FINANCIAL PROFITABILITY AND RESOURCE USE EFFICIENCY OF MUSTARD CULTIVATION IN SOME SELECTED AREAS OF TANGAIL DISTRICT

MD. NAZMUL HASAN

DEPARTMENT OF MANAGEMENT AND FINANCE
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207

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BY
MD. NAZMUL HASAN
REGISTRATION NO. 07-02221

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Approved by:

(Shah Johir Rayhan)	**(Md. Sadique Rahman)**
Assistant professor	**Assistant professor**
Supervisor	**Co-Supervisor**

Mosammod Mahamuda Parvin
Chairman
Department of Management and Finance

Sher-e-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh

Department of Management and Finance

CERTIFICATE

*This is to certify that thesis entitled, "**FINANCIAL PROFITABILITY AND RESOURCE USE EFFICIENCY OF MUSTARD CULTIVATION IN SOME SELECTED AREAS OF TANGAIL DISTRICT**" submitted to the Faculty of **AGRIBUSINESS MANAGEMENT**, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M.S.) in MANAGEMENT AND FINANCE**, embodies the result of a piece of bona fide research work carried out by **MD. NAZMUL HASAN,** Registration No. **07-02221** 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.

.....…….....

Dated
Place: Dhaka, Bangladesh

.....

(Shah Johir Rayhan)
Assistant professor
Supervisor
Department of Management and Finance
Sher-e-Bangla Agricultural University
Dhaka 1207

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The Author

ABSTRACT

The present study was undertaken to determine the financial profitability and resource use efficiency of Mustard cultivation in some selected area of Tangail District. A total of 75 farmers taking 25 from small, medium and large farmers were selected randomly. Descriptive statistics along with a production function analysis was carried out to achieve the objectives of the study. Mustard cultivation is profitable in the study area. Average total cost of production of Mustard was found to be Tk. 52801.83, 53125.5 and 57595.4 for Small, Medium and Large farmers respectively. Average yield was found 1.58, 1.60 and 1.65 ton per hectare for small, medium and large farmers respectively. Net return was Tk. 32589.47, 30384.5 and 25361 for small, medium and large farmers respectively. Undiscounted Benefit Cost Ratio (BCR) was found 1.54. The production function exhibited decreasing returns to scale. Production function analysis suggested that human labour, urea and TSP had positive and significant effect on the yield of Mustard. The ratio of MVP and MFC of Human labor, seed, Urea, TSP and MoP was found 0.16, 6.82, 3.66, 9.06 and 0.21 respectively. It indicates that farmers in the study area over utilizing human labor and MoP while seed, urea and MoP were underutilized. Farmers faced many problems in producing Mustard. About 80% of the farmers reported that they did not have adequate amount of operating capital. Among others lack of machinery, high wage rate of labor, high input price are the major problems of Mustard cultivation. Supply of credit on easy terms, supply of inputs and machinery by responsible authority, improvement of transportation facilities, Formation of farmers' organization, improvement of market facilities can play a important role in increasing Mustard production.

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ABBREVIATIONS

AEO:	Agriculture Extension Officer
BARI:	Bangladesh Agricultural Research Institute
BBS:	Bangladesh Bureau of Statistics
BCR:	Benefit Cost Ratio
BS:	Block Supervisor
DAE:	Department of Agricultural Extension
et al.:	and others
GDP:	Gross Domestic Product
GM:	Geometric Mean
GoB:	Government of Bangladesh
Ha:	Hectare
HSC:	Higher Secondary Certificate
HYV:	High Yielding Variety
IPM:	Integrated Pest Management
i.e, :	That is
ln :	Natural logarithm
MVP:	Marginal Value of Product
MFC:	Marginal Factor Cost
MPP:	Marginal Physical Price
MoF:	Ministry of Finance
Mt.:	Metric Ton
No.:	Number
NGO:	Non Government Organization
PAM:	Policy Analysis Matrix
Qyt:	Quantity
SSC:	Secondary School Certificate
TFC:	Total Fixed Cost
TVC:	Total Variable Cost
Tk.:	Taka
%:	Percentage

CHAPTER I

INTRODUCTION

1.10 Background of the Study

Bangladesh is mainly an agro-based country dominated by crop production. The area of the country is 147570 square kilometers. The population growth rate is about 1.32 % per year and the overall male female ratio is 103:100.The per capita income is 1190 US Dollars in the country (Bangladesh Economic Review, 2014). About 25.6% of the populations live in the extreme poverty measured in the term of their minimum calorie intake per day (Bangladesh Economic Review, 2014).

Agriculture is the main stay of the economy of Bangladesh and this sector contribute about 16.6% of total Gross Domestic Production (GDP). The economy of Bangladesh is based on agriculture which is transforming from traditional to modern system. Bangladesh agriculture has witnessed an all time high growth rate of 7.62 percent in 1999-2010 (MoF, 2012). A high growth rate achieved in the crop sector enhanced overall growth rate in agricultural sector. Although the contributions of agricultural percentage share declining but total value is increasing in the economy of Bangladesh. About 47.5% of the total national labor forces are employed by the agricultural sector (Bangladesh Economic Review, 2014) and about 70% people of this country are directly or indirectly involved with this sector. The oil seed sub sector accounts 1.37% to Gross Domestic Product (BBS, 2010). Various types of crops are produced in this country. Oil seed crops are treated as minor crops. Due to increase of area under cereal crops for meeting the increasing demand of food-stuff, land under Oil seed crops has declined and price of oil has gone up (Anwar, 2004). The government of Bangladesh has, therefore, provided priority to the agriculture sector to increase the production of Oil seeds by giving subsidy to the farmers on different inputs such as fertilizer; irrigation etc. Table 1.1 shows the share of agriculture in GDP over the years.

Table 1.1: Share of agriculture in GDP over the years (%)

Year	Agriculture	Crop	Livestock	Forestry	Fisheries	Oil Seed
2005-06	19.00	11.10	2.38	1.86	3.67	0.86
2006-07	18.92	11.08	2.27	1.83	3.75	0.93
2007-08	18.68	10.88	2.19	1.82	3.79	0.99
2008-09	18.36	10.63	2.13	1.82	3.78	1.01
2009-10	18.38	10.79	2.03	1.81	3.73	1.05
2010-11	18.00	10.50	1.98	1.79	3.73	1.03
2011-12	17.38	10.01	1.90	1.78	3.68	1.03
2012-13	16.77	09.49	1.84	1.76	3.68	1.29
2013-14*	16.33	09.11	1.78	1.74	3.69	1.37

Source: Bangladesh Economic Review, 2014

1.11 Worldwide importance of Mustard among the oil crops

Mustard is an important oil crop and currently ranked as the world's third important oil crop in terms of area and production. Mustard is one of the most important oilseed crops throughout the world after soya bean and groundnut (FAO, 2013). Worldwide total annual production of Mustard is 630.40 lacks metric ton from an area of 343.30 lacks ha (FAO, 2013). But it ranks top in respect of area and production among the oil crops grown in many countries. Mustard oil has been using as cooking oil from the time immemorial. The average yield of Mustard is 1500 Kg/ha. Total production and per hectare seed yield of this crop may be increased by using high yielding variety (HYV) and improved production technologies (Gonzales *et al.,* 1993). Oil cake is a nutritious food items for cattle and fish. It is also a good organic fertilizer for crops. Dry Mustard plants may be used as fuel. According to the World agriculture towards 2015/2030 an FAO perspective, Oil seed crops responsible for a good part of agricultural land

expansion (MoA, 2011)**.** The three fast growing oil seed crops (soybeans, rapeseed and sunflower) have been responsible for a good part of the expansion of cultivated land under all crops in the developing countries and the world as a whole (Gujrati, 1998). In terms of the expansion of land under the four major oil crops (soybeans, sunflower, Mustard and oil palm) was 63 million ha, that is, these four crops accounted for all the increase in world harvested area and more than compensated for the drastic declines in the area under cereals in the industrial countries and the transition economies (Jabbar and Islam, 1981). The growth of food demand in the developing countries was the major driving force behind the rapid growth of the oil crops sector in the historical period (Islam, 2006). The most of the countries played a major role in these developments. Table 1.2 shows the past and present of oil crops production contribution with 15 years formal prediction in terms of Production of oil crops in oil equivalent.

Table 1.2: Major oil crops, world production and prediction over the years

(Million Tones)

Oil Crops	1997/99	2015	2030
Soybeans	27.7	42	58
Mustard	14.5	22	32
Sunflower seed	10.3	15	21
Groundnuts	9.4	15	20
Coconuts	6.0	9	12
Cottonseed	5.3	7	9
Sesame seed	1.2	2	3
Other oil crops	7.6	10	13
Total	82	122	168

Source: World agriculture (2010): towards 2015/2030 an FAO perspective

1.12 Importance of oil Seed in Bangladesh

Due to increase of area under cereal crops for meeting the increasing demand of food-stuff land under oil seeds crops has declined and price of oil has gone up. Mustard is the principal oil producing crop of Bangladesh yielding 52.2% total oilseed produced from 60.3% of the area converge (Anwarul and Arshad, 2010). The seeds contain 40-44% oil, 25% protein and 6.4% nitrogen (FAO, 2012). It is one of the most important oilseed crops among all oilseed crops in Bangladesh. The government of Bangladesh has therefore, provided priority to the agriculture sector to increase the production of oil seeds by giving subsidy to the farmers on different inputs such as fertilizer, irrigation etc (BBS,2012). Oil cake, the by-product of Mustard, is a nutritious food item for cattle and fish (Esmaeili, 2008). It is a good organic fertilizer too. It is an important source of cooking oil in Bangladesh and it meets one third of the edible oil requirement of the country (Ahmed, 2008). The production of oilseed is one-third of total oil seed production in Bangladesh. Mostly supply of oil in the market is maintained through import from abroad at the cost of huge amount of foreign exchange (Hossain *et al.,* 2006).

Table 1.3: Oil Seed and Edible Oil Expenditure by Import (Million US Dollar)

Year	Oil seed	Edible Oil
2005-06	90	473
2006-07	106	583
2007-08	136	1006
2008-09	159	865
2009-10	130	1050
2010-11	103	1067
2011-12	177	1644
2012-13	242	1402

Source: Bangladesh Economic Review, 2014

1.13 Climate & Soil for Mustard Cultivation

Land and Soil

Medium to medium high land is suitable for cultivation but loamy soil is the best for Mustard cultivation. It can also be cultivated in clay loam and sandy loam soil.

Seed rate: 13.5 kg/ha

Seed treatment

Seed treatment before sowing with Captan or Vitavex-200 (2 g/kg of seeds) could be helpful to reduce the incidence of Alternaria blight.

Time of sowing

Mid-October to mid-November is the optimum time for Mustard crop sowing.

Land preparation

Land should be well prepared by 4-5 times ploughings followed by laddering. Land should be well pulverized and free from big clods and weeds.

Sowing method

Seeding could be done both in line and broadcasting methods. In case of line sowing, row to row distance is 30 cm and in rows seeds should be sown continuously

Fertilizers dose

The fertilizer doses of different fertilizers (kg/ha) for different varieties are as follows:

Urea 250-300
TSP 170-180
MP 85-100
Gypsum 150-180
Cow dung (ton) 8-10

The above fertilizer rate may be varied depending on AEZ and fertility condition of land (Begum and Manos, 2005).

1.14 Mustard Cultivation Areas of Bangladesh

In Bangladesh there are 30 agro-ecological zones, among them 23 zones are good for Mustard production (BBS, 2013). Table 1.5 shows Area, Yield and Production of Mustard in various region of Bangladesh.

Table 1.4: Area, production and yield of Mustard in various regions of Bangladesh

Name of Regions	2010-2011			2011-2012		
	Area (in acre)	Yield (kg/ acre)	Production (M. Ton)	Area (acre)	Yield (kg/ acre)	Production (M. Ton)
1.Bandarban Region	766	359	275	598	447	267
2. Chittagong Region	1094	346	378	1091	356	388
3. Comilla Region	17807	427	7606	24093	377	9093
4. Khagrachari Region	268	354	95	299	321	96
5.Nakhali Region	860	236	203	882	239	211
6. Rangamati Region	597	346	207	556	369	205
7. Sylhet Region	3045	456	1387	3051	468	1429
8. Dhaka Region	100468	330	33173	104129	363	37831
9.Faridpur Region	62856	290	18241	63148	292	18412
10. Jamalpur Region	32181	363	11683	30269	350	10586
11.Kishoreganj Region	7862	376	2959	6776	390	2643
12.Mymensigh Region	5730	248	1423	4609	284	1310
13.Tangail Region	71035	311	22160	67414	361	24370
14.Barisal Region	2591	202	524	2636	232	611
15. Jessore Region	48245	321	15510	49762	352	17507
16.Khulna Region	6969	298	2077	4281	318	1363
17. Kushtia Region	30256	503	15228	29428	543	15990
18. Patuakhali Region	333	216	72	344	218	75
19. Bogra Region	26451	405	10717	24659	417	10279
20.Dinajpur Region	21006	381	7997	18068	462	8347
21.Pabna Region	86440	391	33794	84737	410	34768
22. Rajshahi Region	37653	332	12534	64040	339	21681
23.Rangpur Region	13515	331	4474	13384	334	4466
BANGLADESH	578028	351	202717	578028	371	221928

Source: BBS, 2013

1.15 Justification of the Study

In Bangladesh, Mustard is grown in limited area on commercial basis. However, there is a demand for Mustard all over the country. Farmers allocate land and other resources in the production of different crops on the basis of relative financial profitability & resource efficiency. With the rapid increase in population and urbanization, the demand for oil production has been increasing. To meet up growing demand of oil without importing, cultivable area of Mustard should be increased. The high demand of oil can only be met by increasing its production vertically. While making production decision, farmers consider costs of production against the yield of the crop. So, profitability study on Mustard is expected to reveal valuable information relating to farms and farmers growing this crop. With the importance of Mustard cultivation in Bangladesh, it is necessary to find out the maximum level of Mustard produced per unit of land using the existing level of resources. Efficient use of resources can provide the farmers to have higher production from the available resources. The situation is particularly critical in a country like Bangladesh where per hectare recommended amount is seldom used in production. However, a few systematic financial investigations on oilseed crops were undertaken either by private or government organizations and were not sufficient to satisfy the demand of extension workers, policy makers, research personnel's and farmers. In this context, this study will help to diagnose the problems and prove our understanding on the interrelated problems of farmer's choice making in producing Mustard. The findings of the study will generate basic financial data on the production practices of Mustard. The present study will provide valuable information to the individual farmers and researcher who will conduct further studies of the similar nature and encourage them in conducting more comprehensive and detailed investigation in this particular field of study. Keeping this in view the study was undertaken with the following specific objectives.

1.7 Specific objectives of the study

The specific objectives of the study are as follows;

a. To document the demographical profile of Mustard farmers in Tangail district;
b. To determine the financial profitability of Mustard production in the study area;
c. To determine the resource use efficiency of Mustard cultivation; and
d. To find out the major constrains of Mustard cultivation at farm level and suggest some policy guide line.

1.8 Organization of the thesis

This thesis consists of eight chapters. Chapter I deal with the introduction including the background, justification and objectives of the study. Next, review of related literature is presented in Chapter II. Chapter III deals with the research methodology of the study. The results and the discussion of the study are presented in Chapter IV, V, VI and VII. Finally, Chapter VIII represents the summary, conclusions and recommendations of the study.

1.9 Limitation of the Study

Considering time, money and other necessary resources available to the researcher and to make the study meaningful and manageable from the research point of view, it was necessary to impose some restrictions as stated below:

1. The investigation was depended on the data given by the selected growers during their interview
2. For some cases, the researcher faced unexpected interference from the over interested side talkers while collecting data from the target respondents.
3. Due to shortage of time the study could not cover wide areas for collecting necessary information for avoiding inverse relation of the profit.
4. The shortage of money and time that did not allow taking a large numbers of samples to show the real significances among all categories farmers.
5. The farmers always remained busy in field work and it was difficult to collect information from their wife and child without consulting their husband.

6. CHAPTER II

7.

8. REVIEW OF LITERATURE

9.

10. A number of studies have examined financial profitability & resource efficiency of different agricultural crops in Bangladesh. This section presents the literature review on details resource use efficiency and profitability measurement analysis for the cereals and non-cereals using different financial analysis. The main purpose of this chapter is to review some related studies in connection with the present study. Although a number of studies have been done related to Mustard production in Bangladesh, only a few studies have so far conducted related to financial profitability and resource use efficiency of Mustard production in Bangladesh. Again, some of these studies may not entirely relevant to the present study, but their findings, methodology of analysis and suggestions have a great influence on the present study.
11. **Hossain (2013)** conducted a study on the farmers' perception on profitability of Mustard cultivation in between aman and boro rice. Findings indicate that majority of the farmers' (59 percent) had high level of perception on profitability of Mustard cultivation in between Aman and Boro rice. Still there were some respondents (41 percent) had medium perception. Thus, it is indicative that there is scope to take necessary steps to bring 41 percent farmers to high level of perception.
12. **Rabbani *et al.* (2013)** found out that the management and technological training is needed to the farmers to increase farm production and income from Mustard cultivation. The author showed that less of proper technological advancement and proper information supply Mustard production level become low and inefficient resource allocation increase the cost of production.
13. **Rayhan *et al.* (2013)** conducted in Sirajganj district of Bangladesh to determine the profitability and resource use efficiency of Mustard production. Both descriptive statistics and functional analysis was done

to achieve the objectives of the study. The author showed that the productivity and profitability was satisfactory for Sirajganj Mustard farmers. The author also suggested that if the farmers of Sirajganj district use the resources efficiently it could increase the production level more for the Mustard farmers in the study area.

14. **Haque *et al.* (2012)** conducted a study with three categories of seed producers, namely BADC farms at Dattanagar, Jhenaidah and Tabunia, Pabna as public agency, LAL TEER Seed Company in Lalmonirhat district as private company and BRAC farm in Bogra district as NGO during Rabi season of 2007-08 to know the present status and profitability of hybrid maize seed production. In the study they find the cost of production and the yield of hybrid seed was highest under NGO than that of public agency and private company. Benefit cost ratio (BCR) was higher for the contract growers of public agency. Net return of hybrid maize seed production was 50% higher than that of non-seed production. High price of seed and lack of technical knowledge were major constraints of hybrid maize seed production in the study areas.
15. **Navadkar *et al.* (2012)** attempted to study the resource use structure, to estimate the cost of cultivation and to study the marketing of maize. In the study the estimates of the production functions indicated that, human labour, manures and nitrogen are the important resource variables responsible for increasing the yield. The use of these variables has to be carefully extended by the maize growers to increase the yield.
16. **Begum *et al.* (2011)** conducted a study to assess the costs and returns from the cultivation of selected crops in different locations. He finds the benefit cost ratios over total costs were 1.61, 1.72, 1.62, 3.55, 1.90, 2.17, 3.72, 1.94 and 2.64 for the cultivation of maize, groundnut, mungbean, sweet potato, cabbage, cauliflower, tomato, cucumber and okra respectively. High costs of fertilizers and insecticides were the major constraints to higher production for most of the crops as mentioned by the sample farmers.

17. **Ogunniyi (2011)** had done a study to measure profit efficiency among maize producers in Oyo State, Nigeria. He showed that profit efficiencies of the farmers varied widely between 1% and 99.9% with a mean of 41.4% suggesting that an estimated 58.6% of the profit is lost due to a combination of both technical and allocative inefficiencies in maize production. From the inefficiency model, it was found that education, experience, extension and non-farm employment were significant factors influencing profit efficiency. This implies that profit inefficiency in maize production can be reduced significantly with improvement in the level of education of sampled farmers.
18. **Rahman and Hasan (2011)** examined profitability of wheat in Bangladesh. They concluded that the key policy variable of interest, i.e., the output price, has an almost elastic supply response. A 1% increase in wheat price will increase its supply by 0.95%. A positive response of output (rice or wheat) to its price has been common in Asia since the 1970s. For example, return to scale of HYV rice in Bangladesh is estimated at 0.36 (Rahman and Shankar, 2009), Basmati rice in Pakistan Punjab at 0.27 (Farooq *et al.*, 2001), Mexican wheat in Indian Punjab at 0.63 (Sidhu and Baanante, 1981), Jasmine rice and Glutinous rice in Northern Thailand at 0.19 and 0.79, respectively (Rahman and Sriboonchitta, 1995).
19. Alam *et al.* (2010) conducted a study in the haor areas of Bangladesh to assess the land utilization status, delineate the productivity and profitability of growing modern rice, evaluate the existing cropping patterns and assess the prospect of possible cropping patterns. , the study revealed that, there are about 1.26 million hectares of cultivated lands in seven haor districts, of which 66% falls under haor area. According to the farmers' assessment, lack of flood control dam and lack of short duration varieties etc. are the major hindrance to the adoption of potential cropping patterns. Construction of community harvest and threshing facilities and flood control devices could be the

important public interventions for enhanced agricultural productivity in the haor areas.

20. **Barkat *et al.* (2010)** revealed that smaller farmers were more restricted in their choices and opportunities because of their lack of assets and their financial profits from crop production activities are not moderate. A selective, targeted fertilizer subsidy scheme for only the smaller farmers may be the correct subsidy policy. In recent times, it has happened quite often that farmers have complained of not receiving the required amount of fertilizers and even sometimes not any fertilizer at all at the dealer's shops. The study found huge deficit of fertilizers among small farmers, whereas larger farmers were less likely to be fertilizer-deficit as compared to the smaller farmers. The reasons behind the huge deficit of the fertilizers could be attributed to high price of fertilizers, lack of availability on time, transportation problem and so forth.
21. **Karim *et al.* (2010)** conducted study to assess the existing agronomic practices of hybrid maize cultivation, its profitability, constraints and factors affecting hybrid maize production. It is found that the coefficient of human labour, land preparation, irrigation, urea and borax have significantly impact on gross return. Timely non-availability of seeds, high price of fertilizer and low price of yield were the major problems for hybrid maize production. Farmers cultivated hybrid maize because of higher yield, higher income and easy growing.
22. **Onuk *et al.* (2010)** assessed the economics of maize production among farmers in Mangu Local Government Area of Plateau State, Nigeria. The result of the survey also indicated that men had more access to land than women, thus making them to be more involved in maize production. However, both men and women have experience in maize production and obtained planting materials mostly from previous harvest. Finally, the study concluded by advocating adequate market with good stable prices for maize farmers products that would enhance maize production in the study area and the country at large.

23. **Moniruzzaman *et al.* (2009)** carried out a study in four major maize growing areas namely Chuadanga, Dinajpur, Bogra and Lalmomirhat during 2006-07 to know profitability level of maize production in Bangladesh. Benefit cost ratios were calculated as 1.58, 2.10 and 2.58 on total cost, variable cost and cash cost basis respectively. As a result, maize cultivation was more profitable. Lack of capital and high price of TSP were the main constraints to its higher production. Farmers in the study area had scope area had scope to increase maize productivity by attaining full efficiency through reallocating the resources.
24. **Rashid *et al.* (2009)** determines financial profitability of selected crops in the different locations in the country and examines the implications on Bangladesh's trade policies and comparative advantages of selected agricultural commodities like rice, wheat, maize, potato and lentil. The border price of wheat, maize, potato and lentil at producer level measured at official exchange rate was mostly higher than the domestic producer price at the investigated years. For successful implementation of trade liberalization policies, Bangladesh must plan accordingly and take appropriate policies to materialize the likely grains in trade by increasing its trade capacity.
25. **Ali *et al.* (2005)** conducted the profitability & efficiency of pineapple production in some selected areas of Tangail District. The author found that pine apple production is profitable and productivity is high for Tangails farmers. The author also showed that resources were not use efficiently in the study areas.
26. **Anupama (2005)** had done a study in the state of Madhya Pradesh. The study stated the economic efficiency of the maize growers in the state of Madhya Pradesh can be improved by increasing the adoption level of the improved package of practices. This can be made possible by providing good quality seeds of improved maize cultivars and easy and cheap credit for the purchase of critical inputs like fertilizers, plant protection chemicals etc. Additionally, an assured market for their output through forward linkage with agro-processing industries will

indirectly reduce the price volatility in maize produce and increase the socio-economic status of the farmers.

27. **Khan *et al.* (2004)** conducted research on productivity & resource use efficiency of Boro rice cultivation in some selected haor areas of Kishoreganj district. The authors showed that in the haor area Boro rice cultivation is profitable. Boro-Fallow-Fallow is the common land use pattern of the study area. The author also found that the technical efficiency of the study area was 87.27 %. Fertilizer and irrigation significantly increase the production level of Boro rice in the haor area.
28. **Alam (2003)** had undertaken a study to examine possibilities of enhancing the sustainable development of diverse agriculture in Bangladesh. The production of maize and potato has experienced a respectable growth rate during the last decade. A field study conducted in 12 districts on maize, millets, potato, sweet potato, lentil and mungbean suggests that both financial and economical returns to production of those secondary crops are positive. It appears that maize, millets, pulses, potato and sweet potato (CGPRT or secondary crops) have enough potential for crop diversification, employment creation, income generation, reducing malnutrition and poverty alleviation in rural Bangladesh.
29. **Reza (2003)** conducted the input-output relationship and resource use efficiency of snake gourd cultivation in a selected area of Gazipur District. The author showed that snake gourd cultivation is profitable for the farmers but resources are not applied efficiently for Snake gourd cultivation in the study area farmers.
30. **Shahabuddin *et al.* (2002b)** examined the cost and return of rice using two indicators: net financial profitability and domestic resource cost ratio and suggested that Bangladesh had achieve efficiency in rice production except for the upland aus and the deepwater aman rice. Diversification in favour of non-rice economic activities for both upland and extreme lowland was financially justified.

31. ***Zahir (2001)*** *revealed that reduction of subsidy would reduce farmers' profit (net income) and adversely affect crop sector growth. The author suggested that to increase profit and productivity, farmers need support and subsidy on inputs in their cultivation process.* The author showed that less of proper technological advancement and proper information supply Mustard production level become low and inefficient resource allocation increase the cost of production
32. **Bagchi and Hossain (2000)** evaluated the cost and return for rice production in India. The cost was assessed through an estimation of social productivity and domestic resource cost ratio by including the value of rice and the resources involved into the cultivation at their total cost. The result showed that adoption of high yielding varieties, farm mechanization, increased used of fertilizer and chemical led to increase in productivity and profitability. The optimum use of fertilizer inputs also resulted in efficiency of resources. These all factors affected the return and efficiency level of rice.
33. **Das (2000)** conducted a comparative analysis of HYV BR-29 and hybrid Alok paddy in Kalihati Upazila of Tangail District. He determined the costs, returns and relative profitability of HYV BR-29 and Alok paddy. In order to attain objectives, 66 farmers from 6 villages were selected as sample. Analysis of costs and returns showed that the total cost of BR-29 was Tk. 13206.75 and that for Alok varity was Tk. 13894.45. Again, return above full cost for BR-29 variety was found to be higher than Alok variety Tk. 6350.61 per acre. Therefore, production of BR-29 variety was found to be profitable compared to Alok variety.
34. **Rahman (2000)** conducted a study to determine the economics of Boro paddy production in Melandah Upazilla of Jamalpur district. The major findings of the study were that BR-29 was profitable enterprise from the view points of small medium and large farmers. Per hectare costs or BR-29 were calculated at Tk. 3295.54, Tk. 32485.63 and 33617.40 for small, medium and large farmers respectively. Per hectare Yield of BR-

29 were 6290 kg, 6600 kg and 6100 kg, respectively. In general human labor, power tiller, seedling, fertilizers, Irrigations and insecticides emerged as the very crucial contributors to increased income from BR-29 Boro production.

35. **Sukume *et al.* (2000)** measured the cost and return of crop production in Zimbabwe. The author showed that a higher number of crops were economically viable in each zone in small scale commercial sector. The most efficient crop in the communal sector was groundnut and Mustard followed by sunflower, finger miller and cotton in all zones. The author also indicated that the financial system that had been in place for decades had created severe distortion through net subsidization of farmers in regions remote from main consumption centres.
36. **Nantu (1998)** conducted a study to identify costs, returns and resource use efficiency in the production of Boro paddy in some selected area of Bangladesh. The costs of production of Boro paddy per hectare were Tk. 25547, Tk. 25857.73, and Tk. 27548.07 for small, medium and large farmers respectively. Per hectare yield of Boro paddy under different farm categories were 2875.85 kg, 3230.95kg and 3152.50 kg respectively. The net returns per hectare were Tk. 2075.09, Tk. 4986.09 and Tk. 2232.48 respectively.
37. **Zabunnesa (1998)** studied the performance of selected rural development programmes organized by BRAC in a selected area of Mymensingh district. She analysed three BRAC programmes namely poultry, dairy and sericulture. On poultry programmes of the BRAC, she observed that the average annual income per household was Tk. 23388.40 and poultry rearing constituted the major source of income representing 36.47 per cent of total income. Total annual feed cost per household was Tk. 30399.29 and total annual labour cost per household was estimated at Tk. 1178.57 for male and Tk. 1204.76 for female labour. The gross margin of the poultry enterprise was estimated at Tk. 8529.93.

38. **Hasan (1997)** studied poultry rearing of small farmers under the supervision of BRAC in a selected area of Kushtia district. The study reveals that on an average the total cost per poultry farm per year was Tk. 1367.17, 24558.76 and 46707.75 for key rearer, model rearer and chick rearer respectively. The net returns per poultry farm per year were Tk. 6533.25, 5165.60 and 17158.40 for key rearer, model rearer and chick rearer respectively. The study also reveals that annual net return was the highest for the chick rearer but the net return per Taka invested was the higest for the key rearer. The benefit-cost ratio (BCR) of key rearer, model rearer and chick rearer were 4.78, 2.74 and 1.75 respectively.
39. **Yao (1997)** assessed the cost and benefit of the Thai agricultural diversification policy in 1994–96. He suggested that Mustard was also more profitable as soybeans and mug beans implying that government intervention may incur efficiency losses. Sensitivity analyses showed that potential price changes, increasing water scarcity, and the effects of crop production on the environment were important concerns which justify government intervention.
40. **Morris *et al.* (1996)** showed that when inputs and outputs were assigned economic prices, wheat production represents the most efficient use of domestic resources in most non-irrigated zones and in one irrigated zone in Bangladesh.
41. **Ali (1993)** undertook a study to examine the profitable of small-scale layer farms in Dhaka city. In this study 30 egg producing farms were selected, of which 16 were small farms and 14 were medium farms. The average number of birds in the small farms was 61 while it was 178 in medium farms. The average annual egg production was 268 and 266 per hen in small and medium farms respectively. He noted that poultry owners earned net returns above cash cost amounting to Tk. 21301.00 in small farms and Tk. 67316.00 in medium farms. On the basis of full cost, poultry owners earned net returns of Tk. 21135.00 in small farms and Tk. 51556.00 in medium farms. Net returns per taka invested stood

at Tk. 0.45 in small farms and Tk. 0.84 in medium farms. Gross margins in small and medium farms were estimated at Tk. 16171.00 and 60822.00 respectively.

42. Bayes ***et al.*** (1985) concluded that some combination of price support and apply proper doses fertilizer to achieve efficiency of rice in Bangladesh. The authors showed that in Bangladeshis farmers' needs institutional support for reducing operating cost and increase the efficiency level of production.
43. Barker **and** Hayami (1976) found that a subsidy applied to modern inputs, such as fertilizer, that was being used below optimum can be more profitable than supporting product prices. The authors suggested that farmers have to apply modern inputs by maintain proper dose for attaining efficiency.
44. Most of the above studies mainly focused on cost, return and economic analysis of cereal crops but a little of them were focused on oil seed crops. There is also a very little effort on measuring resource use efficiency of oil seed crops production. Nevertheless, no empirical study has yet been conducted specially on the financial profitability and resource use efficiency analysis of Mustard production. So, the present study, a moderate attempt has, therefore, been taken in this direction and be considered as a pioneering work in this field so far as systematic investigation into the cost, returns and resource use efficiency of this enterprise is concerned in some selected areas of Tangail district.
45.

CHAPTER III

METHODOLOGY

This Chapter deals with the methodology used for the study. The reliability of a scientific research depends to a great extent on the appropriate methodology used in the research. Farm management research usually involves collection of primary data from the operating farmers. The method of data collection, however, depends upon the nature aims and objectives of the study. Methodology mainly covers issues like selection of the study area, selection of the samples, preparation of the interview schedule, collection of data, tabulation, analysis and interpretation of the data. A sequential description of the methodology used for this study is presented under the below:

3.1 Method of Investigation

A survey based research deals with collection of information from individual respondents. There are three main methods by which farm survey data can be gathered. These are:

i) Direct observing,
ii) Interviewing respondents and
iii) Record kept by respondents.

Selection of particular method depends on many considerations, such as, the nature of the research problem, provision for research funds, time constraints, etc. In this study, survey method was followed to collect information from the respondents to fulfill the objectives of this study. There are two major advantages of the survey method, such as: quick investigation of large number of cases and wider applicability. The shortcoming of the survey method is to rely solely on the memory of the respondents. Usually the farmers of Bangladesh don’t keep any written records and account for their farm operations. Moreover, most of the rural people of Bangladesh are still illiterate. So, it is a difficult task to conduct a survey

for any scientific farm management study. To minimize errors, repeated visits were made to collect data and in the case of any omission or contradiction, the farmers were revisited to obtain the correct information.

3.2 Selection of the Study Area

Selection of the study area is an important step. To achieve the objectives of the present study, a preliminary survey was conducted in Mirzapur upazilas under Tangail district. On the basis of preliminary information, 6 villages namely Echyail, fathepur, Hatkura, Kurni, Nowapara and Shuvolla were selected for the study. The selection of the study area was based on the following considerations:

i) Farmers of these villages are involved in Mustard cultivation.
ii) From the view point of time and available resource, this area is suitable for the study.
iii) Accessibility to the area is good due to developed communication system and
iv) Expectation of good co-operation from the respondents to obtain reliable data.

3.3 Sampling Technique

It is generally not possible to make a survey covering all farmers and it is not worthwhile to include too many farmers in a survey, because of requiring more time and money to complete the survey. In the present study a total of 75 Mustard farmers were selected randomly of which 25 large, 25 middle and 25 small farmers. In this study, the farm size is classified based on the cultivated land during the survey period and the operational definitions of small medium and large farms have been considered as, farmers having land of 50 to 100 decimal consider as small farmers, 101 to 250 decimal as medium farmers and 251 & above as large farmers (Kazal *et. al*., 2013).

3.4 Preparation of Survey Schedule

To meet the objectives of the study a preliminary survey schedule was designed for collecting data. The draft schedule was pre-tested in the study area by the researcher himself. Thus, some parts of the draft schedule were improved,

rearranged and modified in the light of the actual and practical experiences gathered from pre-testing. The following items were taken into account while preparing the questionnaire:

i) Identification of the respondent and their family composition along with information on education and occupation.
ii) Land utilization pattern.
iii) Quantity of assets and their present value.
iv) Input costs including human labor cost, housing cost, all fertilizer cost and miscellaneous cost.
v) Returns from Mustard cultivation.
vi) Problem faced by the Mustard farmers.

3.5 Period of Data Collection

The researcher himself collected necessary data from the respondents during the months of March to April in 2014 through personal interview.

3.6 Collection of Data

After the schedule was finalized, the selected farmers were interviewed individually by the researcher himself. Before beginning the interview, the respondents were given a brief introduction about the nature and purpose of the study to ensure that information provided by them would be kept secret and be used exclusively for the study and nothing else. Then the questions were asked in a simple manner with explanation whenever necessary. The answers of respondents were recorded directly on the interview schedules. Having done the interview, each schedule was checked in order to be sure that the information of each of the items had properly been recorded or not. Items found contradictory and overlooked were corrected in the second visit.

3.7 Processing of Data

All the collected data were checked and crosschecked before transferring to the computer. Therefore, these were classified, tabulated and analyzed to accomplish the specific objectives of the study. Data were presented mostly in the tabular

form, because it was of simple calculation, widely used and easy to understand. Besides, functional analysis was also adopted in a small scale to arrive at expected findings. Raw data were inserted in computer using the concerned SPSS and MS Excel.

3.7.1 Analytical technique

Data were analyzed with a view to achieving the objectives of the study. For this study, the following techniques were used:

i) Tabular technique
ii) Statistical analysis

Tabular technique

Tabular technique was applied to classify data in order to derive meaningful findings by using simple statistical measures like means, percentage and ratios.

Statistical analysis

This component of financial analysis was designed to study the factors contributing to Mustard production and resource use efficiency. To accomplish that goal, a production function analysis was carried out to explore the contribution and productivity of the individual inputs. The data for this analysis were arranged on per hectare basis.

3.7.2 Financial profitability of crops

Cost and return analysis is the most common method of determining and comparing the profitability of different farm enterprises. In estimating the level of profitability in crop production the following formula was used:

$$\prod = P_1Q_1 + P_2Q_2 - \sum WX_i - TFC$$

Where,

$\prod$ = Profit per hectare for producing the crop;
P_1 = Per unit price of the output;
Q_1 = Quantity of output obtained (per hectare);
P_2 = Per unit price of by-product;
Q_2 = Quantity of by –product obtained (per hectare);

W = Per unit price of the i^{th} input used for producing the crop;

X_i = Quantity of the i^{th} input used for producing the crop; and

TFC = Total fixed cost

3.7.3 Calculation of BCR

BCR is the ratio of gross return and total cost. It indicates that the benefit of per unit of cost. BCR was calculated by using following formula-

$$\textbf{BCR} = \frac{\textbf{Gross return}}{\textbf{Total cost}}$$

3.7.4 Cost items

The cost of inputs is an important factor that plays an important role in financial decision making for performing and income generating activity. Respondents in the study area used purchased inputs as well as home supplied inputs. The cost of purchased inputs and home supplied inputs were not calculated separately. The cost of Mustard cultivation can be broadly classified under the following two heads:

a) Variable cost
b) Fixed cost

a) *Variable cost*

This mainly includes the following heads:

i) Cost of seed
ii) Labor cost
iii) Fertilizers cost
iv) Machinery and animal cost and
v) Interest on operating capital

b) *Fixed cost*

This mainly include only:

i) Land use cost

Cost of seed

Seed constituted the main cost item for Mustard farms. Cost of seed is the money value of total costs of Mustard seed, purchased or kept from previous year by the farmers during Mustard cultivation.

Fertilizer cost

Fertilizer was one of the largest and the major cost items of Mustard cultivation. Cost of fertilizer included (Urea, TSP, MP, Gypsum etc.). Fertilizer costs were calculated at the prevailing local market rates. It's were estimated according to the cash price paid by the farmers per kg.

Human labor cost

Human labor cost was another most important input in the production of Mustard. Labor cost includes both family labor and Hired labors because there was significant use of hired labor in this cultivation. Eight adult male hours were equivalent to one man-day and the opportunity cost principle was used to estimate the wage rate of labor.

Animal labor cost

Animal were generally used for laddering in land preparation and threshing. Most of the farmers of the study areas used their own animals. Sometimes they also hired power animals on pair hour basis. Animal labor included a pair of animals and an attended. An animal pair day consisted of six hours. For calculating animal labor cost, the cost of human labor was deducted from the cost paid for the services of a pair of with the ploughman, because the cost of attended was included in the human labor cost.

Machinery cost

The costs of Machinery services were calculated by taking into account the actual costs incurred by the Mustard farmers. In the study area almost all the sample farmers used power tiller and other machineries for land preparation and threshing. They mainly used hired power tiller. A power tiller owner supplied fuel as well as

driver for land preparation and threshing. Service charge was included into the machinery cost.

Land use cost

The cost of land use was different for different points, according to the location, topography and fertility of the soil. Land was used for a period of four months for growing Mustard starting from land preparation to harvesting. In the present study, the cost for use of land was calculated by taking the cash rental value of land would have been the other choice to account for the cost of land use.

Interest on operating capital

The amount of money needed to meet the expenses on hired or purchased inputs was considered as operating capital in this present study. Interest on operating capital was calculated at the rate of 12 percent per annum. Interest on operating capital was calculated by using the following formula (Mia *et al.*, 2013)

$$IOC= AIit$$

Where,

IOC= Interest on operating capital

i= Rate of interest

AI= Total investment / 2

t = Total time period of a cycle

3.7.5 Return items

Return items were as follows:

(i) Return from selling Mustard.

(ii) Return from selling by product.

3.7.6 Procedure for Evaluation of Return

Per hectare gross return was calculated by multiplying the total amount of product by their respective average market price. Gross return per hectare consisted of the value of main product and the value of by- product. Net return was measured by deducting all direct cash and non cash expenses from the gross return.

3.7.7 Cobb-Douglas production function

To determine the contribution of the most important variables in the production process, the following type of Cobb-Douglas production function was used in the study.

$$Y = aX_1^{b1}\ X_2^{b2}\ X_3^{b3}\ X_4^{b4}\ X_5^{b5}\ e^{ui}$$

By taking log in both sides the Cobb-Douglas production function will be transformed into the following double logarithmic form so that it can be solved as a linear relationship;

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + \ldots\ldots + b_n \ln X_n + u_i$$

Where,

Y = Yield of Mustard (Kg /ha),

a = Constant or Intercept of the function,

Xi = Human labor (Man days /ha),

X2 = Seed (Kg /ha),

X3 = Urea (Kg /ha),

X4 =TSP (Kg /ha),

X5 = MoP (Kg /ha),

b_i = Coefficient of respective variables,

ln = Natural logarithm,

ui = Error term and

i = l, 2 ...n

3.7.8 Efficiency of Resource Allocation

In order to test the efficiency, the ratio of marginal value product (MVP) to the marginal factor cost (MFC) for each input was computed and tested for its equality to 1;

$$\frac{\text{MVP}}{\text{MFC}} = 1$$

In this study the MPP and the corresponding values of MVP will be obtained as follows:

$$MPP_{xi} \times P_{yi} = MFC,$$

$$\text{Where, } MPP_{xi} \times P_{yi} = MVP,$$

$$\text{But, } MPP = b_i \times (Y/xi)$$

$$\text{So, } MVP = b_i \times (Y/xi)\, P_{yi}$$

Where,

b_i = regression coefficient per resource,

Y = Mean output,

xi = Mean value of inputs,

P_{yi} = price of output,

MFC = price of per unit of input.

Thus, when Resource-use efficiency (RUE) =1, resources were optimally utilized,

When RUE < 1, resources were over utilized, and

When RUE > 1, resources were underutilized.

CHAPTER IV

DEMOGRAPHIC PROFILE OF RESPONDENTS

In this chapter, the findings of the study and their logical interpretations have been systemically presented in different sections according to the objectives of the study. Results have been discussed in relation to other similar studies wherever applied. The first section of the study deals with selected demographic characteristics of the sample farmers. Demographic characteristics of the farmers often influence their production decision. Decision making behavior of individual is determined to a large extent by his demographic characteristics. However, it was not possible to collect detailed information regarding the demographic characteristics of the sample farmers. Some important characteristics were considered in this study such as family size and composition, educational status, occupation, and ownership pattern etc. A brief description on these aspects is presented under the following sections.

4.1 Age distribution of the sample Mustard farmers

Age of the sample farmer is a significant part for expressing demographic profile of that area. Age of the farmer also plays an important role for Mustard cultivation. Age of a farmer referred to the period of time from his birth to the time of interview. It was measured in terms of actual years. In the study area, On the basis of the age, the farmers were classified into three categories.

1. Young farmers (20-35) years,
2. Middle age farmers (36-50) years and
3. Old farmers (51-above) years.

Age distribution of the selected Mustard Farmers is presented in Table 4.1. It is evident from the table that the highest number of Mustard Farmers (49.33 %) belongs to the age group of 20-35 years followed by middle age (34.67%) and old age (16%) group. Similar type of situation was found for small and large category

of farmers while highest 36% of the medium farmer belongs to the middle age group.

Table 4.1: Age distribution of the sample farmers

Age group	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	No	%	No	%	No	%	No	%
Young (20-35) Years	14	56	12	16	33	44	11	49.33
Middle (36-50) Years	8	32	9	36	9	36	26	34.67
Old (51-above) Years	3	12	4	16	5	20	12	16
Total	25	100	25	100	25	100	75	100

Source: Field survey, 2014

4.2 Age of the family members

Age of family members is helpful for determining the family contribution for cultivation process. It was found from the Table 4.2 that the highest percentage of family members belong to age group 11 to 25 years for small farmers. Similar picture was found for medium and large farmers' category. In general highest percentage of family members was belong to age group of 11 to 25 years and lowest percentage was belonged to age group of above 55 years.

Table 4.2: Classification of the sample farm families according to age

Age group	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	No	%	No	%	No	%	No	%
Up to 10	43	34	36	24	34	23	113	24
11-25	49	41	66	43	56	37	169	43
26-40	22	18	22	14	22	30	66	16
41-55	2	2	16	11	30	20	48	11
Above 55	6	5	12	8	8	5	26	6
Total	122	100	152	100	150	100	424	100

Source: Field survey, 2014

4.3 Education level of Mustard farmers

Education is the backbone of a nation and the root hidden qualitative causes for all kind of success. Education has its own merits and it contributes to economic and social development. Education also plays an important role in agricultural development. Education helps a person to have day-to-day information about the modern techniques together with technological changes in various production processes. It makes a man more capable to manage scarce resources and hence to earn maximum profit. It also helps a person to take appropriate decision. The educational status of the Mustard farmers was classified into five categories:

(i) Illiterate
(ii) Sign only
(iii) Up to primary
(iv) Up to SSC and
(v) HSC and above

Table 4.3: Literacy status of the Mustard farmers

Literacy level	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	No	%	No	%	No	%	No	%
Illiterate	1	4	2	8	2	8	5	6.67
Able to sign only	7	28	5	20	4	16	16	21.33
Up to primary	9	36	6	24	9	36	24	32
Up to SSC	5	20	8	32	6	24	19	25.33
HSC and above	3	12	4	16	4	16	11	14.67
Total	25	100	25	100	25	100	75	100

Source: Field survey, 2014

The educational status of the selected Mustard farmers is presented in Table 4.3.The table shows that most of the large and small farmers had primary level of education while highest 32% of medium farmers had secondary level of education. In general 6.67% farmers are illiterate, 21.33% farmers can sign only, 32%

farmers had primary level of education, 25.33% had secondary level of education and remaining 14.67% had HSC and above level of education .The table also indicates that about 28% of the respondents had no formal education.

4.4 Educational level of the family members

Education levels of the family members also an important factor for any income generation process. Because it focus that how many active educative person play role for cultivating process.

Table 4.4: Education status of the family members

Literacy level	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	No	%	No	%	No	%	No	%
Illiterate	23	18.5	20	13	16	10.5	59	14
Able to sign only	23	18.5	20	13	16	10.5	59	14
Up to primary	52	43	56	37	70	47	178	42
Up to SSC	18	15	32	21	26	17	76	18
HSC and above	6	5	24	16	22	15	52	12
Total	122	100	152	100	150	100	424	100

Source: Field survey, 2014

Table 4.4 shows that maximum family members had primary level education (42%) followed by secondary level of education (18%). The table also indicates that about 14% of the family members were illiterate and about 28% of the family members had no formal education in the study areas.

4.5 Occupation of the sample farmers

The farmers were mainly lived their livelihood from agriculture. Table 4.5 shows the occupational status of the sample farmers. Agriculture is the main occupation for most of the farmers (82.67%). About 20, 24 and 13 percent of small, medium and large farmers respectively were involved into agriculture indirectly as subsidiary occupation.

Table 4.5: Occupation status of the sample farmers

Occupation of the Respondents	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	No	%	No	%	No	%	No	%
Main occupation								
Agriculture	20	80	19	76	23	92	62	82.67
Business & others	5	20	6	24	02	8	13	17.33
All groups	25	100	25	100	25	100	75	100
Subsidiary occupation								
Absent	15	60	13	52	20	80	48	64
Agriculture	05	20	6	24	02	08	13	17.33
Business & others	05	20	6	24	03	12	14	18.67
All groups	25	100	25	100	25	100	75	100

Source: Field survey, 2014

4.6 Land ownership pattern of the farmers

Average farm size = Own land in cultivation +Rented in land +Mortgage in land – Rented out land –Mortgage out land

In the present study, land ownership was classified into different categories i.e., cultivated own land, land rented in, land rented out, land mortgaged in, land mortgaged out, pond and homestead area. Table 4.6 reveals the average farm size of small, medium large and all farmers were 74.37, 144.08, 259.7 and 159.76 decimal respectively. Average farm size was calculated using the above formula;

Table 4.6: Land ownership pattern of Mustard farmers (decimal)

Items have	Small Farmers		Medium Farmers		Large Farmers		All Farmers	
	Area	%	Area	%	Area	%	Area	%
Homestead	5.28	5.94	8.47	4.73	12.8	3.80	8.85	4.39
Own cultivable Land	47.9	53.84	113.7	63.53	237.5	70.52	133.4	66.17
Pond	3.91	4.40	7.77	4.34	14.9	4.42	8.86	4.39
Rented in	22.11	24.85	18.54	10.36	12.35	3.67	17.67	8.76
Rented out	1.73	1.94	5.76	3.22	14.82	4.40	7.44	3.69
Mortgage in	7.06	7.94	21.17	11.83	34.58	10.27	20.94	10.39
Mortgage out	0.97	1.09	3.57	1.99	9.88	2.93	4.81	2.39
Total land Area	88.96	100	178.98	100	336.8	100	201.6	100
Average farm size	74.37		144.08		259.7		159.76	

Source: Field survey, 2014

CHAPTER V

FINANCIAL PROFITABILITY OF MUSTARD PRODUCTION

This chapter attempts to calculate the costs, return and profitability of cultivating Mustard. The items of costs include fertilizer, seed, labor cost, land cost and cost on operating capital @12 percent in 4 months. On the other side, gross return of Mustard cultivation comprised sales value of product and by-product. After calculating all the cost and return, benefit cost ratio for individual category farmers and all farmers were calculated. All the calculations were performed by hectare.

5.1 Cost of Human Labor

Human labor cost is the most important cost for any production process. Because human labor is the most important factor for utilizing both fixed and variable cost. Human labor is generally required for different operations i.e., land preparation, sowing, weeding, fertilizer application, harvesting and others function. In this sense cost of human labor were categorized into three parts.

1. Human labor cost for the small farmers
2. Human labor cost for the medium farmers and
3. Human labor cost for the large farmers

5.1.1 Human labor cost for the small farmers

Small farmers are mainly poor in nature, so they used less hired labor than the medium and large farmers. From the table 5.1 it is found that they used less hired labor than that of family labor for most of the operations. They used maximum number of hired labor during the time of harvesting (14.5 man-days/ha) whereas minimum labors were used for applying fertilizer. Small farmers used 50.8 man-days /ha for Mustard cultivation of which 23.2 man-days are family supplied and

remain 27.6 were hired. Total labor cost for small farmers was found to be Tk. 16227.6 per hectare.

Table 5.1: Human labor cost for small farmers (Man-days per hectare)

Human Labor	Small Farmer								
	Family			Hired			Total		
Operation	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)
Land Preparation	3.9	300.7	1174.5	3.3	290.6	952.1	7.2	295.7	2123.4
Planting	3.4	308.8	1050.7	2.3	304.6	690.9	5.7	306.7	1739.2
Weeding	4.7	312.0	1474.2	2.9	306.7	888.9	7.6	309.3	2358.2
Applying fertilizer	3.9	310.0	1210.9	1.1	343.3	389.3	5.0	326.7	1646.4
Harvesting & Carrying	2.4	356.0	852.3	12.1	340.6	4120	14.5	348.3	5046.9
Threshing & Grading	4.9	326.0	1588.3	5.9	333.9	1977.5	10.8	330.0	3561.7
Total	23.2	318.9	7400.6	27.6	320.0	8829.2	50.8	319.4	16227.6

Source: Field Survey, 2014

5.1.2 Human labor cost for the medium farmers

From the Table 5.2 it is found that medium farmers used less family labor than that of hired labor for most of the operations. They used maximum number of labor during the time of harvesting (15.7 man-days/ha) whereas minimum labors were used for applying fertilizer. Medium farmers used 49.5 man-days /ha for Mustard cultivation of which 21.1 man-days are family supplied and remain 28.4 were hired. Total labor cost for Medium farmers was found to be Tk. 16538.7 per hectare.

Table 5.2: Human labor cost for medium farmers (Man-days per hectare)

Human Labor	Medium farmers								
	Family			Hired			Total		
Operation	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)
Land Preparation	3.1	320.9	993.9	4.1	306.9	1242.9	7.1	313.9	2243.5
Planting	4.0	327.5	1303.5	1.9	326.7	617.5	5.9	327.1	1920.1
Weeding	3.4	323.8	1084.7	0.9	337.5	297.0	4.2	330.7	1398.6
Applying fertilizer	3.7	331.3	1235.7	1.4	325.0	451.8	5.1	328.2	1680.1
Harvesting & Carrying	2.5	359.4	887.7	13.3	353.8	4687.9	15.7	356.6	5605.8
Threshing & Grading	4.5	344.2	1542.0	7.0	348.6	2433.0	11.5	346.4	3969.6
Total	21.1	334.5	7060.7	28.4	333.1	9472.7	49.5	333.8	16538.7

Source: Field Survey, 2014

5.1.3 Human labor cost for the large farmers

From the Table 5.3 it is found that large farmers used less family labor than that of hired labor for most of the operations. They used maximum number of labor during the time of harvesting (21.7 man-days/ha) whereas minimum labors were used for applying fertilizer. Large farmers used 57.5 man-days /ha for Mustard cultivation of which 19.8 man-days are family supplied and remain 37.7 were hired. Total labor cost for large farmers was found to be Tk. 19338.9 per hectare.

Table 5.3: Human labor cost for the large farmers (Man-days per hectare)

Human Labor	Large farmers								
	Family			Hired			Total		
Operation	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)	No	Wage	Cost (Tk./ha)
Land Preparation	3.7	316.1	1153.8	6.3	301.7	1900.7	10.0	308.9	3073.6
Planting	4.0	312.4	1259.0	2.5	333.3	839.8	6.6	322.8	2114.5
Weeding	3.5	325.6	1149.4	2.3	333.3	756.7	5.8	329.5	1910.9
Applying fertilizer	0	0	0.0	1.9	340.0	642.6	1.9	340.0	642.6
Harvesting & Carrying	3.5	386.0	1362.4	18.1	372.7	6761.0	21.7	379.3	8220.2
Threshing & Grading	4.4	331.1	1460.2	6.6	360.0	2376.0	11.0	345.6	3804.5
Total	19.8	332.5	6576.7	37.7	340.2	12831.0	57.5	336.3	19338.9

Source: Field Survey, 2014

5.2 Human labor cost for all farmers

It is evident from the figure 5.1 that the human labour cost was higher for large farmers (Tk. 19338.9/ha) compare to the small (Tk. 16227.6) and medium (Tk. 16538.7) categories of farmers.

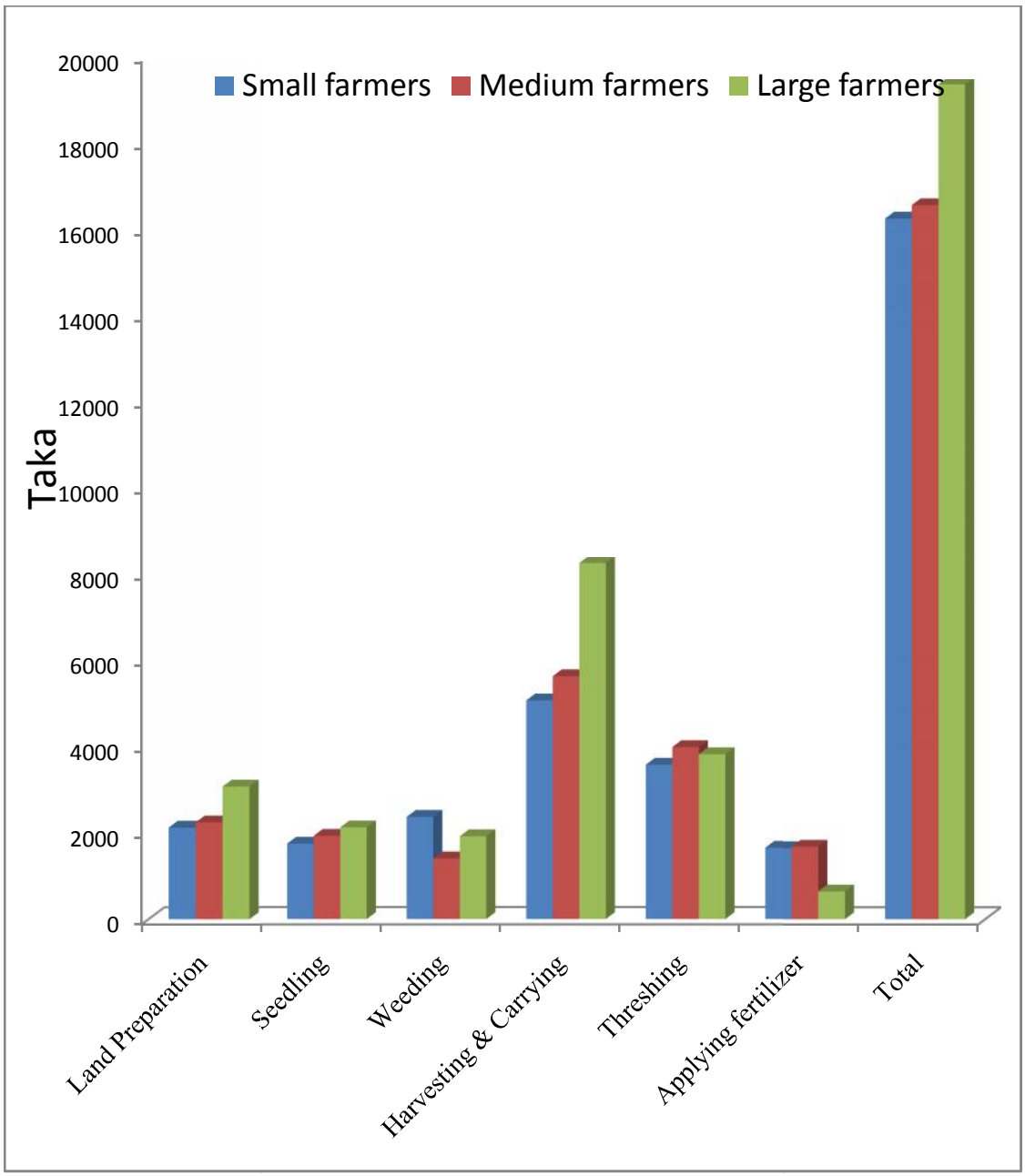

Figure 5.1 Human labor cost for all categories' of farmers

5.3 Machinery and Animal Labor Cost

For measuring financial profitability machinery and animal labor cost is also the part and parcel. In the recent year use animal power is decreasing with the introduction of machine power, but in the study area animal power was partially used for land preparation and mainly used for laddering, threshing and carrying. From the table 5.4 and Figure 5.2 it was found that machinery and animal power cost is higher for large farmers (Tk. 2774.5/ha) compare to the small and medium categories of farmers.

Table 5.4: Machinery and animal power cost for farmers (Tk. /Ha)

Machinery & Animal power	Small			Medium			Large		
Operation	Owned	Hired	Total	Owned	Hired	Total	Owned	Hired	Total
Land Preparation	141.1	2313.7	2454.9	111.7	2476.6	2588.3	218.8	2258.3	2477.1
Carrying and Threshing	0.0	0.0	0.0	0.0	0.0	0.0	25.2	272.2	297.4
Total	141.1	2313.7	2454.9	111.7	2476.6	2588.3	244	2530.5	2774.5

Source: Field Survey, 2014

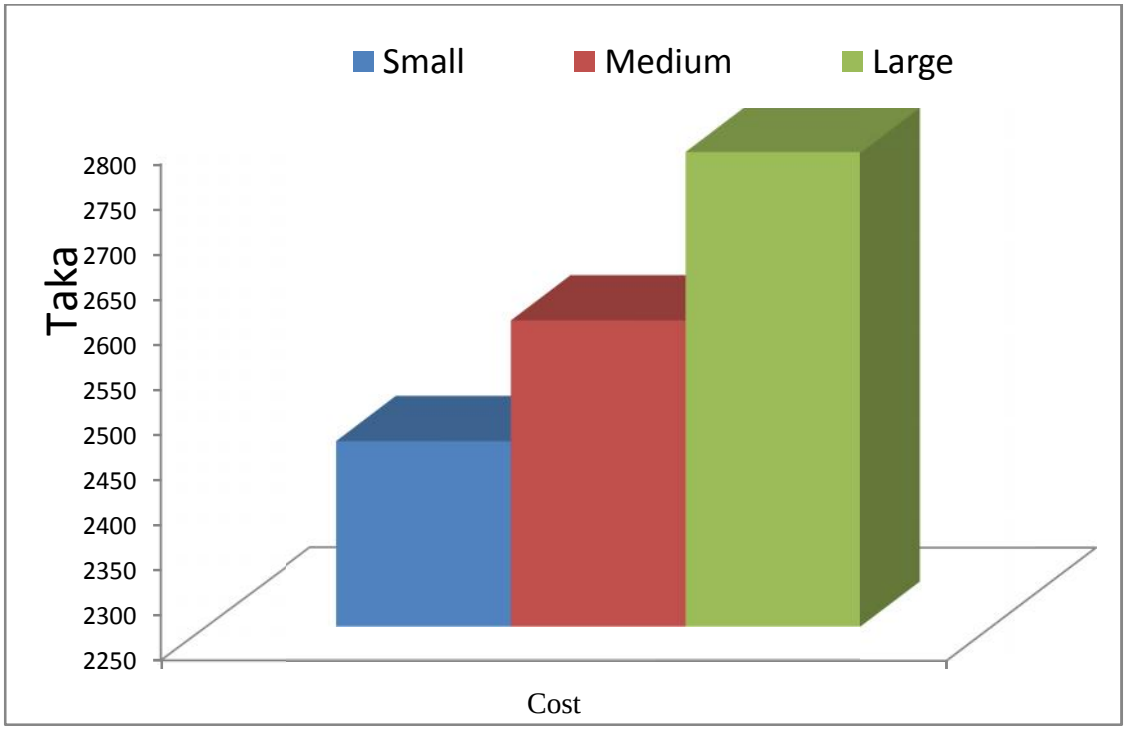

Figure 5.2 Machinery & Animal Labor Cost for all categories' farmers

5.4 Cost of material inputs

Cost of material inputs is another most important and significant factor for calculating financial profitability in any kinds of production process. In the study farmers used different kind of material inputs for Mustard cultivation, such as;

1. Seed
2. Fertilizers, such as;
    a. Urea
    b. TSP and
    c. MoP

5.4.1 Material input cost for small farmers

It is evident from the table 5.5 that the small farmers used 14 kg of seed per hectare. On an average the small farmers were used 230, 123.5 and 100 kg of Urea, TSP and MoP per hectare respectively. Total cost of material input was found to be Tk. 8869 for small farmers.

Table 5.5: Cost of material inputs for small farmers

Operations	Small						
	Owned			Purchased			Total (Tk. /ha)
	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk./ha)	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk./ha)	
Seed / Seedling	8	69	552	6	70	420	972
Urea	-	-	-	230	16	3680	3680
TSP	-	-	-	123.5	22	2717	2717
MP	-	-	-	100	15	1500	1500
Total	-	-	552	-	-	8317	8869

Source: Field Survey, 2014

5.4.2 Material input cost for medium farmers

From the Table 5.6 it is evident that the medium farmers used 14 kg/ha of seed. On an average the medium farmers were used 240, 140 and 100 kg of Urea, TSP and MoP per hectare respectively. Total cost of material inputs was found to be Tk. 9376 per hectare for medium farmers.

Table 5.6: Cost of inputs for medium farmers

Operations	Medium						
	Owned			Purchased			Total (Tk. /ha.)
	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk/ha)	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk/ha)	
Seed / Seedling	12	68.0	816	2	70	140	956
Urea	-	-	-	240	16	3840	3840
TSP	-	-	-	140	22.0	3080	3080
MP	-	-	-	100	15	1500	1500
Total	-	-	816	-	-	8560	9376

Source: Field Survey, 2014

5.4.3 Material input cost for large farmers

It is evident from the table 5.7 that the large farmers used 13.1 kg/ha of seed. On an average the large farmers were used 247, 160 and 120 kg of Urea, TSP and MoP per hectare respectively. Total cost of material input was found to be Tk. 12218 per hectare for large farmers.

Table 5.7: Cost of inputs for large farmers

Operations	Large farmers						
	Owned			Purchased			Total (Tk. /ha)
	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk./ha)	Qty (Kg/ha)	Price (Tk./kg)	Cost (Tk./ha)	
Seed / Seedling	11.6	70	812	1.5	73.33	110	921.6
Urea	-	-	-	247	16	3952	3952
TSP	-	-	-	160	22.0	3520	3520
MP	-	-	-	120	15.1	1812	1812
Others	-	-	-	-	-	2012	2012
Total	-	-	812	-	-	11406	12218

Source: Field Survey, 2014

5.5 Gross Return

It is revealed from the table 5.8 that large farmers received highest yield (1657 kg /ha) compared to medium (1606 kg/ha) and small (1589 kg/ha). But the total

return from Mustard was higher for small farmers in the study area. Value of the by-product was found to be Tk. 3240, 3210 and 3089 per hectare for small, medium and large farmers respectively.

Table 5.8: Per hectare return from Mustard cultivation

Items	Small			Medium			Large		
	Yield (Kg)	Price (Tk./ kg)	Return (Tk./ ha)	Yield (Kg)	Price (Tk./ kg)	Return (Tk./ ha)	Yield (Kg)	Price (Tk./ kg)	Return (Tk./ ha)
Product	1589	51.7	82151.3	1606	50	80300	1657	48.2	79867.4
By-Product	-	-	3240.0	-	-	3210	-	-	3089
Total	-	-	85391.3	-	-	83510	-	-	82956.4

Source: Field Survey, 2014

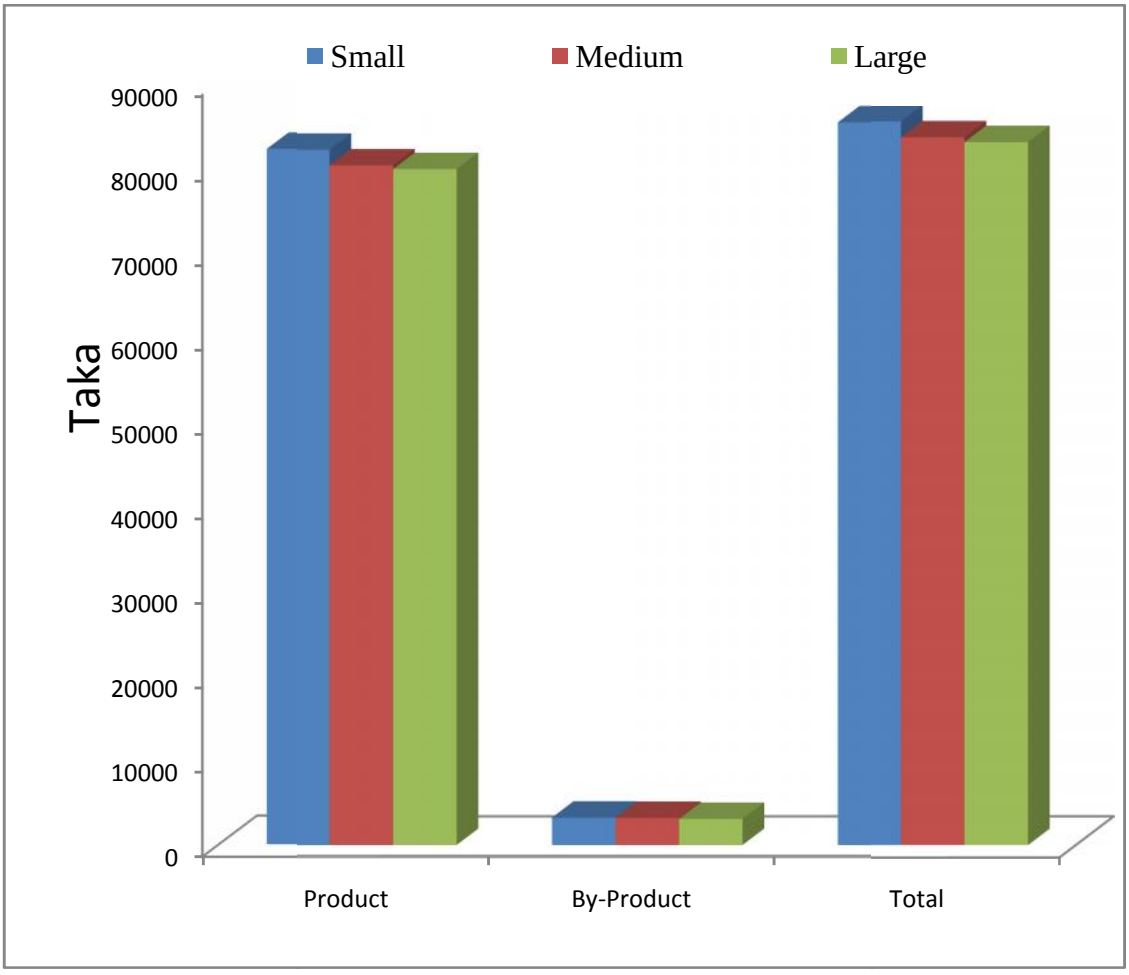

Figure 5.3 Gross returns for all categories' of farmers

5.6 Net return from Mustard production

5.6.1 Variable cost

It is evident from the table 5.9 that among the variable cost items highest cost is incurred for human labor by all the three categories of farmers. Human labor cost was found higher for large farmers (Tk. 19338.9/ha) compare to medium (Tk. 16538.7/ha) and small farmers (Tk. 16227/ha). Total variable cost was also found higher for large farmers (Tk. 35361.3./ha) compare to medium (Tk. 29358.09/ha) and small farmers (Tk. 28378.03/ha).

Table 5.9: Net return for all categories of farmers (Tk. /ha)

Particulars		Small		Medium		Large	
	Unit	Qty	Cost (Tk.)	Qty	Cost (Tk.)	Qty	Cost (Tk.)
A. Variable Cost							
Material inputs	Tk.	-	8869	-	9376	-	12218
Draft power machinery inputs	Tk.	-	2454.9	-	2588.3	-	2774.5
Human labor	Man days /ha	50.8	16227.6	49.5	16538.7	57.5	19338.9
Interest on operating capital	Tk.	-	826.53	-	855.09	-	1029.9
Total variable cost	Tk.	-	28378.03	-	29358.09	-	35361.3
B. Fixed Cost							
Land use cost	Tk.	-	24423.8	-	23767.4	-	22234.1
C. Total Cost (A+B)	Tk.	-	52801.83	-	53125.5	-	57595.4
Return							
D. Gross Return	-	-	85391.3	-	83510	-	82956.4
E. Gross Margin (D-A)	-	-	57013.27	-	54146.91	-	47595.1
F. Net Return (D - C)	-	-	32589.47	-	30384.5	-	25361
BCR (D/C)	-	-	1.62	-	1.57	-	1.44

Source: Field Survey, 2014

5.6.2 Fixed cost

Land use cost

It is evident from the table 5.9 that land use cost was found higher for small farmers (Tk. 24423.8/ha) compare to medium (Tk. 23767.4/ha) and large farmers (Tk. 22234.1/ha).

5.6.3 Total cost

On an average per hectare total costs were found to be Tk. 52801.83, 53125.5 and 57595.4 for Small, Medium and Large farmers respectively. Total cost is higher for large farmers due to higher variable cost compare to medium and small farmers.

5.6.4 Gross return

Per hectare gross return was calculated by multiplying the total amount of product and by product by their respective prices. The gross return of small, medium and large farmers were found to be Tk. 85391.3, 83510 and 82956.4 per hectare respectively. Gross return was higher for small farmers due to higher price of Mustard.

5.6.5 Gross margin

Per hectare gross margin was obtained by subtracting variable costs from gross return. Per hectare gross margin of small, medium and large farmers was found to be Tk. 57839.8, 55002 and 48625 respectively.

5.6.6 Net return

Net return was calculated by deducting the total production cost from the total return or gross return. The Net return of small, medium and large farmers was found to be Tk. 32589.47, 30384.5 and 25361 per hectare respectively (Table 5.9). Net return is found higher for small farmers due to lower variable cost compare to the medium and large farmers.

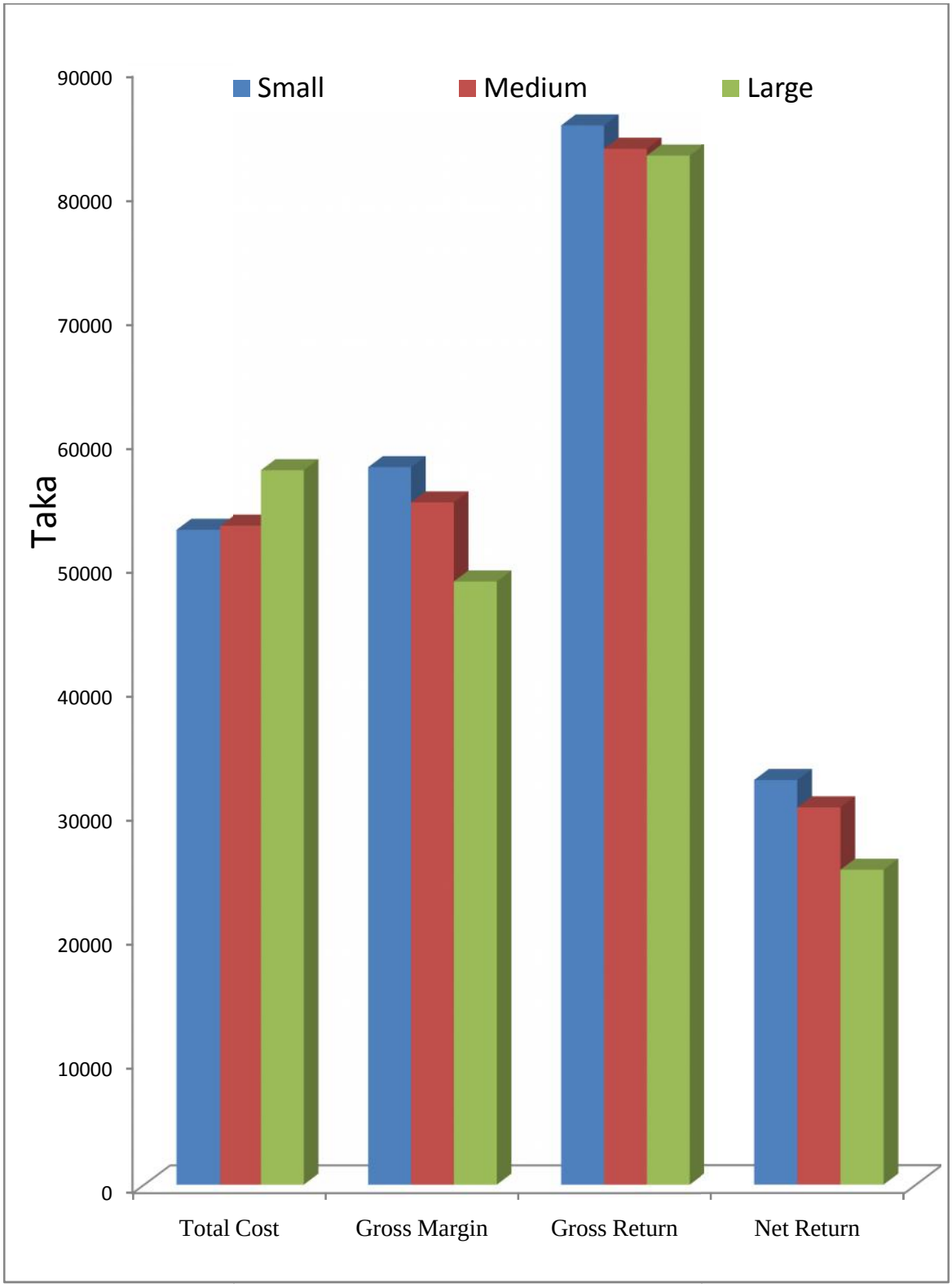

Figure 5.4 Cost and Return of per hectare Mustard production

5.6.7 Undiscounted Benefit Cost Ratio (BCR)

Undiscounted Benefit Cost Ratio (BCR) was calculated based on total cost and total return. Undiscounted BCRs were found 1.62, 1.57 and 1.44 for small,

medium and large farmers respectively. The BCRs of three categories of Mustard farmers were greater than one indicating that Mustard cultivation was profitable in the study area. It is also evident from Table 5.9 that small farmers were earning more profit per hectare from Mustard cultivation compare to medium and large farmers.

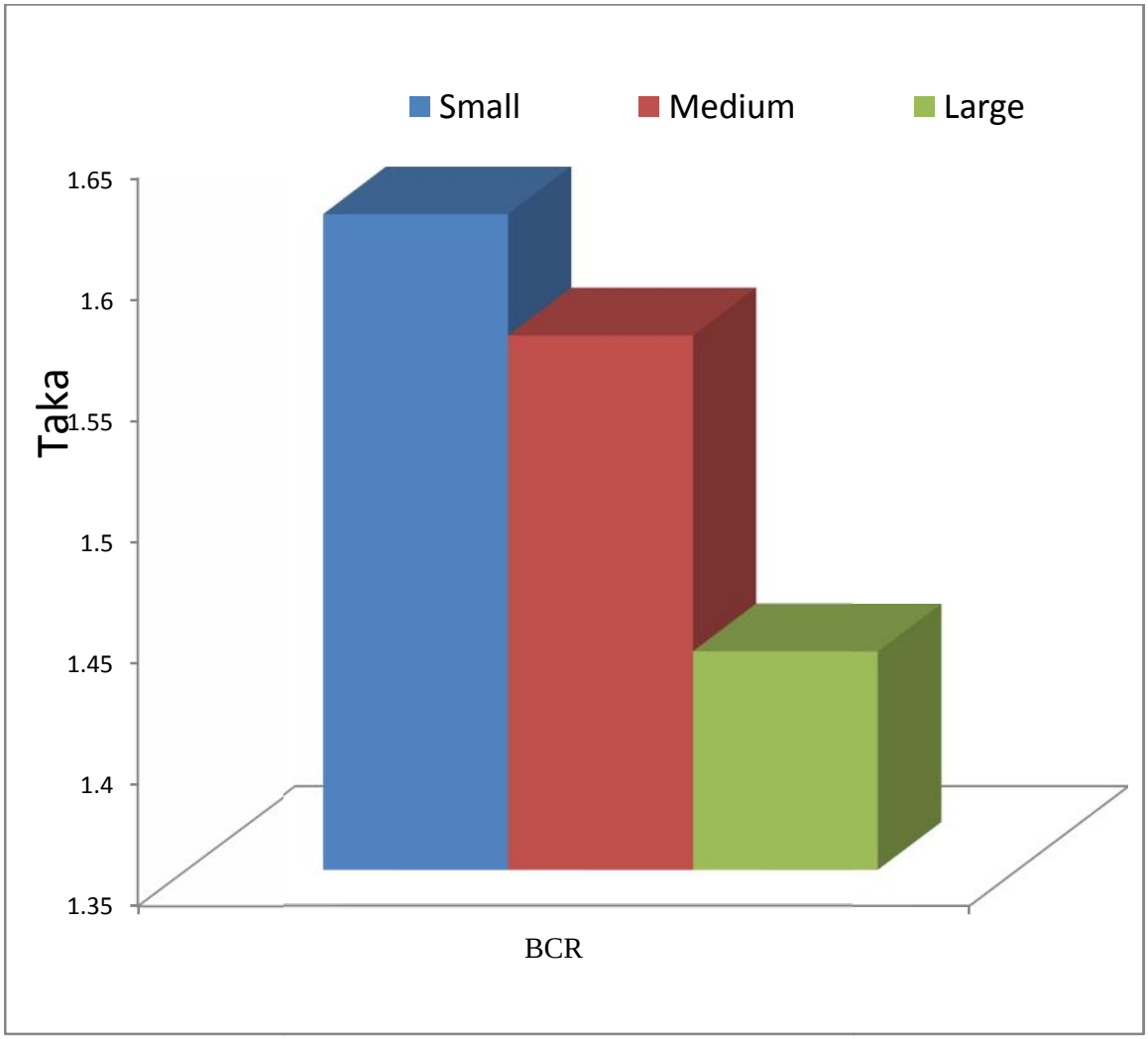

Figure 5.5 Per hectare benefit Cost ratio of Mustard production

5.7 Per hectare cost of Mustard production for all farmers

It is clear from the table 5.10 that on an average the farmers in the study area used 52.6 man-days per hectare of human labor. Among the variable cost items highest cost was incurred for human labor (Tk 17368.4/ha) which was 31.86 % of total cost followed by fertilizer cost. Total cost was found to be Tk 54507.57/ha of which more than 55% was variable and 44% was fixed cost.

Table 5.10: Per hectare cost of Mustard production

Items of cost	Quantity	Rate	Cost (Tk.)	% of Total Cost
1.Human labor (man-days/ha)	52.6	330.2	17368.4	31.86
2.Machinery and animal labor(Tk.)	-	-	2606	4.79
3.Seed (Kg)	13.7	70.1	960.37	1.76
4.Urea(Kg)	239	16	3824	7.02
5.TSP (Kg)	141.17	22	3105.74	5.70
6. MoP (Kg)	106.67	15.03	1603.25	2.94
Interest on operating capital @ of 12% for 4 months	-	-	903.84	1.66
A. Total Variable Cost (TVC)	-	-	**30128.63**	**55.27**
Land use cost	-	-	23475.1	43.07
B. Total Fixed cost (TFC)	-	-	**24378.94**	**44.73**
C. Total cost (A+B)	-	-	**54507.57**	**100**

Source: Field Survey, 2014

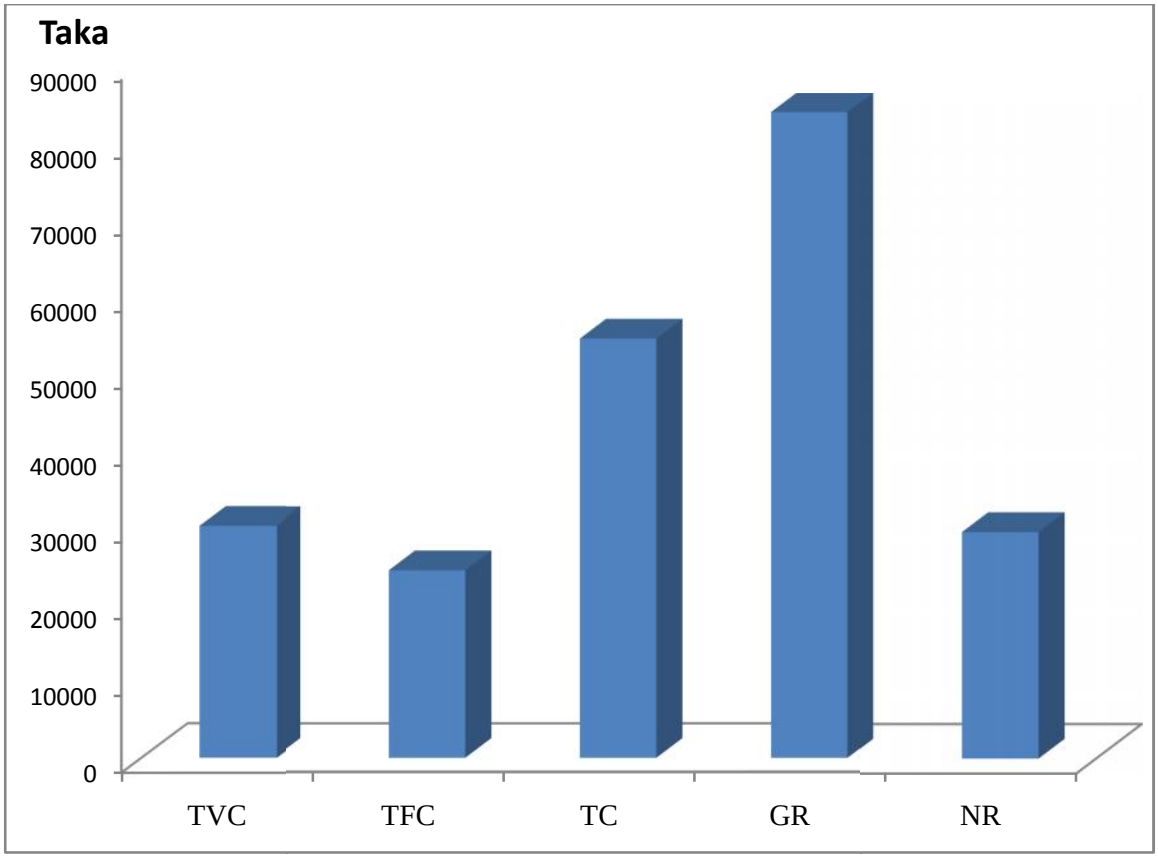

Figure 5.6 Combine TVC, TFC, TC GR and NR per hectare

5.8 Profitability of Mustard production

On average farmers in the study area harvested 1617.33 kg of Mustard seed per hectare. Gross return was found to be Tk 83952.57 per hectare. On an average gross margin and net return of all was found to be Tk. 53823.94 and 29445 per hectare respectively (Table 5.11).

Table 5.11: Per hectare profitability of Mustard production

Items	Quantity	Rate	Value (Tk)
Main product (Kg)	1617.33	49.97	80812.5
By product value (Tk.)	-	-	3179.6
Gross Return (Tk.)	-	-	**83952.5**
Total variable cost (Tk)	-	-	30128.6
Total Fixed cost (TFC)	-	-	24378.9
Total cost (Tk.)	-	-	**54507.5**
Gross Margin (Tk.)	-	-	53823.9
Net Return (Tk.)	-	-	29445
BCR (undiscounted)	-	-	1.54

Source: Field Survey, 2014

Undiscounted Benefit Cost Ratio (BCR) was found 1.54. The BCR was greater than one indicating that Mustard cultivation was profitable for farmers in the study area.

CHAPTER VI

RESOURCE USE EFFICIENCY OF MUSTARD PRODUCTION

This chapter has been designed to present a quantitative relationship between some key inputs and output of Mustard production in the framework of functional analysis. To determine the effects of selected inputs on the production of Mustard, Cobb-Douglas production function was chosen on the basis of the best fit.

6.1 Interpretation of the Estimated Values

Estimated values of the co-efficient and related statistics of the Cobb-Douglas production function of Mustard cultivation are presented in Table 6.1. Major characteristics and interpretations of the values and the major findings are presented below:

1. Total variations of the output were measured by coefficient of multiple determinations, which has been noted by adjusted "R^2".
2. For testing the significance level of individual coefficient which has sufficient degree of freedom, 1 percent and 5 percent probabilities were used.
3. The relative contributions of specified factors affecting productivity of Mustard can be observed from the estimated parameters of the regression equation for farms.

6.1.1 Human labor (X_1)

The Regression coefficient of Human labor (X_1) was positive and significant at 5 percent levels indicates that a 1 percent increase in human labor keeping other factor constant would increase the yield of Mustard by 0.031 percent (Table 6.1).

6.1.2 Seed (X_2)

Coefficient of seed (X_2) was found positive (0.081) but insignificant.

6.1.3 Urea (X_3)

The regression coefficient of urea (X_3) was found positive (0.173) and significant at 5 percent level. The result of the analysis indicates that a 1 percent increase in the use of urea keeping other factor constant would increase the yield of Mustard by 0.173 percent (Table 6.1).

6.1.4 TSP (X_4)

Coefficient of TSP (X_4) was positive and significant at 1 percent level indicates that a 1 percent increase in use of TSP keeping other factor constant would increase the yield of Mustard by 0.345 percent (Table 6.1).

6.1.5 Mop (X_5)

Coefficient of MoP (X_5) was found positive but insignificant indicates that Mop did not have any significant effect on the yield of Mustard in the study area.

6.2 Overall performance of the model

The co-efficient of determination "R^2" is a summary measure, which tells how well the sample regression line fits the data (Gujarati, 1998). The value of the coefficient of determination "R^2" was found 0.694 which indicates that around 69.4 percent of the variation in yield was explained by the independent variables included in the model (Table 6.1). The F-value of the equation was significant at 1 percent level of significance. The F-ratio is found 34.667 indicate that all the included variables were important for explaining the variation in the yield (Table 6.1).

Table 6.1: Cobb-Douglas regression estimates for Mustard production

Variables	Co-efficients	Standard error	T-value
Constant	04.38***	0.350	12.49
Human labour	0.031**	0.015	2.07
Seed	0.081	0.067	1.20
Urea	0.173**	0.066	2.60
TSP	0.345***	0.033	10.35
Mop	0.004	0.017	0.27
Adjusted R^2	0.694		
F value	34.667***		
Return to scale	0.634		
Observations (n)	75		

Note: *** and ** indicates Significant at 1% and 5% level of significance

6.3 Returns to Scale

Returns to scale reflect the degree to which a proportional change in all inputs caused change in the output. Its can give three types of value

1. Constant Return to scale (=1)
2. Increasing Return to scale (>1) and
3. Decreasing Return to scale (<1)

Return to scale of Mustard production were computed by adding coefficients of regression which also indicates the elasticity of production (Table 6.1).In the study, the sum of the coefficients of different inputs stood at 0.635. This indicates that the production function exhibited a decreasing return to scale would implying that if all the inputs specified in the function are increased by 1 percent yield will decrease by 0.634 percent.

6.4 Efficiency of resource allocation

Resource use efficiency is very important to measure how properly the resources are used for getting effective result of the production process. To attain the objectives of profit maximization for efficient allocation of resources, one should use more of the variable resource as long as the value of the added product is greater than the cost of the added amount of the resource used in producing it.

Table 6.2: Estimated resource-use efficiency in Mustard production

Variables	Value of $\bar{Y}$ =GM $\bar{Y}$ x Pyi	Geometric mean (Xi)	MVP= bi($\bar{Y}$÷$\ddot{X}$i)	MFC	$\frac{MVP}{MFC}$ Com	Comment
Human labour	80597.74	49.85	50.12	330.2	0.16	Over utilized
Seed		13.66	477.92	70.1	6.82	Under utilized
Urea		238.29	58.51	16	3.66	Under utilized
TSP		139.58	199.21	22	9.06	Under utilized
Mop		102.64	3.14	15.03	0.21	Over utilized

Source: Author's own estimation

The ratio of MVP and MFC of Human labor was positive and less than one indicating over use of the resources. It indicates that farmers in the study areas using this input inefficiently. Human labor use in Mustard production should reduce considerably to reduce the cost of production and increase profit (Table 6.2).

The ratio of MVP and MFC of seed was positive and greater than one indicates under use of the resources. Use of seed should increase considerably to attain efficiency and to increase the yield (Table 6.2).

The ratio of MVP and MFC of Urea was positive but more than one 3.66. It indicates under use of the resources. Farmers in the study area using this input inefficiently (Table 6.2).

The ratio of MVP and MFC of TSP was greater than one indicates under use of the resources. There is ample scope to increase the use of TSP for higher yield (Table 6.2).

The ratio of MVP and MFC of Mop was less than one. It indicates that farmers in the study area over using this input. Mop use in Mustard production should reduce to attain efficiency in resource use (Table 6.2).

CHAPTER VII

CONSTRAINTS OF MUSTARD CULTIVATION

Agriculture is the part and parcel for Bangladesh economy. Now a day's farmers of Bangladesh are facing different economical and technical problems during their cultivation period. The present study has made an attempt to identify some major constraints with regards to Mustard cultivation. Constrains of Mustard cultivation have been broadly categorized into five:

1. Economic Problems
2. Technical Problems
3. Natural Problems
4. Marketing problems and
5. Others problems

7.1 Economic Problems

Economic problems that the farmers face in producing Mustard were related to capital, inputs, financial status, price, wage etc. These constrains are discussed in the following sub-section.

7.1.1 Lack of Capital

In the study area, farmers were mainly poor. Most of the farmers belonged to medium size category and their economic condition was not good. In the study area, about 80% of the farmers reported that they did not have adequate amount of operating capital. Lack of capital is the most severe problem among all the economic problems. Among the all category farmers, highest 96 % of small

farmers and lowest 68 % of large farmers faced this problem during Mustard cultivation (Table 7.1).

7.1.2 High Wage Rate

In the study area high wage rate was another problem for sample farmers. The wage rate was high during the harvest season. Table 7.1 shows that about 74.67 % farmers faced this problem. Higher wage rate ranked 2nd most acute problem among the economic problems. Among the all category farmers, highest 88 % of large and lowest 56 % of small farmers faced problem of high wage rate during Mustard cultivation.

7.1.3 Low price of output

Most of the farmers were forced to sell their product just after harvest to maintain their household expenditure. Table 7.1 shows that the 66.67% of the farmers faced this problem. Low price of output ranked 3rd most acute problem among the economic problems.

7.1.4 Higher input price

Table 7.1 shows that 60% farmers faced the problem of higher input price. Among different categories of farmers, 68% of the large farmers followed by 60% of medium farmers faced the problem of high input price during Mustard cultivation.

7.1.5 Lack of credit facilities

About 57.33% of the farmers opined they did not get adequate credit facilities from the authority. Most of the small farmers (72%) followed by 64% of medium farmers faced problem of lack of credit facilities during Mustard cultivation (Table 7.1).

Table 7.1: Economic problems of Mustard cultivation

Problems	Farmers category						All		Rank
	Small		Medium		Large				
	No	%	No	%	No	%	No	%	
Lack of capital	24	96	19	76	17	68	60	80.00	1
High wage rate	14	56	20	80	22	88	56	74.67	2
Low price of output	13	52	17	68	20	80	50	66.67	3
High price of inputs	13	52	15	60	17	68	45	60.00	4
Lack of credit facilities	18	72	16	64	9	36	43	57.33	5

Source: Field survey, 2014

7.2 Technical Problems

Technical problems are related to production techniques and technologies which are discussed below:

7.2.1 Lack of machinery support in proper time

Farmers get very short time for sowing and harvesting for Mustard cultivation. During land preparation, it's very much important to supply machinery in proper time. In the study area farmers did not get proper machinery support at the time of land preparation and threshing. About 89% of all farmers reported that they did not get machinery support in proper time. It ranked 1st among all the technical problem. Among different categories of farmers, highest 96 % of small farmers and lowest 80 % of large farmers faced this problem (Table 7.2).

7.2.2 Shortage of labor in peak period

Production of Mustard largely depends on the use of adequate experienced and quantity of labor. In the study area, the Shortage of hired labor was high during the harvest season. Table 7.2 shows that about 85.33 % of all farmers complained that they did not get adequate amount of labor during the period of land

preparation, weeding and harvesting Mustard. It ranked 2nd most acute problem among the all technical problems. Among different categories of farmers, highest 96 % of medium and lowest 76 % of small farmers faced this problem.

7.2.3 Lack of cooperation by block supervisor

In the study area farmers complained that they did not see the block supervisor rather than help. They reported that they did not get proper help by the agricultural assistance from their region. Table 7.2 shows that highest 84 % of small farmers and lowest 56 % of large farmers did not get cooperation by the block supervisors. About 74.67 % of all farmers reported that they did not get support by BS in proper time. As a result, in the study area lack of cooperation by block supervisor ranked 3rd most acute problem among the all technical problems.

7.2.4 Low yield

Low yield is a major problem for all the farmers in all kinds of agricultural crops. In the study area Table 7.2 shows that 65.33 % of all farmers faced this problem. They reported that they did not get desire amount of output. It ranked 4th among all the technical problem. Among different categories of farmers, highest 84 % of large and lowest 44 % of small farmers faced this problem.

7.2.5 Lack of quality seed

Table 7.2 shows that, among different categories of farmers highest 68 % of small farmers and lowest 46 % of large farmers reported problem of lack of quality seed. In the study area about 61.33% % of all farmers faced this problem. Lack of quality seed ranked 5th among all the technical problem.

7.2.6 Lack of technological knowledge

Agriculture is an applied science which deals with continuous growing and rearing of food and fibers. So its need proper knowledge and technology for getting

desired output from soil as well as nature. In the study area table 7.2 shows that, among different categories of farmers highest 72 % of small farmers and lowest 48 % of large farmers reported problem of lack of knowledge of improved technology. About 58.67 % of all farmers faced this problem. Thus lack of knowledge of improved technology ranked 6th among all the technical problems.

7.2.7 Fertilizers crisis

In the study area some farmers faced fertilizers crisis. Among different categories of farmers highest 64 % of medium farmers and lowest 52 % of small farmers reported the problem of fertilizer crisis. About 56 % of large farmers reported the problem of fertilizer crisis. About 57.33%of all farmers faced this problem. It ranked 7th among all the technical problems (Table 7.2).

7.2.8 Problems of harvesting and drying

In the study, Problems of harvesting and drying were faced by some farmers. Among different categories of farmers, highest 60 % of large farmers and lowest 36 % of small farmers reported problem of harvesting and drying. About 44 % of medium farmers reported the problem of harvesting and drying. The problem of harvesting and drying ranked 8th among all the technical problems (Table 7.2).

Problems	Farmers category-25						All-75		Rank
	Small		Medium		Large				
	No	%	No	%	No	%	No	%	
Lack of machinery in proper time	24	96	23	92	20	80	67	89.33	1
Shortage of labor in peak period	19	76	24	96	21	84	64	85.33	2

Lack of cooperation by block supervisor	21	84	18	72	17	68	56	74.67	3
Low yield	11	44	17	68	21	84	49	65.33	4
Lack of quality seed	17	68	15	60	14	56	46	61.33	5
Lack of technological knowledge	18	72	14	56	12	48	44	58.67	6
Fertilizers crisis	13	52	16	64	14	56	43	57.33	7
Problems of harvesting and drying	9	36	11	44	15	60	35	46.67	8

Table 7.2: Technical Problems for Mustard farmers

Source: Field survey, 2014

7.3 Natural Problems

In the study area farmers faced some acute problems relating to the nature. Natural problems are those problems whose can't be protected but can take precaution for remedy of losses. These problems are given under the below:

7.3.1 Non suitable Temperature

In the recent year, temperature is increasing day by day. As a result its create problems for farmers during crop production. In the study area, Table 7.3 shows that, among different categories of farmers, highest 84 % of large, lowest 68 % of medium farmers and about 76 % of small farmers reported that they observed this problem. About 76 % of all farmers reported this problem. The problem of non suitable temperature ranked 1st most acute problem among all the natural problems.

7.3.2 Seasonal change

Non routine wise seasonal change is a severe problem for agricultural sector. In the study area it creates problem for farmers during crop production. Table 7.3 shows that, among different categories of farmer's highest 76 % of medium, lowest 68 % of small farmers and about 72.76 % of large farmers reported this problem. About 72 % of all farmers reported this problem. It ranked 2nd among all the natural problems.

7.3.3 Attack of insect and disease

Table 7.3 shows that, among different categories of farmers highest 60 % of medium, lowest 52 % of small farmers and about 56 % of large farmers reported that they observed insect and diseases problems. About 56 % of all farmers reported this problem. The problem of attack and diseases into the field ranked 3rd acute problem among all the natural problems.

Table 7.3: Natural Problems for Mustard farmers

Problems	Farmers category-25						All-75		Rank
	Small		Medium		Large				
	No	%	No	%	No	%	No	%	
Non suitable Temperature	19	76	17	68	21	84	57	76.00	1
Seasonal change	17	68	19	76	18	72	54	72.00	2
Attack of insect and disease	13	52	15	60	14	56	42	56.00	3

Source: Field survey, 2014

7.4 Marketing Problems

Marketing problems are mainly faced by the farmers after crop cultivation, when it's needed to get benefit during post harvest periods. There are some problems faced by the sample farmers in the study area in marketing. These are discussed in the following sub-section:

7.4.1 Selling problems

Selling problem ranked 1st most acute problem among all the Marketing problems. According the study area table 7.4 shows that, among different categories of farmers, highest 92 % of large, lowest 52 % of small farmers and about 68 % of medium farmers reported that they did not sell their product flexibly. Because owner and other middle men create complexity into the market. About 72 % of farmers reported this problem.

7.4.2 Storage problems

Storage problem ranked 2nd most acute problem among all the Marketing problems. Especially large farmers faced this problem after harvesting period. In the study area, table 7.4 shows that, among different categories of farmers, highest 76 % of large, lowest 16 % of small farmers and about 48 % of medium farmers reported that they did not get proper storage facility. About 46.67 % of all farmers reported this problem.

7.4.3 Transportation problem

In the study area transportation problem also a major problem during post harvest period. Table 7.4 shows that, among different categories of farmers, highest 52 % of large, lowest 20 % of small farmers and about 28 % of medium farmers reported that they did not get proper transportation facility. About 32% of all farmers reported this problem. Transportation problem ranked 4th among all the Marketing problems.

7.4.4 Lack of available Market

Lack of proper marketing channel for reaching available market is one of the most acute problems for the large farmers. Because in the study area they did not get fair price of their large amount of output comparatively to small and medium categories farmers. Table 7.4 shows that, among different categories of farmers highest 56 % of large, lowest 12 % of small farmers and about 24 % of

medium farmers reported that they did not get available market for selling their product for getting fear price. About 32% of all farmers reported this problem. Marketing problem is the last among all the Marketing problems.

Table 7.4: Marketing Problems for Mustard farmers

Problems	Farmers category						All		Rank
	Small		Medium		Large				
	No	%	No	%	No	%	No	%	
Selling problems	14	56	17	68	23	92	54	72.00	1
Storage problems	4	16	12	48	19	76	35	46.67	3
Transportation problem	5	20	7	28	13	52	25	33.33	4
Lack of available Market	3	12	6	24	14	56	24	32.00	5

Source: Field survey, 2014

7.5 Problems Faced by Farmers in Adopting Mustard between Aman and Boro Rice

The Table 7.5 shows nine major problems ranked by the farmers in ascending order of importance which were:

(1) Farmers do not know properly about the cropping pattern of cultivating Mustard in between Aman and Boro rice, (2) seeds of suitable rice and Mustard varieties, like Binadhan-7, Binasarisha-4 etc. are not available in time, (3) fogging during winter causes serious insect infestation and reduces yield drastically, (4) adoption of this type of Mustard cultivation and cropping pattern is very limited due to lack of awareness, (5) lack or less demonstration confuses farmers to adopt this cropping pattern, (6) sometimes rain delayed sowing Mustard timely, which restricted to followthis cropping pattern, (7) due to irrigation and safety problems, it is very difficult to cultivate Mustard lonely as neighboring farmers do

not grow Mustard in between Aman and Boro rice, (8) existing Aman rice varieties take more time to mature, which hamper cultivation of Mustard seriously, and (9) cultivation of Mustard in between Aman and Boro rice is very risky, that's why poor farmers are unable to take risk in this regard.

These problems need to be addressed properly for inclusion of Mustard cultivation in between Aman and Boro rice successfully.

Table 7.5: Problems for cultivation of Mustard in between Aman and Boro rice

Constrains faced by the farmers	Frequency	Rank order
Farmers do not know properly about the cropping pattern of Cultivating Mustard in between Aman and Boro rice.	41	1
Seeds of suitable rice and Mustard varieties, like Binadhan-7, Binasarisha-4 etc. are not available in time.	37	2
Fogging during winter causes serious aphid infestation and reduces yield drastically	34	3
Adoption of this type of Mustard cultivation and cropping pattern is very limited due to lack of awareness.	30	4
Lack or less demonstration confuses farmers to adopt this cropping pattern.	27	5
Sometimes rain delayed sowing Mustard timely, which restricted to follow this cropping pattern.	25	6
Due to irrigation and safety problems, it is very difficult to cultivate Mustard lonely as neighboring farmers do not grow Mustard in between Aman and Boro rice.	23	7
Existing Aman rice varieties take more time to mature, which hamper cultivation of Mustard seriously.	20	8

Cultivation of Mustard in between Aman and Boro rice is very risky. That's why poor farmers are unable to take risk.	18	9

Source: Field survey, 2014

7.6 Suggestions to overcome the problems

Mustard farmers who identified their own problems also suggested measures for the improvement of the existing Mustard production and pricing system. The following measures were suggested by the farmers for solving the above mentioned problems.

7.6.1 Supply of credit on easy terms

Farmers need cash money at the time of cultivation. So, institutional credit facilities should be made available to the Mustard farmers for increasing the volume of production. Government should provide such facilities through Bangladesh Krishi Bank (BKB) and other commercial banks.

7.6.2 Supply of inputs and machinery

Adequate amount of inputs and machinery including HYV seeds of Mustard should be supplied timely by the government and responsible Authority, Agriculture extension officer (AEO) and block supervisors (BS) at subsidized prices to the Mustard farmers. Measures should also be taken to ensure timely supply of fertilizer and pesticides to the Mustard producers at fair price.

7.6.3 Improvement of transportation facilities

Transportation facilities should be improved in the study areas. On the basis of priority, village roads should be developed at least brick bedded road so that rickshaws or motor vehicles could move easily. It would also help in reducing the transportation cost. Local Government administration may develop such facilities.

7.6.4 Formation of farmers' organization

It is necessary to establish farmers' organization that might improve bargaining power of the farmers. It would help the farmers to face the intermediaries and ensuring them better return from Mustard production.

7.6.5 Improvement of market facilities

Market facilities such as pucca floor, tin shed, drainage, water supply, electricity supply, etc should be arranged by the appropriate Government authorities to facilities proper markets of Mustard in the study area.

CHAPTER VIII

SUMMARY AND CONCLUSION

This Chapter summaries the thesis and provides conclusions according to the important findings of the study and suggests some recommendations for Mustard production.

8.1 Summary

Mustard is one of the most important oilseed crops around the world after soya bean and groundnut and also most important oil crops in Bangladesh. The future of Mustard production depends very much on its profitability and resources use efficiency as well as marketing outlet. The present study will provide valuable information to the individual farmers and researcher who will conduct further studies of the similar nature and encourage them in conducting more comprehensive and detailed investigation in this particular field of study. It will be helpful to the planner and policy makers in formulating policy at micro level for the development of oilseeds especially Mustard production in the country. Keeping this in view the study was undertaken with the following specific objectives.

I. To document the demographical profile of Mustard farmers in Tangail district.
II. To determine the financial profitability of Mustard in the study area.
III. To determine the resource use efficiency of Mustard cultivation and
IV. To find out the major constrains of Mustard Cultivation at farm level and Suggest some policy guide line.

To attain the objectives of the study, 75 Mustard growers were selected randomly from the study area. The researcher himself collected necessary data from the respondents during the months of March to April, 2014 through personal interview. To achieve the objectives of the present study, a preliminary survey was

conducted in Mirzapur upazilas under Tangail district. On the basis of preliminary information, 6 villages namely Echyail, fathepur, Hatkura, Kurni, Nowapara and Shuvolla were selected for the study. After completed data collection, raw data were inserted in computer using the concerned software MS Excel. Tabular technique was applied to classify data in order to derive meaningful findings by using simple statistical measures like means, percentage and ratios. A production function analysis was also carried out to explore the contribution and productivity of the individual inputs.

According to the demographic profile of the study area, 49.33%, 34.67% and 16% of all farmers belong to Young farmers (20-35) years, Middle age farmers (36-50) years and Old farmers (51-above) years of age group respectively. Highest percentage of family members were belonged to age group 11 to 25 years. As well as lowest percentage of all farmers were belonged to age group above 55 years. The educational status of the Mustard farmers was classified into five categories: Illiterate, Sign only, Up to primary, Up to SSC and HSC and above. Findings indicate that about 30% of the respondents had no formal education. Education levels of the family members also an important factor for any income generation process. About 14 percent of the family members are illiterate and can sign only, about 42 percent have up to primary level of education. According to the occupation status of the sample farmers, most of the farmers (82.67%) had single occupation where agriculture was in dominating position. Average farm size of small, medium, large and all farmers were 74.37, 144.08, 259.7 and 159.76 decimal respectively. To determine the financial profitability of Mustard in the study area, the items of costs include fertilizer, seed, labor cost, land cost and cost on operating capital @12 percent in 4 months. On the other side, gross return of Mustard cultivation comprised sales value of product and by-product. Human labor cost is the most important cost for any production process. Small farmers used 50.8 man-days /ha of human labour which 23.2 man-days are family supplied and remain 27.6 were hired. Total labor cost for small farmers was found to be Tk. 16227.6 per hectare. Medium farmers used 49.5 man-days /ha 21.1 man-days are family supplied and remain 28.4 were hired. Total labor cost for Medium farmers was found to be Tk 16538.7 per hectare. Total labor cost for large farmers was

found to be Tk 19338.9 per hectare. In the study area, machinery and animal power cost is found higher for large farmers (Tk 2774.5/ha) than small and medium categories of farmers. Cost of material inputs is another most important and significant factor for calculating financial profitability in any kinds of production process. In the study farmers used different kind of material inputs for Mustard cultivation. Total cost of material input was found to be Tk 8317, 9376 and 12218 per hectare for small, medium and large farmers respectively. It is also revealed that large farmers received highest yield (1657 kg /ha) compared to medium (1606 kg/ha) and small (1589 kg/ha). But the total return from Mustard was higher for small farmers in the study area. Value of the by-product was found Tk. 3240, 3210 and 3089 per hectare for small, medium and large farmers respectively. Human labor cost was found higher for large farmers (Tk 19338.9/ha) compare to medium (Tk 16538.7/ha) and small farmers (Tk 16227/ha). Total variable cost was also found higher for large farmers (Tk 35361.3./ha) compare to medium (Tk 29358.09/ha) and small farmers (Tk 28378.03/ha). On an average per hectare total costs were found to be Tk 52801.83, 53125.5 and 57595.4 for small, medium and large farmers respectively. Total cost is higher for large farmers due to higher variable cost compare to medium and small farmers. The gross return of small, medium and large farmers were found to be Tk 85391.3, 83510 and 82956.4 per hectare respectively. Gross returns higher for small farmers due to higher price of Mustard. Per hectare gross margin of small, medium and large farmers was found Tk 57839.8, 55002 and 48625 respectively. Net return of small, medium and large farmers was found Tk 32589.47, 30384.5 and 25361 per hectare respectively. Net return is higher for small farmers compare to the medium and large farmers due to lower variable cost. In the study area, Mustard cultivation was profitable for all the three categories of farmers. Undiscounted BCRs for sample farmers were found 1.62, 1.57 and 1.44 for small, medium and large farmers per hectare respectively. In general total cost was found to be Tk 54507.57/ha of which more than 55% was variable and 44% was fixed cost. Per hectare yield was 1617.33 kg and gross return was found to be Tk 83952.57 per hectare.

The Regression coefficient of Human labor was positive and significant at 5 percent levels indicate that a 1 percent increase in human labor keeping other factor constant would increase the yield of Mustard by 0.031 percent. Similarly the coefficient of urea and TSP was also found positive and significant whereas the coefficient of seed is positive but insignificant. The value of the coefficient of determination "R^2" was found 0.694 which indicates that around 69.4 percent of the variation in yield was explained by the independent variables included in the model. The F-value of the equation was significant at 1 percent level of significance. The sum of the coefficients of different inputs stood at 0.635 indicates that the production function exhibited a decreasing return to scale. The ratio of MVP and MFC of Human labor, seed, Urea, TSP and MoP was found 0.16, 6.82, 3.66, 9.06 and 0.21 respectively. It indicates that human labor and MoP were over utilized while seed, urea and MoP were underutilized by the farmers.

In the study area, farmers faced many problems in producing Mustard. The present study has made an attempt to identify some major problems with regards to Mustard cultivation. Constrains of Mustard growing farmers have been broadly categorized into five: Economic Problems, Technical Problems, Natural Problems, Marketing problems and others problems. Lack of capital is the most severe problem among all the economic problems. Highest 96 % of small farmers and lowest 68 % of large farmers faced scarcity of capital during Mustard cultivation. About 89% of all farmers reported that they did not get machinery support in proper time. It ranked 1st among the technical problems. Highest 84% of large and lowest 68% medium farmers reported the problem of temperature fluctuation as one of the major natural problem. Among the marketing problem selling problem ranked top.

Mustard farmers who identified their own problems also suggested measures for the improvement of the existing Mustard production and pricing system, such as; supply of credit on easy terms, supply of inputs and machinery, improvement of transportation facilities, formation of farmers' organization and improvement of market facilities.

8.2 Conclusions

On the basis of findings of the study in some selected areas of Tangail district the following conclusion may be drawn:

1. Most of the sample farmers are young between 30-35 years and maximum family members are between 11-25 years.
2. The average family size of the sample farmers is higher than national level.
3. Agriculture is the main occupation of most of the farmers.
4. Among the cost items highest cost incurred for human labor. Production cost is higher for large farmers compare to small and medium farmers.
5. Mustard production is profitable in the study area. Among the all category farmers, small farmers received higher profit compared to large and medium farmers.
6. BCR is found higher for small farmers compare to the others.
7. Human labor, urea and TSP had positive and significant effect on the yield of Mustard. Farmers in the study area over utilizing most of the inputs.
8. Lack of capital, lack labors in peak period, lack of machinery supply in proper time, higher wage rate, temperature fluctuation are the most severe problems of Mustard cultivation in the study area.

8.3 Recommendations

The present study reveals that Mustard cultivation in the Tangail district is profitable. On the basis of the findings of the study some recommendations were put forward.

1. For increasing the productivity of Mustard, availability of all necessary inputs should be ensured with reasonable price.
2. Most of the farmers used imbalanced does of fertilizer and insecticides in their plot. Farmers should be given short term-training on proper application of inputs. It will help to increase the resource use efficiency of the farmers in Mustard cultivation.
3. Output price should be increased reasonably by ensuring government regulation. Government procurement center could be established to buy the Mustard from farmers with guaranteed price.

4. To achieve higher degrees of adoption of Mustard crop in between Aman and Boro rice, the farmers' knowledge, attitude and perception have to be increased. Henceforth, DAE and other extension service providing organization should be given more emphasis to take necessary steps to increase perception level of farmers.
5. Effective motivational program should be formulated for the farmers to make understand them advantage of adopting Mustard crop in rice monoculture.
6. Initiatives should be taken to increase the availability of information sources and mass literacy program may be organized to improve farmers' knowledge.
7. Farmers consider profitability as a criterion for adopting any technology. Hence, priority may be given for economic motivation through demonstration, field days, participatory technology development (PTD), formal training day, farmer's field school (FFS) and other appropriate extension method for complete adoption of Mustard cropping pattern.
8. DAE should strengthen the field level service by the field workers (SAAOs) to give farmers proper information, suggestions and advice regarding cultivation of Mustard.
9. Recently developed T. Aman varieties such as Binadhan-7, BRRI dhan 33, BRRI dhan 39 etc. and Mustard varieties such as Binasarisha-4, BARI sarisha 14, BARI sarisha 15, need to be extended to these areas to fit in the cropping pattern. Moreover, research emphasis should be given for developing suitable varieties appropriate to this pattern.
10. The present study was carried out in a small area of Tangail district. Similar studies may be conducted in other parts of the country to get a clear picture of the whole country which will be helpful for effective policy formulation.

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Annexure I

Department of Management and Finance
Sher-e-Bangla Agricultural University,
Dhak-1207

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An Interview Schedule for a Research Study

Title: Financial Profitability and Resource Use Efficiency of Mustard Cultivation in Tangail District of Bangladesh

Dear Respondent,
All of your information will be used for the developmental works of your District. Your accurate information will help me to conduct my research accurately. So your accurate information will be highly appreciable. I will maintain your information with strictly confidential manner.
Thank you.

1: Household Identity

Location of the Household	Name	Identification of Household Head	
District	**TANGAIL**	Name of Household Head (HH)	
		Father / Husband's name	
Thana		Name of the Respondent	
Union / Block / Mouza		If the respondents is other than HH, the relationship with HH by coding	
Village		Type of Family [Nuclear =1, Joint=2, Extended=3]	
HH No.		Religion [Muslim=1, Hindu=2, Buddhist=3, Christian=4]	

House Hold Head=1, Wife=2, Son=3, Daughter=4, Father=5, Mother=6, Brother=7, Sister=8, Daughter in Law=9, Maid=10, Grand Child=11 & Others=1.

2: Demographic profile of the Respondent

Sl. No./Members	Relation with HH (Code)	Sex (M=1 F=2)	Age in complete years	Marital Status (10 yrs. +) (Code)	Occupation (Code)		Education (5 yrs. +) (Year of schooling)
					Main	Subsidiary	
1	1						
2							
3							
4							
5							
6							
7							
8							
9							
10							

Relationship		**Marital Status**	**Occupation**		**Education**	
1= HH Head	7= Brother	1 = Unmarried	01 = Agriculture (Self)	08 = Fishing	01 = Passed class I	95 = Can read and write
2= Wife/Husband	8= Sister	2 = Married	02 = Service	09 = Student	02 = Passed class II	96 = Can write name only
3= Son	9= Daughter in Law	3 = Widowed	03 = Business	10 = Others	…	97 = Can read only
4= Daughter	10= Maid	4 = Separated	04 = Day laborer (agriculture)	Specify ____	10 = Passed S.S.C.	98 = Illiterate
5= Father	11=Grand Child	5 = Divorced	05 = Day laborer (non-agril.)		12 = Passed H.S.C.	
6= Mother	12= others	6 = Left	06 = Rural transportation		…	
			07 = Domestic work			

3: Land ownership and farm category (in decimal)

Category of land	**Tenural Status**							Total land size	**Farm category**
	Own land	Rent in	Mortgage in	Leased In	Rented out	Mortgaged out	Leased out		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8= (1+2+3+ 4-5-6-7)**	**9**
1. Crop land									
2. Orchard									

3. Homestead									
4. Ponds									
5. others									
6. Total									

If total land size is 50 to 100 decimal = marginal farm, 101 to 250 decimal = small farm and 251 and above = medium and large farm. Farm category code – Marginal farm = 1, Small farm = 2 and Medium and large farm = 3.

5: Last year Mustard production and use

Name of the crop		Area Cultivated (Decimal)			Total Production (kg)		Disposal of total production (in kg.)								
		Own	Rented		Own	Rent	Rent		Consume	Sold	Kept for consump-tion	Kept for sale	Debt service	Kept as seed	Price (Tk/ kg)
			In	Out			Paid	Receive							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17
Mustard															

4: Input use in individual Mustard

Please identify land area in local units as follows: A: Decimal, B: Bigha of …… decimal, C: Katha of ……..decimal, D: Pakhi of …… decimal, E: Other ……of ……decimal

Survey plot Area…….Decimal

6: Production cost:

A. Human labor cost:

S. L. No	Operation	No of labour		Total labour	Wage rate (Tk./Man-days)		Total cost
		Family	Hired		Family	Hired	
1	Land preparation						
2	planting						
3	Weeding						
4	Fertilizer application						
5	Pesticides/Insecticides application						
6	Harvesting						
7	Carrying						
8	Grading						
	Special operation						

B: Cost of animal labor:

Animal power	Pair-days	Cost per pair-days	Total cost
1. Family labour			
2. Hired labour			

C: Cost of power tiller:

Power tiller	unit	cost per unit	Total cost
1. Family Supplied			
2. Hired			

D: Cost of Inputs:

Item	Items	Unit	Cost per unit	Other cost	Total cost
1. Seed/Seedling					
2. Straw					
3.Manure					
4. Fertilizers	1. Urea				
	2. TSP				
	3. MP				
	4. $ZnSo_4$				
	5. Gypsum				
	6. Others				
5. Pesticides					
6. Irrigation water					
7. Miscellaneous (if)					

7: Total Output:

Name of crop		Mustard	
Variety			
Area (in decimal)			
Output(s)		Yield / Production	Price/unit
		1	2
Product (KG)			
By-product (KG)			
Others (KG)			

8: Last 3 years Mustard production area:

Year	2011	2012	2013
Decimal			

9: Constrains Related with Mustard cultivation:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Interviewer's Visit		Signature	Date
Name of the Interviewer			
Scrutinizer			
Name of the Data Entry Operator			

Thank You