

## Original Research Article

# Present Practices and Constraints of Juice and Gur Production from Date Palm Trees in Bangladesh

### ABSTRACT

**Aims:** The world date palm production is increasing; however, its cultivation is decreasing in our country due to lack of technical knowledge and preservation method by the farmers. The aim of this study was to determine the present status of date palm juice and *gur*; to assess the socioeconomic characteristics of respondents involved in date palm juice and *gur* production and to explore the production based constraints of date palm *gur*.

**Study Design:** The cross-sectional survey method was used in this study along with a descriptive research design.

**Place and Duration of the Study:** The study has conducted in 4 upazilas (sub district) namely Bagha, Lalpur, Khajuria and Dumuria under 4 districts Rajshahi, Natore, Jessore and Khulna in Bangladesh during November 2020 to March 2021.

**Methodology:** Out of 133 farmers, 97 were selected as samples, using a random sampling technique. Data collected using a structured questionnaire, were subjected to descriptive analysis including frequency count, percentage and mean for describing the level of selected variables.

**Results:** Rajshahi had a maximum area covered by date palm trees (12.02 ha), the highest number of trees (1129) and the highest amount of produced *gur* (14454 kg) compared to other districts. The greatest percentage of farmers were old age (43.3%) and having high annual income (42.3%). All the farmers were used seed as propagating material. In case of constraints, 'Decrease of number of *gachi*' ranked 1st followed by 'Adulteration of *gur*' 2nd and 'decrease of number of date palm trees' as 3rd.

**Conclusion:** Continuous training and management of date palm trees, as well as the production of juice and *gur* with scientific technology will improve farmers' incomes and livelihoods.

**Keywords:** *Gur* adulteration; date palm; farmers, Juice

## 1. INTRODUCTION

A major plantation crop in many nations of the arid regions of West Asia and North Africa is the date plum (*Phoenix sylvestris* L.), which belongs to the family Arecaceae[1]. The plant can withstand extreme temperatures, water stress, and salinity better than many other fruit crops, it is regarded as an emblem of life in the desert. Date palm fruit, juice and *gur* are very popular in urban and rural people of Bangladesh. Date fruit contains carbohydrate, proteins, fibers, fats, vitamins and minerals viz. Fe, Ca, K, Mg, S, Cu [2]. Fruit is one of the most nutrient-dense foods readily available to people in arid and semiarid regions of the world due to its high sugar content [3]. Furthermore, depending on the variety and maturity stage, fruit contains 15-30% water[4]. Products made from date palm tree such as juice, *gur*, vinegar, wine, and chocolate, a crucial component of the food and allied industries, providing good opportunities for people to enhance their income and, consequently, their standard of living [3]. Furthermore, it is critical to environmental and ecological balance. It aids in the mitigation of natural disasters. It also serves as a protective barrier against storms, cyclones, and other natural disasters. It can also survive both flooding and drought. The leaves can be cut and mixed with straw to be fed to livestock during floods. *Gur* can be used in place of sugar to significantly reduce sugar consumption. Additionally, date palms are a significant source of home fuel. Recently, brick kilns have employed it extensively. Making mats, using building materials, and creating other handicrafts are all excellent uses for these materials. It also serves as insurance for the farmers throughout their difficult economic times.

Date palm is grown as a homestead crop in Bangladesh, but it also naturally occurs or is grown in fallow areas, next to dwellings, along the edges of farmlands, and even in marginal areas along roads and canals. It is mainly grown in greater districts of Jessore, Khulna, Noakhali, Patuakhali and Rajshahi. According to Year Book of Agriculture 2021, date palm is grown in around 68400 hectares of land and total estimated juice production is 149760 MT @ 10 percent *gur* recovery 14976 MT of *gur* is produced per year in Bangladesh. Farmers in Bangladesh's rural agrarian regions use their own indigenous expertise and utilization pattern in every stage of date palm upkeep, from planting through sap collecting and product processing. Farmers primarily manage the palm for sap production, which is used to make sugar-based secondary commodities (eg.*gur*). The sap is either consumed fresh or processed into molasses, *gur*, and/or alcoholic beverages[5].

Date palm cultivation in our country is declining due to a lack of technical understanding about date palm plant cutting, juice tapping (collection), *gur* manufacturing, and

preservation [6]. Insufficient fuel is another issue that affects the production of *gur* from date palm plants, as well as juice collection, date palm cutting man (*gachee*), juice tapping, and marketing and storage facilities for both *gur* and juice. *Gachee* wages have also increased. Date palm trees, however, could be able to help the rural economy of the nation to a significant level if we are able to identify the limits' solutions in a more sustainable and scientific manner with the assistance of farmers' indigenous knowledge.

The objectives of this study were as follows

- I. To determine the present status of date palm juice and *gur* in Bangladesh;
- II. To assess the socioeconomic characteristics of respondents involved in date palm juice and *gur* production;
- III. To explore the production based constrains of date palm *gur*.

## **2. METHODOLOGY**

This study was conducted using a cross-sectional survey method. A systematic interview schedule was meticulously constructed in order to capture relevant data for a pre-determined sample, and it comprised both open and closed form questions.

### **2.1 Description of the study area**

The study was conducted in Bagha, Lalpur, Kjjajuria and Dumuriaupazilla of Rajshahi, Natore, Jessore and Khulna district respectively. The increased incidence of date palm agriculture led to the deliberate choice of the study region. Bagha, Lalpur, Kjjajuria, and Dumuria are the main districts, with average altitudes ranging from 23.25 meters to 10.89 meters above sea level with an annual rainfall of 186 cm.

### **2.2 Population and sampling**

Four upazillas (sub district) namely Bagha, Lalpur, Kjjajuria and Dumuria of four districts Rajshahi, Natore, Jessore and Khulna were chosen purposively. All the date palm growing farmers from the selected area was comprised the population of the study which constituted a total of 133 farmers. Among them 97 farmers (80% of the total respondents) have been selected randomly as sample of the study [7]. Respondents were chosen using proportionate random sampling from each upazila.

### **2.3 Data collection and statistical analysis**

During the period from November 2020 to March 2021, information was gathered directly from respondents who were farmers. Data were analyzed using the SPSS v\_23 statistical package for social science. To meet the study's aims, descriptive statistics such as frequency count, percentage, and mean were generated. For a better understanding and interpretation of the phenomenon of interest, data were divided into several groups. Furthermore, the findings were presented in the form of tables and figures.

## 2.4 Calculate constraints index

Attempt has been made to compare the constraints face by the respondents. There are 11 constraints have been selected based on the farmers' opinion. To determine the constraint index the following formula has been followed:

$$\text{Constraint index (PI)} = (N_h \times 3) + (N_m \times 2) + (N_l \times 1)$$

Where,

$N_h$  = Numbers of respondents faced high constraints

$N_m$  = Numbers of respondents faced medium constraints

$N_l$  = Numbers of respondents faced low

Constraint index of all the items could range from 97 to 291, while 97 indicated low Constraint faced and 291 indicated high Constraint faced.

## 3. Results and discussion

### 3.1 Area coverage by date palm tree

**Table 1:** Area coverage by date palm trees in the study area

District	Upazilla	Area (ha)
Rajshahi	Bagha	12.02
Natore	Lalpur	11.77
Jessore	Khajura	8.25
Khulna	Dumuria	3.12
<b>Total</b>		<b>35.16</b>

Table1 innumerate the area coverage by date palm trees in four districts namely RajshahiNatore, Jessore and Khulna. Among the four districts four upazilla viz. Bagha,

Lalpur, Khajura and Dumuria were selected as study area. Maximum (12.02 ha) area covered by date palm trees in baghaupazilla followed by lalpurupazilla (11.77 ha) and the minimum area (3.12 ha) was covered by date palm trees in dumuriaupazilla of Khulna district.

### 3.2 Age wise distribution of date palm trees

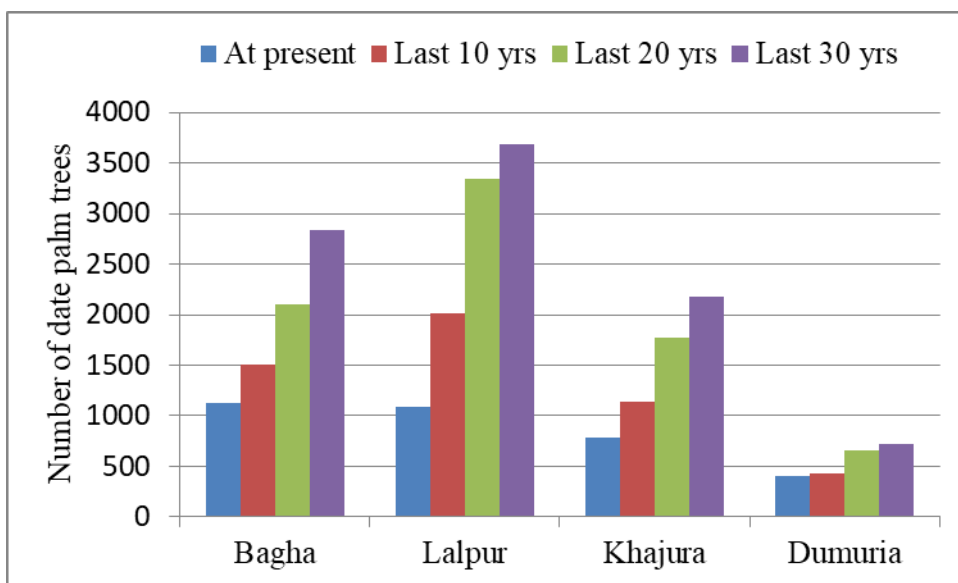
**Table 2:** Distribution of date palm trees according to their age in the study area

Age (years)	Bagha	Lalpur	Khajura	Dumuria
6-10	146	173	105	113
11-15	354	448	279	132
16-20	435	330	270	131
21-25	163	120	88	22
>25	31	16	36	0
<b>Total</b>	<b>1129</b>	<b>1087</b>	<b>778</b>	<b>398</b>

Date palm trees distribution on the basis of their age were represented on table2. The survey data showed that no. of date palm trees fall into 6-10 years of age category were 146, 173, 105, and 113 in Bagha, Lalpur, Khajura and Dumuriaupazilla respectively. Similarly according to the age group 11-15 years no. of date palms were 354, 448, 279, 132, according to the age group 16-20 years no. of date palm trees were 435, 330, 270, 131, no. of date palm trees above age 25 years were 31, 16, 36 and 0 in the study area respectively. From the table it was found that highest number of date palm trees fall into 11-15 years of age category while the lowest no. of date palm belonged in the group up to 25 years. Lalpurupazilla of Natore district had maximum number of date palm trees (448) fall into 11-15 years of age category, while no date palm trees were found in Dumuriaupazilla of Khulna district fall into the group up to 25 years.

### 3.3 Distribution of date palm trees

According to the data in Table 3, there has been a decrease in the number of date palm trees in recent decades. The survey found a large number of date palm trees prior to 20 to 30 years ago when compared to subsequent decades.



**Figure 1:** Number wise distribution of date palm trees in last 30 years in the study area/Distribution of number of date palm trees in the study area in last 30 years

At present Bagha upazilla have 1129 date palm tree whereas Lalpur, Khajua, Dumuria have 1087, 778 and 398 number of date palm trees respectively. Before 10 years Bagha, Lalpur, Khajua, Dumuriaupazilla had 1509, 2018, 1142, 434 number of date palm trees respectively. Before 20 years Bagha, Lalpur, Khajua, Dumuriaupazilla had 2100, 3338, 1776 and 658 number of date palm trees respectively. Before 30 years Bagha, Lalpur, Khajua, Dumuriaupazilla had 2840, 3680, 2178 and 719 number of date palm trees respectively. Kamaluddin *et. al.* [8] also observed similar reduction; while they conducted survey on distribution of date palm in the rural landscape of Bangladesh. The drastic reduction of the number of date palm trees was found in Dumuriaupazilla of Khulna district. Dutta and Iftekhar [9] identified the cause of reduction of date palm as the salinity intrusion in the greater part of khulna region.

### 3.4 Date palm gur production (kg)

**Table 3:** Date palm gur production in the study area

District	Upazilla	Amount (kg)
Rajshahi	Bagha	14454
Natore	Lalpur	14123
Jessore	Khajura	5258
Khulna	Dumuria	1188
<b>Total</b>		<b>35023</b>

There were three forms of date palm gur produced in the study area: semi-liquid, solid, and patali. Table 4 displays the output of date palm gur. Maximum amount of gur (14454 kg) was produced in Bagha upazilla of Rajshahi district followed by lalpurupazilla (14123 kg) of Natore district. Whereas the minimum amount of gur (1188 kg) was produced in Dumuriaupazilla of Khulna district.

### 3.5 Annual income of respondents

**Table 4:** Distribution of respondents according to their annual income from date palm trees in the study area

Annual income (Tk.)	Frequency (n=97)	(%)
Low (up to 50,000)	33	34
Medium (>50000-100000)	23	23.7
High (>100000)	41	42.3

n: number of respondents

On the basis of annual income, the respondents were classified into three categories as presented in Table5. Based on annual income, highest proportion 42.3% of the respondents had high annual income of more than 100 thousand BDT compared to 23.7% as medium annual income of (50-100 thousand BDT) and 34 % under low annual income group which was up to 50 thousand BDT.

### 3.6 Age of the respondents

**Table 5:** Distribution of respondents according to their age in the study area

Age (yrs)	Frequency(n=97)	(%)
Young (up to 30)	21	21.6
Medium (>35-50yrs)	34	35.1
Old (>50 yrs)	42	43.3

n: number of respondents

Table6 innumerate respondents' age in the study area. The highest percent (43.3%) fall in to the group up to 50 years of age category while the lowest portion (21.6%) of them belonged in the group of up to 30 years.

### 3.7 Intercultural practices of date palm trees

**Table 6:** Distribution of respondents according to intercultural practices of date palm trees in the study area

Intercultural practices	Frequency (n=97)		Percentage (%)	
	Yes	No	Yes	No
Fertilizer	0	97	0	97
Irrigation	0	97	0	97
Pest management	0	97	0	97
Propagation by seed	97	0	97	0
Vegetative propagation	0	97	0	97

n: number of respondents

The most significant intercultural operations in an orchard are fertilization and irrigation. It is especially significant in date palm cultivation since date palms are frequently cultivated in sandy soil with low water and nutrient retention capacity. Since date palm trees have a shallow root system, the effectiveness and frequency of watering are crucial for sustaining production[10]. Based on data, 97% respondents did not irrigate their date palm trees.

Several diseases and insect pests damage date palm trees and fruits. The severity of the difficulties varies according on the cultivar utilized, climatic conditions, and cultural practices applied [11]. In most situations, insect pest damage results in significant yield loss and hence economic losses. Despite the presence of many pests and diseases in the research area, 97% of respondents did not perform pest management.

Date palms, like other fruit crops, can be propagated vegetatively and generatively. According to the data, 97% of the respondents in the study area employed seed for date palm tree growth. Date palm trees propagated by seeds are produced low inferior quality fruit and low yield [3]. The results of this investigation showed that the propagation technique used in the chosen area is typically not the best for date palms which is in agreement with the findings of Salah *et al.* [12] and Hussien *et al.* [13].

### 3.8 Common practices of date palm juice and gur production

**Table 7:** Distribution of respondents according to common practices of date palm juice and gur production in the study area

Practices	Frequency (n=97)	Percentage (%)
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	Yes	No	Yes	No
Cutting by own	44	53	44	53
Cutting by Gachi	07	90	07	90
Use of V-type cutting	97	0	97	0
Use of U-type cutting	0	97	0	97
Use of soil made pot for juice collection	97	0	97	0
Use of others type of pot for juice collection	0	97	0	97
Use of protection for juice collection	0	97	0	97
Use of lime during juice collection	47	50	47	50
Use of crops residue as a fuel for juice boiling	44	53	44	53
Use of garments debris for juice boiling	47	50	47	50
Use of fuel wood for juice boiling	22	77	22	77

n: number of respondents

Common practices of date palm juice and gur production in the study area were represented in the Table-8. Data showed that 44% respondents involved in cutting by own whereas 7% respondents engaged gachi for cutting. For extraction of juice 97% respondents used V-type cutting while no respondents were involved in U-type cutting. During juice collection 97% respondents used soil made pot and 47% respondents used lime whereas no respondents used protector like bamboo skirts, polythene skirts, jute stick etc for juice collection. In case of boiling of juice for gur production 44% respondents used crop residue, 47% respondents used garments debris and 22% respondents used wood as fuel.

### 3.9 Constraints of date palm gur production in the study area

**Table 8:** Ranking order of production based constraint of date palm Gur in the study area

Sl. No.	Items	High	Medium	Low	Performance indices	Rank
1	Decrease of number of gachi	94	3	0	288	<b>1</b>
2	Decrease of number of date palm trees	90	7	0	284	<b>3</b>
3	No new plantation	87	10	0	281	4
4	High wage rate of gachi	6	70	21	179	8
5	Insect and pest attack	7	14	76	125	9

6	Weather condition	7	9	81	120	10
7	Use of date palm trees as fuel	24	65	8	210	7
8	No training as gachi	34	54	9	219	6
9	Lower market price of Gur	73	24	0	267	5
10	Adulteration of Gur	91	6	0	285	2
11	Shorter winter period	4	5	88	110	11

n: number of respondents

Ranking of major production problems is presented in Table 9. It was found that decrease of number of gachi, adulteration of Gur, decrease of number of date palm trees were the major problems in production with ranking 1, 2 and 3 respectively. It was followed by other production problems like no new plantation (4), lower market price of Gur (5) and no training as gachi (6). In addition to that, high wage rate of gachi, insect and pest attack, weather condition, and shorter winter period seems to least bother the date palm farmers with rank 8, 9, 10 and 11 respectively.

#### 4. CONCLUSION

Date palm juice and *gur* are important seasonal livelihoods in rural Bangladesh. It makes an active economic contribution to the rural economy as well as to the local people's cultural heritage. Traditional and inefficient agronomic practices such as propagation, irrigation, and fertilizer management are used in the production of date palms that are passed down from generation to generation. Continuous training, extension services, and the management of date palm trees, as well as the production of juice and gur with scientific technology, are all recommended to help farmers in the study area improve their incomes and livelihoods.

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