



Prospects of Commercial Date Plum Cultivation in the Environmental Settings of Bangladesh

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Abstract

Agriculture is the single largest producing sector of the economy in Bangladesh. It has a big opportunity to cultivate commercial varieties of Date in the agriculture sector where rice, potato, pulses, wheat etc. are the principal food crops. The present study was conducted to find out the prospects of commercial Date cultivation in the environment of Bangladesh. Date palms are distributed between 10°N and 39°N latitude in the northern hemisphere. Date palms require an arid climate with an average temperature between 25° C to 32° C and a sufficient water supply. The environment of Bangladesh complies with the climatic factors in the various date growing areas in the world.

Key words: Bangladesh, Cultivation, Date plum, Environment

Introduction

Agriculture is the single largest producing sector of the economy and contributes about 17.22% to the total Gross Domestic Product (GDP) in Bangladesh (BBS, 2016). GDP growth rate of Bangladesh mainly depends on the performance of the agriculture sector. Rice, jute, sugarcane, potato, pulses, wheat, tea and tobacco are the principal crops of Bangladesh (BBS, 2016). There is a big opportunity to cultivate commercial varieties of Date in the agriculture sector of Bangladesh.

Date plum (*Phoenix dactylifera* L.) of the family Arecaceae is a key plantation crop of many countries of arid regions of West Asia and North Africa (Al-Khalifah *et al.*, 2012). Dates are produced in the hot arid regions of the world and marketed worldwide as high value confectionary (Mahmoudi *et al.*, 2008). The current geographic distribution of date plum encompasses the dry desert regions of the world between 10° N and 39° N in the Northern hemisphere and between 5° S to 33° 51' S in the Southern hemisphere (Al-Khalifah *et al.*, 2012).

With the present uncertainty in the world food supply and the expected increase in demand, the date palm could be a good source of food of high nutritional value. Lot of food products are produced from Date due to its high nutritional values. The commercial cultivation of Date in Bangladesh would meet the demand of food as well as give a good account for the economic growth of the country. The present study was conducted to find out the prospects of commercial Date cultivation in the environment of Bangladesh.

Origin and classification of date palm

Date Palm (*Phoenix dactylifera* L.) is thought to have originated in Mesopotamia (what is now Iraq) and its cultivation spread to the Arabian Peninsula, North Africa, and the Middle Eastern Countries in ancient times (about 5000 years ago) (Zaid and de Wet, 2002a). Belonging to the Angiosperms-Monocotyledones, Palmaceae is a family of about 200 genera and 1, 500

species (Dowson, 1982). Phoenix (Coryphoideae Phoeniceae) is one of the genera which contains a dozen species, all native to the tropical or subtropical regions of Africa or Southern Asia, including Phoenix dactylifera L. (Munier, 1973). According to Dransfield and Uhl (1986) date palm is classified as follows:

Group: Spadiciflora
Order: Palmae
Family: Palmaceae
Sub-family: Coryphoideae
Tribe: Phoeniceae
Genus: Phoenix
Species: *Dactylifera* L.

According to Chevalier (1952) among the first listed twelve species of the genus "Phoenix", along with their geographical distribution, *P. acaulis* Roxb and *P. paludosa* Roxb are found in Bangladesh.

Geographical distribution of date palm

Date palm is found in both the Old World (Near East and North Africa) and the New World (American continent) where dates are grown commercially in large quantities (Zaid and de Wet, 2002b). In order to have a clear picture on the geographical distribution of date palm, it is worth looking at it from the following aspects: (i) Distribution according to latitude and (ii) Distribution according to altitude.

Distribution according to latitude

The distribution according to latitude for both northern and southern hemispheres is illustrated in Tables 1. The extreme limits of date palm distribution are between 10°N (Somalia) and 39°N (Elche/Spain or Turkmenistan). Favorable areas are located between 24° and 34°N (Morocco, Algeria, Tunisia, Libya, Israel, Egypt, Iraq, Iran, etc.). In USA, date palm is found between 33° and 35°N. Because of climatic factors, the date palm will grow, but will not fruit properly outside the above defined geographical limits. In Asia, 32° N, in the Indus Valley, is the northern limit of date palm cultivation (Zaid and de Wet, 2002b).

Table 1. Latitude limits of date palm cultivation in the Northern and the southern hemisphere

Country	Latitude	Country	Latitude
Pakistan	25°22' N to 33° N	Arabian Peninsula	12°36' N to 23°37' N
India	23° N to 25°59' N	Somalia	1°47' N
Iran	28° 18' N to 34°31' N	Djibouti	11°30' N
Turkmenistan	29°07' N to 39° N	Ethiopia	10°15' N
Iraq	30°34' N to 34°53' N	Sudan	15°02' N
Syria	34°27' N to 35°27' N	Cameroon	8°40' N
Palestine, Israel and Lebanon	30° N to 34°26' N	Chad	13°40' N
Cyprus and Turkey	36°10' N to 36°34' N	Niger	13°45' N to 18°50' N
Algeria	33°09' N to 35°14' N	Mauritania	16°50' N to 20°38' N
Spain	38°17' N	Mali	13°20' N to 18°27' N
Egypt	30°02' N	Senegal	14°51' N
Tunisia	33°57' N	Tanzania (R.S.A.)	5° S; 27° S to 29° S
Morocco	31°26' N	Australia	25°03' S to 33°51' S
USA	33°43' N	Namibia	20°09' S to 28°24' S

Source: Zaid and de Wet, 2002b

Distribution according to altitude

Altitude is very important since it imposes the availability of water and the temperature limits which largely determine the distribution of date palm in the world. In fact, date palm grows and flourishes from 392m below sea level to 1,500m above with an altitude range of 1,892m (Zaid and de Wet, 2002b).

Climatic requirements of date palm

The climatic factors influence in date growth and production. Temperature, rainfall, humidity, light and wind are the most important climatic factors which determine the suitability of a specific site for growing date palm.

Temperature

The highest maximum temperatures found in the date growing areas of the world are the result of low

humidity, great insolation and long days in summer. Exceptional high temperatures ($\pm 56^{\circ}\text{C}$) are well endured by a date palm for several days under irrigation. During winters, temperatures below 0°C are also endured. The zero vegetation point of a date palm is 7°C , above this level growth is active and reaches its optimum at about 32°C ; the growth will continue at a stable rate until the temperature reaches $38^{\circ}\text{C}/40^{\circ}\text{C}$ when it will start decreasing (Zaid and de Wet, 2002c). According to Mason (1925), the growth of a date palm does not cease if, (i) minimum daily temperature does not fall below freezing point, and (ii) maximum daily temperature at the growth centre does not fall below 9 to 10°C . The temperature requirements presented in the Table 2 are those of normal growth, flowering and fruit maturation.

Table 2. Maximum, minimum and average temperatures of various date growing areas

Station/Country	Length of record (years)	Maximum May to Oct.	Minimum (Jan.)	Average
Turbat/Pakistan		41	6.7	
Basra/Iraq	19	37.4	6.4	24.2
Muscat/Saudi Arabia		38.5	15.9	
Cairo/Egypt		33.7	7.6	
Gabes/Tunisia	30	29.3	6	21.3
Touggourt/Algeria	15	35.9	3.4	21.4
Erfoud/Morocco	12	36.4	1.3	
Elche/Spain		28.2	6.9	
Indio/California; USA	25	37.6	3.7	
Bahrein/Bahrein	12	34.3	13.3	
Oued Haifa/Sudan	30	40.2	1.1	
Keetmanshoop/Namibia	37	35.1 (Jan)	6.2 (July)	20.7

Source: Al Bakr, 1972 and Dowson, 1982.

Rainfall

Date palm culture has mostly been developed in areas with winter rainfall which does not cause harm to the date fruits. Table 3 shows that the main date-growing regions are almost rainless until November. Rain during

the flowering and harvest season is likely to cause some damage to the fruits. The major damage caused by rain occurs when either the rain is early, or the dates are late in ripening. In fact, rain does not seriously damage the dates when they are still at the early Khalal stage, but

rather has a beneficial effect by washing away all dust and sand particles from the fruits (Zaid and de Wet, 2002c).

Table 3. Rainfall in the main date palm growing regions

Grove/Country	Length of record (years)	Rainfall (mm)				
		Jul.	Aug.	Sept.	Oct.	Nov.
Northern Hemisphere						
Multan/Pakistan	-	60	50	8	0	2
Maskat/Oman	37	0	0	0	2	10
Bushire/Iran	52	0	0	0	2	40
Bahrein/Bahrein	21	0	0	0	0	10
Basra/Iraq	24	0	0	0	2	22
Cairo/Egypt	25	0	0	0	1	3
Tozeur/Tunisia	49	1	2	7	9	12
El Oued/Algeria	25	0	0	3	7	13
Biskra/Algeria	25	1	2	7	9	12
Indio, Ca/USA	33	0	1	1	1	1
Yuma, Ariz/USA	60	1	2	1	1	1
Southern Hemisphere		Jan.	Feb.	Mar.	Apr.	May
Alice Springs/Australia	17	43	41	33	16	13
Finke/Australia	26	22	40	17	14	11
Keetmanshoop/Namibia	37	25.2	43.4	41.3	16.3	4.4
Mariental/Namibia	50	35.9	54.5	47.2	15.7	3.1

Source: Nixon and Carpenter, 1978; Dowson, 1982; and McColl, 1992.

Relative humidity

Depending on air humidity at the locality of a date palm plantation, various advantages and/or disadvantages are found. In fact, the date palm eco-system is mostly of an arid nature where air relative humidity has a large influence (Zaid and de Wet, 2002c). Air humidity also affects the date quality during the maturation process.

At high humidity, fruits become soft and sticky, while at low humidity they become very dry (case of Northern Sudan and in-land plantations) (Zaid and de Wet, 2002c). Table 4 illustrates the high relative humidity of four Middle East date plantations and at one place in Namibia.

Table 4. Examples of relative humidity of various date plantations

Place/Country	Length of record (years)	Averages of Relative Humidity (%)			
		July	August	September	October
Baghdad/Iraq	80	37	40	42	51
Basra/Iraq	18	51	51	55	60
Bahrein/Bahrein	15	68	74	74	77
D.I. Khan/Iran	10	72	75	75	76
		Jan.	Feb.	March	April
Keetmanshoop/Namibia	37	43	52	57	58

Source: Dowson, 1982.

Geography and climate of Bangladesh

Bangladesh lies in the north eastern part of South Asia between 20° 34' and 26° 38' north latitude and 88° 01' and 92° 41' east longitude. Bangladesh enjoys generally a sub-tropical monsoon climate. In winter there is not usually much fluctuation in temperature which ranges from minimum of 7°C – 13°C to maximum 24°C – 31°C (Fig 1). The maximum temperature recorded in summer is 37°C although in some places this occasionally rises up to 41°C or more. The period of Monsoon is accounts for 80% of the total rainfall. The average annual rainfall varies from 1429 to 4338 millimeters (Fig 2). Comparing to the geography and environmental conditions for Date cultivation in the world and Bangladesh, it can be easily said that it is

very much suitable for the cultivation of commercially important varieties in Bangladesh.

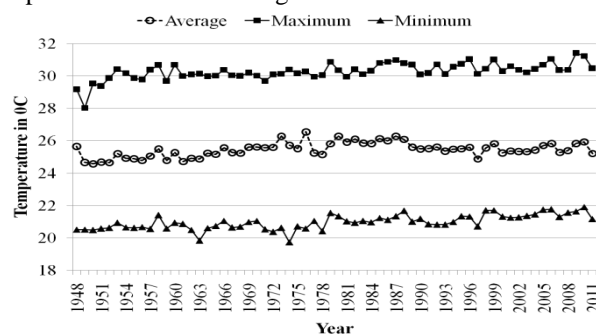


Fig. 1. Average, minimum and maximum temperature in Bangladesh from 1948 to 2011

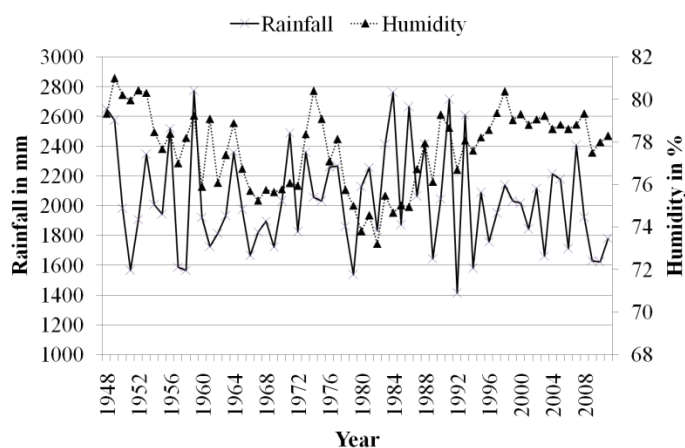


Fig. 2. Yearly total Rainfall and average Relative Humidity in Bangladesh from 1948 to 2011

Conclusions

The date palm could play an important role in the ecology of various desert and semi-desert environments. This Date plum could also be cultivated in the environmental context of Bangladesh where the geography and climate matches the other Date growing countries in the world. Furthermore, with the micro climate created by date palm plantations, the cultivation of some fruit palms and annual crops will be possible.

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