ECONOMICS OF MARIGOLD CULTIVATION IN SOME SELECTED AREAS OF BANGLADESH

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Abstract

Marigold cultivation is now a profitable enterprise to the farmers, but the socio-economic data and information of this flower are very scarce in Bangladesh. Therefore, the study was conducted to identify agronomic practices, analyze relative profitability, and input-output relationship during February 2011. Primary data were collected from 100 randomly selected farmers from Jessore and Jhenaidah districts. The results indicated that 95% farmers cultivated T- 004 line and only 5% farmers cultivated T- 003 line of marigold. The per hectare costs of marigold cultivation were Tk. 1,47,234 and Tk. 1,02,858 on full cost and variable cost, respectively. The major share of full cost was for human labour (34%), land use (18%), fertilizer (15%), and irrigation (10%). The yield of marigold was 2,650,447 flowers per hectare. The gross margin and net return were Tk.1, 62,186 and Tk.1, 17,812 per hectare, respectively. The net return was 81% higher than lentil, 85% higher than mustard, and 6% lower than potato cultivation. The benefit cost ratios were 2.57 and 1.80 on variable cost and full cost basis, respectively. Cobb-Douglas production function revealed that human labour, land preparation, seedling, urea, TSP, MoP, and irrigation had positive effect on marigold cultivation. The lack of technical knowledge, non-availability of high yielding variety, and infestation of insects and diseases were major problems for marigold cultivation. Therefore, necessary steps from concerned authority are needed to overcome these problems.

Keywords: Marigold, gross margin, net return, BCR.

Introduction

Commercial floriculture in Bangladesh is a new dimension in farming culture. Evidences from all civilizations reveal that mankind has historical interest in gardening and culturing flowers to satisfy aesthetic need. But, in the present world, flower becomes important not only for its aesthetic social values, but also for its economic contribution (Aditya, 1992; Dadlani, 2003). People usually use flowers in all their ceremonies like wedding, birthday, and marriage day greetings, religious offerings and sometimes in social, political, and historical occasions (Haque *et al.,* 1992). The universal usage has created a real trend of producing flower on a commercial basis to meet increasing demand in the

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market. The area under marigold cultivation was about 344 ha producing about 1560 tonnes with an average yield of 4.54 t/ha. The annual growth rate of area, production, and yield of marigold for the period from 2007-2008 to 2009-2010 were 12.44%, 11.12%, and -1.32%, respectively (Table 1).

Table 1. Annual growth rates of marigold, 2007-2008/2009-2010.

Year	Area (ha)	Prod (mt)	Yield (t/ha)
2007-2008	268	1249	4.66
2008-2009	325	1622	4.99
2009-2010	344	1560	4.54
Mean	312	1477	4.73
CV (%)	12.63	13.53	4.93
Growth rate (%)	12.44	11.12	-1.32

Source: BBS, 2010

Considering the market value, some farmers in association with some entrepreneurs have started cultivation of gladiolus, tuberose, marigold, rose, gerbera, and orchid flowers. But the socio-economic data and information of marigold cultivation is very much scarce in Bangladesh. Nevertheless, marigold cultivating farmers are depriving from higher production and fair prices due to various farm level constraints that need to be explored.

With this view in mind, the present study was undertaken to: (i) identify the existing agronomic practices of marigold cultivation; (ii) measure the relative profitability of marigold with major competing crops; (iii) determine the input-output relationship of marigold cultivation; and (iv) find out the socio-economic constraints to its higher production.

Materials and Method

Sampling technique: A multi-stage sampling technique was followed in this study to select study areas and sample farmers. In first stage of sampling, two marigold growing districts, namely Jessore and Jhenaidah were selected purposively. In the second stage, one *Upazila* was selected from each district for sample survey. The names of the *Upazilas* were Jhikorgacha under Jessore district and Kaligonj under Jhenaidah district. In the third stage, a complete list of marigold growers were collected from each *Upazila* and finally a total of 100 marigold farmers taking 50 farmers from each *Upazila* were selected by random sampling technique.

In order to compare the benefit of marigold cultivation with other existing competing crops like potato, lentil, and mustard for marigold were selected. The competitive crops were selected on the basis of same soil and land type of

marigold cultivation in the study areas. Rice is not considered as a competitive crop of marogold because farmers cultivate rice as scattered in the study area.

Method of data collection: Data for the present study were collected from sample marigold farmers through face to face interview method using a pre-tested interview schedule. Field level data were colleted by the researcher with the help of trained enumerators for the period of February, 2011.

Analytical techniques: Both fixed cost and variable cost were taken into account in calculating cost of marigold cultivation. Land use cost was calculated on the basis of per year existing lease value of land. The profitability of marigold cultivation was examined on the basis of gross margin, net return and benefit cost analysis. The collected data were edited, summarized, tabulated and analyzed to fulfill the objectives of the study. Tabular method using descriptive statistics was mostly used in the study. Cobb-Douglas production function model was used to estimate the contribution of factors to marigold cultivation. The functional form of the Cobb-Douglas production function model is given below:

$$Y = AX_1^{b1}X_2^{b2} \text{------------------------} X_n^{bn}e^{ui}$$

The production function was converted to logarithmic form so that it could be solved by least square method i.e.

$$\ln Y = \ln a + b_1\ln X_1 + b_2\ln X_2 + \dots\dots\dots\dots\dots\dots b_n\ln X_n + U_i$$

The empirical production function model was the following:

$$\ln Y = a + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 +$$

$$b_7\ln X_7 + b_8\ln X_8 + U_i$$

Where, Y = Yield (No/ha); X_1 = Human Labor (Man-day/ha); X_2 = Land preparation cost (Tk/ha); X_3 = Seedling (No./ha); X_4 = Manure (kg/ha); X_5 = Urea (kg/ha), X_6 = TSP (kg/ha),

X_7 = MoP (kg/ha); X_8 = Irrigation cost (Tk/ha); A = Intercept; b_1, b_2 ---- b_8 = Coefficients of the respective variables to be estimated; and U_i = Error term.

Results and Discussion

Agronomic practices of marigold

The average number of ploughings per farm was 4.5. The number of ploughings per farm was found higher in Jessore than in Jhenaidah (Table 2). All the farmers planted seedling in line. The planting time of marigold started from mid October and continued up to mid November. The average number of weeding, insecticide spraying, and irrigation per farm were 5, 6.5, and 7.5, respectively. The harvesting time of marigold started from January and continued up to May. On an

average, 95% farmers in the study areas cultivated T- 004 line and only 05% farmers cultivated T- 003. Both were promising lines of BARI.

Table 2. Agronomic practices of marigold cultivation in different study areas.

Items	Jessore	Jhenaidah	All areas
Ploughing (no./farm)	5	4	4.5
Planting method (% of farmers):			
Line	100	100	100
Planting time	Mid Oct.-Mid Nov.	Mid Oct.-Mid Nov.	Mid Oct.-Mid Nov.
Weeding (no./farm)	6	5	5
Spraying insecticides (no./farm)	7	6	6.5
Irrigation (no./farm)	8	7	7.5
Harvesting time	Jan.- May	Jan.- May	Jan.- May
Types of marigold (% of farmers):			
T- 003	10	-	5
T- 004	90	100	95
Total	100	100	100

Input use pattern

The number of human labourers used for producing marigold was 416 man days per hectare. The use of human labour was found to be higher in Jessore than in Jhenaidah area. The cost of land preparation was Tk. 7976 per hectare (Table 3). The respondent farmers used 5.10 tons of manure per hectare. The farmers also used chemical fertilizers like urea, TSP, MoP, zipsum, and zinc sulphate at the rate of 363 kg, 342 kg, 231kg, 101 kg and 7 kg, per hectare, respectively. The use of urea was found lower than the recommended doses (Urea- 420 kg/ha) but the use of TSP and MoP were found higher than the recommended doses (TSP-200 kg/ha and MoP-150 kg/ha).

Table 3. Input use pattern of marigold cultivation in different study areas.

Items	Jessore	Jhenaidah	All areas
Human labour (man-day/ha)	426	406	416
Family	151	136	143
Hired	275	270	273
Land preparation cost (Tk./ha)	8111	7841	7976
Seedling/Cutting (No./ha)	48750	46205	47478
Manures (kg/ha)	2001	8209	5105
Fertilizers (kg/ha)*			
Urea	322	404	363
TSP	350	334	342
MoP	246	217	231
Zipsum	-	201	101
Zink sulphate	-	15	7
Insecticides (Tk./ha)	10019	9111	9565
Irrigation (Tk./ha)	14302	14806	14554

* Per hectare recommended doses of fertilizers (Urea = 420kg, TSP =200kg and MoP =150 kg)

Cost and return from marigold cultivation

All variable costs incurred for land preparation, hired labour, seedling, manures, chemical fertilizers, insecticides and irrigation were considered for calculating the cost of marigold cultivation. The cost of land use was calculated on the basis of per year lease value of land. The costs of marigold cultivation were Tk. 147234 and Tk. 102858 per hectare on full cost and variable cost, respectively. The major share of total cost was for human labour (34%), land use (18%), fertilizer (15%), and irrigation (10%).The cost of cultivation of marigold at Jessore was found higher than Jhenaidah due to higher cost of land use, seedling, human labour and chemical fertilizers (Table 4).

The average yield of marigold was 2650447 flowers per hectare. The yield of marigold was reportedly higher in Jessore compared to Jhenaidah due to better land preparation and fertile soil. The gross margin and net return of marigold cultivation were Tk. 162186 and Tk. 117812 per hectare. The cost of marigold cultivation was 43% lower than potato cultivation, whereas it was 73% and 77% higher that lentil and mustard cultivation respectively (Table 6). The gross margin and net return were found to be higher in Jessore than Jhenaidah due to

higher yield of marigold. The net returns from marigold cultivation were 73% and 77% higher than lentil and mustard cultivation and 5.68% lower than potato (Table 5). The benefit cost ratios were 1.80 and 2.57 on full cost and variable cost basis, respectively (Table 3).

Table 4. Cost and return of marigold cultivation in different study areas

(*Figure in (Tk./ha*)

Items	Jessore	Jhenaidah	All areas
A. Variable costs	103733 (68)	101984 (72)	102858 (70)
Hired labour	33030 (22)	32425 (23)	32728 (22)
Land preparation	8111 (5)	7841 (5)	7976 (5)
Seedling/cutting	12187 (8)	9351 (6)	10769 (7)
Organic manure	1401 (1)	4104 (3)	2752 (2)
Chemical fertilizers	20693 (14)	20421 (15)	20557 (15)
Urea	6411	4853	5632
TSP	9353	8353	8853
MoP	4928	4996	24642
Zipsum	-	806	403
Zink Sulphate	-	1412	76
Insecticides/Pesticides	10019 (6)	9111(6)	9565 (6)
Irrigation	14302 (9)	14806 (10)	14554 (10)
Interest on operating capital	3990 (3)	3922 (3)	3956 (3)
B. Fixed costs	48039 9 (32)	40711 (28)	44375 (30)
Family labour	18099 (12)	16386 (11)	17242 (12)
Land use	29939 (20)	24325 (17)	27132(18)
C. Total cost (A+B)	151772 (100)	142695 (100)	147234 (100)
Yield (Flowers/ha)	2947293	2353602	2650447
Price (Tk/flower)	0.10	0.10	0.10
D. Gross return (Tk/ha)	294729	235360	265045
Gross margin (Tk/ha)	190996	133376	162186
Net return (Tk/ha)	142958	92665	117812
Benefit cost ratio			
Full cost basis (D/C)	1.95	1.65	1.80
Variable cost basis (D/A)	2.84	2.30	2.57

Figures within the parentheses indicates percentage of total cost

Table 5. Cost and return of different competing crops of marigold

(Figures in Tk./ha)

Items	Potato	Lentil	Mustard
A. Variable cost	**164135**	**18846**	**14582**
Hired labour	21393	6630	4969
Land preparation	5420	3225	2915
Seed	69277	1050	552
Manures	3692	830	762
Fertilizers	43966	4576	3700
Pesticides	10148	820	88
Irrigation	4663	1345	1291
Int. on operating capital	5575	370	305
B. Fixed cost	**46494**	**20316**	**19530**
Family labour	20000	3000	2500
Land use	26494	17316	17030
C. Total cost (A+B)	**210629**	**39162**	**34112**
Yield (kg/ha)	26139	1200	979
Price (Tk/kg)	12.79	51.42	53.44
D. Gross return	335138	61692	52327
Gross margin	171003	42846	37745
Net return	124509	22530	18215
D. Benefit cost ratio			
Over full cost (D/C)	1.59	1.58	1.53
Over variable cost (D/A)	2.04	3.27	3.58

Table 6. Relative economic performance of marigold with other competitive crops.

(Figure in Tk. /ha)

Parameters	Marigold	Potato	% higher/ lower than potato	Lentil	% higher than lentil	Mustard	% higher than mustard
A. Gross return	265045	335138	-26	61692	76	52327	80
B. Variable cost	102858	164135	-60	18846	82	14582	85
C. Total cost	147234	210629	-43	39162	73	34112	77
D. Gross margin (A-B)	162186	171003	-5.44	42846	74	37745	77
E. Net return (A-C)	117812	124509	-5.68	22530	81	18215	85
F. Benefit cost ratio							
Over full cost (A/C)	1.80	1.59	-	1.58	-	1.53	-
Over variable cost (A/B)	2.57	2.04		3.27		3.58	

Factors affecting marigold yield

In order to determine the contribution of inputs like human labour, land preparation, seedling, manure, urea, TSP, MoP and irrigation for marigold production, Cobb- Douglas production function was used. The estimated values of co-efficient and related statistics of Cobb- Douglas production function were presented in Table 7. It is clear from the model that the co-efficient of human labour, seedling, manure, urea, TSP and irrigation are positively significant at 1% level indicate that 1% increase in the use of these inputs, keeping other factors remaining constant would increase the yield of marigold by 0.01%, 0.01%, 0.003%, 0.003%, 0.030%, and 0.002%, respectively. The co-efficients of MoP is positively significant at 5% level indicate that 1% increase in the use of MoP, keeping other factors remaining constant would increase the yield of marigold by 0.004%.

Table 7. Estimated coefficients and their related statistics of production function for marigold.

Explanatory Variables	Co-efficient	t-values
Intercept	28.85***	12.25
Human labor (X_1)	0.01***	3.60
Land preparation (X_2)	0.004ns	1.28
Seedling (X_3)	0.01***	3.50
Manure (X_4)	0.003***	4.60
Urea (X_5)	0.003***	3.20
TSP (X_6)	0.030***	3.50
MoP (X_7)	0.004**	2.20
Irrigation (X_8)	0.002***	4.20
R^2	0.52	-
F value	4.85***	-

Note: *** and ** indicate significant at 1% and 5% level respectively

The value of coefficient of determination (R^2) was 0.52, which indicated that around 52% of the variation in yield was explained by the independent variables included in the model. The F-value was found 4.85 which were significant at 1% level implying that the variation of yield mainly depends on the explanatory variables included in the model.

Constraints to marigold cultivation

Although marigold was observed to be a profitable crop, there are several constraints to its higher production. The constraints are shown in Table 8. The floriculture section of Bangladesh Agricultural Research Institute is responsible

for flower research and development. Till to date, the institute did not provide farmers any complete package of technology on marigold cultivation. Therefore, 35% respondent farmers reported that they had no technical know-how about marigold cultivation. Non-availability of good variety seed or seedling of marigold flower was also a problem reported by 30% farmers. The highest percentage of respondent farmers (65%) raised problem regarding existing transportation facility. Transportation problems were reported to be lack of refrigerated covered van, poor loading, and un-loading system, bad road condition, higher cost, and non-availability of truck, etc. Marigold farmers also faced some production problems. Thirty nine percent farmers opined that they faced disease and insect problem during marigold cultivation.

Table 8. Constraints to marigold cultivation in the study areas.

Constraints	% of farmers		
	Jessore	Jhenaidah	All areas
1. Lack of technical knowledge	40	30	35
2. Non- availability of HYV seedling	25	35	30
3. Lack of transportation facility	60	70	65
4. Disease and insects infestation	32	36	39

Conclusions

The farm level cultivation of marigold flower is highly profitable because of its higher demand compared to its production. Its cultivation is also profitable compared to its competitive crops like potato, lentil, and mustard. Human labour, land preparation, seedling, urea, TSP, MoP, and irrigation have positive and significant effect on the yield of marigold. The marigold farmers face various problems during production and marketing of their produces. The major problems are transportation facility, insects and diseases infestation and lack of technical know-how.

Recommendations

The following recommendations put forward for the improvement of marigold cultivation at farm level.

o Farmers' training should be conducted by BARI scientists to develop technical knowledge about improved cultivation practices of marigold.

o High yielding varieties of marigold seed should be made locally available to the farmers at proper time. For this reason, government should encourage researcher and private seed companies for producing HYV seed of marigold.

o More intensive research should be undertaken by the BARI scientists to develop disease and insect-pest resistant HYV varieties of marigold seed in the near future.

o Finally, special type of transportation facility may be developed by private organization with the initiative of government agencies.

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