International Journal of Research in Advent Technology, Vol.6, No.11, November 2018
E-ISSN: 2321-9637
Available online at www.ijrat.org

Distribution of near threatened palm *Hyphaene dichotoma* (White) Furtado in Gujarat State and Union Territories Diu, Daman, Dadra and Nagar Haveli, India.

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Abstract- *Hyphaene dichotoma* (White) Furtado commonly known as Indian Doum palm has been categorized as Near Threatened by the IUCN in 2014. The species was introduced in India by Portuguese sailors from Africa and was planted in the coastal region of Gujarat. This species is declining in numbers due to anthropogenic factors like continued deforestation, change in land use patterns, unscrupulous extraction of wild sources, etc. These factors pose barriers for seed germination. This article aims to present the distribution of *Hyphaene dichotoma* in Gujarat State and in the Union Territories of Diu, Daman, Dadra and Nagar Haveli.

Keywords: *Hyphaene dichotoma,* near threatened, Gujarat & Union Territories.

1. INTRODUCTION

Worldwide 11 species of *Hyphaene* genus are distributed in the dry regions of continental Africa, Madagascar, the Red Sea region, and the coasts of the Gulf of Eilat, Arabia and western India. Species of *Hyphaene* commonly grow in sandy lowlands, open secondary forests and inland or coastal savannahs, although some species are also present in the riverine forest. Highly adapted to dry and xeric conditions, they grow from sea level up to 1400 m. Many wild animals are responsible for the dispersal of seeds including elephants and baboons. The flowers are pollinated by bees (Dransfield et al., 2008). In Madagascar human activity has favored the establishment of palm pampas with *H. coriacea* cited among the palms able to survive a fire in the annually burned grassland (Dransfield and Beentje, 1995). *Hyphaene* provides essential resources for rural people ranging from construction materials to food, including wine, and to raw materials for thatching, handcrafts, medicines and livestock feed. The leaves of *H. compressa* are used in many economic needs of the nomadic pastoralist and agro-pastoralist communities in the northern and eastern regions of Kenya (Amwatta, 2004). The fruits of *Hyphaene* are regarded as a central author of nutrition during the remainder of the dry season when food is scarce throughout Africa, mainly in Djibouti, Sudan, Kenya, Nigeria and Namibia (Lokuruka, 2007; Aremu and Fadele, 2011; Cheikhyoussef and Embashu, 2013; Aboshora, 2014). *H. thebaica* is considered as an invasive palm in Curaçao, in the West Indies (Delnatte, 2003).

Hyphaene dichotoma (White) Furtado (Indian Doum Palm) is a near threatened palm categorized by IUCN in 2014. The species is distributed along the watercourses, coastal sand dunes and flat areas of Gujarat, Union territories of Dadra, Diu and Daman, Goa and Maharashtra and some parts of Sri-Lanka. Indian Doum Palm is also maintained in the Indian Botanical Garden, Calcutta. Blatter in 1926, published a plate of an Indian Doum palm growing at Bassein, north of Mumbai. Kiran and Das (2010) reported *Hyphaene dichotoma* in Andhra Pradesh. Along the Coromandel coast of India, the fruits are edible and eaten locally. The leaves are also used for making hats, mats, bags and baskets and the seeds are made into buttons and beads.

2. HISTORY

Beccari (1908) gave details of this species under *H. indica* describing the fruit as obovate-pyriform and giving an illustration of its longitudinal section; it could not therefore be allied to *H. thebaica* though it was long regarded to be that species introduced in Kachchh in Gujarat. If the species is not really an indigenous one but an introduced palm in India, Beccari suggested searching for its original parent in Arabia especially in Oman where, according to 10 reports noticed by Martius, similar palms were seen growing by ancient travelers. Later Beccari (1924) showed that the Indian species is allied to *H. macrocarpa* (Becc.) Furtado (*H. multiformis* subsp *H. macrocarpa* Becc.) from east Africa.

The Indian Doum Palm was introduced in India by Portuguese sailors from Africa, using the oil-rich seeds to light up their ships during the night (Kulkarni and Maulani, 2004). Hooker (1893) observed *Hyphaene dichotoma* to have been founded on an abnormal branching of *Borassus flabellifer*; he therefore condensed the former to a synonym of the latter. However, the phrase "it is branched like the Doum Palm" should be taken to mean that the palm produces (perhaps repeatedly) dichotomous branches as in the Doum and one should not expect abnormal branching (if such were really the case) to occur uniformly in all the palms from the Diu Island and from the various parts of Gujarat. Martius (1850) recognized the species as new and remarked that the palm in Bombay was carried by Parsis from Gujarat and could easily be differentiated from *B. flabellifer*. Martius added a new locality, Ahmedabad where Baron von Hugel (Car. =a misprint for Bar.) had collected the specimens (Furtado, 1970).

3. DESCRIPTION

Hyphaene Gaertn., Fruct. Sem. Pl. ii. 13. t. 82, 1788.

Stem usually dichotomously branched, leaves costa-palmate, divided into numerous segments, segments divided for more than half their length. Petiole spiny, usually with black upwardly

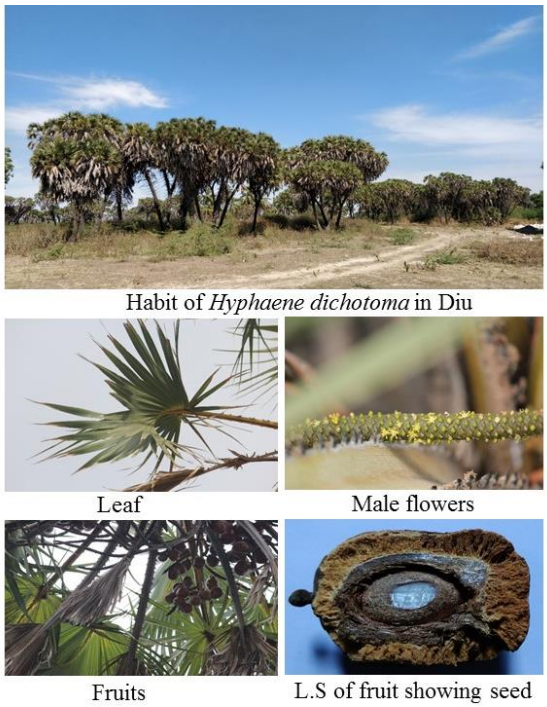

Figure 1: Habit and morphology in *Hyphaene dichotoma*

curved hooks. Hastula often oblique. Dioecious pleonanthic. Inflorescence intra-foliar and branched. Flowers small, male and female equal in size. Male flower: sepals 3; petals 3, united to form a stalk; stamens 6, filaments free, anthers ovate, bifid at base, fixed by their back. Female flower: sepals and petals 3, staminode rudimentary; stigmas 3, sessile. Ovary 3-celled, usually only one developing into fruit giving fruit with basal stigma remains; sometimes more than 1 ovule develops, ill-defined pore in apical position opposite the embryo. Drupe oblong, sweet; albumen bony, homogeneous, hollow, embryo at tip vertical.

Hyphaene dichotoma (White) Furtado in Gard. Bull. Singapore 25: 301, 1970; Shah GL in Flora of Gujarat 3, 1978.

Borassus dichotomus White ex Nimmo in Graham Cat.Bombay Pl. 226, 1839.

Hyphaene indica Becc.in Agri. Colon. 2(3), 1908.

Stem dichotomously branched, 8-10 m long; trunk, dark-black, annulated, sometimes covered with persistent leaf scars, smooth; bark grey-ash coloured in lower half, green on upper part. Leaves about 1 m broad, flabellate, multifid, long petiolate. Inflorescences branched about 6, bearing about 6

flowering branchlets, digitately arranged the next bearing 5, and the apical branch which is convex and only 8 mm in diameter bearing only 2. The branches arise from their respective spathes. Fruits pretty, regularly obovate pyriform.

4. DISTRIBUTION IN GUJARAT

Indian Doum Palm naturally occurs in the coastal region of Gujarat starting from Beyt Dwarka, Porbandar, Mangrol, Somnath, Una and Valsad. In Una, *Hyphaene dichotoma* occurred commonly near the river side and fallow land, agricultural land along with Cocos nucifera L. (Coconut). Few saplings are recorded along the way from Una towards Malgam. The only individual recorded standing is at Somnath temple. At Veraval, few members were recorded near the Creek site, behind the Costal Guard Residence (20°54'24.4"N 70°22'58.1"E) and near the Bus Station. In Porbandar, few more Indian Doum palms have been recorded at Rani Baug and adjoining areas. Along the coastal region of South Gujarat few more palms have been recorded in areas including Kalgam in Valsad district (Umergam Road), Udvada and one which is planted in a private bungalow near Atul village on the national highway (20°32'22.5"N 72°57'36.9"E) and at BMK Science College.

In Central Gujarat,*Hyphaene dichotoma* are planted as ornamental palms at Calico Museum, Serenity Library and at Vasna in Ahmedabad district. Vadodara district shows the presence of this palm at Sayaji Baug.

5. DISTRIBUTION IN UNION TERRITORIES DADAR, DIU AND DAMAN

Diu and Daman has the natural habitat for Hyphaene dichotoma (White) Furtado. Diu is a small island located in the Saurashtra costal region, showing abundant population of Indian Doum palm at Nagoa Beach (20°42'41.2"N 70°55'12.9"E), along the side of the Nagoa-Airport road, Diu fort and Jallandhar beach. Daman is situated on the southern coastal region, with small patches of *H. dichotoma* at St. Jerome fort, near Rajiv Gandhi Setu (20°24'46.4"N 72°50'18.7"E) and at some other location where it shows presence with one or two individuals. As compared to Diu, in Daman the population of *H. dichotoma* has decreased due to the loss of habitat.

6. CONCLUSION

Hyphaene dichotoma is found abundantly in the Union territories of Diu and Daman. On the way from Diu to Okha and from Daman to Khambhat the occurrence of the species has decreased due to loss of habitat byanthropocentric activity. Martius (1850) reported *Hyphaene dichotoma* from Ahmedabad district, but at present there are no records in the natural or wild habitat.

Figure 2: Distribution map of *Hyphaene dichotoma* in Gujarat and Union Territories of Diu, Daman, Dadra and Nagar Haveli.

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