Profitability and Comparative Advantage of Groundnut Production in Some Selected Areas of Bangladesh

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ABSTRACT

The present study was conducted to estimate the profitability and comparative advantages of groundnut production in Bangladesh. Primary data were used in this study, where a total of 384 randomly selected farm surveys was conducted in Kishoreganj, Panchagarh and Faridpur districts using an interview schedule. Descriptive statistics, domestic resource cost (DRC) and profitability model were used to analyze the collected data. The study revealed that the total cost of production was Tk. 83,490 per hectare where 34% was fixed costs and 66% was variable costs. The net profit of groundnut production was about Tk. 84,748. The benefit-cost ratio (BCR) was highest in Kishoreganj (2.02), whereas lowest in Faridpur (1.97). The average BCR of all districts was 2.01, indicating that groundnut cultivation in Bangladesh are profitable. The DRC of groundnut production was the highest in Kishoreganj (0.42), followed by Faridpur (0.37) and Panchagarh (0.34) districts. The average DRC of all districts was 0.35 which implies that Bangladesh has a comparative advantage in producing groundnut. In this study, production, credit and marketing problems have been listed which will help to formulate appropriate policy by stakeholders, researchers and policy makers for further improvement of groundnut production in Bangladesh.

Keywords: Groundnut production, Profitability, Domestic Resource Cost, Constraints, Bangladesh

INTRODUCTION

Groundnuts are a significant crop that are used to make edible oil and other food items in Bangladesh (BBS, 2023). It is used to make cakes, biscuits, and bakeries in the food industry. A crucial source of dietary fat and necessary nutrients for both human consumption and animal feed, groundnuts are an oilseed crop high in protein, vitamins, and minerals (Nautiyal et al., 2003). Although groundnuts have been grown in Bangladesh for many years, there are still few thorough and current studies of their relative benefits and profitability in various growing areas. Previous research frequently concentrates on particular elements, including yield performance (Islam et al., 2018) or cost-benefit analysis in regional contexts (Rahman & Hossain, 2020). However, a comprehensive knowledge of the crop's economic feasibility requires a comparative evaluation across a few significant groundnut-producing regions, taking into account current data on input costs, output prices, and possible alternative growing alternatives.

Despite its importance, the productivity and profitability of groundnut cultivation in Bangladesh vary significantly across different agroecological zones due to factors such as soil type, climate variability, access to quality inputs, and prevailing market prices (Islam et al., 2018). Profitability analysis, encompassing gross margin, net return, and benefit-cost ratio, provides essential insights into the economic incentives for farmers to adopt or continue groundnut cultivation. However, profitability varies significantly depending on access to inputs, market linkages, land quality, and irrigation facilities. Prior studies have indicated that with proper agronomic practices and institutional support, groundnut can serve as a profitable alternative to traditional cereal crops in specific regions (Islam et al., 2021; Alam et al., 2023). Understanding the comparative advantage of groundnut production in specific areas is crucial for informed decision-making by farmers, policymakers, and agricultural extension services aimed at optimizing resource allocation and enhancing farm

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income. Comparative advantage, in this context, refers to the ability of a particular region to produce groundnut at a lower opportunity cost compared to other regions, often stemming from inherent environmental or resource endowments (Ricardo, 1817).

Several studies have explored the economic aspects of groundnut production in Bangladesh (Rahman et al., 2015; Hossain & Ahmed, 2019), highlighting the input costs, yield levels, and profitability. Bangladesh are producing only 20% oilseed and 80% is imported to meet the demand every year. Therefore, more research as well as investigation regarding the oil sector are needed to change the existing situation. However, a comprehensive analysis focusing on the comparative advantage of groundnut production across diverse selected areas within Bangladesh, incorporating recent data on production costs, yields, and market prices, remains limited. This study aims to address this gap by investigating the comparative advantage and profitability of groundnut production in some key groundnut-growing areas of Bangladesh. This is important information in deciding whether to make an investment or not. The profitability of a commodity production crucially depends on its prices, cost of production, availability of technology etc.

The findings of this study are expected to provide valuable insights for stakeholders involved in agricultural development in Bangladesh. By pinpointing regions with a strong comparative advantage and profitability, this research can contribute to the formulation of targeted policies and strategies aimed at promoting sustainable and economically viable groundnut production, ultimately benefiting the farmers and the national agricultural economy.

METHODOLOGY

Selection of the study area

The study was conducted in three intensively groundnut growing areas of Bangladesh, namely Kishoreganj, Faridpur and Panchagarh districts. From each district, two upazila were selected purposively to conduct the study. The selected upazilas were Bhairab and Katiadi from Kishoreganj; Alfadanga and Sadarpur from Faridpur; and Boda and Debiganj from Panchagarh, district.

Sampling design and data collection

Both qualitative and quantitative data were used for this study. Quantitative data was collected through questionnaire survey at farm level in the selected areas and qualitative data was assembled through Focus Group discussion (FGD) and secondary information. For the interview schedule survey, both multistage and random sampling techniques were adopted to select sample farm households for collecting primary data and information. Priority in selection of study areas was specified to the intensity of area coverage by groundnut and regional differences in Agro-ecological zones. In each selected location (district), 2 upazilas were chosen purposively for the survey. The upazilas and villages were selected by respective scientists and consultation with local DAE officials. A complete list of farmers growing different crops in each selected village collected from local DAE offices. The total sample size was 384, 120 from Kishoreganj district, 130 from Faridpur district, and 134 from Panchagarh district (Table 1).

Table 1 Sample size with study locations

District/upazila	Sample size
Kishoreganj (120)	
Bhairab	60
Katiadi	60
Faridpur (130)	
Alfadanga	65
Sadarpur	65
Panchagarh (134)	
Boda	67
Debiganj	67
Total	**384**

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Analytical techniques

Analytical techniques were used to measure profitability and comparative advantage was discussed in this section. The collected data was edited and scrutinized for analysis. Most appropriate, available and necessary descriptive methods, tools and techniques were used for data analysis.

The amount of input used has a direct impact on the price. Therefore, understanding the current technology in relation to local input usage and agronomic methods is beneficial. Consequently, the cost elements of groundnut production in the chosen areas are briefly described. Among the tasks required to prepare the soil for seedling planting were plowing, laddering, pit preparation, and other tasks. One of the most crucial elements of groundnut farming is human labor. For farming in our nation, machine power has not yet been able to completely replace human labor. Both hired labor and family labor were used by farmers. Family labor comprises the operator and other family members who work, whereas hired labor consists of both permanent hired labor with a monthly contract and casual labor with a different payment schedule. The majority of farmers harvest seeds from their own household. Very few farmers buy seed from external resources or the local market. Most of the local BINA and BARI cultivars were grown by the farmers in the research locations. When fertilizer is applied correctly, it can help maintain or increase soil fertility and significantly increase agricultural output. Four types of chemical fertilizers urea, TSP, MoP, Zn, and Boron were employed by the sample farmers during the survey. Based on the actual price paid by the farmers, the cost of the insecticide was calculated. Nearly every farmer in the research areas used shallow tube wells to supply irrigation water to their plots. Only a small percentage of farmers used manual irrigation techniques. One of the largest fixed costs of the industrial process is land rent. At the rate that prevailed in the research area, the rental value of the land was calculated for the cropping period. Six months of cropping season at a 12% interest rate was taken into account in this research.

Measurement of profitability

Profitability depends on the costs involved in production and returns from its product. In this study, costs and returns analyses were done on the total cost basis. The following equation (1) was used to assess the profitability of groundnut production:

$$\Pi = \sum_{i=1}^{n} P_i Q_i - TC = \sum_{i=1}^{n} P_i Q_i - (TVC + TFC) \text{ ----------(1)}$$

Where,

Π = Profit or value addition from groundnut production

Q_i = Quantity of groundnut of i^{th} farmers (kg ha^{-1})

P_i = Average price of groundnut of i^{th} farmers (Tk. kg^{-1})

TC = Total cost (Tk. ha^{-1})

TVC = Total variable cost (Tk. ha^{-1})

TFC = Total fixed cost (Tk. ha^{-1})

i = 1, 2, 3, ……., n

Gross return, gross margin, and net return were used to measure the profitability of groundnut cultivation per hectare from the perspective of individual farmers. By simply multiplying the total volume of output by the price per unit throughout the harvesting period, the gross return was determined. The gross margin was calculated in order to quantify the difference between variable costs and total return (Islam et al., 2020). The justification for employing the gross margin analysis is that Bangladeshi farmers are more concerned with their return than with variable costs. Fixed costs, such as labor provided by family members and land rent, were

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taken into account in the analysis. Deducting all expenditures, both fixed and variable, from gross return yielded the net margin.

Benefit Cost Ratio (BCR) is an indicator to analyze the relationship between the benefit and cost of any project in monetary terms. Higher BCR indicates a higher return from the production and vice-versa. Typically, BCR is computed using total cost.

$$\boldsymbol{BCR} = \frac{\boldsymbol{TR}}{\boldsymbol{TC}} \quad \text{……..…… (2)}$$

There is a profitable investment if the BCR is higher than one and vice versa.

Measures of Comparative Advantage

Comparative advantage in the production of a given crop for a particular country is measured by comparing its border price with the social or economic opportunity costs of producing, processing, transporting, handling and marketing an incremental unit of commodity. The domestic resource cost (DRC) provides a measure of efficiency, with implications for the level of incentives offered to producers. Whether it is efficient for a country to produce a commodity as opposed to importing it, depends on the opportunity cost of domestic production relative to the value added it creates in foreign currency.

The DRC is the ratio of the cost in domestic resources and non-traded inputs (valued at their shadow prices) of producing the commodity domestically to the net foreign exchange earned or saved by producing the good domestically.

Formally DRC is defined as

$$\text{DRC} = \frac{\text{Cost of domestic resource and non-traded inputs for producing per unit of output}}{\text{Value of tradable output} - \text{Value of tradable inputs}}$$

$$\text{DRC} = \frac{\sum f_{ij} P_j^d}{U_i - \sum a_{ik} P_k^b} \text{----------(3)}$$

Where,

f_{ij} = Domestic resource and non-traded inputs j used for producing per unit commodity i

P^d_j = Price of non-traded intermediate inputs and domestic resource

U_i = Border price of output i

a_{ik}= Amount of traded intermediate inputs for unit production of i

P^b_k = Border price of traded intermediate input

If DRC < 1, the economy saves foreign exchange by producing the good domestically either for export or for import substitution. This is because the opportunity cost of domestic resources and non-traded factors used in producing the good is less than the foreign exchange earned or saved. In contrast, if DRC > 1, domestic costs are in excess of foreign exchange costs or savings, indicating that the good should not be produced domestically and should be imported instead.

Rental value of per unit land was applied to the shadow price of land. Market wage rate was considered for shadow pricing because no substantial market imperfection exists in agricultural labor market. Interest rate was used to calculate the working capital. International prices were used to calculate the import parity prices of fertilizers. Seed cost was considered in the actual market price.

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RESULTS AND DISCUSSION

Pattern of input use for groundnut cultivation

Farmers in the study areas used various inputs for groundnut cultivation (Islam et al., 2019). Farmers used on average 101 man-days per hectare of total human labor for groundnut cultivation where family labor was 42 man-days and hired labor was 58 man-days. On average, they sowed 111 kg of seed per hectare of land. They applied Urea at the rate of 42 kg ha^{-1}, TSP 149 kg ha^{-1}, and MoP 114 kg ha^{-1}. It was observed that among the chemical fertilizer, farmers used highest amount of TSP for the studied districts (Table 2). In the study areas, farmers also applied gypsum (95 kg ha^{-1}), Cowdung (3674 kg ha^{-1}) and Boric Acid (3 kg ha^{-1}) for groundnut cultivation.

Table 2 Level of input use per hectare of groundnut cultivation

Particulars	Districts			
	Kishoreganj	Panchagarh	Faridpur	Total
Human labor (man-days)	95	105	102	101
Hired	56	61	58	58
Family	39	45	44	42
Seed (kg)	116	111	105	111
Cowdung (Kg)	3000	3867	4155	3674
Urea (Kg)	38	38	50	42
TSP (Kg)	149	138	159	149
MoP (Kg)	108	107	128	114
Gypsum (Kg)	108	83	95	95
Boric Acid (kg)	3	3	4	3

Source: Author's own calculations

Total cost of groundnut production

The cost of production included all kinds of variable costs such as hired labor, land preparation, seed/seedling, manure, fertilizers, irrigation, pesticides, etc. used for the production of groundnut (Islam et al., 2018). Both cash expenses and the imputed value of family supplied inputs were included in the variable cost. The study revealed that the total variable cost of groundnut cultivation was Tk. 54957 ha^{-1} which was 66% of total cost of production (Table 3). The highest cost item was hired labor which accounted for about 22% of the total cost. Seed cost accounted for about 16% of total cost.

Table 3 Per hectare cost of groundnut cultivation

Particulars	District				
	Kishoreganj	Faridpur	Panchagarh	Total	
	(Tk. ha^{-1})	(Tk. ha^{-1})	(Tk. ha^{-1})	(Tk. ha^{-1})	%
Variable Cost					
Cost of land preparation	7527	5359	7238	6708	8
Hired labor	18419	18270	17545	18078	22
Seed	13967	13348	12542	13286	16
Cowdung	1500	1934	2077	1837	2
Urea	488	500	650	546	1
TSP	2383	2209	2538	2377	3
MoP	1727	1705	2042	1825	2
Gypsum	1624	1238	1431	1431	2
Boric acid	518	430	538	495	1
Cost of irrigation	-	4000	5000	4500	5

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Cost of insecticide pesticide	1150	1089	1220	1153	1
Sub-total	49303	50082	52822	50735	-
Interest on operating capital	3796	5002	5832	4877	1
Total variable cost	52433	54450	57988	54957	66
Fixed Cost					
Family labor	11704	13364	13062	12710	15
Land use cost	16120	15300	16050	15823	19
Total fixed cost	27824	28664	29112	28533	34
Total cost	80256	83114	87099	83490	100

Source: Author's own calculations

Family labor and the rental value of land were considered as fixed cost of groundnut production (Islam et al., 2021). The family labor and land use cost were Tk. 12710 ha^{-1} and Tk. 15823 ha^{-1} which were accounted for about 15% and 19% of total cost, respectively. Total cost of production included variable costs and fixed costs incurred for groundnut cultivation. On average, the total cost of groundnut production was Tk. 83,490 ha^{-1} where 34% was fixed costs and 66% was variable costs (Table 3).

Profitability of Groundnut Production

Profitability is based on the calculation of market prices of inputs and outputs that farmers actually pay or receive for producing a crop, along with the quantities used for each. Farmers allocate land and other resources in groundnut production on the basis of profitability.

Table 4 Per hectare return of groundnut production

Particulars	**Districts**			
	Kishoreganj	**Faridpur**	**Panchagarh**	**Total**
Yield (ton)	2.02	1.95	2.17	2.05
Price (Tk. Kg^{-1})	74	78	77	76
Return from Groundnut	149682	152529	165776	155996
Return from by-product	12173	11455	13100	12243
Gross Return	161855	163984	178876	168238
Total variable cost (TVC)	52433	54450	57988	54957
Total fixed cost (TFC)	27824	28664	29112	28533
Total cost (TC)	80256	83114	87099	83490
Gross Margin	109422	109534	120888	113281
Net Return	81599	80870	91776	84748
BCR over total cost	2.02	1.97	2.05	2.01
Cost of production (Tk. kg^{-1})	39.73	42.62	40.19	40.81

Source: Author's own calculations

Per hectare average yield of groundnut was 2.05 ton and per kg average price was about Tk. 76. The average gross return and gross margin of groundnut cultivation were found Tk. 168238 ha^{-1} and Tk. 113281 ha^{-1} respectively. Per hectare average net return was Tk. 84748 which was found to be highest in Panchagarh (Tk. 91776) followed by Kishoreganj (Tk. 81599) and Faridpur (Tk. 80870). BCR on a total cost basis was found 2.01 which was more or less similar among the districts. It was estimated that, to produce one kilogram of groundnut, total cost incurred Tk. 41 (Table 4).

Comparative advantage of groundnut

The DRC value for groundnut found to be less than one (0.35) indicating that Bangladesh had comparative advantage in producing groundnut for import substitution (Table 5). This is plausibly attributed to the higher yield of hybrid groundnut which results to the lower cost of production per unit of land. Furthermore, due to

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higher demand in the local market, there is greater scope for efficient groundnut production. The result is similar to the result found by Rashid et al. (2009).

Table 5 Domestic Resource Cost (DRC) of groundnut

Items	Districts			Total
	Kishoreganj	Faridpur	Panchagarh	
A. Traded input (Tk. MT^{-1})	**5177**	**6071**	**4598**	**5281**
Urea	604	824	562	663
TSP	3000	3316	2586	2967
MoP	1572	1931	1450	1651
B. Non-Traded inputs and domestic resources (Tk. MT^{-1})	**36724**	**39829**	**37127**	**37893**
Human labor	14912	16223	14105	15080
Land preparation	3726	2748	3335	3270
Seed	6914	6845	5780	6513
Manure	743	992	957	897
Pesticide	569	558	562	563
Irrigation	0	2051	2304	1452
Int. on operating capital	1879	2565	2688	2377
Land use cost	7980	7846	7396	7741
C. Output price (Tk. MT^{-1})	112481	112481	112481	112481
D. Value added (Tradable) (Tk. MT^{-1}) (C-A)	107305	106411	107882	107199
E. DRC (B/D- Import parity	**0.342**	**0.374**	**0.344**	**0.354**

Source: Author's own calculations

Problems faced by the farmers in groundnut cultivation

The first and foremost constraints for groundnut cultivation in all areas were the labor crisis and high price at harvesting time (56%). They mentioned some other constraints as lack of quality seeds at appropriate time (43%) followed by adulterated fertilizer/ fertilizer not working properly (41%), low market price at harvesting time (34%), insect infestation like aphid, cutter pillar (27%), lack of drainage system (19%), adulterated seed and root rot disease (13%), unavailability of bank loan (12%), etc. (Table 6).

Table 6 Problems faced by the farmers in groundnut cultivation

Particulars	Kishoreganj	Faridpur	Panchagarh	Total
Production related problems				
Lack of quality seeds at appropriate time	64	28	37	43
Adulterated seed	15	12	11	13
Adulterated fertilizer	50	32	43	41
Insect infestation	45	13	24	27
Disease (root rot)	12	9	18	13
High labor price in harvesting time	71	42	54	56
Loan related problems				
Unavailability of bank loan at proper time	22	4	10	12
Marketing related problems				
Low market price at harvesting time	44	26	31	34
Distance of market is high	10	9	4	8
Lack of drainage system	22	20	14	19

The government should take initiatives regarding the supply of quality seed at the proper time with a reasonable price and should control and restrict the supply and availability of adulterated fertilizer from the

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market. More emphasis should be given to develop new short-duration varieties and loan facilities to cultivate these varieties. The government should fix labor prices taken at harvesting time. Drainage system should be developed to reduce the loss of groundnut production.

CONCLUSION

The profitability and comparative advantage of groundnut production are very important in Bangladesh for efficient use of resources. The groundnut production is highly profitable. Bangladesh possesses a significant comparative advantage in groundnut production, making it an efficient and globally competitive groundnut for the nation. Addressing major constraints through well-informed policy interventions by relevant stakeholders, researchers, and policymakers is paramount to fully unlock the potential of groundnut production and ensure its sustained growth and contribution to the agricultural economy of Bangladesh.

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