

A Socio-Economic Analysis of Date Palm and Palmyra Palm Cultivation in Some Selected Areas of Bangladesh

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ABSTRACT

The present study was conducted to determine the socio-economic analysis of date palm and palmyra palm cultivation and its marketing in selected areas of Bangladesh during the period of 2006-07 to 2008-09. Total 540 date palm and 540 palmyra palm growers were selected from 6 locations. Profitability analysis and financial analysis was used in this study. On an average the farmers were benefited by 22 and 36 kg *gur*, 146 and 257 liter of juice production from per date palm and palmyra palm tree respectively. The farmers got highest BCR (undiscounted) in ripened fruits (4.57 and 5.48) followed by juice (3.91 and 4.37) and *gur* (2.86 and 3.61) production from per date palm and palmyra palm tree respectively. The NPV was Taka 0.54 and 0.42 million, BCR (discounted) was 3.00 and 2.71 and IRR was 88% and 31 % from per hectare date palm and palmyra palm cultivation respectively, which indicated that the date palm and palmyra palm cultivation provide higher returns and continue positive returns over a long period time. It is an alternative source of sugar and *gur* to supplement the increased demand of sugar and *gur*. Therefore, it is important to pay more attention on date palm and palmyra palm cultivation.

Key words: Date palm, palmyra palm, juice, *gur*, BCR, net return

INTRODUCTION

Un-certainty in the sugar production and rising population of Bangladesh is burning issues in recent years since, production per hectare and productivity is extremely low as compared to the developed countries. Sugarcane is the main source of white sugar and *gur*. Sugarcane does not fulfill the increasing demand of sugar/*gur* requirements of population. According to FAO recommendation, per capita at least 13 kg sugar and *gur* is required for human balanced diet and as such present requirements of sugar for 140 million populations in Bangladesh is about 1.8 million tons. But the present production of sugar and *gur* in the country is about 0.2 million tons and 0.45 million tons respectively as such shortfall of sugar/ *gur* is about 1.15 million tons (Miah, 2001). This shortfall of sugar/*gur* cannot meet through sugarcane cultivation alone. Palm *gur* may be an alternative source of sugar to supplement the shortfall and increasing demand of sugar/ *gur*.

Palm is a food-cum-cash-cum-cottage industrial plant in Bangladesh. Date palm is one of the important horticultural crops in many countries (James, 1980 and Kamal, 1969). It grows naturally and no systematic cultivation practices of date palm and palmyra palm trees are done and a few planned gardens are available for commercial production purposes in Bangladesh (Miah, 2001). Among the palms ever found in Bangladesh, the wild date palm (*Phoenix sylvestris* Roxb), locally known as khejur, is one of the most common popular palms and a well known source of sugar/*gur*. Date production is a world agricultural industry producing about 5.4 million metric tons of fruit. In Bangladesh, very little attention is paid for the systematic cultivation of date palm and palmyra palm

trees for better yield. It is mainly grown in greater districts of Jessore, Khulna, Noakhali, Patuakhali, Faridpur, Kustia and Rajshahi. It grows in homesteads, road sides, embankment sides, fallow lands, and farm land boundary and even in the marginal lands and in certain parts it is cultivated in orchards by planting seedlings. In Bangladesh the trend of area and production under date palm and palmyra palm cultivation shows from 2000-01 to 2005-06 (Table1). It is grown in the country with no inputs and minimum cares. In Bangladesh date palm and palmyra palm juice and *gur* is very popular to urban and rural people. The nutritional value of date fruit is very high containing sugar up to 70 percent. Dates are also good source of iron, potassium, calcium, magnesium, sulphur, copper and phosphorus. So, this fruit plays an important role in the nutrition of human populations (Khushk *et al.* 1996). The fruits and trunks of date palm and palmyra palm are utilized in many small industries, which provide packing material for local market and offer an extra income. Its dry leaves are used for country fan, cap, basket, etc. this sugar plants has established her to accrue an economic benefit and income generation tools to the rural people. A significant economic return is possible from the cultivation of date palm and palmyra palm. However, by considering the above benefit the study was taken to investigate the socio economic analysis, juice and *gur* marketing, constraints and potentiality of date palm and palmyra palm cultivation in Bangladesh.

Table 1 : Area and production of date palm and palmyra palm in Bangladesh

Year	Date palm		Palmyra palm	
	Area (ha)	Production (ton)	Area(ha)	Production (ton)
2000-01	12471.66	209440	3688.26	91100
2001-02	12085.02	185410	3866.40	93984
2002-03	12585.02	202630	3965.59	94900
2003-04	12850.20	211635	4350.20	105635
2004-05	1536.84	46220	6300.00	194295
2005-06	4155.47	332830	1242.91	196705

Source : BBS (Year Book of Agril. Statistics) (2000-2006)

MATERIALS AND METHODS

The present study was conducted during 2006-2007 to 2008-09 cropping season at Madaripur, Faridpur, Jessore, Satkhira, Patuakhali & Natore districts. Primary and secondary data were collected. Primary data were collected randomly from 1080 sample taking 30 from each district (6 locations, 3 years, 2 crops) using the pre-tested questionnaire. Secondary data were collected from BBS and DAM. Simple tabular analysis was used for cost and returns. The present study has been designed to determine returns from date palm for 15 years and from palmyra palm for 50 years. Therefore, costs and return are estimated by discounting future benefits and future costs and these are called, respectively discounted benefits and discounted cost. Financial analysis was used to determine profitability of date trees. For this purposes two techniques i.e. Net present value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR) were used, as discussed by Gupta and George (1974), Vaidya *et al.* (1991).

Net Present Value (NPV) of an investment is the discounted value of all cash inflows and cash outflows of the project during its life time. The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows during the life of the project.

Analytical Technique:

$$\text{Net Present Value} = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

Where,

B_t = Benefits from date palm in the t year ; C_t = Cost of date palm cultivation and product processing t year; T = Number of years ; i = Interest rate

$$\text{Benefit Cost Ratio} = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$$

$$\text{IRR} = \text{LDR} + \text{DTDR} (\text{NPV}_L / \text{ADP}_V)$$

LDR = Lower discount rate ; DTDR = Difference between two discount rates.

NPV_L = Present value of cash flow at the lower discount rate.

ADP_V = Absolute difference between the present value of cash flow at two discount rates.

To determine the profitability of date palm, the costs and returns were estimated. Cost includes human labour, fuel cost, cost of chemicals for molasses and solid *gur* preparation. Total returns of date palm comes from juice, molasses, solid *gur*, timber, leaves and other materials which were considered as by-product.

RESULTS AND DISCUSSION

Date Palm and Palmyra Palm Cultivation in the Study Area

Total of 5506 and 5170 nos. of date palm and palmyra palm was considered in the study. Among them 2361, 2060, 1085 number of trees were used for *gur* production, juice production and ripen fruits production under date palm respectively. Again a total of 975, 1360, 1505 and 1330 number of trees used for *gur*, juice, green fruits and ripen fruits production under palmyra palm trees (Table 2).

Socio- economic profile

Within the sampled 30, 44 and 26 percent of date palm and 22, 48 and 30 percent of palmyra palm farmers were small, medium and large respectively. Eighteen percent date palm farmers and 16 percent palmyra palm farmers were illiterate, 69 percent date palm and 70 percent of

palmyra palm farmers were primary educated. Among the date palm farmers 33 percents were young, 55 percent medium aged and 12 percent were old farmers. In case of palmyra palm farmers 36 percents were young, 53 percents middle aged and 11 percents were old. Main occupation most of the date and palmyra palm farmers were agriculture. Average family size of date and palmyra palm farmers were 7.5 and 7.8 and annual income was Tk.25,000 – 1,44,000 and Tk.20,000- 1,45,000 (Table 3).

The average cultivable land, area under date palm orchard and percent of date palm area in the total cultivable land are presented in Table 4. Average farm size of the small, medium, large and all farms were 0.41, 1.45, 5.03 and 2.30 ha and cultivable land per farm was 0.34, 1.34, 4.55 and 2.07 ha respectively. Area under date palm was 5.88, 1.45 and 0.88 percent in the cultivable land respectively. In case of palmyra palm average cultivable land and area under palmyra palm were 2.27 and 0.21 hectare respectively. It was also found from the Table 4 and 5 that the small farmer devoted larger percent of area in date palm (5.88%) and palmyra palm (12.50%) cultivation under the cultivable land compared to others.

Table 2 : Saline Feature of Date Palm and Palmyra Palm Cultivation in the Study Areas (2006/70-2008/09)

Particulars	2006-07		2007-08		2008-09		Total	
	Date palm	Palmyra Palm	Date palm	Palmyra Palm	Date palm	Palmyra Palm	Date palm	Palmyra Palm
No. of Location	6	6	6	6	6	6	18	18
No. of Sample farms	180	180	180	180	180	180	540	540
No. of trees	1921	1730	1835	1680	1750	1760	5506	5170
Trees under <i>Gur</i> production	821	325	760	300	780	350	2361	975
Trees under juice production	705	470	705	430	650	460	2060	1360
Trees under green fruits production	-	505	-	500	-	500	-	1505
Trees under ripen fruits production	395	430	370	450	320	450	1085	1330

Source: Field Survey 2006- 2008

Table 3. Socio- economic profile of date palm and palmyra palm farmers

Farmers' Characteristics	Date Palm Growers (%)	Palmyra palm Growers (%)
A. Farm Size		
a. Small (<1 ha)	30	22
b. Medium(1-3 ha)	44	48
c. Large (>3)	26	30
B. Educational level		
a. Illiterate	18	16
b. Primary	69	70
c. Secondary	10	9
d. Above secondary	3	5
C. Age		
a. Young (16-30)	33	36
b. Middle age(31-55)	55	53
c. Old (56)	12	11
D. Occupation		
a. Agriculture	55	65
b. Business	30	18
c. Service	15	17
E. Average Family size (no.)	7.5	7.8
F. Annual Income(Tk.)	25,000- 1,44,000	20,000-1,45,000

Source: Field Survey 2006- 2008

Table 4. Area of date palm orchard in the total cultivable land

Farm size	Total land (ha)	Cultivable land per farm (ha)	Area under date palm orchard(ha)	Percent of date palm in the cultivable land per farm
Small	0.41	0.34	0.02	5.88
Medium	1.45	1.34	0.02	1.45
Large	5.03	4.55	0.04	0.88
Average	2.30	2.07	0.03	1.45

Source: Field Survey 2006-2008

Table 5. Area of Palmyra palm orchard in the total cultivable land

Farm size	Total land (ha)	Cultivable land per farm (ha)	Area under palmyra palm orchard(ha)	Percent of palmyra palm in the cultivable land per farm
Small	0.50	0.40	0.05	12.50
Medium	1.62	1.42	0.08	5.63
Large	6.50	5.00	0.50	10.00
Average	2.87	2.27	0.21	9.38

Source: Field Survey 2006-2008

Production practices by the farmers of date palm and palmyra palm

There is no systematic cultivation practice of the date palm and palmyra palm is done and a few planned gardens are available for commercial production purpose in Bangladesh (Miah, 2001). Even, they did not have any technical knowledge regarding palm cultivation, palm cutting, juice collection and *gur* preparation (Table 6). New plantation of date palm seedlings was found to be rear. Results shows that during last ten years growers cut 5 plants where planted 1.5 plants per year (Alam *et al.*, 2008). The date palm and palmyra palm farmers did not get any extension service regarding date palm cultivation either from DAE or other organization. They did not apply any fertilizers or irrigation and they collected juice and prepared *gur* traditionally. They did not follow the improved technology.

Table 6. Production practices of date palm and palmyra palm agroforestry system in the study area.

Items	Activities
No. of plants per hectare	500
Agronomic Cultural Practices	Farmers' existing practices
Fertilizer Application	Not applied
Irrigation Application	Not applied
Methodological cultivation	Not followed
Technical knowledge regarding date palm cultivation	No
Training / Extension services	No
Tapping / juice collection	Traditional
<i>Gur</i> preparation and preservation	Traditional

Source: Field Survey 2006-2008

Profitability of date palm and palmyra palm cultivation

It was revealed from table 7 that from the date palm trees, farmers got on an average 22 kg *gur* when juice is used only for *gur* production and a quantity of 146 liter juice in a season per tree. Production cost per tree *gur*, juice and fruits production were Tk. 280.00, 213.00 and 7.00 respectively. Gross returns from *gur* and juice production were Tk. 803.00 and Tk.832.00 respectively. The value of ripen fruits was about Tk. 32.00. Benefit cost ratio of *gur*, juice and ripen fruits were 2.86, 3.91 and 4.57 respectively (Table 7).

Palmyra palm farmers got 35.53 kg *gur* when juice used only for *gur* production, 257.33 litre juice, 500 green fruits and 37 ripen fruits. Gross return from *gur*, juice, green fruits and ripen fruits were Tk. 1258.85, 1721.33, 450.00 and 371.67 respectively. Highest benefit cost ratio was obtained from ripen fruits production (5.48) followed by green fruits (4.76), juice (4.37) and *gur* (3.61) production. However, the highest net return came from juice production (Tk1330.00) followed by *gur* (Tk. 786.56), juice (Tk. 350.00) and ripen fruits (Tk. 250) (Table 8). It is found from the Figure 1 that the highest net return offered in date palm juice (Tk.1326/tree) followed by palmyra palm *gur* (Tk. 911/tree).

Table 7. Profitability of per tree production of gur, juice and ripen fruits from date palm during the period of 2006-07 to 2008-09

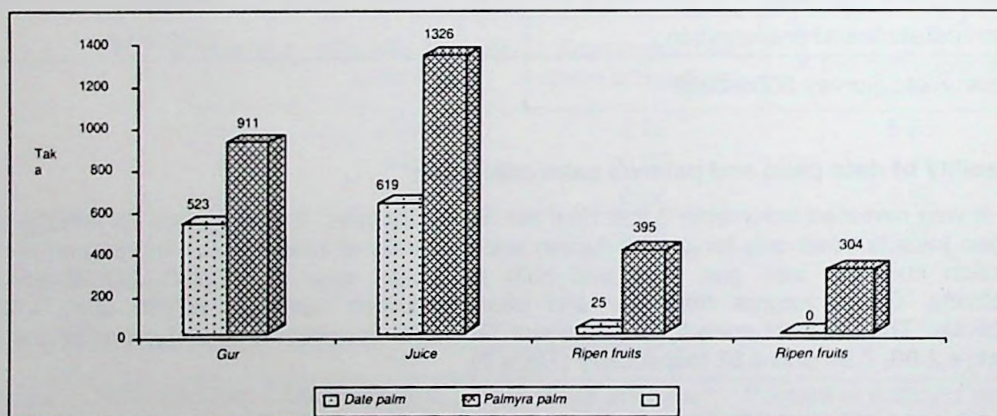
Particulars	No. of trees	Production/ tree (Kg/ Litter /No.)	Gross return (Tk./tree)	Cost of Production (Tk./tree)	Net return (Tk./tree)	BCR
Gur	2361	22	803	280	523	2.86
Juice	2060	146	832	213	619	3.91
Ripen fruits	1085	-	32	7	25	4.57

Source: Field Survey 2006-2008

Table 8. Profitability of per tree production of gur, juice, green fruits and ripen fruits from palmyra palm during the period of 2006-07 to 2008-09

Particulars	No. of trees	Production/ tree (Kg/Litter /No.)	Gross return (Tk/tree)	Cost of Production (Tk./tree)	Net return (Tk/tree)	BCR
Gur	975	36	1259	348	911	3.61
Juice	1360	257	1721	395	1326	4.37
Green fruits	1505	500	500	105	395	4.76
Ripen fruits	1330	37	372	68	304	5.48

Source: Field Survey 2006-2008

**Figure 1: Comparison of net return between date palm and palmyra palm.****Financial analysis of date palm and palmyra palm agro forestry system:**

In temporal budgeting there includes gross cost, gross benefit, cash flow of date palm cultivation by age of trees. Cash flow of date palm agro forestry system is negative in the 1-5 years but it became positive from the sixth year and it continued in the subsequent years (Table 9). At 10% discounted rate per hectare gross cost, gross benefit, cash flow (net benefit) of date palm were

Tk.298466, Tk.846901, Tk.548441 respectively. It is also found from the table that the benefit cost ratio was 3.00, net present value was Taka 548441 and internal rate of return was 88 clearly indicated the date palm agro forestry system was profitable (Table 9).

Table 9: In temporal budgeting (per ha) for date palm plantation system for 15 years.

Age of date palm (years)	Gross cost (Taka)	Gross benefit (Taka)	Cash flow (net benefit) (Taka)	Cost discounted at 10%	Benefit discounted at 10%	Cash flow discounted at 10%	Cash flow discounted at 80%	Cash flow discounted at 90%
1	6000	-	-6000	5455	-	-5455	-3333	-3158
2	2000	-	-2000	1653	-	-1653	-617	-554
3	3000	-	-3000	2254	-	-2254	-514	-437
4	5000	-	-5000	3415	-	-3415	-476	-384
5	6000	-	-6000	3726	-	-3726	-318	-242
6	10000	2500	-7500	5645	1411	-4234	-221	-159
7	85000	277000	192000	43618	142145	98526	3136	2148
8	85000	277000	192000	39653	129223	89569	1742	1131
9	85000	277000	192000	36048	117475	81427	968	595
10	85000	277000	192000	32771	106795	74024	538	313
11	85000	277000	192000	29792	97087	67295	299	165
12	85000	277000	192000	27084	88261	61177	166	87
13	85000	220000	135000	24621	63726	39105	65	32
14	85000	210000	125000	22383	55300	32916	33	16
15	85000	190000	105000	20348	45484	25136	16	7
Total	797000	2284500	1487500	298466	846907	548441	1483	-442
BCR (Discounted)			3.00					
NPV			548441					
IRR			88					

Table 10 revealed the temporal budgeting of palmyra palm cultivation and there includes gross cost, gross benefit, cash flow of palmyra palm cultivation by age of trees. Palmyra palm trees lives more than 80 years, but after fifty its production decreases. Therefore, we considered it about fifty years. Cash flow of palmyra palm agro forestry system is negative during the period 1-14 years but it became positive from the fifteen year and it continued in the subsequent years (Table 10). At 10% discounted rate per hectare gross cost, gross benefit, cash flow (net benefit) of palmyra palm were Tk.33,66,000, Tk.1,16,24,000 Tk. 82,58,000 respectively. It is also found from the table that the benefit cost ratio was 2.71, net present value was Tk. 423406 and internal rate of return was 31 clearly indicated the palmyra palm agro forestry system was profitable.

Table 10: In temporal budgeting (per ha) for palmyra palm plantation system for 50 years.

Age of date palm (years)	Gross cost (Taka)	Gross benefit (Taka)	Cash flow (net benefit) (Taka)	Cost discounted at 10%	Benefit discounted at 10%	Cash flow discounted at 10%	Cash flow discounted at 30%	Cash flow discounted at 35%
1-14	26000	24000	-2000	16420	-	-9447	-9462	-9044
15-20	540000	1200000	660000	103219	229375	126156	7383	540000
21-25	450000	1400000	950000	50713	157773	107060	2435	1043
26-30	450000	1400000	950000	31489	97965	66476	656	233
31-35	450000	1900000	1450000	19552	82553	63001	270	79
36-40	450000	1900000	1450000	12140	51259	39119	73	18
41-45	500000	1900000	1400000	8376	31828	23452	19	4
46-50	500000	1900000	1400000	5201	19763	14562	5	0
Total	3366000	11624000	8258000	247109	670515	670515	430379	-3738
BCR (Discounted)			2.71					
NPV			423406					
IRR			31					

Marketing system of the products

According to the farmers' opinion, majority of the products are sold at the local markets through middlemen, *tapper* or *gachhi*. Some cases they directly sold in the local market. According to Alam *et al.* (2008), growers sold 30 percent *gur* direct to village consumers. They also sold *gur* to consumers at local/village market or upzilla/central market. In case of date palm after collecting the sap from the palm, sometimes it was reported to be shared with the tapers. There are several problem arises in the marketing of palm products. The local farmer does not get the proper price of their product due to improper marketing system. Sometimes the middlemen get the maximum benefit from the farmer's products. This is due to lack of marketing knowledge and available market information as well as marketing facilities. The price variation might be higher than the stated price, as the middlemen generally do not state the real price. Warner (1995), Halim *et al.* (2008) and Chowdhury *et al.* (2008) reported the similar barriers of obtaining the information from the middlemen.

In this study it is exposed that the date palm and palmyra palm cultivation is profitable. Juice production is more profitable than *gur*, green fruits and ripened fruits production in date palm and palmyra palm cultivation. It is also revealed that the highest net return achieved in palmyra palm juice production compared to date palm.

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