

Ethnobotanical Studies on Dwarf Palm (*Nannorhops ritchieana* (Griff.) Aitchison) and Date Palm (*Phoenix dactylifera* L.) in Dera Ismail Khan, KPK, Pakistan

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ABSTRACT

This paper is based on research work conducted during 2008-2010 in Dera Ismail Khan (D. I. Khan) District, Pakistan, to investigate Socio-Economic Impacts of Dwarf Palm (*Nannorhops ritchieana*) and Date Palm (*Phoenix dactylifera*) on the local inhabitants. A questionnaire for data collection of Dwarf Palm was designed and local people were interviewed. The main Dwarf Palm (Mazri) areas are lying between the Koh-i-Surkh and Marwat hill and yielding about 1000 tons of mazri leaves annually. Date Palm plantations are concentrated in Paniala, Paharpur, Chawdwan and Dhakki. The prominent varieties grown in the area are Dhakki, Shakri, Gulistan, Zaidi, Hillawi, Basra, Azadi and khudarawi. Dhakki Dates are well-known among all other varieties. Total area under dates cultivation in the district is 100,000 hectares, with total production of 11,000 tons dates. An average yield of Dhakki-Dates y^{-1} ranges from 6500 to 7000 tons *i.e.*, 75% of the total production of dates in the area and dried dates production ranges from 800 - 1000 tons·year⁻¹. A significant population is involved in processing of mazri and date palm leaves to prepare different products. Dates have a tremendous potential for economic uplift of the people. But growers face limitations and challenges regarding lack of information about customers and markets, harvesting, processing, and packaging techniques and infrastructure for producing good quality fresh dates. Fruit dropping in date palm particularly in Dhakki variety has become a serious concern. More than 70% date fruits drop before maturity. If production and processing constraints are properly handled, this may have significant socio-economic impact on local inhabitants.

Keywords: Mazri Palm; Date Palm; Arecaceae; Socio-Economic Impact

1. Introduction

Dwarf Palm (*Nannorhops ritchieana*) and Date Palm (*Phoenix dactylifera*) are monocotyledonous plant species belonging to family Arecaceae (Palmae). Arecaceae is a large family of 200 - 210 genera and 2800 - 3000 species distributed mainly in the tropical and sub-tropical regions of the world [1,2].

Mazri is the local name of dwarf palm (*Nannorhops ritchieana*) (**Figure 1(a)**). It is gregarious, usually small tufted palm, from a much branched underground rhizome. Leaves are coriaceous, glabrous; petiole (15 - 30) × (2.5 - 3) cm from the base, concavo-convex; leaf-blade 60 - 90 cm long and broad, palmately divided to the middle or lower into 8 - 15 (-40) segments; segments deeply bipartite, 30 - 38 cm long, linear, rigid. Inflorescence is compound panicle, 60 - 100 cm long. There are usually 3

flowers with in bracteole, developing in succession, one sessile and others pedicellate; calyx 2 - 3 mm long, thin, flat, membranous, joined, forming a trilobed tube; petals c. 4 × 2 cm, coriaceous, connate at base; stamens dorsally fixed, filaments subulate, anthers 1 - 1.5 mm long, deeply sagittate; style short. Seeds (11.5 - 15) × (11 - 15) mm. *Fl. Per.*: July-October [1].

It is native to South Europe, North Africa and Western Asia, distributed in Pakistan, Afghanistan and S. Persia in the mediterranean arid regions [3].

Mazri collection and processing of raw material into useful products are major source of income for poor and especially for rural women who are mostly landless families. Its processing is the only source of personal income for women [4].

Date Palm (*Phoenix dactylifera*) (**Figure 2**) is locally

known as Khajoor and Khaji. It is a tall tree, grown in sandy loam soil. Stem is un-branched, reaching up to 30 m high, usually surrounded at the base by root suckers, and covered for a considerable distance by bases of fallen leaves. Leaves are glabrous, grayish-green, 2.5 - 5 m long; leaflets distichous, 16 - 45 cm long and nearly 2 cm broad, sharply pointed, the lowest converted in to spines [5]. Inflorescence is covered by a hard, boat-like bract. Female inflorescence is 90 - 120 cm long, main stalk flat, 45 - 75 cm long; and flowers rounded, green, and distant. Male inflorescence is much smaller, 12 - 25 cm long, sometimes larger, main stalk 60 - 90 cm long, flat, glabrous. Fruit is cylindrical, (2.5 - 5) × (1 - 1.5) cm edible, fleshy, yellowish-brown to reddish-brown. Seeds are stony, acute at the apex, longitudinally grooved from one side [1].

Date Palm is playing an important role in the history of mankind. Its importance and versatility are borne out by the fact that this fruit and its blessed palm find mention in the Holy Quran more than 20 times. Starting with verse 23, there are three references to it in *Sura Maryam* alone. Verse No. 25 and a part of verse no. 26 of *Maryam* read as:

“And shake towards thyself the trunk of the date palm tree; it will let fall fresh ripe dates upon thee (25). So eat and drink and cool your eyes (26).” [6].

Our Holy Prophet Muhammad (PBUH) urged Muslims to eat dates as it is the world's only 100% complete and balanced diet. It could be used as a primary energy source for attaining the maximum energy for every age group in order to retrieve lost energies [7].

Date fruits have a high nutritional value. It consists of 70% carbohydrate, 2.5% protein, 0.4% fat, 2.1% minerals, 3.9% fiber, and 15% - 30% moisture contents. Vitamins A, B complex and K are also found in dates. Date fruit is considered as one of the oldest fruits found on earth, having the traces in prehistoric era. Alphonse Pyrame de Candolle (1806-1893), a noted French-Swiss botanist claimed that in pre-historic times date palm cultivation ranged from Senegal in the Western Africa to the basin of the River Indus in South Asia. Apart from our own land, dates have been in cultivation in Senegal, Mauritania, Mali, Nigeria, Algeria, Tunisia, Morocco, Libya, Egypt, Sudan, Chad, Iraq, Saudi Arabia, Yemen, UAE, Oman and Iran since the ancient times. Egypt, Iran, Saudi Arabia, and UAE are the largest dates producing countries in the world. Pakistan is the fifth largest dates producing country in the world having a production of 622,000 tons·year⁻¹ which is 9% of the world total production of dates. Arabs spread dates into Spain during their rule in Southern European country from the 12th to 15th centuries. Dates were introduced further from West into the American continent by the Spaniards in the 18th

century. Currently, all the major dates producing countries form part of the Muslim world [6].

2. Methods and Materials

The research area (D. I. Khan District) was extensively surveyed to investigate Socio-Economic Impacts of Dwarf Palm (*Nannorhops ritchieana*) and Date Palm (*Phoenix dactylifera*) on the local inhabitants. Questionnaire for data collection of Dwarf Palm was designed and local inhabitants were interviewed. Mean data (2008-2010) regarding fruit dropping in date palm was collected on monthly basis from Agricultural Extension workers deputed at different sites viz. Ratta Kulachi, Paniala, Paharpur, Chawdwan, Gomal University, and Dhakki in D. I. Khan district. Shopkeepers were also consulted to investigate prices of various items of the products of both the palm trees. Photographs related to the plant species and their products were made. Since Pakistan is one of the top exporting countries of dates in the world, therefore, data regarding import and export of dates were collected from the office of the Ministry of Food, Agriculture and Livestock Department [8].

The study area, Dera Ismail Khan, is located in Khyber Pakhtunkhwa (KPK), Pakistan and has an elevation of 173 meters above sea level. It has a total geographical land mass of 0.896 million hectares out of which 33% is cultivated [9]. The climate is continental with marked temperature fluctuations both seasonal and diurnal, with significant aridity. January is the coldest month of the year and July the hottest. The mean maximum and minimum temperatures during winter are 20.3°C and 4.2°C respectively, compared to 42°C and 27°C during summer. Average annual rainfall is 180 to 200 mm [10].

3. Results and Discussion

3.1. Mazri Palm (*Nannorhops ritchieana*)

This study is based on research work conducted during 2008-2010 in Dera Ismail Khan, KPK, Pakistan. The main mazri production area in D. I. Khan District is Paniala circle comprising villages lying between the *Koh-i-Surkh* (Red mountain) and *Marwat hill*. The villages are Abdul Khel, Katta Khel, Shah Hassan Khel, Badni Khel, Kuthi Khel, Rehmani Khel, Shabazi, Lalai, Tangai, Shero wanda, Kothrian, Wanda Feroz, Wanda Borh, Wanda Karim Khan, Wanda Madat, Wanda Naurogi, Wanda Umri, Wanda Jamal, Wanda Bahadari, Wanda Merabi and Wanda Moazzam etc. Mazri also occurs in Trans Indus territory along the eastern skirts of Sulaiman Range ascending up to 914 m. on the hills. It is propagated by seeds and offsets. The regeneration occurs both through natural and artificial methods. The natural regeneration occurs mostly by means of offsets, but it is

not common by means of seeds. The artificial regeneration is carried out by means of seeds [11].

Plantation of mazri on farmlands in Paniala circle, under local initiatives without any support of the Forest Department, is a unique and an encouraging experience. There is no natural forest of mazri in Paniala. About 15 - 20 years ago, people started planting mazri palm in their agricultural lands along the agricultural crops [12] and are yielding an estimated quantity of 1000 tons of mazri leaves and products per year. The production is expected to increase, as more area is being brought under mazri plantation. Commonly two varieties are grown in D. I. Khan District. One is called green and the other is white. These names were given by the local people due to their appearance. As the leaves of the white variety are comparatively soft and its products are worth seeing and costly, therefore, this variety is much liked by the people of the area. The local inhabitants like that Mazri palm which has greater production, soft leaves, whitish colour and longer and broader leaves [13]. On the basis of questionnaire and interview and personal observations of various shops visited during survey it was investigated that various items of common use are prepared from the leaves of Mazri Palm and Date palm (**Table 1** & item 3.2.1). These products are of common use in Pakistan particularly in Khyber Pakhtunkhwa Province and exported to the neighbouring countries as well. And the inhabitants of the area are economically affected positively. Besides a source of income, it provides a social charm to the inhabitants involving a significant population such as male (20%), female (70%), and children (10%) in processing of fruits and leaves to prepare different products. Therefore, the farmers of the area are of the view that mazri crop is more profitable than agricul-

tural crop. That is why the practice of plantation of mazri on agricultural land is readily prevailing among the farmers.

3.2. Date Palm (*Phoenix dactylifera*)

The date palm (*Phoenix dactylifera*) is considered as one of the most important cash crop of Pakistan and holds a very significant position on the agricultural horizon of Sindh. Wonderfully delicious dates are one of the most popular fruits with an impressive list of essential nutrients, vitamins and minerals, required by humans for normal growth, development and overall well-being. Fresh date is made of soft, easily digestible flesh with simple sugars like fructose and dextrose that when eaten, replenishes energy and revitalizes the body instantly, thus, for these qualities, dates are being used to break fasts during the holy month of Ramadan all across the Muslim world [7].

Most of the plantations in D. I. Khan are concentrated in Paniala, Paharpur, Chawdwan and Dhakki. In these areas the summer is hot, a climate responsible for early ripening of the date fruit. The Prominent varieties grown in D. I. Khan District are Dhakki, Shakri, Gulistan, Zaidi, Hillawi, Basra, Azadi, Khudarawi (**Table 2**).

Dates produced in D. I. Khan are known for its better quality all over Pakistan and in international market as well. District D. I. Khan is one of the largest producers of fresh and dried Dates in Pakistan and on the top in Khyber Pukhtunkhwa province. Total area under Dates cultivation is approximately 100,000 hectares, with an average total production of 11,000 tons Dates in Dera Ismail Khan. There are many varieties of Dates produced in D. I. Khan but Dhakki Dates are well known beside all other

Table 1. Purchase price of Mazri products in D. I. Khan district (price of each item depends upon its quality).

S.#.	Name of Products		Rate of Products (Rs. per Item)
	Local Name	English Name	
1	Bozay(P), Punkha(S,U)	Hand Fan	10 - 60
2	Tokrai (P), Tokri (S,U)	Basket	15 - 100
3	Topai (P), Topi (S,U)	Cap and Hat	10 - 30
4	Chabai (P), Chabbi (U,S)	Hot Pot	50 - 250
5	Thaday (P), Chataee (S,U)	Small mat	40 - 150
6	Raybaj (P), Jaru (U), Boowari (S)	Broom	10 - 25
7	Masala (P), Ja-e-Namaz (U)	Carpet or mat used by single person to pray on	30 - 100
8	Skore (P), Changer (U,S)	Tray	10 - 150
9	Saf (P,U,S)	Long mat used for prayer in mosque.	200 - 1000
10	Wanr (P), Wan (U,S)	Rope	20 - 45/kg

Key: P = Pashto, S = Saraiki, U = Urdu.

Table 2. Showing yield and some other physical properties of seven local date cultivars grown in D. I. Khan.

Cultivars	Average			
	Fruit Length (cm)	Fruit Weight (gm)	Fruit Volume (cc)	Fruit Yield/Plant (kg)
Dhakki	4.95	19.29	18.75	100 - 150
Shakri	3.54	7.90	9.55	100
Shamran	3.76	7.90	10.03	50 - 60
Khudrawi	3.36	9.90	10.07	50 - 60
Gulistan	3.70	12.07	10.17	90 - 100
Basra	3.00	12.87	10.05	80 - 90
Zaidi	3.25	9.32	9.29	50 - 60

Source: [14,15].



(a)



(b)

Figure 1. (a) Mazri palm (*Nannorhops ritchieana*) plant species; (b) A Woman is making a hot pot from Mazri palm leaves. Source: Photos by author.

varieties. Approximate yield of Dhakki-Dates per annum ranges from 6500 to 7000 tons that is 75% of the total production of Dates in the area and dried Dates production ranges from 800 tons to 1000 tons per annum. An estimated production of regional varieties in D. I. Khan is 3000 tons that is 25% of total production in Dera Ismail Khan and its surrounding areas.

Dates cluster in D. I. Khan has a tremendous potential for growth and can contribute significantly to the economic uplift of the area. But at the same time this cluster faces many limitations and challenges regarding lack of information about customers and markets, modern harvesting, processing, packaging techniques and importantly lack of infrastructure for producing good quality fresh dates. Moreover fruit dropping particularly Dhakki dates (**Table 3**), is a major problem as reported by some researchers [16] (**Table 4**). If huge dropping problem is resolved the world highest yield of Dhakki dates per unit area could be realized in Pakistan. This would have surely socio-economic impacts on the lives of the inhabitants of the study area. Besides other growers members



Figure 2. About hundred years old Dakki Date Palm (*Phoenix dactylifera*) tree. Source: Photos by author.

Table 3. Dropping (%) of Dhakki dates at different sites in D. I. Khan district (mean of three years i.e. 2008-2010).

Sites	April	May	June	July	August	Total Dropping
Ratta Kulachi	12	13	15	15	16	71
Paniala	12	13	14	16	16	71
Paharpur	10	13	15	16	16	70
Chawdwan	12	12	14	16	16	70
Gomal University	13	14	15	16	15	72
Dhakki	11	12	15	15	16	69
Mean	12	13	15	16	16	71

Source: Collected by authors through field workers.

Table 4. Total monthly fruit drop (%) in date palm varieties.

Date Palm Varieties	April	May	June	July	August	Total Fruit Drop
Dhakki	13.00	13.94	14.60	15.94	13.00	70.48
Zaidi	2.11	4.64	2.44	1.67	0.00	10.86
Basra	3.44	2.07	1.77	2.00	0.00	9.28
Gulistan	3.44	4.34	4.20	4.10	0.00	16.08
Khudrawi	2.51	2.41	3.20	2.00	0.00	10.12
Shakri	2.84	4.56	3.07	2.10	0.00	12.57

[16] Source: Iqbal *et al.* (2012).

of the Dates Cooperative Societies are also producing dried dates as it can be sold out in less time and they can have considerable amount of money to feed their families.

The total area under Date palm cultivation in KPK is 1240 hectares with a total annual production of 8148 tons approximately [6].

Products of Date Palm Leaves

Followings are the main products of Date Palm Leaves:

1. Skor (Tray): Skor is a traditional utensil. It is large flat plate with raised edges, for serving bread, fruit etc.
2. Bozay (Hand fan): It is used for starting current of air.
3. Musalla (A mat to pray on single person): It is used both in homes and mosques for prayer.
4. Poozay/Chatayee (Mat). It is used for multipurpose.
5. Chabai (Hot pot or bread basket): It is a basket with a lid as a covering and used in homes for storing bread, knitting materials. It is also used by snake-charmers for holding (keeping) snakes.
6. Thong (very large hot pot): It is just like previous basket (Chabai) but many times larger than it. It is usually used for storing clothes by poor people in villages.
7. Topee (Hat): Used for shade.
8. Jaru (Groom): Used for cleaning purposes.
9. Tokrai (Basket): These are of small and large sizes used for packing fruits especially dates.

Wood of the date-palm is used as beam in buildings by villagers. Its trunk is also used as or in making bridge over streams or small water canals. All left over parts of the trunk are burnt for fuel. In some of the mosques, mostly in villages, the seeds are used by local people for the recitation of the sacred names of Allah and Durood (invoke Allah's blessings) on Rasulullah (Sallallahu alaihe wassallam). Seeds are cut and erased to give them proper shape of beads and are used in making of rosary.

Pakistan is a major date exporting country and stand 2nd in exports after Tunisia. Pakistani dates are exported to Bangladesh, India, Germany, Canada, Japan, UAE, Denmark, South Africa, Australia, Saudi Arabia, USA and UK. Pakistani dates are generally considered as Industrial dates and fetch a modest price. Pakistani quality dates fetch a price between 600 - 1500 US\$-ton⁻¹ in Europe and North American markets. Prices of higher quality dates may go up to US\$ 2000 a ton. Pakistani dates may get an attractive price from the international markets if dates are properly processed for quality improvement. Pakistan is striving to establish a processing plant for fresh dates in D. I. Khan, however, the plan could not be implemented probably due to financial constraints [17]. Pakistan exported 1079 tons of fresh dates and 667 tons of dry dates to USA in 2008. Bangladesh has also come out as a big date market for Pakistani dates. Bangladesh imported 1057 tons of fresh dates and 557 tons of dry dates from Pakistan during 2008. Pakistan is

generating major income from the export of dry dates. Pakistan is the main supplier of dry dates to India. The statistical records show, that Pakistan had exported over 100,125 tons of dry dates to India worth US\$ 38 million out of total dry date exports of US\$ 39.9 million during that period [8].

4. Conclusions and Recommendations

There is a big potential for growing Dwarf palm and Date palm in Dera Ismail Khan, Pakistan. Besides a source of income, it provides a social charm to the inhabitants involving a significant population such as male (20%), female (70%), and children (10%) in processing of fruits and leaves to prepare different products. Women living in the study area (Paniala Circle) are playing an important role in supplementing their household income by manufacturing mazri products (**Figure 1(b)**) at household level. Management of mazri resources in the area on scientific lines can not only enhance the production capacity, but also can improve the supply of the mazri leaves.

The prominent varieties of dates grown in the area are Dhakki, Shakri, Gulistan, Zaidi, Hillawi, Basra, Azadi and Khudarawi. Dhakki Dates are famous for unique production and taste among all other varieties. Dhakki Dates contribute about 75% to the total production of dates in the study area. Despite a huge potential for growing dwarf palm and date palm in Pakistan particularly in the study area, growers face many limitations and challenges regarding production, protection, and processing technology, such as huge dropping of dates fruits (>70%) before maturity, lack of information about customers and markets, modern harvesting, processing, packaging techniques and importantly lack of infrastructure for producing good quality fresh dates. Government of Pakistan plans to establish a processing plant for fresh dates in D. I. Khan, however, the plan is yet not implemented due to financial constraints. If production and processing constraints are removed, the world highest production and quality of the dates can be realized in Pakistan, because in the present scenario Pakistan ranks 5th in world largest dates producing countries. Therefore, a well-organized and thorough research is needed to address the aforementioned constraints, particularly severe dropping problem in Dhakki dates.

In the light of studying the following measures for the improvement of mazri crop are suggested.

- More markets facility in a few selected places for purchase and sale of mazri products should be promoted.
- Mazri plant nurseries must be raised on scientific lines at various locations in the mazri growing areas for sustained supply of seedlings.
- The cottage industry needs to encourage so as improving the Self-employment structure and living standard of the rural communities. For accomplishment of that task, exhibition needs to be arranged for different Mazri-made products.
- Improved harvesting, storage, transportation, processing and manufacturing methods need to be introduced in the area to overcome difficulties faced by the manufacturers particularly women.

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