

A New Record of Multi-Branching in Date Palm (*Phoenix sylvestris* L.) in India

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Abstract

Usually, date palm doesn't show branching phenomenon in trunk. Even the healthy plant can become dead after cutting its stem. But sometimes, branching can be observed in date palm tree. *This* article is an evidence of branching in date palm in India. A date palm is observed with seven branches on its crown segment. This is indeed first time observed event and unrecorded phenomenon of multi-branching in date palm (*Phoenix sylvestris* L.) in Indian circumstances. Author wants to report this record in some appropriate and suitable periodicals as one of his small discoveries.

Keywords

Date Palm, Indian Circumstances, Branching Event, First Record

1. Introduction

In Indian agricultural panorama, palms grow on field edges; individuals or clusters are occasionally present, sometimes close to the houses. They form hedges, together with shrubs such as acacias, *Calotropis procera* and henna (Newton *et al.*, 2013). Whether wild or cultivated, this palm is used for other purposes as well. The fruit is sweet and edible, although the seed is large compared to the amount of flesh. It is used both as food and as fodder for domestic animals. The stem is widely used as building material – beams in houses and half-pipes to conduct water – and the leaves for matting and basketry. The palm is also planted as an ornamental along roadsides and in gardens. Additionally, many parts of the plant are used for their medicinal properties (Newton *et al.*, 2013).

Date palm is the tallest of the Phoenix species and the non-branching trunk can grow, under some conditions, taller than 30 M. the plant has one terminal shoot apex that ensures the growth lengthwise (Jain *et al.*, 2011). Belonging to the Angiosperms-Monocotyledones, *Palmaceae* is a family of about 200 genera and 1500 species (Dowson, 1982). Phoenix (*Coryphoideae Phoenixaceae*) is one of the genera, which contains more than a dozen species, all native to the tropical or subtropical regions of Africa or Southern Asia, including

Phoenix dactylifera and *P. sylvestris* (Munier, 1973).

2. *Phoenix dactylifera* L. and *P. sylvestris* L.

The distinction between *P. sylvestris* and *P. dactylifera* was not always clear. *Phoenix dactylifera* L. is a palm in the genus Phoenix, cultivated for edible sweet fruits in Arabian and Asian countries and frequently grows in wasteland and roadside in India. It's probably originated from lands around Iraq. *Phoenix dactylifera* grows 70–75 feet in height, growing singly or forming a clump with several stems from a single root system (Morton, 1987).

Phoenix sylvestris Roxb., together with 13 other species, forms the genus *Phoenix*. In a phylogenetic study combining morphological, anatomical and genetic data, it appears close to the date palm (*Phoenix dactylifera* L.) and to *Phoenix theophrasti* (Barrow, 1998). The phylogeny of the genus itself remains to be elucidated. *Phoenix sylvestris* is widely distributed in South Asia, from Pakistan to Myanmar, across India, Nepal, Bhutan and Bangladesh (Barrow, 1998). This palm produces edible fruits but it is generally called “wild date palm” to distinguish it from the closely related *Phoenix dactylifera*, which is known as “date palm” and is cultivated agriculturally as the commercial source of edible dates. This palm is a major source of sugar in India, and the sap is

sometimes fermented into a drink called “toddy,” which explains the names “sugar date palm” and “toddy palm.” In present-day India, it is commonly found on low ground in the sub-Himalayan tract, along riverbanks on the Deccan Plateau (south-central India), in forests up to elevations of 1350 m in Himachal Pradesh, and especially on lower hill slopes in Haryana (northwestern India). It survives in disturbed areas, such as wastelands or seasonally inundated areas (Newton *et al.*, 2013). Apart from its distribution in a “wild” state, *P. sylvestris* is also cultivated in parts of South Asia, mostly in its eastern and southeastern parts.

In English, it is called date-sugar palm, Indian wine palm, sugar palm or wild date palm. Its local names in South Asia are numerous, according to the different regions and languages spoken: *sendhi*, *kejur*, *khajur*, *khaji*, *salma*, *thalma*, *thakil* (Hindi-Urdu); *kajar*, *kejur* (Bengali); *khejuri* (Oriya, Orissa, W. Bengal); *khajur* (Kolami, Andhra Pradesh, Maharashtra); *khijur* (Santali); *sindi* (Gondi); *khajur*, *khaji* (Punjabi); *seindi* (Berar); *inta kattinta* (Kerala); *sendi*, *khajura*, *khajuri* (Bambaiya, Mumbai, Mahashashtra); *boichand*, *sendri*, *shindi* (Marathi, Maharashtra); *kharak* (Gujarati, Gujarat); *sandole-ka-nar* (Dakhini, Deccan); *itchumpannay*, *periaitcham*, *itcham-nar*, *ichal*, *ithal pannay* (Tamil, Tamilnadu); *ita*, *pedda-ita*, *itanara*, *ishan-chedi* (Telugu, Andhra Pradesh); *ichal*, *kullu*, *ichalu mara* (Kannada, Karnataka); *andadayichali*, *sunindu* (Karnataka); *khurjjuri*, *khajura*, *madhukshir* (Sanskrit) (Parmar and Kaushal, 1982).

There are complex relationships between *P. sylvestris* and *P. dactylifera* (Newton *et al.*, 2013). Morphologically, *P. sylvestris* is close to the date palm, but several characters allow their differentiation. *Phoenix sylvestris* is a strictly solitary palm, also distinguished by its dense spherical crown composed of relatively short leaves with small leaf bases forming a characteristic dense and regular pattern of small diamond-shaped leaf scars on the trunk of old specimens. Leaf segments are grayish, not very rigid and sometimes twisted. Basal acanthophylls are long, deeply channeled adaxially, grouped by two and the transition with foliar segments is progressive. *Phoenix dactylifera* is considerably less homogeneous morphologically than *P. sylvestris*. Barrow (1998) distinguished *P. sylvestris* by having channeled acanthophylls, but this characteristic is also common in *P. dactylifera*. In both species, leaf segments are clustered and disposed on various planes. The fruits of *P. sylvestris* are smaller than those of the date palm (Barrow, 1998). Because of this morphological proximity, *P. sylvestris* has long been considered as the wild progenitor of the cultivated date palm. However, a genetic study challenged this hypothesis and with the discovery of truly wild date palm (*Phoenix dactylifera*) populations, it is now completely rejected. Nevertheless, the two species are inter-fertile, and their relationship remains to be investigated (Newton *et al.*, 2013).

2.1. Date Palm Trunk

The date palm trunk, also called stem or stipe is vertical, cylindrical and columnar of the same girth all the way up.

The girth does not increase once the canopy of fronds has fully developed. It is brown in colour, lignified and without any ramification. Its average circumference is about 1 to 1.10 m. The trunk is composed of tough, fibrous vascular bundles cemented together in a matrix of cellular tissue, which is much lignified near the outer part of the trunk. Being a monocotyledon, date palm does not have a cambium layer. The trunk is covered for several years with the bases of the old dry fronds, making it rough, but with age these bases weather and the trunk becomes smoother with visible cicatrices of these bases. Vertical growth of date palm is ensured by its terminal bud, called phyllophore, and its height could reach more than 20 metres (www.pubhort.org).

Sometimes date palms show a branching phenomenon which was studied by Zaid (1987) and found to be attributed to several causes. Branching in date palm is a result of dichotomy, axillary bud development, polyembryony or attack by a disease. Branched date palms are fertile and can produce as much fruit as a single headed palm. There is a need of a further analysis of the vascular system of branched date palm. This anatomical study is necessary to show the continuity of growth from the single to the divided state of the stem. It is necessary to study *in vitro* the regenerating capacity of divided portions of the apical meristem and axillary buds of these specimens in the hope of establishing a rapid mass propagation technique for date palm (www.pubhort.org). Branching abnormality in date palm trees has been observed and recorded in two different locations in Egypt. Frequently, this phenomenon occurs naturally. Sometimes, farmers decapitate or wound the terminal bud of the tree in order to extract a sweet drink (coined as ‘Lagby’). Generally, the axillary buds around the wounded area: of the apical region are dormant. Decapitation or wounding this apical dome enhances and accelerates the outgrowth of these buds to form new branches.

2.2. Branching in Date Palm

The causes of such abnormal growth like branching may be due to different internal as well as external reasons. Zaid (1987) and Fisher (1974) have cited some examples of the true dichotomous branching in angiosperms especially in Palmaceae. In survey and observations, Harhas and Al-Wakil (1998) found a specimen of branched palm in Rosetta (Rashid) region (Northwest Delta in Egypt). Zaid (1987) found the same phenotype in one specimen after three years of survey in Moroccan date plantations. Another system of dichotomous branching was noticed in one specimen in Siwa Oasis (FAO, 2002). The growth system of this tree differed drastically from that in Rashid region. It is important to suggest that these two cases of dichotomous branching were produced from natural seeds germination. This may suggest that both of them are genetic segregants. Therefore, different genetic factors may control such phenotypes, one responsible for elongated branching and the other for compact branching (FAO, 2002).

In addition to the internal causes of the stem branching in date palm and or the genetic effect on abnormality of the

branching, there are external effects may cause such phenomenon. Zaid (1987) and Dijerbi (1983) reported that the two minor diseases in date palm (Black Scorch and Belaat diseases) were responsible for the destruction of the terminal bud. Some attacked palms could recover or revert by developing one or several lateral buds. Another interesting cause of abnormal branching or outgrowth of new axillary buds in date palm is the artificial decapitation or wounding the apical dome by the farmers. In most cases, this procedure leads to complete damage of the whole apical dome and subsequently death of the tree and hence the survival chances are very less in this process. It is not always that the outgrowth of new branches is produced from activation of dormant axillary bud but also there is a chance to initiate adventitious buds (Goodwin, 1978).

The physiological events of releasing the new formed axillary buds after apical decapitation in mature trees could be explained on the basis of the production of cytokinin and auxins & development of axillary buds (El-Nil and Al-Ghamdi, 1986).

3. Case Study

In Indian conditions, many joint date palm trees are observed with a common complex root system, but the true branching in date plant has still not been documented except those reported in *Phoenix dactylifera* (L.) Roxb. by Harikrishnan and Shrirammurthy (2005). But branching in *Phoenix sylvestris* has so far not been documented in India. This date plant has a nodule like bund on the upper portion of stem (as seen in Fig. 1), which gives platform to seven secondary stems (branches). The base of these seven branches is a mysterious nodule and might have some good events as well as evidences for further studies in this regard. Author wants to register this record in some appropriate and suitable periodicals as one of his small discoveries.

Geographical position of observed multi-branched Indian Date Palm is given in Table 1. The specimen is situated on a road side near Village Dhoondly Tabibpur, Bijnore (UP), India. Height of this tree is about 24 feet and circumference of 3.5 ft.

Table 1. Geographical position of observed multi-branched Indian Date Palm.

S.N.	Particulars	Details
1.	Latitude	29° 07' 54.38" N
2.	Longitude	78° 21' 51.91" E
3.	Altitude	748 Ft



(Photos by: Dr. Pawan Kumar 'Bharti')

Fig. 1(A-B). First multi-branching event in Indian date palm (*Phoenix sylvestris* L.).



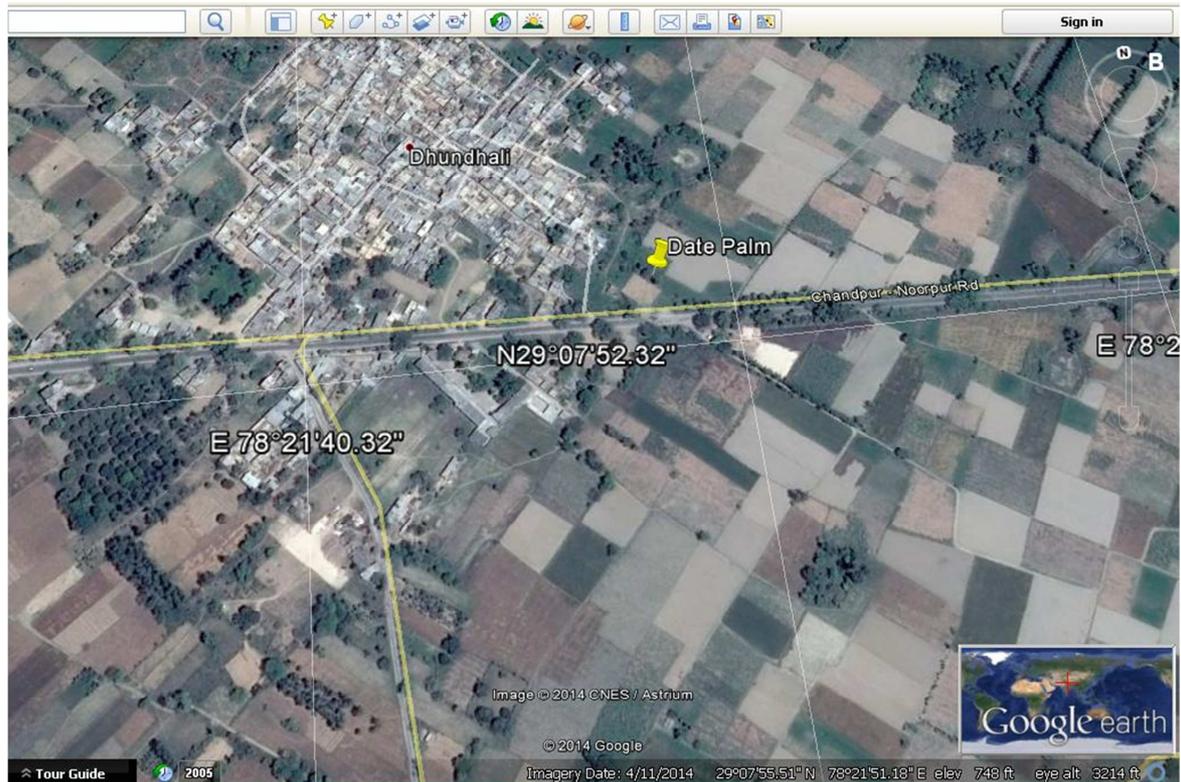


Fig. 2(A-B). Map showing the location of Date plant in India.

4. Conclusion

The observed multi-branched specimen of Indian date plant (*Phoenix sylvestris* L.) presented in this study (given in Fig. 1) is a first record of branching or even multi-branching in Indian circumstances. Hence, it may be-

- (i). A new variant or
- (ii). Deformity in the individual part or
- (iii). A degree of adaptation or
- (iv). Starting of new evolution.

Further, investigations are needed to ascertain factors that lead to branching in this phenotype.

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