of the farmers and their constraints faced in cassava cultivation was found to be -0.442 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.442) was found to be larger than the table value ('r'= 0.251) with 106 degrees of freedom at 0.01 level of probability. Thus, statistically the relationship was significant at 0.01 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between annual income by cassava cultivation of the farmers and their constraints faced in cassava cultivation. This indicated that higher the annual income from cassava cultivation of the farmers, lower was their constraints faced in cassava cultivation.

4.3.8 Relationship between cassava cultivation knowledge of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between agricultural knowledge of the farmers and their constraints faced in cassava cultivation was found to be -

0.203 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= - 0.203) was found to be larger than the table value ('r'= 0.192) with 106 degrees of freedom at 0.05 level of probability. Thus, statistically the relationship was significant at 0.05 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between agricultural knowledge of the farmers and their constraints faced in cassava cultivation. This indicated that higher the cassava cultivation knowledge of the farmers, lower was their constraints faced in cassava cultivation.

4.3.9 Relationship between extension contact of the farmers and their constraints faced in cassava cultivation

Computed value of the coefficient of correlation between extension contact of the farmers and their constraints faced in cassava cultivation was found to be -0.201 as shown in table 4.12. The following observations were found on the basis of computed value of 'r':

Firstly, a negative relationship was found to exist between the variables. Secondly, the computed value of 'r' ('r'= -0.201) was found to be larger than the table value ('r'=0.192) with 106 degrees of freedom at 0.05 level of probability. Thus, statistically the relationship was significant at 0.05 level.

Based on the above findings, the null hypothesis was rejected and hence, the investigator concluded that there was significant negative relationship between extension contact of the farmers and their constraints faced in cassava cultivation. This indicated that the farmers who had higher extension contact faced lower constraints in cassava cultivation.

4.4 Comparative Constraints faced by the farmers in Cassava Cultivation

Comparative constraints faced index (CFI) of farmers each of 17 selected items of constraints in cassava cultivation were determined. by using the following formula:

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

Where,

P_n= Percentage of farmers facing no constraints in cassava cultivation

P_l = Percentage of farmers facing low constraint

P_m = Percentage of farmers facing medium constraint

P_h = Percentage of farmers facing high constraint

Constraint Faced Index (CFI) for each of the selected dimensions could range from 0 to 300 where 0 indicated no constraint and 300 indicated highest constraint facing. Comparative pictures of the 17 selected aspects have been shown in Table 4.13 on the basis of their Constraint Facing Index (CFI).

Table 4.13 Rank order of 17 selected items of constraints faced in cassava cultivation according to descending order of CFI

Aspects of cassava cultivation	% of the respondents				CFI index	Rank order
	Faced no constraints	Faced low constraints	Faced medium constraints	Faced high constraints		
Lack of cassava storage facility	0	0	0	100	300	1
Higher interest rate of credit	0	0.1	60.2	38.9	238	2
Lack of sufficient labor facility	0	0.9	63.9	35.2	234.3	3
Lack of sufficient credit	0	0	75	25	225	4
Low price of produced cassava	0	0	90.7	9.3	209.3	5
High production cost	0	24.2	75.5	0.3	175.9	6
High cost of pesticide	0.9	53.7	45.4	0	144.5	7
Unavailability of pesticide	14.9	40.7	40.7	3.7	133.2	8
Weed infestation	28.7	26.9	40.7	3.7	119.4	9
Low benefit from cassava cultivation	0	82.4	17.6	0	117.6	10
Difficulty to procure cassava from field	1.9	89.8	8.3	0	106.4	11
Lack of knowledge on insect and diseases control	24.6	49.9	26.5	0	102.9	12
Difficult to make suitable as food	34.3	61.1	4.6	0	70.3	13
Lack of necessary technical advice from extension worker	47.6	46.6	2.8	3	61.2	14
Sufficient supply of seedling	70.4	29.6	0	0	29.6	15
High cost of seedling	100	0	0	0	0	16
Lack of sufficient irrigation facility	100	0	0	0	0	17

The CFI in the Table 4.13 indicates that lack of cassava storage facility ranked first followed by higher interest rate of credit and lack of sufficient labor facility. Lack of sufficient irrigation facilities ranked last.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter presented the summary of the findings, conclusions and recommendations of the study:

5.1 Summary of findings

5.1.1 Characteristics of the farmers

Findings in respect of the selected characteristics are summarized below:

Age: More than half (57.4 percent) of the farmers fell in the middle aged category (35 to 48 years) compared to 21.3 percent falling in the young category (up to 35 years) and same percentage (21.3%) in old aged category (above 48 years).

Education: Findings revealed that 30.6 percent farmers had primary education, 27.8 percent farmers could sign their name, 23.1 percent farmers had no education and 18.5 percent farmers had Secondary education.

Family size: That highest proportion (75.9 percent) of the respondents belongs to medium category by family member compared to 14.8 percent was small farmers and only 9.3 percent was large farmers by family member. The findings indicate that 85.2 percent of the cassava farmers were the owner of medium to large farmers by the presence of family size.

Farm Size: The highest proportion (58.4 percent) of the farmers had medium farm (1.1 to 3 hectare) compared to 37.0 percent having small farm (up to 1 hectares) and only 4.6 percent had large farm. The findings indicate that 63 percent of the cassava farmers had medium to large farm size (above 3 hectares).

Cassava cultivation area: The highest (52.7 percent) respondents were medium farmers (0.25 to 1 ha of land) as compared to 45.4 percent being small farmers (Up to 0.25 ha of land) and only 1.9 percent being large farmers (Above 1 ha of land) according to the respondent's cassava cultivation area.

Annual family income: The highest proportion (66.7 percent) of the respondents had medium income (Tk. 121 to 300 thousand per year) compared to 28.7 percent of the farmers having low annual income (Tk. up to 120 thousand per year) and 4.6 percent of the farmers having high annual income (Tk. above 300 thousand per year).

Annual income from cassava cultivation: The highest proportion (60.2 percent) of the respondents had medium income (Tk. 13 to 25 thousand per year) where low (Tk. Up to 13 thousand per year) income and high income (Tk. Above 25 thousand per year) by cassava cultivation were observed 25.9 and 13.9 percent respectively of the total respondents.

Cassava cultivation knowledge: The most of farmers (68.5 percent) had a moderate knowledge as compared to high knowledge (27.8 percent) in cassava cultivation and only 3.7 percent having poor knowledge.

Extension Contact: Findings revealed that about three-fourth (74.1%) of the farmers had medium extension contact followed by 15.7 percent and 10.2 percent had high and low extension contact respectively.

5.1.2 Constraints Faced by the Farmers in Cassava Cultivation

Findings in respect of constraints faced by the farmers in cassava cultivation revealed that overwhelming majority 86.2% of the farmers faced medium constraints where 12% and 1.8% farmers faced low and high constraints respectively.

5.1.3 Relationship between constraints faced by the farmers in cassava cultivation and their selected characteristics

Farm size, cassava cultivation area, annual family income, annual income from cassava cultivation, cassava cultivation knowledge and extension contact of the respondents had significant negative relationship with their constraints faced in cassava cultivation. Others variables namely age, education and family size of the respondents had no significant relationship with their constraints faced by cassava cultivation.

5.1.4 Comparative Constraints Facing of Selected Aspects of Cassava Cultivation

Based on descending order of CFI, lack of cassava storage facility ranked first followed by higher interest rate of credit and lack of sufficient labor facility. Lack of sufficient irrigation facilities ranked last.

5.2 Conclusion

On the basis of the findings of the study and logical interpretation of findings and other relevant facts, following conclusion were drawn:

1. Overwhileming majority 88% of the cassava farmers faced medium to high constraints in cassava cultivation. From this fact, it may be concluded that until the cassava farmers are free from different constraints in cassava cultivation, they will not be in a position to adopt improved technology in cassava cultivation.
2. Majority (58.4%) of the farmers had medium farm size. There was a negative relationship with their farm size and cassava cultivation area of the farmers constraints faced cassava cultivation. In the context of Bangladesh, it is difficult to increase the farm size. However, the small farm owners with small income may be helped by different government organizations and NGOs to provide credit facilities for purchasing various inputs for production and overcome their constraints in cassava cultivation.
3. Annual family income and annual income from cassava cultivation of the farmers had significant negative relationships with their constraints faced in cassava cultivation. This means that the higher income of the cassava farmers lower was their constraints in cassava cultivation. In view of the above facts it may be concluded that majority of the cassava farmers more likely to continue to face constraints unless steps are taken to help them to increase their income.
4. Majority of the farmers (68.5 percent) had moderate knowledge in cassava cultivation. Again cassava cultivation knowledge of the farmers had significant negative relationship with their constraints faced in cassava cultivation. Cassava cultivation knowledge of the farmers helps them to understand the various complex and complicated issues of cassava cultivation. Cultivation of cassava requires a series of operations form its beginning until its harvesting. Each of the operations needs

technical knowledge. Therefore, it may be concluded that steps should be taken to increase the knowledge of the farmers on cassava cultivation.

5. Extension contact of the farmers had significant negative relationship with their constraints in cassava cultivation. This indicated that farmers having higher extension contact faced lower constraints. This leads to the conclusion that increasing extension contact will give the farmers good opportunities to overcome their different constraints in cassava cultivation.
6. Different levels of severity were found in selected 17 constraints in cassava cultivation. Therefore, steps should be taken to minimize these constraints based on their severity.

5.3 Recommendations

On the basis of findings and conclusions following recommendations were drawn:

1. It was revealed from the CFI that, lack of cassava storage facility ranked first followed by higher interest rate of credit and lack of sufficient labor facility. Lack of sufficient irrigation facilities ranked last. Therefore, it may be recommended that storage facility of cassava should be developed and credit should be given for cassava cultivation with low and no interest. Other constraints should be minimized on the basis of their severity. It may be also recommended that necessary steps should be taken be DAE and other related organization to minimize the constraints of cassava cultivation.
2. Farm size, cassava cultivation area, annual family income and annual income from cassava cultivation of the farmers had significant negative relationships with their constraints faced in cassava cultivation. Therefore, it may be recommended that necessary steps should be taken by the concerned authorities to increase their income.
3. Cassava cultivation knowledge of the farmers had significant negative relationship with their constraints face in cassava cultivation. Therefore, it may be recommended that necessary steps should be taken by the concerned authorities to increase their knowledge on cassava cultivation by providing training and motivational campaign.
4. Extension contact of the farmers had significant negative relationship with their constraints faced in cassava cultivation. Therefore, it may be recommended that necessary steps should be taken by the concerned authorities to increase regular contact with the cassava farmers.

5.4 Recommendations for Further Study

This study investigated constraints faced by the farmers in respects of cassava cultivation. There is need for investigation of other potential crops.

1. The present study conducted on the population of the cassava farmers of ten villages of Madhupur under Tangail district. Findings of the study need to be varied by undertaking similar research in other cassava growing zones of the country.
2. This study investigated the relationships of 9 selected characteristics of the farmers with their constraints faced in cassava cultivation. But farmer's constraints in cassava cultivation might be affected by various other personal, social, psychological, cultural and situational factors of the farmers. It is, therefore, recommended that further study should be conducted involving other characteristics in this regard.
3. The study investigated only 17 dimensions of cassava cultivation. But it is required to investigate other aspects of cassava cultivation such as use of high yielding variety, intercultural operations, net return etc.
4. Relationships of 9 characteristics of the farmers with their constraints faced in respect of cultivating cassava was investigated. Further research may be undertaken for exploring relationships of other characteristics of the farmers with their constraints faced in cassava cultivation.
5. Research should be undertaken on the effectiveness of agricultural extension service and other related organizations in helping people solve their agricultural constraints.

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APPENDICES

APPENDIX-A

Department of Agricultural Extension and Information System

Sher-e- Bangla Agricultural University

Sher-e- Bangla Nagor, Dhaka-1207.

INTERVIEW SCHEDULE FOR A RESEARCH STUDY ON

CONSTRAINTS FACED BY THE FARMERS IN CASSAVA CULTIVATION

Serial no.....

Name of the respondent:.....

Village..... Union.....

Upazila..... District.....

(Please answer to the following questions)

1. How old are you? .....Years

2. What is the level of your education?

   i) ..... (Do not know reading and writing)

   ii) ..... (Do not know reading and writing, but can sign only)

   iii) ..... (Never attended school, but I can little read and write)

   iv) (Up to the level of class .....Passed class/ Examination)

3. Including yourself, how many members belong to your family?

4. Including yourself, how many members belong to your family?

Male: ..... Nos. Female: .....Nos. Total: .....Nos.

5. Furnish the area of your lands according to use:

Serial no	Type of land	Local unit	Hectare
1	Own house		
2	Own land under own cultivation		
3	Land taken from other on borga		
4	Land taken from other on lease		
5	Own land given to others on borga		
	Total		

6. Mention the area you have cultivated cassava last year.

..... acre .....hectare

7. Please mention your annual income:

Source of income	Amount	Price (Tk./ Amount)	Total taka
1. Agricultural sector			
a) Rice			
b) Wheat and Jute			
c) Cassava			
d) Potato and sweet potato			
e) Pulses			
f) Vegetables			
g) Fruits			
h) Poultry			
i) Cattle			
j) Fishes			
k) Others (Please mention)			
2. Services			
3. Business			
Total			

Total income = ...Taka

8. Please answer the following questions in connection with Cassava cultivation

Sl. No.	Questions	Score	Score obtained
1	What are the soil elements?	2	
2	What do you mean by organic manure?	2	
3	What is balanced fertilizer?	2	
4	What type of land is suitable for cassava cultivation?	2	
5	When manuring is needed in cassava cultivation?	2	
6	How many tillage is needed in cassava cultivation?	2	
7	When irrigation is needed in cassava field?	2	
8	Mention two improved varieties of cassava.	2	
9	How urea should apply in cassava field?	2	
10	Name two diseases of cassava	2	
11	When will you do weeding?	2	
12	Mention the optimum time of cassava cultivation.	2	
13	Which of type seedling do you cultivated?	2	
14	Name two pesticides.	2	
15	Name one insecticide	2	
16	Name two insects	2	
17	How to harvest cassava?	2	
18	How to eat cassava?	2	
19	How to preserve cassava?	2	
20	What is I.P.M.?	2	

9. Please mention your nature of contact with the following extension personnel:

Sl. No.	Extension personnel	Nature of extension contact				
		Regularly	Often	Occasionally	Rarely	Not at all
1	Cassava cultivated farmers					
2	Dealers (Fertilizer, pesticide)					
3	Sub Assistant Agriculture Officer					
4	NGO worker					
5	Upazila Agriculture officer					

10. Please indicate the constraints faced by the cassava cultivation:

Sl. No.	Constraints	Nature of constraints			
		Faced high constraints	Faced medium constraints	Faced low constraints	Faced no constraints
1	Sufficient supply of seedling				
2	High cost of seedling				
3	Lack of knowledge on insect and diseases control				
4	Lack of cassava storage facility				
5	Unavailability of pesticide				
6	Lack of necessary technical advice from extension worker				

Sl. No.	Constraints	Nature of constraints			
		Faced high constraints	Faced medium constraints	Faced low constraints	Faced no constraints
7	Lack of sufficient credit				
8	Higher interest rate of credit				
9	Weed infestation				
10	Lack of sufficient labor facility				
11	Lack of sufficient irrigation facility				
12	High production cost				
13	Low benefit from cassava cultivation				
14	Difficulty to procure cassava from field				
15	Difficult to make suitable as food				
16	Low price of produced cassava				
17	High cost of pesticide				

(Thank you for your cooperation)

Date: ……..

……..

Signature of the interviewer

APPENDIX-B

Correlation matrix

	X^1	X^2	X^3	X^4	X^5	X^6	X^7	X^8	X^9	Y
X^1	1									
X^2	.494**	1								
X^3	.432**	.174	1							
X^4	.329**	.267**	.415**	1						
X^5	.421**	.354**	.421**	.785**	1					
X^6	.239*	.237*	.353**	.781**	.613**	1				
X^7	.323**	.200*	.424**	.780**	.836**	.705**	1			
X^8	.135	.363**	.233*	.309**	.172	.439**	.293**	1		
X^9	.185	.195*	.113	.205*	.185	.169	.217*	.159	1	
Y	-.084	-.023	-.117	-.521**	-.400**	-.432**	-.442**	-.203*	-.201*	1

^{NS} Non-Significant

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

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

X^1 =	Age	X^6 =	Annual Family Income
X^2 =	Education	X^7 =	Annual Income from Cassava
X^3 =	Family Size	X^8 =	Cassava Cultivation Knowledge
X^4 =	Farm size	X^9 =	Extension Contact
X^5 =	Cassava Cultivation Area	Y =	Constraints Faced in Cassava Cultivation