

**FARMERS' KNOWLEDGE AND PRACTICES ON EXPORT QUALITY  
MANGO PRODUCTION IN SHIBGANJ UPAZILA UNDER  
CHAPAINAWABGANJ DISTRICT**

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MANGO PRODUCTION IN SHIBGANJ UPAZILA UNDER  
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BY

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*This is to certify that thesis entitled, ‘FARMERS’ KNOWLEDGE AND PRACTICES ON EXPORT QUALITY MANGO PRODUCTION IN SHIBGANJ UPAZILA UNDER CHAPAINAWABGANJ DISTRICT’ submitted to the Department of Agricultural Extension and Information System, 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 AND INFORMATION SYSTEM**, embodies the result of a piece of bona fide research work carried out by **MD. TOHRUL ISLAM** Registration No. **19-10042** 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 duly been acknowledged.*

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DEDICATED  
TO  
MY BELOVED  
PARENTS

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## **ABBREVIATION AND ACRONYMS**

DAE	Department of Agricultural Extension
BBS	Bangladesh Bureau of Statistics
BAU	Bangladesh Agricultural University
SPSS	Statistical Package for Social Sciences
GOs	Governmental Organizations
NGOs	Non-governmental Organizations
SAAO	Sub Assistant Agriculture Officer
AEO	Agricultural Extension Officer
UAO	Upazila Agricultural Officer
UISC	Union Information Service Centre
AICC	Agricultural Information and Communication Centre
et al.	And Others (at Elli)
Ha	Hectare
TK	Taka

# **FARMERS' KNOWLEDGE AND PRACTICES ON EXPORT QUALITY MANGO PRODUCTION IN SHIBGANJ UPAZILA UNDER CHAPAINAWABGANJ DISTRICT**

## **ABSTRACT**

The purpose of this research was to determine farmers' knowledge and practices on export quality mango production and to explore the relationships between characteristics of the mango farmers and their knowledge and practices on export quality mango production. The study was conducted in 6 villages of shibganj upazila under Chapainawabganj district. The populations of mango farmers in these villages were from where 120 samples were drawn by using random sampling technique. An interview schedule was used for data collection. Knowledge and practices on export quality mango production was determined by a validated test. The data were collected during 15th March to 13th April 2021. Appropriate scales were developed in order to measure the variables. Descriptive statistics such as mean, standard deviation, range and percentage were used to describe the variables under consideration. Correlation test was used to ascertain the relationship between the concerned dependent and independent variables. The majority (70 percent) of the mango farmers' possessed medium knowlege, (17.5 percent) of the mango farmers possessed high knowledge and (12.5 percent) of the mango farmers had low knowlege. About (63.33 percent) of the mango farmers had medium practice, while (24.17 percent) farmers had low practice and only (12.5 percent) farmers had high practice. educational background, effective farm size, annual family income, income from export quality mango production, professional training experience, experience in mango cultivation, extension media contact and extent of use of modern technology of the mango farmers had positive significant relationship with farmers' knowledge on export quality mango production, In case of farmers' practice effective farm size, annual family income, income from export quality mango production, professional training experience, extension media contact, extent use of modern technology had positive significant relationship Researcher perceived that farmers increasing effective farm size, annual family income, professional training received, farming experience, income from export quality mango production, extension media contact, use of modern technology, it may be increased farmers knowledge and practice level.

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the Study

Bangladesh is blessed with many horticultural crops. More than 90 vegetables, 60 fruits and 25 spices are being grown in the country. Fruits play a unique role both in economic and social sphere for improving income and nutritional status, particularly rural masses. Fruits are highly valued in human diet mainly for vitamins and minerals. Along with these, orchards of fruits help in maintaining ecological balance. Fruit contributes 10% income of the national economy and 1-2% land covered of the total cultivable land in Bangladesh (Mondal et al., 2011). Mango (*mango. indica L.*) is considered as one of the main tropical fruits in the world believed to be originated from Asia. (Hirano et al., 2010).

Mango fruit peel and flesh are reported to be a rich source of fiber, vitamin C and A, essential amino acids, and polyphenols (Ajila et al., 2007).

Bangladesh produces a large number of superior varieties of mangoes and these have wide demand in the market and are commercially important. Prominent cultivars among the elite varieties of mango are Fazli, Langra, Gopal-bhog, Laksman-bhog, Mohan-bhog, Raj-bhog, Himsagar, Chousha and Amrapali etc. As per FAO statistics, total transaction or exchange value of mango in the domestic market stands at around US\$ 1 billion. It replaces many snack items during mango season. The current consumption of fresh mango is almost one million tons and is growing with the growth of GDP and population (FAO, 2014).

Emphasized some important local mango cultivars grown at Chapai Nawabganj district has selected as a study area, from 2008-2011 fruiting seasons. Seven locally cultivated important mangos were selected. Both qualitative and quantitative characteristics are considered in order to study the variations among the cultivars. The studied characters indicated that there remained considerable variations among those cultivars and these could be used for commercial basis as well as varietal development and needs to take action for sustainable conservation (Shirin et al., 2013).

Mango production has been increasing at an average rate of approximately 5.5 percent per year from 2005 to 2013. Between 2005 and 2013 annual production of mangoes Proper post-harvest management is the need to deliver good quality mango to the market and ultimately to the consumer to command buyer attention and gives the grower a competitive edge. Bangladesh's earlier track record of exporting frozen fish and edible items like vegetables to Europe was not encouraging. However, over the years the condition began to be favorable to it. Largely buoyed by the GI tag for one of its mangoes, the country's exporters this year began preparing to export the fruit overseas. In the recent years, the market has witnessed stiff competition. Many traditional mango-exporting countries continue to dominate the market. Braving this adverse condition, Bangladesh entered the market, humbly at that, back in 2015. It exported 800 tonnes of mango to European countries that year. The quantity fell to 300 tonnes the following year. The decline was singularly blamed on the stringent safety measures in the importing countries. As a new entrant to the mango export market, Bangladesh should have been aware of some basic prerequisites for the export. As per internationally applied rules for fruit export, traders have to strictly abide by the requirements of phytosanitary and quarantine certifications relating to the health of the plants from specific departments in the exporting countries. Apparently the exporters were unaware of the rules. Thanks mainly to this deficiency, 15 consignments of Bangladeshi vegetables were cancelled by the European countries earlier (Sarkar, 2019)

In Bangladesh postharvest losses were 30-35 percent and 27.2 percent due to faulty Post-harvest practices during harvesting, packaging, storage, grading etc. (Azad, 2001). In Bangladesh mangoes are transported from the growers' field to the local assemble markets by rickshaw, van and bicycle and to the distant markets by truck. The truck is found to be the main transport vehicle to carry mango from the place of purchase to the distant markets. No 'Bepari' is found to use a refrigerated vehicle to carry perishables despite the fact that refrigerated vehicle is used to carry perishables in developed countries as part of cool chain management. The retailers mainly use vans to carry mangoes from the wholesale to retail markets. A large proportion of the retailers also use trucks to carry mango from the wholesale to the distant retail markets. The destination markets of the mangoes produced in Chapai Nawabgonj and Rajshahi districts are spread all over Bangladesh. However, the overwhelming majority of the produced mango from Chapai Nawabgonj and Rajshahi is delivered to different wholesale markets of Dhaka (Hasan, 2010).

Bangladesh is the country of potential possibilities and one of the possibilities is mango cultivation. It is the most appetizing fruits of Bangladesh, which has also high nutrition value. Mango has a lot of carotene. Moreover, there are vitamins and minerals. For the nutritional value of mango it is called the king of fruits of Bangladesh. In Bangladesh, more than 8, 8 9176 metric tons of mango is produced every year. Mango of Bangladesh is very popular to all over the world. Different kinds of processed foods like “Amchur” and “chutney” are made from raw mango. Also jam, Jelly and juice are made from seasoned mango. Mango of Bangladesh can be exported in different countries. The export of Mango from Bangladesh to different country is very easy, because mango market in Bangladesh is very cheap. Now Bangladesh government is going to take necessary steps to increase the export of mango. Not only that government is encouraging the businessmen to export mango and very soon Bangladesh can be the largest mango exporter countries in international mango market. Use of herbal medicine, furniture and fuel wood is of particular importance. So, the government of Bangladesh declared the mango tree as a national tree in 15-Nov-2011.

India is the top mango producing country in the world. Production here reaches over 18 million tones, which is approximately 50% of the global mango supply. The principal mango producing states in India are Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, and Orissa, although many other Indian states also cultivate mangoes. In total, India has about 2,309,000 acres dedicated to mango farming. The second largest mango producer is China with 4.77 million tons of mango. These figures include the mangoes produced in Taiwan. Significant commercial production began here during the 1960’s, although mango has been grown in China for centuries. Most of the mango crops can be found in the southern regions, where temperatures are warmer. Major importers of mangoes from China include Russia, Japan, and South Korea. Thailand is the third largest mango producer in the world, with 3.4 million tonnes produced in 2016. Thailand has about 753,671 acres dedicated to mango production. Thailand processes and exports this fruit, including in the following presentations: fresh, frozen, canned, and dried. The majority of fresh mangoes, however, are sold in domestic markets. Only about 2% of the fresh fruit is exported to South Korea, China, Japan, Malaysia, and Singapore. Mango sales total over \$50 million. Bangladesh is the eighth largest mango producer in the world, with 1.16 million tonnes produced in 2016. Thailand has about 753,671 acres dedicated to



mango production. The presented export performance of fresh mangoes in the world (Table 1.1).

**Table 1.1: Export of fresh mangoes to top 9 countries in 2013-2020**

Mango exporting country	Export percent
Thailand	18.91
Mexico	11.82
Netherlands	10.72
Brazil	10.61
Peru	10
Hong Kong	3.7
India	3.54
Indonesia	3.37
Spain	2.9

Source: FAO (2020)

More than 90% of mango products exported from the ECOWAS region are fresh fruits. This shows that little processing takes place. Main exporters are Côte d'Ivoire, Mali, Burkina Faso and Ghana. In all countries, export performance would be enhanced if processing industries are established to enhance value addition. Other products that would thus emerge would include mango juice, dried mangoes, fresh mango cubes (slices), puree, chutney, pickles, jam and mango pulp. These products would ensure longer shelf life of output, easier and more convenient local and export marketing. They would also, to some extent, take care of the problem of seasonality of supply as products could be preserved to be used during the off-season. India represents one of the most successful stories in the export of value added mango products, with over 50% of its US\$ 12.6 million mango export income coming from processed products. Another similar successful processing country is Costa Rica, where exports of dried mangoes compete reasonably with its fresh fruit exports. However, achieving this goal for ECOWAS mango exports is constrained by a number of challenges, mainly emanating from a poor production environment due to weak infrastructures such as power and roads, inadequate finances, high cost of funds, etc.

## **1.2 Statement of the Problem**

There are number of proven recommended technologies but not all of those are accepted by the farmers although they are intelligent and hard working. As a result a wide gap between actual achievement and achievable potential mango production still exists.

Attainment of highest possible production in mango and thereby maximum profit may be achieved only when farmers are well equipped with required technological knowledge and needed inputs and other relevant supports and most authentically if knowledge and skills are applied correctly in the field. Hence, a systematic research is needed to correctly estimate the levels of postharvest losses, both quantitative and qualitative (nutritional) in Bangladesh. Identification of technological and knowledge gaps existing in the entire value chain of mango production is also a critical research question. Researchers selected Shibganj upazila under Chapainawabganj district to find out farmers knowledge and practice level on export quality mango production. To form a research question, it is very important to determine what type of research will be conducted such as qualitative, quantitative or mixed study. Answering the research questions may help to address a research problem. It determines where and what kind of research the writer will be looking for along with the specific objectives of the research paper. To find-out farmers' problematic on export quality mango production. However, in order to make the present study meaningful attempts were made to find-out the answer of the following questions:

1. What is the scenario of socio-economic profile of mango farmers in study area?
2. What is the knowledge and practices of mango farmers on export quality mango production?
3. Are there any relationships between the selected characteristics of the farmers with their knowledge and practices on export quality mango production?

### **1.3 Specific Objectives**

Specific objective(s) are pre-requisite for conducting any research work which gives a guideline to researcher to obtain concerned goal. From the above statement of problem the researcher had set the following specific objectives:

1. To describe socio-economic profile of the mango farmers.
2. To determine the level of extent of knowledge and practice of mango farmers on export quality mango production.
3. To explore relationship between each of the selected characteristics of the farmers and their knowledge and practices of export quality mango production.

#### **1.4 Justification of the Study**

Mango has a lot of carotene. Moreover, there are vitamins and minerals. Mango is a commercial horticultural crop in many countries of Southeast Asia, India, Pakistan, Philippines, Malaysia, Thailand, Burma, Srilanka and Java. The main mango producing countries of world are India, Pakistan, Mexico, Brazil, Haiti, the Philippines and Bangladesh. The Northern and North-western parts of Bangladesh are well known for better mango production. In shibganj upazila under Chapainawabganj is one of the districts of these parts. Farmers in shibganj upazila depend on mango production as the major source of income but no study was conducted on export quality mango production as well as on growers in this area. The main reason for the decline in export quality mango production is due to the lack of proper knowledge, GAP (Good Agricultural practices) and negligence. In shibganj upazila mangoes is very sweet and of good quality and that is why its demand in international market is increasing day by day. This is why the study was conducted in the shibganj upazila under Chapainawabganj district.

#### **1.5 Assumption of the Study**

Assumptions are things that are accepted as true or at least plausible by researcher and peers who will read the thesis. According to Good (1945), an assumption is the supposition that an apparent fact or principle is true in the light of the available evidence. Assumptions generally refer to the characteristics of the data, such as distributions, co-relational trend, variable type etc. violating these assumptions can be drastically invalid results though this often depends on sample size and other considerations. The researcher made the accompanying assumptions while undertaking this study:

- i. The responses furnished by the respondents were reliable. The truth about their opinion and interest were expressed by them.
- ii. The researcher who acted as interviewer adjusted to social and environmental conditions of the study area. Hence, the collected data by him from the respondents were free from bias.
- iii. The respondents included in the sample for the study were competent enough to furnish proper responses to the queries included in the interview schedule;
- iv. Views and opinions furnished by export quality mango production farmers included in the sample selected those of the population of the study.

## **1.6 Limitations of the Study**

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

1. Few specific unions and villages in Shibganj upazila under Chapainawabganj district will be selected as the study area Northern region of Bangladesh.
2. The study was confined mainly to status of export quality mango production, mango varieties produced and problems confronted by the grower.
3. Out of many characteristics of mango growers only twelve characteristics were selected for investigation in this study.
4. For information about the study, the researcher was depended on the data furnished by the selected respondents during data collection.
5. The respondents for data collection were kept limited within the heads of farm families.
6. No secondary data input there.
7. Various problems in adopting export quality mango production were likely to be confronted by the growers.

## **1.7 Definition of the used Terms**

**Knowledge:** Knowledge is the facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject.

**Export:** Exports are goods and services that are produced in one country and sold to buyers in another. Exports, along with imports, make up international trade.

Quality: The standard of something as measured against other things of a similar

Kind; the degree of excellence of something.

About mango: Mango (*Magnifia indica* L.) is one of the most common and popular fruit and often mentioned as the 'King of fruits'.

Production: Production is a process of combining various material inputs and immaterial inputs (plans, know-how) in order to make something for consumption (output). It is the act of creating an output, a good or service which has value and contributes to the utility of individuals.

Post-harvest: In agriculture, postharvest handling is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. Postharvest treatment largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product.

Harvest: Harvesting is the process of gathering of crops or fruits of one growing season.

Innovativeness: Innovativeness is a state of mind that is attributable to the recognition and active pursuit of opportunities for innovation. It's innovativeness that allows for leaders to leverage the influence of associations, create space for innovation, and apply innovativeness regularly.

Training exposure: It was used to refer to the completion of an activity by the farmers which were offered by the government, semi-govt. or non-government organization (s) to improve the knowledge & skills of farmers for better performing an agricultural job. It was measured by the number of days of training received by the respondent.

Sorting: The purpose of sorting is grading fruit according to parameters such as dimensions (diameter, length and shape), thus defining sorting classes for the many varieties of fruit. Fresh fruit and vegetables are then examined by graders and sorting systems according to external (color, skin defects, etc.).

Grading: Grading of fruits is a very important operation as it fetches high price to the grower and improves packaging, handling and brings an overall improvement in marketing system. The fruits are generally graded on basis of size and graded fruits are more welcome in export market.

**Chilling injury:** Chilling injury is damage to plant parts caused by temperatures above the freezing point (32°F, 0°C). Plants of tropical or subtropical origin are most susceptible.

**Top-working:** Top-working is the name for grafting established trees to another variety. The existing tree, the "stock", is cut back, leaving just one or two limbs (nurse limbs) to supply the tree with energy. ... Once the tissues of stock and scion make new connections, the scions begin to grow into a new tree.

## CHAPTER II

### REVIEW OF LITERATURE

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing researcher to identify relevant theories, methods and gaps in the existing research. Conducting a literature review involves collecting, evaluating and analyzing publications (such as books and journal articles) that relate to research questions. The researcher made an elaborated search of available literature for this research. However, no study was found to be specially undertaken in this direction. This present chapter has portrayed some reviews of interlinked knowledge on this aspect that is endeavored. The interlinked reviews easily portrayed basic objectives of the study as far as possible. All the reviews in this chapter are from secondary sources and no new or original experimental work is reported there. Review of Literature of this study is presented in (10) sections.

#### **2.1 Concept on knowledge of export quality mango production**

Knowledge is the facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject. That experience, or percept, is the joint product of the stimulation and of the process itself. Relations found between various types of stimulation (e.g., light waves and sound waves) and their associated percepts suggest inferences that can be made about the properties of the perceptual process; theories of perceiving then can be developed on the basis of these inferences. Because the perceptual process is not itself public or directly observable (except to the perceiver himself, whose percepts are given directly in experience), the validity of perceptual theories can be checked only indirectly. That is, predictions derived from theory are compared with appropriate empirical data, quite often through experimental research. The exporters form contract farming with the mango farmers who produce quality mangoes and ship the produces to the exporters. Then, the exporters undergo all the technical and chemical steps to package the exportable items, and finally, the mangoes are exported to the detained countries through the air. As such, the supply chain of exportable mangoes constitutes inbound and outbound activities. Though inbound supply chain activities like producing by the farmers to reaching the inputs to the exporters from Chapainawabganj do not encounter major challenges, outbound functions, in particular, triggering technical aspects to move on the products by the exporters seem to be much more challenging

## **2.2 Concept on practice of export quality mango production**

The present study was undertaken with a view to have an understanding about the status of mango production, mango varieties produced, problems confronted by the grower and to explore their relationship with some selected characteristics. The findings of this study will be particularly applicable to the farmers of the respective study area. The findings may also have applicability to other areas of the country when the physical conditions are mostly similar with those of the study area. However, the findings of the study will be helpful for the specialist of different organizations and planners, policy makers and horticulturists to deal with mango production. The administrators, supervisors, field workers and others who are to work in the field of mango may find this study informative. This study could be helpful for commercial export mango production Programme in one hand and motivate to the authority to reduce hazards cause decline in mango production and source of earning money and reducing poverty (sultana et al., 2018).

## **2.3 Knowledge issues on export quality mango production**

RHRSC (2015) points out a few challenges as to produce and export mangoes from Chapainawabganj consist of natural calamities, short duration of mango, lack of high water treatment, extensive use of chemical to protect and ripe mangoes are mentionable. Moreover, dissatisfactory packaging and transportation system, unawareness of the farmers about export condition, exporters' knowledge gaps about Bangladeshi mangoes, improper research and extension initiative to promote mangoes, fewer air cargoes, insufficient cooperation from the government and lack of suitable principles regarding mango export are considered the other challenges.

RHRSC (2018) They include seeking permission from plant quarantine; listing farmers for contract farming through the registered forms from the allowed exporters; ensuring safe and chemical free quality mangoes under contract farming; continuation of the GAP principles from commencement of mango production to the end of export; taking sufficient measures to be taken to free mangoes from fruit flies with proper documentation for traceability. Making sure satisfactory arrangement for controlling mango stone weevil and mango pulp weevil; carrying out cleanliness campaign every year in the mango orchard; and collecting to packing mangoes should be done in way so that mangoes are not attacked by flies. In addition to these, maintenance of fruit bagging technologies as per international standard; applying the best tools and techniques in the garden; using of cooling van for transporting mangoes from packing to shipment



Quroshi and Meah (1991) made a survey on postharvest losses in 18 mango varieties in 161 temporary storage of wholesalers and retailers at 20 spots in six districts of Bangladesh during May-August, 1987. The average loss was 12.5 percent. In different varieties the losses varied from 6.3%, with a maximum in Dudshor and Kohitoor (16.3%), followed by Himsagar (15.4%). The popular varieties Fazli and Aswina suffered losses from 6.2-17.0% and 7.5-17.5%, respectively in six districts. A linear relationship between the per cent fruit loss and the transport distance was reported. The maximum loss was recorded in Chittagong (16.2%) followed by Comilla (15.6%), the most distant retailing spots and the minimum in Chapai Nawabganj (7.6%), the production area.

Hasan et al., (2014) estimated postharvest losses of fruits and vegetables in Bangladesh ranged from 23.6 to 43.5% of total production. The total loss of mango was estimated to be 27.4% (at growers' level 4.4%, bepari 8%, wholesaler 8% and retailer level 7%). This was probably due to conventional harvesting methods, ignorance of the pickers, and most importantly due to the carelessness of the pickers. Damages of mango fruits included bruises, cuts, sap burn and fruit cracking. Bruises were the major cause of mango postharvest damage at the growers (51-88%) and bepari (28- 100%). 24-88% bepari used straw in the bamboo basket to reduce postharvest loss during transport from one place to another, whereas 12-56% of the bepari used paper during packaging of mango. The losses are due mainly to the sub-standard postharvest practices, inadequate transport, lack of storage facility, and ignorance of the stakeholders. From the foregoing literature it is clear that quite a large number of research works have been carried out in Bangladesh and elsewhere in the world. However, reports on important fruit mango is lacking, and a systematic approach to estimate their losses in quantitative and economic terms is the need of the time in Bangladesh. More specifically, the postharvest losses of banana, citrus, grapes, apples, avocado, and papaya were reported to be 20-80%, 20-95%, 27%, 14%, 43%, and 40-100%, in the developing countries, respectively (NAS,1978), Singh (1960) reported from India that the postharvest loss of fresh mango fruit due to microbial decay varied from 20-33%. Srinivas et al., (1996) provided more specific reports on postharvest losses of mango of varieties „Totapuri“ and „Alphonso“, where the losses were 17.9% (3.5% in orchard, 4.9% during transportation, 4.1% in storage, and 5.4% in retail level) and 14.4% (1.9% in orchard, 3.7% during transportation, 3.7% in storage and 5.3% in retail level), respectively.

Roy (2005) Farmers transportation loss was observed in any packages. Better quality mangoes were obtained after transportation in corrugated cartons, wooden boxes and plastic crates compared to traditional bamboo baskets. Additional costs of 2-3 Tk./kg for packaging can be offset by premium prices of good quality mangoes. For bulk carrying of mangoes, 20 kg plastic crates and 25 and 30 kg cartons, and for supermarket selling, 5 and 10 kg cartons were found suitable. In terms of packaging cost, the plastic crate was the cheapest and can be used for 5 to 6 years. Though bamboo baskets are cheaper and traditionally used, quite significant loss of fruits occurred.

An investigation was carried out by Yadav et al., (2007) to assess the level of knowledge of mango orchardists regarding postharvest processing and marketing practices in Saharanpur and Bulandshahr districts of western Uttar Pradesh, India. The percentages of the orchardists had knowledge on postharvest management and grading were 52.13% and 51.06%, respectively. Most of the orchardists (60.64%) were not familiar with storage of fruits after harvesting.

#### **2.4 knowledge issues on export quality fruits and other production**

Rahman (1995) conducted a study on farmers' knowledge on improved practices of potato cultivation. His study at Kajipur thana under Sirajgonj district revealed that 54% of the potato growers possessed good knowledge, 34% poor knowledge and the rest 12% possessed excellent knowledge on improved practices of potato cultivation.

Afique (2006) stated that majority (97.5 percent) of the respondent rural women had favorable perception while only 2.5 percent had moderately favorable perception of the benefits of agricultural model farm activities of Sabalamby Unnayan Samity (SUS).

Islam (2005) found in his study that 57.8 percent had high Knowledge, 41.4 percent had medium Knowledge and only 0.8 percent had no Knowledge about causes of monga. On the other hand, 91.4 percent of the respondents had high perception compared to 8.6 percent having medium knowledge and none had no knowledge about remedies of Monga in Kurigram district.

Sayeed (2003) conducted a study on Knowledge on farmer's benefits from using manure towards Integrated Nutrient Management (INM) for sustainable crop production. He found that 56.7 percent of the farmers had no knowledge of benefit of using manure towards INM for sustainable crop production, while the rest 43.3 percent had favorable perception of this issue.

Chakraborty (2002) conducted a study on Sub Assistant Agriculture Officers' (former BS) perception of changes from mono rice culture to diversified crop cultivation. He reported that the highest proportion (68.0 percent) had high perception and 10.0 percent had low perception of changes.

Kabir (2002) observed that majority (65.0 percent) of the farmers had moderately favorable perception on the effect of Barind Integrated Area Development Project (BIADP) towards environmental up gradation where only 16.0 and 19.0 percent of them had low and highly favorable perception respectively on this issue.

Uddin (2004) conducted his study on farmers' perception of sustainable agriculture. He found that knowledge of environment friendly farming had significant and positive relationship with their perception of sustainable agriculture. He further conduct environment friendly farming had higher perception of sustainable agriculture.

Saha (2001) conducted a study on farmers' knowledge on improved practices on pineapple cultivation. His study a Ausnara union under Madhupur upazila of Tangail district revealed that 62% of the farmers possessed good knowledge, 33% poor knowledge and only 5% possessed excellent knowledge on improved practices on pineapple cultivation.

## **2.5 Practice issues on export quality mango production**

The financial express (2021) Growing exportable mangoes demands more investment than is required for the fruits aimed at local consumption. Growers are prepared to spend more on advanced methods of farming technologies, as they know mango exports fetch more profits than they earn in local markets. Growing orchards of quality mangoes alongside the native ones has been in practice in this land for ages. The soil and weather of the southwestern Bangladesh are especially suited for growing high-quality mangoes. They are different from the fruits grown elsewhere in South and Southeast Asia. It's undeniable that state patronage and expediting the application of modern agro-technology to the sector can make Bangladesh mangoes stand out in the overseas market. Nation's export earnings from mango are still negligible. The authorities' continued focus on the fruit-crop and its rising popularity overseas can, of course, make its economic potential a welcome reality.

According to Ahmed (1992), there were three principal types of marketing channels in the domestic market of vegetables, such as local, regional and inter-regional. The first type of channel is characterized by the intervention of fewer middlemen between vegetable producers and consumers; regional marketing channels consist of an extended chain of

intermediaries than the local marketing channels, and the inter-regional channels are the most lengthy, both in terms of the number of traders involved between producers and consumers, and the distance over which the vegetables are transported. A research project was carried out in Chapainawabganj district to develop suitable packages to minimize long distance transportation loss of mango during June to August 2004. In Bangladesh, fruits are generally handled and transported from one place to another in bulk in gunny bags, bamboo baskets and temporarily packing with leaves. As a result, a significant amount of fruits are damaged, and also qualitative loss occurs.. Four different types of packages, namely corrugated fiber board cartons, wooden boxes, plastic crates and bamboo baskets were used for the transportation of mango.

## **2.6 Practice issues on export quality fruits and vegetable production**

Mandal (2016) found that, Majority (71.3 %) of the watermelon farmers had ‘medium practice’, while 16.1 percent farmers had ‘high practice’ and 12.6 percent farmers had ‘low practice’ of watermelon cultivation.

Calatrava (2014) Mango production and trade at all levels (local, domestic and international) generate sizeable benefits and externalities for producers, manufacturers and traders, as well as for rural societies in the producing countries. Moreover, its benefit to worldwide consumers in health and dietary terms is also well known and it is also one of the main sources of fresh fruits for many poor people in the locality of many developing countries (Calatrava.2014). Thus, maintaining and ensuring the quality and safety of harvested mangoes from the farm until the fruit reaches the consumer should be the prime consideration of all stakeholders in the mango supply chain that will also help in reducing level of post-harvest loss in the supply chain.(Esguerra and Rolle.2018)

Mondal (2014) found that, majority (69.9 percent) of the strawberry farmers had medium practice, while 17.7 percent farmers had high practice and 12.4 percent farmers had low practice on strawberry cultivation.

Nawaz (1968) conducted a study on the characteristics of farmers and adoption of improved farm practices in Pakistan villages. He indicated that the age of the farmers was positively associated with the adoption of improved farm practices.

Altendorf (2017) The export of fresh mango cannot be said to be attaining the potential matching the factor endowments of Bangladeshi fresh mango. Being eight in the mango producing countries in the world, Bangladesh has no significant position in the global

export market yet which could have added more value not only to the farmers but also to the economy in general. It has been mentioned in many occasions by many of the stakeholders that Participation in Implementation or adaptation of Global GAP is important to increase export and mostly to enter the international mainstream markets (Hossain, 2007).

Sarker (1997) conducted a study to determine the relationship between selected characteristics of potato growers and their adoption of improved potato cultivation practices in five villages of comilla district. He found that education of potato growers had significant relationship with their adoption of improved potato cultivation practices.

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern Boro-rice cultivation practices.

Gogoi and Gogoi (1989) in their study observed that size of land holding of farmers had a significant relationship and positive effect on their adoption of plant protection practices.

Islam (2002) found in his study that majority (87 percent) of the ecological farmers of Proshika had medium adoption while only one percent had low and 12 percent had high adoption of ecological agricultural practices. Considering extent of adoption, the mostly adopted ecological practices, as stated in descending order, were compost, mulching, inter and mixed cropping, multi-layer crop, crop rotation, green manuring, mechanical control of pest, disease and pest resistant varieties and botanical pesticides.

Hussen (2001) conducted a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that the farm size of the cane growers had a positive significant relationship with their adoption of modern sugarcane cultivation practices.

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that the farm size of the farmers and a positive significant relationship with their adoption of IPM practices.

Sarker (1997) found that farming experience of potato growers had no significant relationship with their adoption of improved potato cultivation practices.

Hossain and Crouch (1992) revealed that income of farmers had a significant relationship with adoption of improved farm practices in Bangladesh.

Hussen (2001) conducted a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that annual income of the cane growers had a positive significant relationship with their adoption of modern sugarcane cultivation Practices.

Hossain (2003) found that the annual income of the respondents had positive and significant relationship with their knowledge on modern Boro rice cultivation practices.

Islam (2008) found that vegetable cultivation experience had a positive and substantial significant relationship with knowledge on vegetables production activities by woman members in homestead area under world vision project.

Sarkar (1997) found that extension advice had a positive significant relationship with farmers' adoption of improved cultivation practices. Chowdhury (1997) also observed similar findings. With few exception like Alam (1997) reported a non-significant relationship between extension contact and adoption, most of the studies found a positive relationship between extension advice and adoption of agricultural innovations. Thus, the literature supports that extension advice has a great influence in adoption of agricultural innovations. In fact, when farmers had some advice about what to do and how to do, it was comparatively easier for them to adopt the innovation or technique than the farmers who did not receive any advice. Extension advice helped them in decision making on what the innovation they will like adopt and what should they do in future for better result. Thus, it can be concluded that extent of advice seeking is positively influenced farmers' adoption decision of improved practices like intercropping.

Hussen (2001) conducted a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that extension contact of the growers had significant relationship with their adoption of modern sugarcane cultivation practices.

Koch (1985) conducted a study in the north western Orane Free state, South Africa, concerning perception of agricultural innovations, aspirations knowledge and innovation adoption. It was found that there was a strong positive relationship between perception, knowledge and practice adoption. This findings very much in agreement with that of Rogers and Shoemaker (1971). However, a significant difference was found between participant and non-participant farmers with respect of knowledge level and adoption behavior and there was significant association. Between knowledge and adoption with

respect to adoption of an improved package of practices in paddy production by participant and non-participant farmers as reported by Reddy *et al.* (1987).

## **2.7 The interlinked reviews on export quality mango production in Bangladesh**

Mango (*Mangifera indica*) is a fleshy stone fruit belonging to the genus *Mangifera*, consisting of numerous tropical fruiting trees in the flowering plant family Anacardiaceae. The mango is native to the south Asia from where it was distributed worldwide to become one of the most cultivated fruit in the tropics. Mango (*Mangifera indica*) is produced in most frost free tropical and sub-tropical climates, more than 85 countries in the world cultivate mango. The total production area of mango in the world is around 3.69 million hectares. The total amount of mango production in the world is around 35 million tons by the year 2009 (Hussen and Zeru, 2013).

The rank of Bangladesh in mango production is third among the tropical fruits grown in the world with total production at nearly 35,000,000 tons (FAO, 2009). Furthermore, its mango rank is second in terms of area and occupies the third position in production among the fruits grown in Bangladesh (Kobra *et al.*, 2012). The leading mango growing districts are Nawabganj, Rajshahi, Rangpur, Dinajpur and Kushtia. In the year 2010-2011, Bangladesh produced around 1.05 millions of tons of mango (UN FAOSTAT, 2011)

Mango grows in almost all of Bangladesh but commercial and good quality mangoes grown in the North-Western districts of the country. The leading mango growing districts of the country are Rajshahi, Chapainawabganj and greater Dinajpur. Mango is seasonal cash crop of North-Western region of Bangladesh which dominates the economy of Rajshahi and Chapainawabganj district. More than 500 varieties of sweet edible mangoes can be found in Rajshahi and Chapainawabganj district. It is estimated that around 85% people of the mentioned districts are directly or indirectly dependent on mango cultivation and business (Dhaka Tribune, 2018).

When farmers first began producing safe mangoes following a Chinese method of using fruit bags in mango trees (to combat fruit flies) in 2015, the potential of mango exports came to light. For the first time, 165 tonnes of mangoes were sent to Europe and the Middle East that year. Of this, only 10 tonnes were from Rajshahi and Chapainawabganj districts with the rest from southern districts, according to the DAE. Next year saw the highest export of mangoes till date -- 665 tonnes -- of which 90 percent were from Rajshahi and Chapainawabganj, the major mango-producing districts in the country. Inspired by the

2016 export, the farmers of Rajshahi region produced some two crore safe mangoes with an export target of 5,000 tonnes in 2017. But they managed to sell only 2.8 tonnes to exporters that year. Most of the 324 tonnes of mangoes exported in 2017 were bought from markets and not from the contract farmers, DAE officials and farmers confirmed. In 2018, most contract farmers were once again unable to sell their produce to exporters and only 231 tonnes of mangoes were exported that year. Last year, mango exports fell to below 100 tonnes -- an 85 percent decline since 2016. (The daily Star, 2020).

The first interviewee and secretary of mango production association and pioneer of mango export in Chapainawabganj said that export quality mangoes were being produced from 2016 following good agricultural practices (GAP) though no authority in our country persists to look after the GAP. However, it is 90% possible to accommodate the GAP conditions to produce quality mangoes. The second interviewee claimed that best effort is carried out to produce quality mangoes for exports, but due to extensive sorting and grading by the exporters, the quantity reduces by 10% at the end, and they are capable enough to document the required papers entirely. The third interviewee who is altogether a farmer and middleman reported that he can send mangoes to the exporters on time as per the requirements of GAP. The conditions of GAP are a bit tough though it does not pose any problem to produce export quality. The fourth interviewee who is a farmer and secretary of local mango and crops protection

Association urged that mangoes from Chapainawabganj are delicious, sweet and good enough unboundedly but they are fully uncertain about sending the quantity of mangoes due to the lack of permanent contract with the exporters or the middlemen. The fifth interviewee the senior scientific officer and mango export specialist at mango research center replied as to quality mango export is that farmers are in practice under the GAP since 2015 using the fruit bagging technology resulting in the production of 100% exportable mangoes. However, it may not be possible to test the quarantine here in Chapainawabganj (Islam et al., 2019)

According to DAE, 788 tons of mangoes were exported in 2014-15, but it drastically dropped to 288 tones in the 2015-16 fiscal year. There are several reasons behind this low tide in mango export trade. The biggest reason is our negligence. I spoke to some of those who took part in the first mango export at Walmart. They say how a possibility is wasted in the bud. The first blow came because of the dishonesty of some people between farmers and exporters. Farmers said that the quality of the mangoes they gave was mixed with the



mangoes bought from outside and the quality was ruined. As you already know GAP (Good Agricultural Practice) wasn't properly maintained in some cases. If you want to send agricultural goods to any country in the European Union, you have to abide by the EU's compliance in production and packaging. Due to lack of will of those, who were involved in these export activities (The daily Star, 2020)

Bangladesh is positioned as the eighth country in the world in terms of mango production although in exporting its place is not mentionable (RHRSC, 2015).

On 24th of June 2015, Chapainawabganj initiated shipping mangoes for the first time to the supermarkets of the United Kingdom creating a huge commercial potential for mango growers to gain higher prices of their best quality harvest. In the beginning, two tons of Langra and Fazli varieties of mango were shipped to the Walmart Chain Super Shop in the UK that is recognized as the first export journey of mangoes of Chapainawabganj to mainstream international supermarket through Messers Barkullah Traders in the district town. The mangoes were being sent to the chain shop and other Bangladeshi markets in the UK through Deep Enterprise (The Daily Observer, 2015).

Mango export has significantly dropped in 2016 only after one year start of shipment of this delicious fruit due to the failure of quarantine tests adhere to the European standard (Mirdha, 2016).

Though Bangladeshi mangoes are consumed in the ethnic market, and the formal export commenced on 17 May 2015 making Bangladeshi mangoes available for consumption of the UK people. However, the journey towards export started with ASDA (a Wal-Mart subsidiary) in early 2014 with a sample of Himsagar, Langra and Amrapali mangoes trailed by a Bangladeshi export-oriented firm known as DIP international. Within a shorter possible of time, the supply chain of mango export has faced few challenges as the participants in the supply chain of mango exporting has not been able to maintain few conditions set by the importers (FAO, 2015).

The conditions set for exportable mangoes include germ, insects and spot free mangoes with an average weight of each mango 200 to 350 kilogram, its colorful skin solid core part inside along with light sweetness (RHRSC, 2015).

Exporters have mainly set three conditions consisting of quality standard, on-time delivery and proper documentation for mangoes from Bangladesh to be exported to the European countries. In addition, few guidelines to produce quality mangoes known as good

agricultural practice (GAP) are also given to the mango growers. However, it is almost difficult to follow all the guidelines to the point. Communication gaps persist between the farmers and mango exporter regarding the quality of exportable mangoes. Farmers perceive that their harvested mangoes are delicious and standard enough to meet the international standard whereas international standard requires some specific conditions to be met, and farmers lack adequate information about the international standard of mango production (RHRSC, 2015).

## **2.8 The interlinked reviews on export quality mango production Worldwide**

The top ten major mango-exporting countries according to steadily increasing of mango harvested area, India takes the largest fresh mango export market share from 2008. However, up to 2007 Mexico was the number one exporter of the fresh mango export market. India and Mexico are the dominators of global fresh mango export market since 2003. In 2009, India accounted for a share of 22.84 % of total world export followed by Mexico (18.53%), Thailand (11.47%), Brazil (8.79%) and Pakistan (5.86%). Other major exporters include the Netherlands (major re-exporter), Peru, Ecuador, the Philippines, and Guatemala (Evans and Mendoza, 2009 and FAOSTAT, 2012)

Fruits and vegetables are considered to be the protective food because it helps us to develop a defensive mechanism in human system. Mango is called as “The King of Fruits” preferred by all sections of people for its delicious taste, flavor, attractive color, nutritive value and superior fragrance. India is the topper in mango production in the world. The important mango producing states in India are Andhra Pradesh, Utter Pradesh, Karnataka, Bihar, Gujarat, Maharashtra, Tamil Nadu, West Bengal, Kerala and Orissa. The Productivity of mango found to be declining over the years. The National average productivity is found to be as low as 10tonnes per ha (Biswas and Lalitkumar, 2011)

Fresh Mango and Processed Mango products are exported to different countries. From India major mango importing countries are United Arab Emirates, Bangladesh, United Kingdom, Saudi Arabia, Kuwait, Qatar, Bahrain, Nepal, United States of America, Oman, Singapore etc. and the foreign exchange earned from such exports amounts to about Rs. 2005 million (Biswas and Lalitkumar, 2011).

In India, about 1,500 varieties of mango are grown including 1,000 commercial varieties. Each of the main varieties like Alphonso, neelum, mallikaarjun etc. has a unique taste and flavor. Mango varieties having good demand in international market are Alphonso, kesar,

banganapalli, dasheri etc. This remarkably marks great potential for other Indian varieties to explore in the international market. Keeping in view the same, the export figures are not healthy, like we are exporting only 41.2 K tonnes of quantity to major export destinations such as UAE, UK, Saudi Arabia and Kuwait etc. It indicates that production to export share is only 0.22 % mango exports to the United Kingdom increased in value by 153 percent between 2012 and 2013. During the same period, export in value to Germany increased by 91 percent while the one to Qatar increased by 67 percent. It is not clear whether exports to Qatar are fresh or processed mango; exports to Oman are fresh mango. (ITC Trade Map 2014).

The study revealed India is native to mango and is also the largest producer of mangoes with 44.14 per cent of the total world production with the help of secondary data for a period 10 years. The export of fresh mangoes has increased from 35.2 crores in 1991-92 to `162 crores in 2010-11. The paper attempted to quantify the changing structure of Indian mango exports. The study has categorized as stable market unstable markets (Nepal, Saudi Arabia) based on the magnitude of transition probabilities. The major export markets for Indian mangoes are Bangladesh (46.22 %), U.A.E (33.26 %), Nepal (6.06 %), Saudi Arabia (3.63 %) and UK (3.06 %). The study concluded that efforts are also needed to improve the efficiency of production and quality in order to stabilize the markets and also to make the product acceptable and price competitive in other importing countries (Kusuma and Basavaraja, 2014).

Thus, on-season production still contributes the greatest share to total mango production in Thailand. Of the more than 50 described mango varieties grown in Thailand, four are grown for export: Nam Dokmai, Nam Dokmai Si Thong, Maha Chanok and Chok Anan (DOA 2012). For the export business, year round production is necessary to satisfy demand, and this is achieved due to staggered production activities based on chemical flower induction using paclobutrazol (Hegele et al. 2006), as practiced across many intensively managed orchards in central Thailand. However, in the northern parts of the country, climate peculiarities still impose restrictions on year round production. Among the different mango varieties Chok Anan takes a special position, as only variety which flowers naturally up to three times per year. However, its importance in terms of exports has decreased, as, due to phytosanitary problems in the past, it cannot be sold in Japan, which is the most important mango export market for Thailand. On a national level, constant supply can be obtained through sequential on-season production at different

locations distributed over different climate zones in the country, and nowadays, 20 grower groups operate in well-organized clusters, these being: joint ventures among growers, the Department of Agriculture (DOA), the Department of Agricultural Extension (DOAE), chemical supply companies, and exporters (Chomchalow and Songkhla, 2008).

Kenya however, remains a smaller player in the global mango trade, exporting approximately 2% of national production or 1% of the fresh mangoes traded on the world market (GoK/ITC/FPEAK, 2012). In 2011, Kenya earned Kshs 1 Billion (\$ 11.1 Million) from mango exports. Between 2006 and 2010, Kenya's mango exports grew by 17.7 % per annum, the sixth fastest growth among exporting economies (ITC 2012). These projections corroborate the National Mango Business Plan estimate of 50,000 in 2022 (GoK/FPEAK/ITC, 2012).

Mangoes exported to some European countries were intercepted, confiscated, and destroyed because of the presence of insects considered as quarantine pests, thus leading to huge economic losses to the exporters and the whole horticultural sector of most of the exporting countries including Ghana (ACP-EU, Newsletter 2013)

While currently only 3.52% of the world production of mango is traded globally (Evans and Mendoza, 2009),

The noticeable export quantities were increasing since the late 1990s. Evans and Mendoza (2009) mentioned that Mexico, Brazil, Peru, Ecuador and Haiti were the main supplier of North America's imports. The export market share of the West Asian was predominated by India and Pakistan. Thailand, Indonesia and the Philippines were the main suppliers and owned more export share from Southeast Asian countries. South America and Asia countries were the main sources of European Union (EU) buyers. In 2009, the world total mango export quantity reached 12.56 million metric tons that was slight increase of 0.37% compared to the previous year, and were valued at 9.97 million US\$ (FAOSTAT, 2012).

Emphasized some important local mango cultivars grown at Chapai Nawabganj district has selected as a study area, from 2008-2011 fruiting seasons. Seven locally cultivated important mangos were selected. Both qualitative and quantitative characteristics are considered in order to study the variations among the cultivars. The studied characters indicated that there remained considerable variations among those cultivars and these

could be used for commercial basis as well as varietal development and needs to take action for sustainable conservation (Farzana Shirin et.al 2013)

Mango production in Pakistan has increased overtime but this increase is mainly attributed to an increase in area under cultivation and not due to significant increase in mango yield. Mango production in Pakistan increased from 519.2 thousand tones to 1816.7 thousand tones, showing an increase of 237 per cent over the years, 1970 -71 to 2013 -14 (PBS 2015)

Mangos are the leading fruit export after citrus and Pakistan is the fourth largest exporter of mangoes in the world followed by Mexico, India and Brazil (Ghafoor 2010).

Gulf countries (UAE, Saudi Arabia and Oman) are the major traditional export markets. The United Kingdom is the major market in Europe; Germany, France, Norway, Denmark, Switzerland, Singapore, Malaysia and Hong Kong are other important markets. The People's Republic of China and Iran are likely to emerge as future prominent markets for Pakistani mangoes. Exports are freighted by air to Europe and by sea to Gulf countries (PHDEC 2005).

Pakistani mangoes receive `USD 0.30 per Kilogram in comparison to USD 1.59 of Philippines, USD 0.91 of China, USD 40.48 of India and USD 0.46 of Thailand (Collins et al. 2006).

The Philippines holds a relatively significant position in the mango GVC. The country has been an important player in the global market since the 1980, with exports taking off in the 1990s. By 2015, the Philippines ranked seventh in exports of fresh and dried mango, with US\$91 million in fresh and dried mango exports for a 4% share of the global market (UNComtrade, 2016). It accounts for an average of 10% of world fresh and dried mango exports (FAO, 2016). Leading processors have been steadily gaining access to regional and global markets—major export destinations in 2015 were the US (24%), Hong Kong (17%), Republic of Korea (13%) and Japan (12%) (UNComtrade, 2016).

## **2.9 The research gap of the Study**

There are many researchers on mango production issue but no researches had so far been done to merely asses the farmers knowledge and practice export quality mango production. Moreover among the limited studies on export quality mango production. This was one of the research gaps of the study. Bangladesh ranks seventh among the top 10 mango producing countries. But Bangladesh is not among the top 20 mango exporting countries,

though mango production is increasing every year. Mango farmers are producing mangoes every year with interest to capture a big market. But why can't we enter the global market with all fruits and mangoes? This was the significant research gap of the study. Hence, the researchers carried out the present study farmers' knowledge and practice export quality mango production in shibganj upazila. There was no work before export quality mango production, they do not know whether the mango they produce is like exporting. This was one of the research gaps of the study. There has yet to be study that conducted to assess the farmers knowledge and practice export quality mango production compared with the study and control group farmers. This was also significant research gap of the study. The methodology of the present work unique in this regard. Lastly, no research were conducted to farmers' knowledge and practice export quality mango production taking the unique variables that were used in the present study. This is also a research gap of the present research.

## **2.10 Conceptual Framework of the Study**

A conceptual framework may be defined as the framework illustrates what one expect to find through a research. It defines the relevant variables for a study and maps out how they might relate to each other. This study tried to focus on farmers' knowledge and practice on export quality mango production. A dependent variable may be influenced and affected through interacting forces of many characteristics in its surroundings. It is possible to deal with all characteristics in a single study.

According to Rogers and Havens (1960) the conceptual framework is kept in mind while framing the structural arrangement for the dependent and independent variables. This study was expected that farmers' knowledge and practice on export quality mango production as a dependent variable, which was influenced by selected characteristics of the farmers as independent variables. Such as Age, Educational background, Effective farm size, Farming experience, Annual family income, Income from export quality mango production, Professional training experience, Experience in mango cultivation, Extent use of modern technology, Knowledge on export quality mango production, Problem of mango production. The conceptual framework or model of the study has been presented) (figure 2.1).

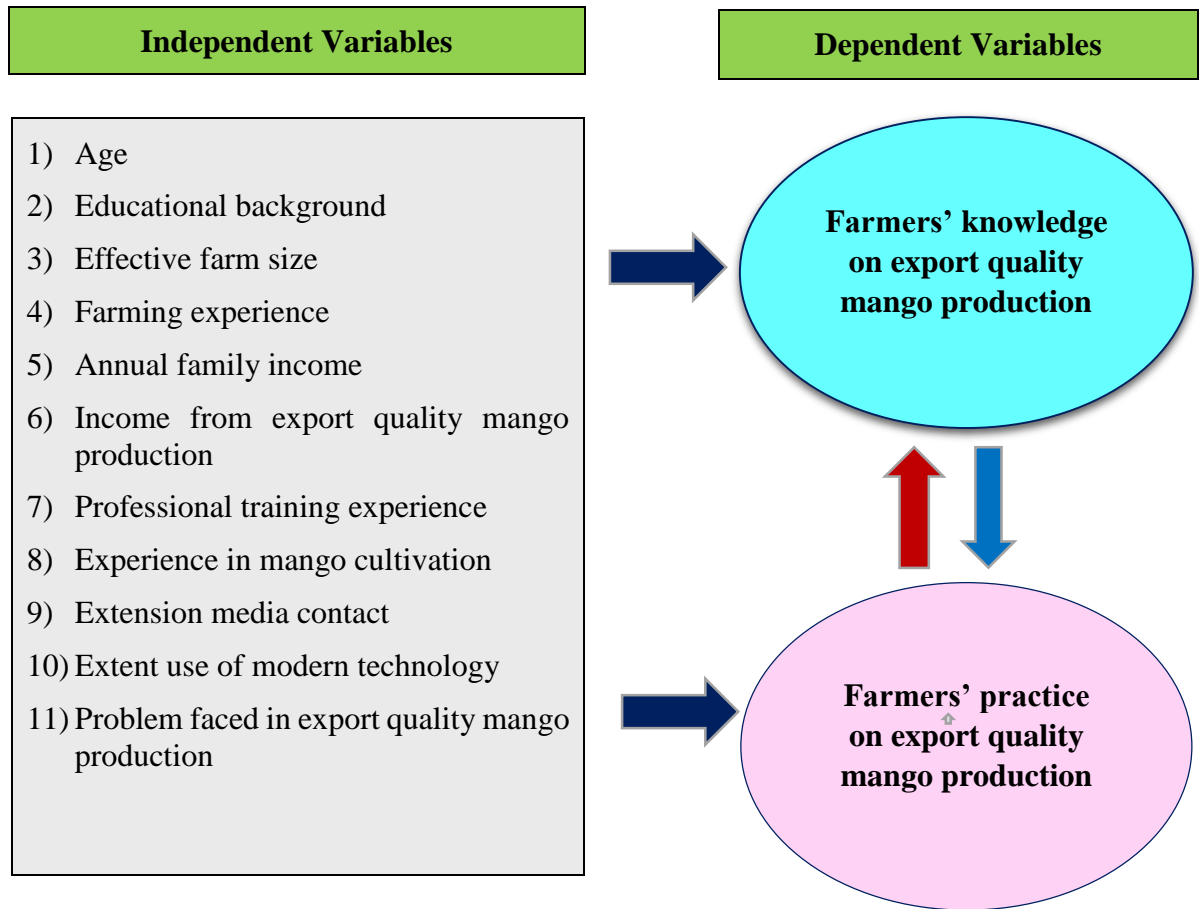


Figure 2. 1: A Conceptual Framework of the Study

## **CHAPTER III**

### **METHODOLOGY**

In any scientific research, methodology and procedures play an important role. To perform a research work systematically, careful consideration is a must. It should be such that it would enable the researcher to collect valid and reliable information to arrive at correct decisions. The methods and procedures followed in conducting this study have been described in below:

#### **3.1 Research design**

##### **3.1.1 Locale of the area**

The study was conducted in Shibganj upazila under Chapainawabganj district. The area was also prominent mango growing upazila under greater Chapainawabganj district. Shibganj upazila is consisted of 15 unions. An up to date list of all the mango growers of the six villages was prepared with the help of local Upazila Agricultural Office (UAO), Agricultural extension officer (AEO) Sub-Assistant Agriculture Officer (SAAO) and helped the researcher in this respect. Out of 15 unions of this Upazila, six villages were randomly selected in Shibganj upazila under Chapainawabganj district. The physical, social and cultural heritages of the people of the study areas were almost similar in many cases with other areas of the upazila. Figure 3.1 showed the map of the study.



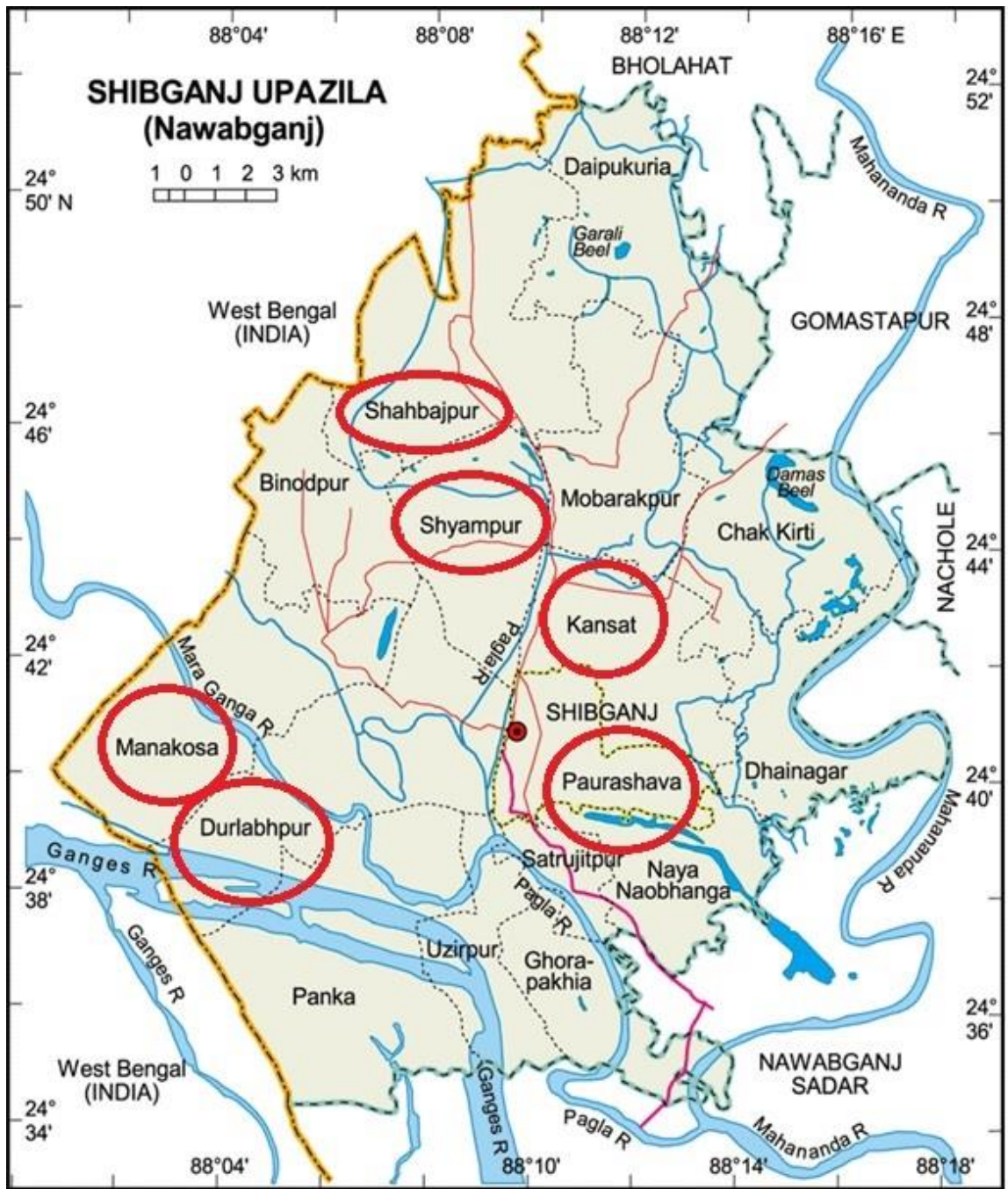


Figure 3. 1 A map of Shibganj Upazila under Chapainawabganj District

### 3.1.2 Population and sampling techniques

Considering time and money constrain survey area was selected purposively. Mango farmers operating within the Chapai nawabgonj district were taken into account for this study considering availability and easy access. To assess the socio-economic condition of mango farmers 6 villages from 15 union in shibganj upazila were covered. Export quality Mango producers of villages were chosen randomly for data collection. Farmers' from 6 villages were selected randomly for collecting information about their socioeconomic condition. 120 farmers were covered by this method randomly. The sample contained one hundred twenty (120) mango producers.

**Table 3.1 Population and sampling procedure**

Sl. No.	Villages name	Total population ( according to DAE, Shibganj)	Sample size	Sample percentage
1	Dhobra	105	21	17.5
2	Miapara	120	23	19.17
3	Kansat bazar	100	27	22.5
4	Katkhal	85	17	14.17
5	Monakosa bazar	90	15	12.5
6	kalupur	115	17	14.16
	Total	615	120	100

### 3.1.3 Variables of the study

In a descriptive social research, selection and measurement of the variable is a momentous task. An organized research usually contains at least two identical elements viz. independent and dependent variable. Variables are important for social research on which the statistical analysis was done by obtained score on these variables. The following 11(eleven) characteristics of farmers were considered as independent variables in this study and these are:

- I. Age
- II. Educational background
- III. Effective farm size
- IV. Farming experience
- V. Annual family income
- VI. Income from export quality mango production
- VII. Professional training experience
- VIII. Experience in mango cultivation
- IX. Extension media contact
- X. Extent use of modern technology
- XI. Problem faced in export quality mango production

In the study the dependent variable was farmers' knowledge and practices on export quality mango production.

### **3.2 Measurement for Variables**

Variables are measured in different parameter. The measuring processes or methods for the variables of this study are given below

#### **3.2.1 Measurement for independent variables**

As different parameters are used to measure different variables for the study, they are described separately below:

##### **3.2.1.1 Age**

Age of the respondent farmers was measured by the period of time from her/his birth to the time of conducting interview. It was measured in terms of actual year(s) on the basis of their response. A score of one (01) was assigned for each year. For example, if a farmer age was 40 years then her/his age score was assigned as 40.

##### **3.2.1.2 Education**

The educational background of a respondent was measured on the basis of her/his year(s) of schooling completed in any educational institute, which was measured by her/his response. A score of one (01) was given for each complete year of schooling. For example, if a respondent passed class Five (V) his education score was given as 05. If a respondent passed the final examination of class IX, his score was taken as 09. A score of 0.5 was given to that respondent who could sign her/his name only. A score of zero (0) was

assigned to the illiterate respondents who cannot read and write. The educational background was categorized into following level.

Category	Score
Illiterate	0
Can sign only	.5
Primary level	1-5
Secondary level	6-10
Higher Secondary level	11-12
Above Higher secondary	Above 12

### 3.2.1.3 Effective Farm size

The total land area possessed by the farmer under farm and homestead either his own or taken from other as Borga or lease was the basis of measuring the total farm size. It was measured in hectare scale by using the following formula for each farmer.

$$\text{Total Farm Size} = A1 + A2 + \frac{1}{2} (A3 + A4) + A5$$

Where, A1 = Homestead area;

A2 = Own land under own cultivation;

A3 = Land taken from others on Borga system;

A4 = Land given to others on Borga system;

A5 = Land taken from others on lease.

Data was first gathered in local measurement units such as decimal, Katha, bigha etc. and then converted into hectare. Thus, the total farm size was obtained by the above mentioned formula (giving a score of one point for each hectare of land).

### 3.2.1.4 Farming experience

Farming experience refers to the experience of a farmer in agricultural works in her/his field or others. It was expressed in terms of year(s). If a farmer has one years' experience on farming activities then it was assigned score of 01

### **3.2.1.5 Annual family income**

Annual family income of a respondent referred to the total earning by her/him and other members of her/his family from agriculture, livestock, poultry, fisheries, and other sources (service, business, daily wages by working, etc.) during a year. It was expressed in Taka. In measuring this variable, total earning of an individual respondent was converted into score. A score of one (01) was given for every one (01) thousand ('000') taka.

### **3.2.1.6 Income from export quality mango production**

Income from export quality mango production of a respondent referred to the total Yearly earning by her/him of all the farmers from export quality mango production were added together to calculate the actual income of the respondent. A score of one (01) was given for every one (01) thousand ('000') taka.

### **3.2.1.7 Professional training experience**

Professional experience refers to the extent of participation of the farmers' to any kind of agricultural training program related to export quality mango production offered by different organizations and agencies up to the time of interview. If a respondent took training for 1 days, she/he got a score of 01.

### **3.2.1.8 Experience in mango cultivation**

Experience in mango cultivation of the respondent was measured by the number of years a respondent engaged in mango cultivation. If a farmer has one years' experience on mango cultivation then it was assigned score of 01.

### **3.2.1.9 Extension media contact**

Extent of contact with the following information sources for receiving farm related information was the measurement of extension media contact. It was measured in point scale. The farmers were asked how much contact they kept with different 28 information sources such as SAAO, AEO/AAEO, UAO, NGO Worker, Peer farmers, Agriculture Fair/Workshop/Meeting, Farm Radio Listening, Farm TV Program and Others (e.g. ICTs, Krishi Call Centre, UISC and AICC) or vice-versa.

Following scores were allotted for each of the information sources:

<u>Information Sources</u>	<u>Allocated scores</u>
Regularly	4
Often	3
Occasionally	2
Rarely	1
Not at all	0

Therefore, the total score could be range from 0 to 36 for the extension media contact of export quality mango production farmers where the score “0” refers to no contact with extension media and the score “36” refers to high contact with extension media.

#### **3.2.1.10 Extent of use of modern technology**

Extent use of modern technology of the respondent was measured on the basis of their adoption of ten new technologies related to mango production. Score was assigned on the basis of earliness in the use of a practice by a respondent. The score of Extent of use of modern technology was assigned as 4,3,2,1,0 for the adoption within one year, after 2 years, after 3 years, after 4 years and do not use 0 for no adoption respectively. Thus, Extent use of modern technology score of a farmer could range from 0 to 40, where ‘0’ indicated very low use of modern technology 40 indicated highest level of use of modern technology on export quality mango production.

#### **3.2.1.11 Problem faced in export quality mango production**

Ten problems were selected for the study after thorough consultation with supervisor and relevant experts. The respondents were asked to respond to four alternative responses as ‘severe problem’, ‘moderate problem’, ‘little problem’ and ‘no problem’ for each of nine selected problems. Scores were assigned to those alternative responses as 3, 2, 1, and 0, respectively. Score for particular problem was measured by Problem Faced Index (PFI) as follows:

$$PFI = (Ps \times 3) + (Pm \times 2) + (Pl \times 1) + (Pn \times 0)$$

Where,

PFI = Problem Faced Index

Ps = Number of respondents faced severe problem

Pm = Number of respondents faced moderate problem

Pl = Number of respondents faced little problem

Pn = Number of respondents faced no problem

Score of problem faced in mango production of a respondent was computed by adding all the scores obtained by those responses from all the ten problem items. Thus, the problem faced in mango production of the mango growers could range from 0 to 30 where '0' indicated no problem and 30 indicated highest problem in mango production.

### **3.2.2 Measurement of dependent variables**

Export quality mango production could measures in many ways. For this study farmers' knowledge and practice on export quality mango production were measured by different techniques. The techniques perception refers to the ability of a respondent to recall or recognize items of information related to anything. Farmers' knowledge and practice on export quality mango production was the dependent variable of the study. It was measured based on knowledge and practice on export quality mango production.

#### **3.2.2.1 Knowledge on export quality mango production**

Knowledge on export quality mango production farmers was measured in score by asking 10 selected questions related to various activities related to export quality mango production. Knowledge on export quality mango production relevant question weight is different, therefore, responses to all the questions marks should be vary. Respondent could get a total score of '29', while for wrong responses to all the questions a respondent could get '0'. However, the knowledge scores of the respondents were computed by adding her scores for all the 10 items. Thus, the knowledge score could range from '0' to '29', where '0' (zero) indicates 'no knowledge on export quality mango production' and '29' indicates 'high knowledge on' export quality mango production.

#### **3.2.2.2 Farmers' practice on export quality mango production.**

A good number of innovations are being practiced now a day by the mango owners for export quality mango production. Based on pre-test experience and thorough consultation with relevant experts 10 practiced regarding export quality mango production were consider for this study. The respondent were asked to indicate their extent of practice of these 10 statement with four alternative responses as regularly, frequently, Occasional,

Rare and never and weights were assigned to the alternative responses as 4,3,2,1 and 0 respectively. Practice on export quality mango production of the respondents were computed by summing up all the scores obtained by them from all the 10 practiced. Thus the possible range of practice on export quality mango production score was 0-40, while 0 indicated no practice and 40 indicated highest practice on export quality mango production

### **3.3 Hypothesis of the Study**

According to Kerlinger (1973), “a hypothesis is a conjectural statement of the relation between two or more variables”. It represents a declarative statement of the relations between two or more variables. Hypothesis is not meant to be haphazard guesses, but should reflect the depth of knowledge, imagination and experience of the researcher. In the process of formulating the hypothesis, all variables relevant to the study must be identified.

There are two types of hypothesis used in social science: these are

- i. Research Hypothesis; and
- ii. Null Hypothesis.

#### **3.3.1 Null hypothesis**

The null hypothesis reflects that there will be no observed effects of a research or it states that there is no contribution between the concern variables. Therefore, in order to conduct tests, the previously formed research hypothesis was converted into null form as given below:

“There is no contribution of the selected characteristics (age, educational background, effective farm size, farming experience, annual family income, income from export quality mango Production, professional training experience, experience in mango cultivation, extension media contact, extent use of modern technology and problem faced in export quality mango production.

### **3.4 Data collecting instrument**

In order to collect valid and reliable information from the SAAOs and AEO, an interview schedule was carefully designed and prepared keeping the objectives of the study in mind. Simple and direct questions and different scales were used to obtain information. Direct questions were included to collect information like age, education, farm size, annual income, income from export quality mango production, experience in mango cultivation



and training received. Scales were used to measure the extension media contact, extent use of modern technology and problem faced in export quality mango production. The schedule was pre-tested during 5th to 11th February 2021 through interviewing fifteen farmers of shibganj upazila. Open and Closed forms of questions were used in maximum time .Necessary corrections additions and alterations were made in the questionnaire on the basis of the results of the pre-test. The questionnaire was then printed in its final form. An English version of the interview schedule attached in the Appendix-A.

### **3.5 Summarization, tabulation and analysis of data**

The collected data will be coded, tabulated and analyzed in accordance with the objectives of the study. To explore the relationship between each of the selected characteristics of the farmers and their knowledge and practice of export quality mango production variables correlation co- efficient analysis will be used. One and five percent level of probability will be used as the basis for rejection / acceptance of any null hypothesis.

## CHAPTER IV

### RESULTS AND DISCUSSION

The results or the findings of this study and its explanation or illustration have been presented here in this chapter. According to the objectives of the study, collected data were surveyed, analyzed, tabulated and statistically treated which were obtained from the respondents. These are presented in three section according to the objectives of the study. The first section deals with the socio-economic determination of the mango farmers and the second level of extent of knowledge and practices of mango farmers on export quality mango production and third section deals with the relationships between the farmers' selected characteristics and their extent of knowledge and practices on export quality mango production has been discussed.

#### **4.1 Socio-economic Determinates of the mango farmers**

This section deals with the classification of the farmers according to their various characteristics. Knowledge and practice of an individual largely depends on these characteristics. These characteristics of an individual contribute largely in the matter of shaping of export quality mango production. 11 selected characteristics have been discussed from the findings in this chapter. These selected characteristics are age, educational background, effective farm size, farming experience, annual family income, income from export quality mango production, professional training experience, experience in mango cultivation, extension media contact, extent use of modern technology, problem faced in export quality mango production. Therefore, the major hypothesis was the knowledge and practices of the farmer that would also be influenced by various characteristics of the farmers. Measuring unit, range, mean and standard deviations of these characteristics of the farmers have been described in the following sub-sections.

**Table 4.1 The salient features of the selected characteristics of the farmers**

Categories	Measuring Unit	Range (Observed)	Mean	S.D
Age	Actual Year	22-75	44.30	10.946
Educational background	Year of Schooling	0-18	9.9958	5.10046
Effective farm size	Hector	0.217-10.829	3.58	2.58
Farming experience	Year of experience	7-55	23.45	8.77
Annual family income	Actual (in '000' Tk.)	50-2500	741.42	536.81
Income from export quality mango production	Actual (in '000' Tk.)	0-1400	66.63	215.80
Professional Training experience	No. of days	0-30	10.58	8.34
Experience in mango cultivation	Year of cultivation experience	2-40	16.11	8.31
Extension media contact	Score	3-32	10.67	4.75
Extent use of modern technology	Score	4-27	14.26	4.29
Problem faced in export quality mango production	Score	13-36	20.42	4.20

#### 4.1.1 Age

The age of the farmers has been varied from 22 to 75 years with a mean and standard deviation of 44.30 and 10.946, respectively. Based on their age, the farmers were classified into three categories namely „young“; „middle“ and „old“ aged. The distribution of the farmers in accordance of their age is presented in Table 4.2.

**Table 4.2 Distribution of the farmers according to their Age**

Category	Range (Years)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Young aged	Up to 35	22-75	30	25	44.30	10.946
Middle aged	36-50		62	51.67		
Old aged	Above 50		28	23.33		
Total			120	100		

Data presented in table 4.2 indicated that the highest proportion (51.67 percent) of the respondents was in middle aged category compared to (23.33 percent) old aged and (30 percent) young aged category. The findings indicate that a large proportion (51.67 percent) of the farmers were middle aged. Kalam (2018) also found that, middle aged farmers are proportionately higher than two other categories.

#### 4.1.2 Educational background

The level of educational scores of the mango farmers ranged from 0 to 18 with a mean and standard deviation of 9.9958 and 5.10046 respectively. Based on the educational scores, the respondents were classified into five categories such as can't read of sign (0), can sign only (0.5), primary education (1 to 5), secondary education (6 to 10), above secondary (above 10). The distributions of the respondents according to their level of education are presented in Table 4.3.

**Table 4.3 Distribution of the farmers according to their Educational background**

Category	Range (School Years)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Can't read and write	0	0-18	2	1.67	9.9958	5.10046
Can sign only	0.5		15	12.5		
Primary education	1-5		4	3.33		
Secondary Education	6-10		45	37.5		
Above secondary	> 10		54	45		
Total			120	100		

Table 4.3 shows that respondent under secondary education category constitute the highest proportion (45 percent) followed by Secondary (37.5 percent), can sign only (12.5 percent), primary education (3.33 percent) and cant not read and write (1.67 percent). Sakinur, (2017) and Reza (2020) also found that the most educated mango farmer is likely to be more responsive to the modern facts, ideas, technology and information of mango production. To adjust with the same, they would be progressive minded to adopt as well as involve with modern cultural, processing and marketing facilities of mango along with searching for the opportunities to export their mango in different countries through proper marketing channel.

#### 4.1.3 Effective farm size

The farm size of the mango farmers' scores ranged from 0.217 ha to 10.829 ha with a mean and standard deviation of 3.58 and 2.58 respectively. This farm size average was higher than the national average of 0.91 hectare (BBS, 2013). Based on their farm size, the respondents were classified into three categories which is presented in Table 4.4.

**Table 4.4 Distribution of the farmers according to their Effective farm size**

Category (Mean $\pm$ SD)	Range (Hector)		Respondents		Mean	S.D
	Score (Ha)	Observed	Number	Percent		
Small farmer	Below 1	0.217- 10.829	14	11.67	3.58	2.58
Medium farmer	1-5		80	66.67		
Large farmer	Above 5		26	21.66		
Total			120	100		

Table 4.4 indicates that the medium farm holder constitutes the highest proportion (66.67 percent) followed by large farm holder (21.66 percent), whereas (11.67 percent) was small farm holder. The findings of the study reveal that majority of the mango farmers were medium to large sized farm holder.

#### 4.1.4 Farming experience

The Computed scores of the farmers about farming experience ranged from 7 to 55 years with a mean of 23.45 and standard deviation of 8.77. On the basis of farming experience, the respondents were classified into three categories as follows in Table 4.5.

**Table 4.5 Distribution of the farmers according to their Farming experience**

Category (Mean $\pm$ SD)	Range (years of experience)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low experienced	Up to 15	7-55	25	20.83	23.45	8.77
Medium experienced	16-32		80	66.67		
High experienced	Above 32		15	12.5		
Total			120	100		

Data contained in Table 4.5 showing that (66.67 percent) of the farmers had medium farming experience, whereas (20.83 percent) had low farming experience and (12.5 percent) had high farming experience. Farming experience is helpful to increase knowledge, improve skill and change attitude of the farmers. It also builds confidence of the farmers for making appropriate decisions at the time of need. The majority (87.5 percent) of the farmers had medium to low farming experience. Generally, experience helps to cope up any problematic situation. Therefore, the higher experience might be increased the risk bearing ability of the farmers in mango production as well as increase their knowledge and practices on export quality mango production.

#### 4.1.5 Annual family income

Annual income from mango production of the respondent ranged from 50 to 2500 thousand taka. The mean was 741.42 thousand taka and standard deviation was 536.81. On the basis of annual income from mango, the respondents were categorized into three groups as shown in Table 4.6.

**Table 4.6 Distribution of the farmers according to their Annual family income**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score (000 tk.)	Observed	Number	Percent		
Low income	Up to 2	50-2500	28	23.33	741.42	536.81
Medium income	3-12		69	57.5		
High income	Above 12		23	19.17		
Total			120	100		

Data shown in the Table 4.6 indicated that (57.5 percent) of the farmers had medium income where (23.33 percent) farmers had low and (19.17 percent) had high family income from mango production. Thus, the overwhelming (80.83 percent) of the farmers had low medium to annual income from export quality mango production and Reza (2020) also found that medium income farmers are more interested of mango .

#### 4.1.6 Income from export quality mango production

Income from export quality mango production of the respondent ranged from 0 to 1400 thousand taka. The mean was 66.63 and standard deviation was 215.80. Table 4.7 see that the standard deviation was very larger than mean value. There wear only 29 mango exporter farmers in shibganj upazila under chapai nawabgonj district. Their knowledge and practices level was much higher than any other mango farmers. Since there was very few mango exporter farmers and their income level was very low. There were many fluctuations in their income level among 29 mango exporter farmers. So standard deviation is much bigger than mean. On the basis of Income from export quality mango production the respondents were categorized into three groups as shown in Table 4.7.

**Table 4.7 Distribution of the farmers according to their Income from export quality mango production**

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score (000 tk.)	Observed	Number	Percent		
No income	Below 149	0-1400	0	0	66.63	215.80
Low income	149 to 282		113	94.2		
Medium income	Above 282		7	5.8		
Total			120	100		

Table 4.9 indicates that the low income in mango cultivation constitutes the highest proportion (94.2percent) followed by no and medium income. Low income from export quality mango production were more interested to farmers' knowledge and practices on export quality mango production.

#### 4.1.7 Professional training experience

Professional training received scores of the respondents were found to be varying from 0 to 30 days there with the average of 10.58 and the standard deviation was 8.34. The farmers on the basis of training received score were classified into three categories namely, low

training received, medium training received and high training received as shown in Table. 4.8.

**Table 4.8 Distribution of the farmers according to their Professional training experience**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score (000 tk.)	Observed	Number	Percent		
Low training	Up to 2	0 -30	19	15.83	10.58	8.34
Medium training	3 - 19		78	65		
High training	Above 19		23	19.17		
Total			120	100		

Data presented in the Table 4.8, showed that the highest proportion (65.7 percent) of the respondents belonged to medium training received category as compared to (19.17 percent) and (15.83 percent) having high and low training received category, respectively. Overwhelming majority (84.17 percent) farmers had medium to high level training received. Who received any professional mango training base they are more conscious about export quality mango production as well.

#### 4.1.8 Experience in mango cultivation

Experience in mango cultivation of the respondent ranged from 2 to 40 years. The mean was 16.11 and standard deviation was 8.31. On the basis of mango cultivation, the respondents were categorized into three groups as shown in Table 4.9.

**Table 4.9 Distribution of the farmers according to their Experience in mango cultivation**

Category (Mean $\pm$ SD)	Range (years of experience)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low experienced	Up to 8	2-40	29	24.17	16.11	8.31
Medium experienced	9 - 24		70	58.33		
High experienced	Above 24		21	17.5		
Total			120	100		

Table 4.9 indicates that the medium experience in mango cultivation constitutes the highest proportion (58.33 percent) followed by low experience (24.17 percent), whereas



(17.5 percent) was high experience in mango cultivation. Kalam (2018) also found that majority of the mango farmers were medium to low experience in mango cultivation. Agriculture is a complex business. Therefore, one needs multiple information to take correct decision. One acquires practical knowledge only after a long experience for judicial using the information sources. Moreover, the experience in mango cultivation of an individual helps him to learn new technologies and may lead him to take correct decisions.

#### 4.1.9 Extension media contact

The observed extension media contact scores of the farmers ranged from 3-32, the mean being 10.67 and standard deviation of 4.75. According to their observed ranged of extension media contact scores, the farmers were classified into three categories as shown in Table 4.10.

**Table 4.10 Distribution of the farmers according to their Extension media contact**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low media contact	Up to 6	3-32	17	14.17	10.67	4.75
Medium media contact	7 – 15		88	73.33		
High media contact	Above 15		15	12.5		
Total			120	100		

Data presented in Table 4.10 indicates that the highest proportion (73.33 percent) of the farmers had medium media contact with different GOs and NGOs whereas (14.17 percent) of the farmers had low media contact. There are (12.5 percent) of the farmers who had higher media contact. However, Medium media contact farmers are more favorable and engaged in export quality mango production. Lower availability of the network, it was very difficult to use technology for different updates of their produces. On the other hand, due to farmers' less contact farming with the agricultural extension officers and the officers also could not visit the farmers' farm.

#### 4.1.10 Extent use of modern technology

The score of innovativeness of the farmers ranged from 04-27 with a mean and standard deviation of 14.26 and 4.29. On the basis of use of modern technology the respondents were classified into three categories namely, low, medium and high. The scale used for computing the use of modern technology score is presented in the Table 4.11.

**Table 4.11 Distribution of the farmers according to their Extent use of modern technology**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low use of technology	Up to 10	4-27	20	16.67	14.26	4.29
Medium use of technology	11 - 19		90	75		
High use of technology	Above 19		10	8.33		
Total			120	100		

Data presented in Table 4.11 indicate that the highest proportion (75 percent) of the farmers use of modern technology had medium compared to (16.67 percent) had low use of modern technology and (8.33 percent) have high use of modern technology. The majority (91.67 percent) of the mango farmers were medium to low use of modern technology. It is true that all the farmers will not be similar innovative to all types of extent use of modern technology.

#### 4.1.11 Problem faced in export quality mango production

The computed Problem faced in export quality mango production scores of the farmers ranged from 13 to 36, the mean being 20.42 and standard deviation of 4.20. Based on their mango cultivation problems scores, the farmers were classified into three categories as shown in Table 4.12.

**Table 4.12 Distribution of the farmers according to their Problem faced in export quality mango production**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low Problem	Up to 16	13-36	25	20.83	20.42	4.20
Medium Problem	17 - 25		76	63.33		
High Problem	Above 25		19	15.84		
Total			120	100		

Data presented in the table shows that the majority (63.33 percent) of the farmers faced medium problem while (20.83 percent) of the farmers faced low problem. Comparatively few farmers (15.84 percent) faced high problem in mango cultivation. The findings again

revealed that an overwhelming proportion (84.16 percent) of the farmers faced medium to low problem. The study showed that most of the farmer of the study area was more or less conscious about export quality mango production. Farmers increased their knowledge level, training received, extension media contact to reduce problems in export quality mango production.

#### 4.2 Farmers' knowledge on export quality mango production

Scores of knowledge on export quality mango production of the respondents could range from 6 to 28. The mean score was 13 with the standard deviation 4.66 as shown in Table 4.12. Based on their knowledge on export quality mango production, the respondents were classified into three categories namely low knowledge, medium knowledge and high knowledge as shown in Table 4.13.

**Table 4.13 Distribution of the farmers according to their Knowledge on export quality mango production**

Category (Mean $\pm$ SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low Knowledge	Up to 8	6-28	15	12.5	13.00	4.66
Medium Knowledge	9 - 18		84	70		
High Knowledge	Above 18		21	17.5		
Total			120	100		

Data contained in the table 4.13 indicate that the highest proportion (70 percent) of the farmers had medium knowledge while (17.5 percent) had high knowledge and (12.5 percent) had low mango production knowledge. Findings showed that majority (87.5 percent) of the farmers possessed medium to high level of knowledge on various aspects export quality mango production and (Chowdhury, 2018) also similar result found. The study showed that most of the farmer of the study area was more or less increased had some educational quality, lack of contact farming and they were very conscious about problems faced in export quality mango production. Finally different mass media as well as training received from the training center increased their knowledge level for export quality mango production.

### 4.3 Farmer’s practice on export quality mango production

Practice scores of the farmers observed ranged from 8 to 27 with a mean of 16.29 and the standard deviation of 3.82. Based on the scores, the farmers were classified into three categories as shown in table 4.14.

**Table 4.14 Distribution of the farmers according to their on practice export quality mango production**

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low practice	Up to 13	8 -27	29	24.17	16.29	3.82
Medium practice	14 - 20		76	63.33		
High practice	Above 20		15	12.5		
Total			120	100		

Data presented in table 4.14 reveal that the highest proportion (63.33 percent) of the farmers fell under the practice category while (24.17 percent) had low and (12.5 percent) had high practice categories. It is noted that, an overwhelming majority (87.5 percent) of the farmers had medium to low practice level. Medium practice level farmers was more interested on export quality mango production. To cultivate mango regular irrigation, fertilizer, insecticide, weeding is required. Without these practices mango plant can’t give expected production. Mango is highly perishable and hence a great deal of care is needed in handling as well as its marketing. Mango should not be left at room temperature for more than a few hours. Warm temperature causes browning effect in mango. Mango should be stored 12 degree temperature in refrigerator condition. On the other hand care should be taken during packaging, loading, unloading and during transportation. To get proper price washing, grading and modern packaging should be done.

### 4.4 Relationship between the selected characteristics of the mango farmers and their knowledge on export quality mango production

The purpose of this section is to explore the relationships of the selected characteristics of the mango farmers with their perception on export quality mango production. Pearson’s Product Moment co-efficient of correlation (r) was used to test a null hypothesis concerning the relation between any two variables. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis. Results of the test of co-efficient

of correlation between each of the selected characteristics of the farmers and their perception on export quality mango production are shown in table 4.15.

**Table 4.15 Results of correlation of co-efficient showing relationship between each of the selected characteristics of the farmers’ knowledge on export quality mango production**

Dependent Variable	Independent Variable	Observed correlation co efficient value(r) with 118 d.f	Table value	
			At 0.05 level	At 0.01 level
Farmers’ knowledge on export quality mango production	Age	0-.049 <sup>NS</sup>	0.179	0.237
	Educational background	0.208 <sup>*</sup>		
	Effective farm size	0.438 <sup>**</sup>		
	Farming experience	0.002 <sup>NS</sup>		
	Annual family income	0.411 <sup>**</sup>		
	Income from export quality mango production	0.607 <sup>**</sup>		
	Professional training experience	0.637 <sup>**</sup>		
	Experience in mango cultivation	0..188 <sup>*</sup>		
	Extension media contact	0.713 <sup>**</sup>		
	Extent use of modern technology	0.465 <sup>**</sup>		
	Problem faced in export quality mango production	0-.187 <sup>*</sup>		

<sup>NS</sup> Not Significant

\* Significant at 0.05 level of probability

\*\*Significant at 0.01 level of probability

### **Educational background and farmers’ knowledge**

“There is no relationship between educational background of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between Educational background of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.208. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positively significant trend between the concerned variables.
- ❖ The observed value of 'r' (0.208) between the concerned variables was found to be bigger than the tabulated value ( $r = 0.179$ ) with 118 degrees of freedom at 0.05 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.05 level of probability.

Based on the above findings, it was concluded that educational background of the mango famers had positively significant relationships with their knowledge on export quality mango production. This represent that educational background of the respondent farmers was an important factor on export quality mango production.

#### **Effective farm size and farmers' knowledge**

“There is relationship between effective farm size of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between effective farm size of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.438. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.438) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that effective farm size of the mango famers had significant relationships with their knowledge n export quality mango production. This

represent that effective farm size of the respondent farmers was an important factor on export quality mango production.

### **Annual family income and farmers' knowledge**

“There is relationship between annual family income of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between annual family income of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.411. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of ‘r’ (0.411) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that annual family income of the mango famers had significant relationships with their knowledge on export quality mango production. This represent that annual family income of the respondent farmers was an important factor on export quality mango production.

### **Income from export quality mango production and farmers' knowledge**

“There is relationship between income from export quality mango production of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between income from export quality mango production of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.555. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.

- ❖ The observed value of 'r' (0.607) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that income from export quality mango production of the mango farmers had significant relationships with their knowledge on export quality mango production. This represent that income from export quality mango production of the respondent farmers was an important factor on export quality mango production.

### **Professional training experience and farmers' knowledge**

“There is relationship between professional training experience of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between professional training experience of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.637. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.637) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that professional training experience of the mango farmers had significant relationships with their knowledge on export quality mango production. This represent that professional training experience of the respondent farmers was an important factor on export quality mango production.



### **Experience in mango cultivation and farmers' knowledge**

“There is relationship between experience in mango cultivation of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between Experience in mango cultivation of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.233. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of ‘r’ (0.233) between the concerned variables was found to be greater than the tabulated value ( $r = 0.188$ ) with 118 degrees of freedom at 0.05 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.05 level of probability.

Based on the above findings, it was concluded that experience in mango cultivation of the mango famers had significant relationships with their knowledge on export quality mango production. This represent that experience in mango cultivation of the respondent farmers was an important factor on export quality mango production.

### **Extension media contact and farmers' knowledge**

“There is relationship between extension media contact of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between extension media contact of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.713. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of ‘r’ (0.713) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.

- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that extension media contact of the mango famers had significant relationships with their knowledge on export quality mango production. This represent that extension media contact of the respondent farmers was an important factor on export quality mango production.

#### **Extent use of modern technology and farmers' knowledge**

“There is relationship between extent use of modern technology of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between extent use of modern technology of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0.465. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of ‘r’ (0.465) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that extent use of modern technology of the mango famers had significant relationships with their knowledge on export quality mango production. This represent that extent use of modern technology of the respondent farmers was an important factor on export quality mango production.

#### **Problem faced in export quality mango production and farmers' knowledge**

“There is no relationship between problem faced in export quality mango production of the mango farmers with their knowledge on export quality mango production. The coefficient of correlation between Problem faced in export quality mango production of the mango and export quality mango production by them is presented in Table 4.15.

The coefficient of correlation between the concerned variables was found to be 0-.187. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a negatively significant trend between the concerned variables.
- ❖ The observed value of 'r' (0-.187) between the concerned variables was found to be bigger than the tabulated value ( $r = 0.179$ ) with 118 degrees of freedom at 0.05 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically negatively significant at 0.05 level of probability.

Based on the above findings, it was concluded that problem faced in export quality mango production of the mango famers had negatively significant relationships with their knowledge on export quality mango production. This represent that problem faced in export quality mango production of the respondent farmers was an important factor on export quality mango production.

#### **4.5 Relationship between the selected characteristics of the mango farmers and their practice on export quality mango production**

The purpose of this section is to explore the relationships of the selected characteristics of the mango farmers with their practice on export quality mango production. Pearson's Product Moment co-efficient of correlation ( $r$ ) was used to test a null hypothesis concerning the relation between any two variables. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis. Results of the test of co-efficient of correlation between each of the selected characteristics of the farmers and their practice on export quality mango production are shown in table 4.16.

**Table 4.16 Results of correlation of co-efficient showing relationship between each of the selected characteristics of the farmers practice on export quality mango production**

Dependent Variable	Independent Variable	Observed correlation coefficient value(r) with 118 d.f	Table value	
			At 0.05 level	At 0.01 level
Farmers' practice on export quality mango production	Age	-.004 <sup>NS</sup>	0.179	0.237
	Educational background	0.030 <sup>NS</sup>		
	Effective farm size	0.423**		
	Farming experience	0.013 <sup>NS</sup>		
	Annual family income	0.390**		
	Income from export quality mango production	0.491**		
	Professional training experience	0.532**		
	Experience in mango cultivation	0.102 <sup>NS</sup>		
	Extension media contact	0.524**		
	Extent use of modern technology	0.442**		
	Problem faced in export quality mango production	0-.145 <sup>NS</sup>		

<sup>NS</sup> Not Significant

\* Significant at 0.05 level of probability

\*\*Significant at 0.01 level of probability

#### **Effective farm size and farmers' practice**

“There is relationship between effective farm size of the mango farmers with their practice on export quality mango production. The coefficient of correlation between o Effective farm size of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.423. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.

- ❖ The observed value of 'r' (0.423) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was not statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that effective farm size of the mango famers had significant relationships with their practice on export quality mango production. This represent that effective farm size of the respondent farmers was an important factor on export quality mango production.

#### **Annual family income and farmers' practice**

“There is relationship between Annual family income of the mango farmers with their practice on export quality mango production. The coefficient of correlation between o annual family income of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.390. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.390) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was not statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that annual family income of the mango famers had significant relationships with their practice on export quality mango production. This represent that annual family income of the respondent farmers was an important factor on export quality mango production.

#### **Income from export quality mango production and farmers' practice**

“There is relationship between income from export quality mango production of the mango farmers with their practice on export quality mango production. The coefficient of

correlation between Income from export quality mango production of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.491. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.491) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was not statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that income from export quality mango production of the mango famers had significant relationships with their practice on export quality mango production. This represent that income from export quality mango production of the respondent farmers was an important factor on export quality mango production.

### **Professional training experience and farmers' practice**

“There is relationship between professional training experience of the mango farmers with their practice on export quality mango production. The coefficient of correlation between professional training experience of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.532. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.532) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that professional training experience of the mango farmers had significant relationships with their practice on export quality mango production. This represents that professional training experience of the respondent farmers was an important factor on export quality mango production.

#### **Extension media contact and farmers' practice**

“There is a relationship between Extension media contact of the mango farmers with their practice on export quality mango production. The coefficient of correlation between Extension media contact of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.524. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of ‘r’ (0.524) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that extension media contact of the mango farmers had significant relationships with their practice on export quality mango production. This represents that Extension media contact of the respondent farmers was an important factor on export quality mango production.

#### **Extent use of modern technology and farmers' practice**

“There is a relationship between extent use of modern technology of the mango farmers with their practice on export quality mango production. The coefficient of correlation between Extent use of modern technology of the mango and export quality mango production by them is presented in Table 4.16.

The coefficient of correlation between the concerned variables was found to be 0.442. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of 'r' (0.442) between the concerned variables was found to be greater than the tabulated value ( $r = 0.237$ ) with 118 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis could be rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that extent use of modern technology of the mango famers had significant relationships with their practice on export quality mango production. This represent that extent use of modern technology of the respondent farmers was an important factor on export quality mango production.

#### 4.6 Comparative Problem faced in export quality mango production

Problem facing index (PFI) of the farmers of the 10 problem items in mango cultivation ranged from 149 to 340. According to the descending order of the PFI a rank order was made as shown in Table 4.18.

**Table 4.18 Problem Faced Index (PFI) with Rank Order**

Sl. No.	Problem	Extent problem				PFI	Rank order
		Severe	Moderate	little	No		
1	High price of insecticides and pesticides	101	18	1	0	340	1
2	Insect and Disease attack	91	29	0	0	331	2
3	Dropping of flowers and fruit	39	66	15	0	264	3
4	Lack of marketing facility	42	59	15	4	259	4
5	Lack of fruit preservation	32	72	16	0	256	5
6	Lack of fruit processing industry	33	63	22	2	247	6
7	Natural calamities	25	56	38	1	225	7
8	Lack of extension contact	55	11	21	33	208	8
9	Lack of loan facility	29	25	32	34	169	9
10	Lack of labor	16	23	55	26	149	10



Data contained in Table 4.18 indicate that High price of insecticides and pesticides ranked first severe problem. It was observed that there was the insecticides and pesticides price is much higher. I think it needs a price reduction.

Insect and Disease attack ranked second, farmers cannot expose insecticides and pesticides proper time there. For this reason it ranked as the second problem.

Dropping of flowers and fruit was also major problem face of farmers. Some reason that Natural calamities problem and they cannot give the treatment that is needed for the fall of flowers and fruits at the right time. For this reason it ranked as the third problem.

Lack of marketing facility was the fourth problem. It was observed that there was no established mango market in the study area. The quality of mango transported to distant places often gets deteriorated and damaged.

Another big problem was faced was Lack of fruit preservation. There was no cold storage for fruit preservation. For this reason it ranked as the five problem.

Lack of fruit processing industry was the sixth position problem. Fruit can go through numerous types of processing, including canning, drying, and juicing. Farmer's fruit processing industries was very needed for many purpose.

Natural calamities was very much hampered for mango production. It's deteriorated the mango quality, decreases production, dropping of flowers and fruit. For this reason it ranked as the seven problem.

Lack of extension contact was the more or less farmer's problem. Due to farmers' less contact farming with the agricultural extension officers and the officers also could not visit the farmer's farm. For this reason it ranked as the eight no. position.

Related to the loan problem, the mango owners face problems of mango production related equipment's and inputs. High price of the inputs and equipment's is experienced by them as a result they need loan facility. Due to this reason insufficient loan ranked the nine problem.

Lack of labor problem was the ten position ranked. Sometimes Labor was not available at the exat time and labor cost is also very high. Farmers were more or less faced problem of labor.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of the Findings

##### 5.1.1 Selected characteristics of the mango farmers

**Age:** Overwhelming majority (76.67percent) of the mango farmers were middle aged to young. This means that mango farming in the study area is being managed by comparatively middle aged to younger aged mango owner.

**Educational background:** The highest proportion of (45 percent) of them had education up to above secondary. Thus, the overwhelming majority (82.5 percent) of the mango owners had at least some education ranging from above secondary level to Secondary level Education.

**Effective farm size:** The highest proportion (66.67 percent) of the farmers had medium farm size, while (21.66 percent) and (11.67 percent) belonged to the large farm and small farm respectively.

**Farming experience:** Farmers having medium experienced of farming occupied the Supreme proportion (66.67%) compared to 20.83% occupied by the farmers having low experienced and the rest 12.5% of the farmers had high experiences in farming experience.

**Annual family income:** The highest proportion (57.5 percent) had medium annual family income compared with 23.33 percent having low income and 19.17 percent having high annual family income.

**Income from export quality mango production:** Findings revealed that 94.2 % of the farmers had low income from export quality mango production whereas 5.8 had medium income and 0% had no income from export quality mango production.

**Professional training experience:** The highest proportion (65 percent) of the mango farmers had medium training, while the rest 19.17percent of them high received training and 15.83 percent had low training exposure.

**Experience in mango cultivation:** The highest proportion (58.33 percent) of the farmers had medium mango cultivation experience, while 24.17 percent and 17.5 percent belonged to the low mango cultivation experience and high mango cultivation experience respectively. It means, overwhelming majority (82.5 percent) of the mango growers had medium to low training on mango cultivation.

**Extension media contact:** The highest proportion (73.33%) of the farmers had medium media contact with different GOs and NGOs followed by 14.17% of the farmers had low media contact and 12.5% had higher media contact.

**Extent use of modern technology:** The medium use of modern technology farmers covered the highest proportion (75%) whereas 16.67% of farmers were of low use and rest 8.33% of farmers are of high use of modern technology.

**Problem faced in export quality mango production:** About 63.33 percent of the mango farmers had medium problem compared to 20.83 percent of them having low problem and only 15.84 percent having high problem. Thus, the vast majority (84.16percent) of the mango farmers faced medium to low problem.

**5.1.2 Knowledge on export quality mango production:** Findings revealed that 70% of the farmers had medium knowledge followed 17.5% of the farmers had high knowledge and 12.5% had low knowledge on export quality mango production.

**5.1.3 Farmer's practice on export quality mango production:** The highest proportion (63.33 percent) of the farmers had medium practice, while 24.17 percent and 12.5 percent belonged to the low practice and high practice respectively. It means, overwhelming majority (87.5 percent) of the mango growers had medium to low practice on export quality mango production.

#### **5.1.4 Result of hypothesis testing**

Knowledge on export quality mango production had significant positive relationship with their practice on export quality mango production. Out of eleven selected characteristics of the mango farmers, educational background, effective farm size, annual family income, income from export quality mango production, professional training experience, experience in mango cultivation, extension media contact, extent use of modern technology and problem faced in export quality mango production of the mango farmers

had positive significant relationship with farmers' knowledge on export quality mango production, while age, , farming experience, had negative relationship.

In case of farmers' practice effective farm size, annual family income, income from export quality mango production, professional training experience, extension media contact, extent use of modern technology had positive significant relationship and age, educational background, farming experience, experience in mango cultivation and problem faced had negative relationship.

## **5.2 Conclusions**

“A conclusion presents the statements based on major findings of the study and these statements mostly confirm to the objectives of the research in the shortest form. It presents the direct answers of the research objectives, or it relates to the hypothesis” (Labon and Schefter, 1990). Findings of the present study and the logical interpretation of other relevant facts prompted the researcher to draw the following conclusions:

Knowledge is an important factor for mango production about findings revealed that 70% of the farmers had medium knowledge followed 17.5% of the farmers had high knowledge and 12.5% had low knowledge on export quality mango production. Their knowledge was particularly lower in such aspect of mango cultivation as mango disease management, new mango harvesting technology, marketing and mango preservation, training facility, extension media contact. These facts lead to the conclusion that the production of export quality mango will not be possible to improve to a significant extent unless the concerned authorities (regional DAE) take proper steps to improve their knowledge in overall management of mango and in particular the aspects in which their perception is poor.

Practice of mango cultivation is also not up to mark. Overwhelming majority (87.5 percent) of the mango growers had medium to low practice on export quality mango production. Most of the farmers practice was particularly lower in such aspects of mango production as applying fertilizer, applying supplementary insecticides and pesticides, applying compost, applying tree management and post-harvest practice in the mango farm. It may be concluded that the production of mango will not be possible to improve to a significant extent unless the concerned authorities take proper steps to improve farmers overall practices regarding export quality mango production.

Education of the farmers had significant relationship with their knowledge and practice on export quality mango production. It was thus proved that farmers' knowledge and

practice is independent with their education. In other words it may be concluded that the education of the farmers was an important factor in perception and practice on export quality mango production.

Effective farm size of the mango grower showed positive and significant relationship with their knowledge and practice on export quality mango production. It's concluded that's farmers needed increasing their farm size for mango export purpose. (88.34 percent) of the land is occupied by middle and large farm. Remaining 11.67% land is occupied by small farm.

The annual income of the farmers had significant positive relationship with their knowledge and practices on export quality mango production. It leads to the recommendation that extension service should provide adequate farm management advice to the farmers for increasing their farm income. It is the real fact that if income be increased, farmer's receptive capacity to adopt improved technologies will be increased and thereby production will be increased.

Income from export quality mango production of farmers had a positive and significant relationship with their knowledge and practice. Farmer's receptive capacity to adopt improved technologies will be increased, improved contact farming with extension worker and thereby production also increased.

Professional Training received of farmers had a positive and significant relationship with their knowledge and practices on export quality mango production. Training received help the respondents in different farming activities. Therefore, it can be concluded that more the training received by the respondents, higher would be favorable extent of their knowledge and practices on export quality mango production.

Almost 87.5% of the mango farmers had low to medium extension media contact. Findings showed that there was a significant positive relationship between the extension media contact with their knowledge and practices on export quality mango production. So, it may be concluded that if the mango farmer come in more contact of extension provider, electronics and printed media, they will face less problems in mango cultivation.

Extent use of modern technology the farmers had a significant positive relationship with their knowledge and practices on export quality mango production. The having moderate extent use of modern technology, they are able to adopt new technologies and ideas. It can

be concluded that Extent use of modern technology is a valuable factors for increasing farmer's knowledge and practices on export quality mango production.

### **5.3 Recommendations for further study**

- ❖ The study was conducted on the farmers of only one selected area of Shibganj upazila. Finding of the study need verification by similar research in other areas of the country including areas where mango cultivation is yet to get popularity.
- ❖ Contributions of 11 characteristics of farmers with their knowledge and practice on export quality mango production have been investigated in this study. Further research should be conducted to explore contribution of the other personal characteristics of the farmers with their knowledge and practice on export quality mango production.
- ❖ Age, farming experience, experience in mango cultivation and problem faced in export quality mango production had no significant contribution with their knowledge and practice on export quality mango production. So, further investigation may be taken to verify the result.
- ❖ Research should also be undertaken to identify the other factors causing hindrance to high adoption of intercrop.

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## APPENDIX-A

**Department of Agricultural Extension and Information System  
Sher-E-Bangla Agricultural University  
Dhaka-1207**

An interview schedule for a research study entitles

**FARMERS' KNOWLEDGE AND PRACTICES ON EXPORT QUALITY  
MANGO PRODUCTION IN SHIBGANJ UPAZILA UNDER CHAPAI  
NAWABGANJ DISTRICT**

Serial No.

Respondent Name:

Village:

Union:

Upazila:

District:

Cell Phone No:

Please answer the following questions

### 1. Age

What is your present age? .....Years

### 2. Educational background

What is the background of your education?

- i. Cannot read or write (Illiterate).....
- ii. Can sign only.....
- iii. Have passed class.....

### 3. Effective Farm size

Please mention here about your farm size

Sl. no.	Use of land	Measuring unit	
		Local unit	Hectare
1	Homestead area (A1)		
2	Own land under own cultivation (A2)		
3	Land taken from others on Borga system (A3)		
4	Land given to others on Borga system (A4)		
5	Land taken from others on lease (A5)		

Total farm size=  $A1+A2+1/2 (A3+A4) +A5=$

#### 4. Farming experience

How many year(s) you are engaged with farming activities? .....Year(s)

#### 5. Annual family income

Please state the income of your family income during the last year

i) Agriculture income ..... taka

ii) Income from livestock and fisheries ..... taka

iii) Income from other sources (service/ labor/ business) ..... taka

Total income (i+ ii+ iii) .....taka

#### 6. Income from export quality mango production ..... taka

#### 7. Professional training experience

Have you participated in any agricultural training program related to export quality mango production?

Yes..... /No..... (If yes, mention the following information)

Sl. No	Name of training course	Sponsoring Organization	Day (s)
1			
2			
3			
4			

#### 8. Experience in mango cultivation ----- years

#### 9. Extension media contact

Please mention the nature of contact with the following extension media

Sl. No.	Place of Visit	Regularly	Often	Occasionally	Rarely	Not at all
1	SAAO	More than 5 times/month	4-5 times/month	2-3 times/month	1 time/month	
2	AEO/AAEO	More than 6 times/year	5-6 times/year	3-4 times/year	1-2 times/year	
3	UAO	More than 6 times/year	5-6 times/year	4-5 times/year	1-2 times/year	
4	NGO Workers	More than 5 times/month	4-5 times/month	2-3 times/month	1 time/month	

5	Peer Farmers	More than 6 times/month	5-6 times/month	3-4 times/month	1-2 times/month	
6	Agril. Fair/ Workshop/ Meeting	More than 5 times/year	4-5 times/year	2-3 times/year	1 time/year	
7	Farm Radio Listening	More than 5 times/month	4-5 times/month	2-3 times/month	1 time/month	
8	Farm TV Programme	More than 5 times/month	4-5 times/month	2-3 times/month	1 time/month	
9	Others (e.g. ICTs, Krishi Call Centre, UISC, AICC)	More than 5 times/month	4-5 times/month	2-3 times/month	1 time/month	

### 10. Extent use of modern technology

If you use the following technologies, please indicate duration of its Use from first hearing

Sl. No.	Modern technology	Extent of use				
		Used within 1 year	Used within 2 year	Used within 3 year	Used within 4 year	Do not use
1	Cultivation of new variety of mango (BARI Aam-13, BARI mango-17, BARI mango-21, etc.)					
2	Use of fruit bagging techniques					
3	Use of IPM method					
4	GAP (Good Agricultural Practices)					
5	Use of modern technology					
6	Use of organic fertilizer					
7	Organic mango production					
8	Use of sex-pheromone trap					
9	Intercropping					
10	Use of impact type model stick for mango harvest					

### 11. Problem faced in export quality mango production

Please mention the extent of problems related to mango production

Sl. No.	Problem	Extent problem			
		Severe	Moderate	little	No
1	High price of insecticides and pesticides				
2	Lack of labor				
3	Insect and Disease attack				
4	Lack of fruit processing industry				
5	Lack of marketing facility				
6	Lack of loan facility				
7	Lack of extension contact				
8	Natural calamities				
9	Lack of fruit preservation				
10	Dropping of flowers and fruit				

### 12. Knowledge on export quality mango production

Please answer the following questions

Sl. No.	Question	Full marks	Marks obtained
1	What do you understand by export quality mango production?	2	
2	Do you know about mango disease?	2	
3	Do you know about mango post-harvest practice?	4	
4	What kind of fertilizer should be use for mango cultivation?	3	
5	How do you shipping mangoes to export?	4	
6	What is the optimum time for treatment to control mango disease and insect?	3	
7	What is the stage of maturity appropriate to harvest mango?	2	
8	Do you know about new technology about mango production?	2	
9	What are major transportation exporting facility of mango?	4	
10	What type of special mango variety are cultivated for export?	3	

### 13. Farmers' practice on export quality mango production

What is your level of practice for the following statement on export quality mango production?

Sl. No.	Practice	Extent of practice					Score
		R	F	O	R	N	
1	Agronomic management practice (planting pattern and fertilizer application)						
2	Tree management and irrigation						
3	Mango harvesting practice (harvesting criteria, stage, method and time)						
4	Mango storage practice (shade under cold storage, storage house)						
5	Top working practice						
6	Pest and disease management practice						
7	Each individual fruit of mango will be enclosed in a clean, white, soft, expandable and netted type polystyrene sleeve and insect proof boxes practice for export						
8	Shading regulation of mango practice for export purpose						
9	Growth regulator practice						
10	Adoption of Post- harvest practice						

\*R=Regularly, F= Frequently, O= Occasional, R= Rare, N= Never

**Thank you for your kind co-operation in data collection**

**Signature of interviewer**

**Date:**



## APPENDIX – B (CORRELATION MATRIX)

Variables	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	Y1	Y2
X1	-												
X2	-.103	-											
X3	.179	-.018	-										
X4	.710**	-.177	.180*	-									
X5	.132	.121	.806**	.235**	-								
X6	.017	.094	.371**	.052	.331**	-							
X7	-.085	.245**	.294**	.041	.325**	.480**	-						
X8	.563**	-.107	.123	.731**	.174	.071	.052	-					
X9	.033	.323**	.281**	.040	.280**	.645**	.602**	.115	-				
X10	-.009	.043	.229*	.111	.269**	.453**	.401**	.070	.413**	-			
X11	.043	.063	-.098	.008	-.032	.007	-.034	.048	-.041	-.082	-		
Y1	-.049	.208*	.438**	.002	.411**	.607**	.637**	.188*	.713**	.465**	-.187	-	
Y2	-.004	.030	.423**	.013	.390**	.491**	.532**	.102	.524**	.442**	-.145	.771**	-

X1: Age

X2: Educational background

X3: Effective farm size

X4: Farming experience

X5: Annual family income

X6: Income from export quality mango production

X7: Professional training experience

X8: Experience in mango cultivation

X9: Extension media contact

X10: Extent use of modern technology

X11: Problem faced in export quality mango production

Y1: Farmers' knowledge on export quality mango production

Y2: Farmers' practice on export quality mango production

## APPENDIX- C

During data collection for my research work

