IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 14, Issue 1 Ser. I (January 2021), PP 21-26
www.iosrjournals.org

An Economic Study on Sesame Variety Binatil-3 in Some Selected Areas of Bangladesh

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Abstract: *The study was conducted in four major Binatil-3 growing areas of Bangladesh, namely Magura, Kushtia, Jhenaidah, Madaripur and Faridpur district. The average costs of Binatil-3 cultivation were Tk. 48604.49 and Tk. 33218.48 per hectare on full cost and cash cost basis, respectively. The highest production cost was for human labour (42.62%), followed by fertilizer use (16.03%), power tiller (11.65%), and irrigation (10.11%). The average net return per hectare was Tk. 23232.57. The net return was highest in Kushtia (Tk. 33149.58 ha^{-1}) followed by Magura (Tk. 25318.01 ha^{-1}), Jhenaidah (Tk. 23824.76 ha^{-1}), Faridpur (Tk. 19362.44 ha^{-1}) and Madaripur (Tk. 14511.05 ha^{-1}), respectively. The average Benefit cost ratio was estimated at 1.48 and 2.16 on full cost and cash cost basis implying that the Binatil-3 cultivation at farm level was highly profitable. The highest BCR was found in Kushtia (1.66) followed by Magura (1.52), Jhenaidah (1.49), Faridpur (1.41) and Madaripur (1.32), respectively. Binatil-3 farmers received high return on its investment and cultivation of this variety increasing in the study areas day by day due to its high yield potential.*

Key Words: *Binatil-3, cost, return, constraints and guidelines*

Date of Submission: 26-12-2020 Date of Acceptance: 07-01-2021

I. Introduction

Edible oils play vital roles in human nutrition by providing calories and aiding in digestion of several fat soluble vitamins, for example Vitamin A (National Research Council, 1989). The per capita recommended dietary allowance of oil is 6 gm/day for a diet with 2700 Kcal (BNNC, 1984). At least 15% (405 kcal) of the total calories must come from visible and invisible oils or fats for maintaining good health. Some oilseeds are also a source of good quality protein, vitamins, and fuel. Oilcake is also an important manure for crop production and livestock feed. Bangladesh has to spend a huge amount of foreign exchange on imports of edible oils and oilseeds to meet the increasing demand of its population. The values of imported edible oils Mondal and oilseeds were USD1574 million and USD354 million in 2014-2015, respectively (Bangladesh Bank, 2016). The area under oilseeds cultivation is decreasing over the years due to various economic and technical reasons. However, the area under mustard (major oilseed crop in Bangladesh) has started increasing from 2010 onwards (Miah et al., 2014). Bangladesh government has given due importance for research and development (R&D) of oilseed crops and invests a lot for attaining self-sufficiency in edible oils. Bangladesh Agricultural Research Institute (BARI) and Bangladesh Institute of Nuclear Agriculture (BINA) have released a good number of improved varieties of oilseeds. The rate of adoption of these improved varieties at farm level is encouraging (Miah et al., 2015b; Miah et al., 2015c) and have created positive impact and saved foreign exchange for the country (Miah et al., 2015a). Trend of import value of oilseeds and edible oils Policy-makers and research managers need overall information on oilseed crops to formulate suitable policy guidelines on oilseeds. The objectives of the study were **(i)** to estimate the cost and return of Binatil-3; **(**ii**)** to identify the major constraints of Binatil-3; and **(**iii**)** to suggest some policy guidelines. However, an in-depth analysis is needed to explore the causes of low adoption and find out the ways for the expansion of oilseed cultivation. This study explores the challenges and opportunities in the oilseeds sector of Bangladesh.

II. Metarials and Methods

2.1 Sampling design

A multi-stages sampling procedure was followed to select study areas and sample households. At first, we selected five major Binatil-3 growing areas of Bangladesh, namely district and then two Upazilas in each Magura, Kushtia, Jhenaidah, Madaripur and Faridpur districts were purposively selected for the study. Secondly, two villages were purposively selected from each upazila for household survey. Finally, a list of Binatil-3 growers was constructed for each village and then a total of 200 samples taking 40 samples from each district were randomly selected for data collection.

2.2 Data collection procedure

Data for the present study were collected by interviewing sample Binatil-3 growers using a pre-tested interview schedule during the period from March to May 2018. Secondary data were also collected from Directorate of Agricultural Extension to supplement the study. Data were collected from Binatil-3 growers through interview schedule. Collected data were edited, summarized, tabulated and analyzed to fulfill the objectives. Some descriptive statistics were used for analyzing the collected data. The profitability of Binatil-3 cultivation was examined on the basis of gross margin, net return, and rate of return over cost. In the study, costs and return analysis were done on both cash cost and full cost basis.

2.3 Analytical Model

The production of Bianatil-3 is likely to be influenced by different factors, such as human labour, seed, chemical fertilizer, insecticide, etc. The following algebric equation was developed to assess the comparative costs and returns of Bianatil-3 production.

$$\text{GRi} = \sum_{i=1}^{n}(Q_{mi}P_{mi}) + \sum_{i=1}^{n}(Q_{bi}P_{bi})$$

Where, GRi = Gross return from ith product (Tk/ha); Q_{mi} = Quantity of the ith main product (kg/ha); P_{mi} = Average price of the ith main product (Tk/kg); Q_{bi} = Quantity of the ith by product (kg/ha); P_{bi} = Average price of the i^{th} by product (Tk/kg); i = 1,2,3, ….,n

Net return was calculated by deducting all costs from gross return. To determine the net return of Bianatil-3 production the following equation was used in the present study:

$$\pi = P_y Y + \sum_{i=1}^{n}(P_{xi}X_i) - TFC$$

Where, π= Net return (Tk/ha); Py= Per unit price of the product (Tk/kg); Y = Quantity of the product per hectare (kg); Pxi= Per unit price of ith inputs (Tk); Xi = Quantity of the ith inputs per hectare (Kg); TFC = Total fixed cost (Tk); i = 1,2,3, ..., n (number of inputs).

2.4 Benefit – Cost Ratio (BCR) analysis

This ratio of Bianatil-3 was measured in the study in two different ways:

$$\text{BCR} = \frac{\text{TR}}{\text{TVC}}$$

Many economists called it as O/I.

$$\text{BCR} = \frac{\text{TR}}{\text{TC}}$$

It is widely used in Economics. If BCR>1, then the production of revenue from rice is economically satisfactory; if BCR<1, then the revenue from rice is not economically satisfactory and if BCR=1, then there is economic breakeven point of rice production which is similar to other crop cultivation

III. Results and Discussion

3.1 Estimation of the Cost and Return of Binatil-3 of Production

The cost and return are the major criteria for determination of profitability of a crop. The cost of Binatil-3 production, gross return, gross margin, net return and the benefit cost ratio (BCR) for Binatil-3 cultivation are being discussed in the following sections.

3.2 Cost of Binatil-3 cultivation

The cost of human labour, land preparation, seed, fertilizers, pesticides, and irrigation were taken into consideration, while calculating cost of Binatil-3 production. Beside this, interest on operating capital was also considered as the cost of Binatil-3production. Total cost consists of variable cost and fixed cost that covered 91.53% and 8.47% of total cost for Binatil-3 production.

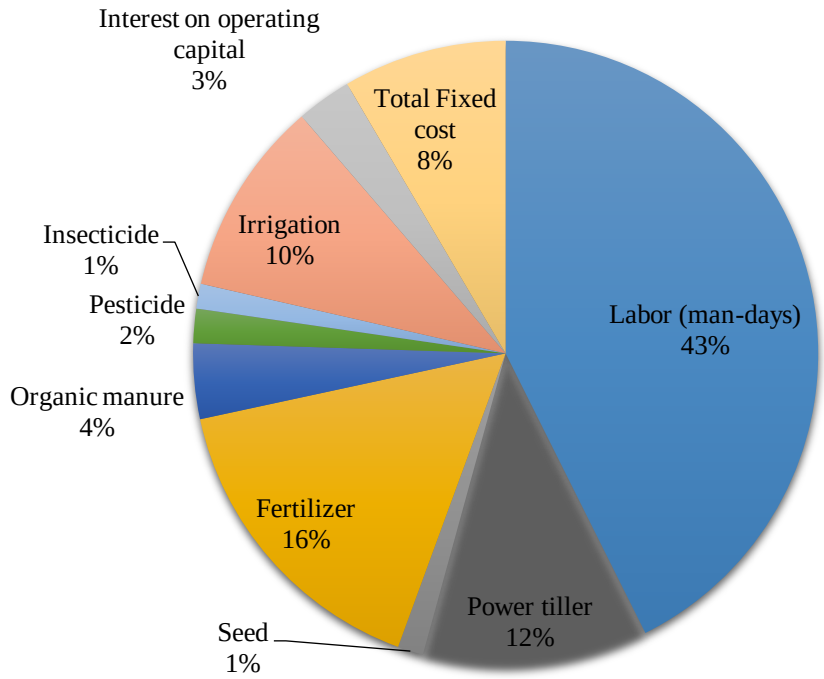
From table 1, the average costs of Binatil-3 cultivation were Tk. 48604.49 and Tk. 33218.48 per hectare on full cost and cash cost basis, respectively. The highest production cost was for human labour (42.62%), followed by fertilizer use (16.03%), power tiller (11.65%), and irrigation (10.11%). The cost of Binatil-3 cultivation was found highest in Kushtia (Tk. 49915.54 ha^{-1}) followed by that in Magura (Tk. 48632.58 ha^{-1}), Jhenaidah (Tk. 48554.63 ha^{-1}), Madaripur (Tk. 47663.23 ha^{-1}) and Faridpur (Tk. 47356.46 ha^{-1}), respectively.

Table 1: Per hectare cost of Binatil-3 production in different locations

Cost Component		Location-wise cost in Taka					Average
		Magura	Madaripur	Jhenaidah	Faridpur	Kushtia	
Labor (man-days)		20578.56	20639.47	21008.88	19899.47	21068.54	20638.98 **(42.62)**
	Family	5210.23	6626.72	5467.20	5607.28	4548.04	5491.89
	Hired	15368.33	14012.75	15541.68	14292.19	16520.50	15147.09
Power tiller		5602.69	6025.47	4990.23	5826.31	5754.04	5639.75 **(11.65)**
	Owned	1867.56	2008.49	1663.41	1942.10	1918.01	1879.92
	Hired	3735.13	4016.98	3326.82	3884.21	3836.03	3759.83
Seed		594.23	613.94	611.26	664.94	720.37	640.95
	Owned	198.08	204.65	203.75	221.65	240.12	213.65
	Purchased	396.15	409.29	407.51	443.29	480.25	427.30
Fertilizer		7300.92	7694.18	7964.92	7437.74	8407.81	7761.11 **(16.03)**
Organic manure		1645.61	1674.09	2352.05	1800.20	1969.58	1888.31 **(3.90)**
Pesticide		720.95	959.67	841.60	951.99	825.87	860.02
Insecticide		598.98	642.42	563.38	664.94	637.36	621.42
Irrigation		6152.65	4390.94	4641.65	4524.82	4776.01	4897.21 **(10.11)**
	Owned	2050.88	1463.65	1547.22	1508.27	1592.00	1632.40
	Hired	4101.77	2927.29	3094.43	3016.55	3184.01	3264.81
Interest on operating capital		1379.24	1433.55	1255.61	1365.25	1450.85	1376.90
Total variable cost		44573.83	44073.73	44229.58	43135.66	45610.43	44324.65 **(91.53)**
Total Fixed cost		4058.75	3589.50	4325.05	4220.80	4305.11	4099.84 (8.47)
Total cash cost		33601.47	32096.14	32995.95	32056.16	35342.67	33218.48 **(68.60)**
Total Cost		48632.58	47663.23	48554.63	47356.46	49915.54	48424.49 (100.00)

Note: Bracketed figures indicate the percentage of total cost

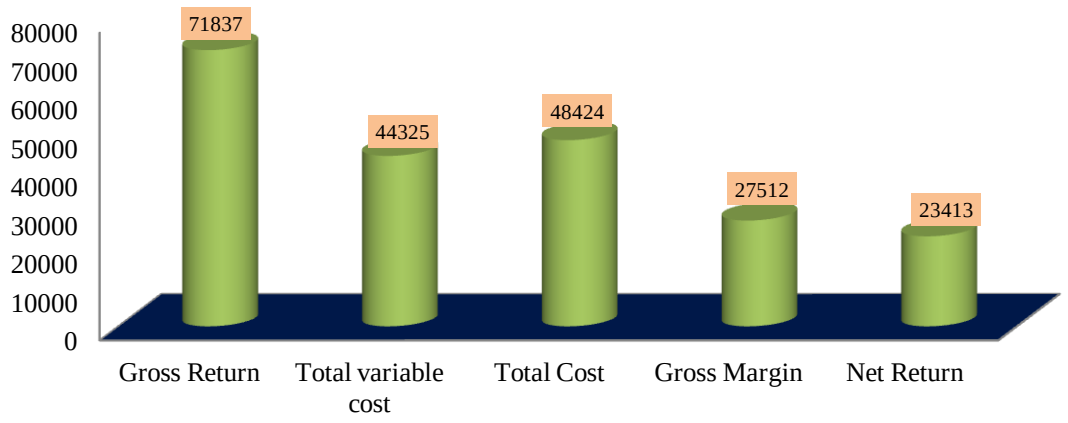
Fig. 1 : Percent of share in Binatil-3 cultivation



3.3 Return from Binatil-3 production

The average return from Binatil-3 production in different locations is shown in Table 2. The average yield of Binatil-3 was 1386.90 kg ha^{-1}. The yield was highest at Kushtia 1540.16 kg ha^{-1} followed by Magura (1422.81 kg ha^{-1}), Jhenaidah (11394.58 kg ha^{-1}), Faridpur (1312.04 kg ha^{-1}) and Madaripur (1264.91 kg ha^{-1}). Most of the farmers in the study areas sold their product just after harvest. The price of Binatil-3was found the highest in Kushtia (Tk. 51.00 kg^{-1}) and the lowest in Madaripur (Tk. 47.00 kg^{-1}). The total return from Binatil-3 production consists of the values of yield of grain and straw.

Fig. 2 : Cost and return of Binatil-3 cultivation (Tk./ha)

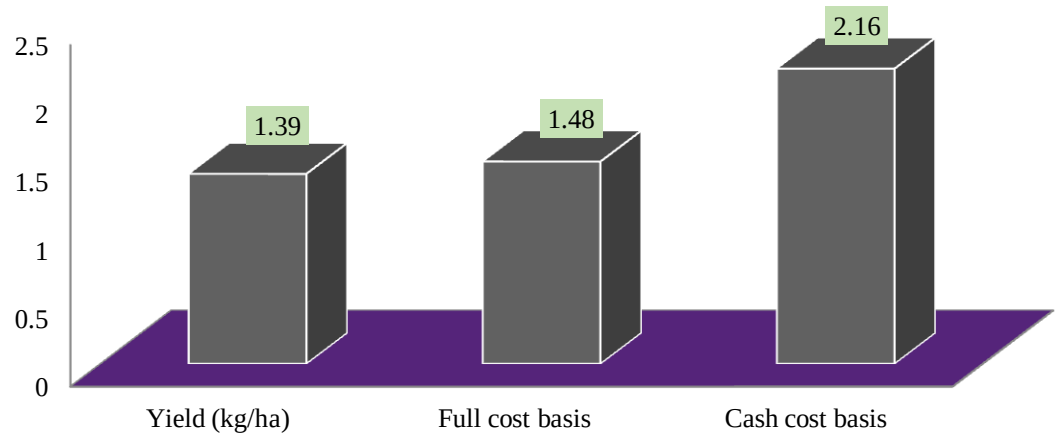


The average gross margin was found Tk. 27512.41 ha^{-1} on variable cost basis. Gross margin was highest in Kushtia (Tk. 37451.69 ha^{-1}) followed by Magura (Tk. 29376.76 ha^{-1}), Jhenaidah (Tk. 28149.81 ha^{-1}), Faridpur (Tk. 23583.24 ha^{-1}) and Madaripur (Tk. 19000.55 ha^{-1}), respectively. The average net return per hectare was Tk. 23232.57. The net return was highest in Kushtia (Tk. 33149.58 ha^{-1}) followed by Magura (Tk. 25318.01 ha^{-1}), Jhenaidah (Tk. 23824.76 ha^{-1}), Faridpur (Tk. 19362.44 ha^{-1}) and Madaripur (Tk. 14511.05 ha^{-1}), respectively.

Table 2: Profitability of Binatil-3 cultivation in different location

Type	Cost and Return in Taka					Average
	Magura	Madaripur	Jhenaidah	Faridpur	Kushtia	
Yield (kg/ha)	1422.81	1264.91	1394.58	1312.04	1540.16	1386.90
Yield (Tk./ha)	69717.69	59450.77	68334.42	62977.92	78548.16	67805.79
By product (Tk./ha)	4232.90	3623.51	4044.97	3740.98	4513.96	4031.26
Gross Return(Tk./ha)	73950.59	63074.28	72379.39	66718.90	83062.12	71837.06
Total variable cost(Tk./ha)	44573.83	44073.73	44229.58	43135.66	45610.43	44324.65
Total cash cost(Tk./ha)	33601.47	32096.14	32995.95	32056.16	35342.67	33218.48
Total Cost(Tk./ha)	48632.58	47663.23	48554.63	47356.46	49915.54	48424.49
Gross Margin(Tk./ha)	29376.76	19000.55	28149.81	23583.24	37451.69	27512.41
Net Return (Tk./ha)	25318.01	15411.05	23824.76	19362.44	33146.58	23412.57
Benefit Cost Ratio (BCR)						
Full cost basis	1.52	1.32	1.49	1.41	1.66	1.48
Cash cost basis	2.20	1.97	2.19	2.08	2.35	2.16

Fig. 3 : Profitability of Binatil-3 cultivation



The average Benefit cost ratio was estimated at 1.48 and 2.16 on full cost and cash cost basis implying that the Binatil-3 cultivation at farm level was highly profitable. The highest BCR was found in Kushtia (1.66) followed by Magura (1.52), Jhenaidah (1.49), Faridpur (1.41) and Madaripur (1.32), respectively.

3.4 Major constraints to Binatil-3 cultivation

Binatil-3 is a profitable crop in the study areas. But Farmers faced various constraints to Binatil-3 cultivation. In table 3, about 81% farmers opined inadequate supply of quality seeds at proper time as a top ranked problem of Binatil-3cultivation. Other constraints were infestation of root rot disease (70%), lack of technical know-how (60%), natural calamities (46%), higher price of fertilizers & insecticides (19%).

Table 3. Major constraints to Binatil-3 cultivation in the study areas

SL. No.	Constraints	% of farmers responded					Aver-age
		Magura	Madaripur	Jhenaidah	Faridpur	Kushtia	
1.	Inadequate supply of quality seeds at proper time	76	90	80	87	70	81
2.	Infestation of root rot disease	66	80	75	68	61	70
3.	Lack of technical know-how	56	69	58	61	55	60
4.	Naturalcalamities	44	57	50	48	30	46
5.	Higher price of fertilizers & insecticides	15	35	18	9	-	19

3.5 Recommendations for policy guidelines

To solve the major farmers problem following recommendations may be suggested as: i) it should be ensured quality seed timely; ii) drainage system should be developed, more research are needed to recover root rot disease or release disease resistant variety; iii) most of the farmers did not follow the recommended doses of inputs in the production process. So the field workers of the Department of Agricultural Extension (DAE) should be more careful about the proper dissemination of the scientific technology, more extension and training services must be enhanced and lastly; and iv) Government should take appropriate action through law enforcement team to stop the use of adulterated fertilizers and insecticides throughout the country.

IV. Conclusion

Binatil-3 production in the study areas is profitable. Binatil-3 farmers received high return on its investment and cultivation of this variety increasing in the study areas day by day due to its high yield potential.

Acknowledgement

The authors acknowledged the financial grant from Government of Bangladesh.

Conflict of Interest

This manuscript is original and contains not any published material. The corresponding author confirms that all of the others authors have read and approved the manuscript and thus declare no conflicts of interest.

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Syful Islam. "An Economic Study on Sesame Variety Binatil-3 in Some Selected Areas of Bangladesh." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 14(1), 2021, pp. 21-26.