



The date palm and its cultivation

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The date palm (*Phoenix dactylifera* L.) belongs to the family palmae. Although there are other species in palmae family, the *Phoenix dactylifera* L. is the only species with economic importance.

The fruits of date palm *Phoenix dactylifera* L. are sweet berries with sugar content from 50 to 70 percent. The origin of date palm *Phoenix dactylifera* L. is supposed to be in North Africa or in Middle East. In North Africa and in middle East the date palm is a staple food; that can be produced easily under unfavourable natural and economic conditions. Normally this palm is cultivated for subsistence and local markets by small farmers along with other crops.

Because of its nutritional value, higher yields and its long life (100 to 150 yrs) the date palm was mentioned as the “tree of life” in the bible. In India locally it is called **Khajur** when semi dried and **kharik** when fully dried. The date palm tree has a single stem of 15-30 mtr height. 12 to 25 flower buds which develop during the winter in the axils of leaves, just below the growing point (in India Feb. - March).

During youth stage, the palm shoots are developed from the buds in the leaf's axils. These bud-shoots are used for vegetative propagation. Normally the female plant flowers within five years from offshoot planting.

The palm is dioecious; means male and female flowers develop on separate plants and not on the same plant. The flowers are attached directly to the spikelets.



Male flowers are creamy coloured, waxy, sweet scented and have six stamens. Female flowers are yellowish-whitish in colour and consists of three carpels with ovules, of which normally only one will develop into a fruit. One large inflorescence may embrace 6000 – 10000 flowers.

For fruit setting, fertilization of the female flower by male pollen is required; which in date palm is not left to the wind or insects but is done traditionally by man. Traditionally men insert a piece of male spikelet in female flowers at the moment when the female flowers are getting open and receptive.

In modern methods, the people collect pollen from the male flowers, mix it with carrier such as wheat flour and dust it on the female flowers with a mechanical device like brush, puffer and duster pump etc. development of the berries take 4-5 months. The colour of ripe berries is yellow and brown red depending on the variety.

The flowering clusters are produced with axils of leaves of the previous year growth. The flowers are born in a big cluster (inflorescence) called spadix or spike; which consists of a contra stem called rachis and several strands or spikelets which range from 50-150.

Natural pollination by wind, bees, insects is found to yield very less fruit set. Therefore, in natural situation (without hand pollination) a dense stand of 50 % male: 50 % female plants is required. Under hand pollination system viz. modern plantings one male plant is enough to pollinate 50 female plants (2 % male plants).

Hand pollination methods

- i. Insertion of fresh male strands:** In this system from s freshly opened male's path the strands of male flowers are cut and placed two to three strands length wise and in an inverted position between the strands of the female inflorescence. In order to keep the male strands in places and also to avoid the entanglement of the female cluster's strands, tie the pollinated female cluster by string 5 – 7 cm from the outer end. Dusting may be repeated 2-3 times. Female flowers remain receptive 4-10 days.
- ii. Use of pollen suspension:** In this system a suspension made of pollen grains plus 10 % sucrose solution and 20 ppm GA₃ is sprayed on the female flowers. The results are as good as hand pollination (80-100 % fruit set).



iii. **Use of dried (preserved) pollen:** This technique is more economical and allows proper use of pollen as well as proper timing of pollination. Dried pollen could be collected from the last season, also from the early maturing males of the same season; or few days old flowers.

Pollen grains are stored. These stored pollens can be applied by several techniques as follows.

- a. **Use of cotton pieces:** the dry pollen is dusted on the cotton pieces about the size of a walnut and placed one or two pieces between the strands of female inflorescence.
- b. **Use of a puffer (duster):** A small manually operated duster is used to dust the dry pollen on the female flowers. This technique is either alone or in addition to the cotton pieces technique either on the same day or next day or 2-3 days later.
- c. **Mechanical pollination:** mechanical pollination is mostly used in the new world of date palm (USA and Israel) where labour is expensive and always not available.

In this technique the freshly opened female spathes are pollinated from the ground with the use of a special apparatus. Mechanical pollination from ground level for three times, pollen: filler ratio 1:10 is recommended.

In order to accommodate the palm height and also to direct the pollen delivery tube near the bloom of each palm, the machine is equipped with a variable height platform capable of 4–5-meter vertical movement. The duster is driven along one side of the date row and then returned on the opposite side. It needs two labours at a time. The fillers such as talc, wheat flour etc. are used.

Pollen harvesting (extracting and storing)

A male spathe that is ready to split assumes a brown colour and a soft texture. Such spathes are to be pressed at middle or lower part of the male between the thumb and forefinger; if a cracking noise is heard it is a sign of maturity of flowers. In such a case the spathe is cut and the flowers taken to the storage room for drying. During drying hot air or sun exposure to be avoided.

In a moisture free and cool room, the flower strands are separated and placed in a tray or on-screen wire mesh below which the tray is placed. The released pollens are drifted through mesh and collected in the tray and butter paper bags or Petri dishes. Pollen shedding continues for 3 to 7 days. Nicely dried pollen then be stored in the open jar within a larger air tight container preferably a desiccator in the bottom of which are placed well dried lumps of calcium chloride (CaCl_2) as a dehydrating agent.



The desiccators must be maintained at low temperatures in a refrigerator between 4 -7 °C. approximately 500 g of calcium chloride is enough for 2-3 kg of pollen. Pollen from date palm could also be preserved cryogenically in the liquid nitrogen at -196 °C. it can easily keep the pollen viable more than a year. Such pollens can be used at proper time for pollinating the female flowers either by a. placing cotton plugs, b. by using puffer, c. by using hand duster and d. by mechanical duster etc. date growers in Iraq and in Egypt preserve the pollen by placing the male flower in a dried and crushed form in a muslin bag and left in a well dried-ventilated room/place. Likewise, butter paper bags and polythene bags, glass jars etc, also can be tried.

Pollination time: Satisfactory pollination results are obtained within 2-3 days after the female spathe has opened. March and April are the normal pollination period in the Indian situation. Variety and season temperatures could delay or advance the openings of the flowers. It is preferable if the male spathe opens 2- 4 days earlier than the female spathe. Using 2-3 male strands per female inflorescence can give satisfactory results. Applying more strands is a good insurance. A good male palm should produce an average of 500 g of pollen. Pollen should be taken only from the healthy fungal free male palms. The development of barriers takes around five months till maturity. The colour of ripe berries is yellow and brown red depending on the variety. The date palm may reach an age of over 100 years and reach up to 30 meters in height. The high yielding period is between 40 to 80 years.

Climate requirement: According to an Arab saying date palm should grow with its feet (root) in running water and its head in fire of the sky. The successful cultivation of date palm requires a long summer with high day and night temperature; a mid-winter without frost and absence of rain during flowering and fruit setting with low relative humidity and plenty of sunshine. For production of good quality date 3300 units of heat (base 10 °C) is required up to fruit maturity. In India the fruiting period is February to July.

Soil requirement: deep sandy loam, medium clay loam, medium deep soils with loose structure are good for date palm. Date palms a salt tolerant crop. It can grow in soils having pH 8-10. It can tolerate soils having 4% salt concentration. In general, the date palm thrives on any kinds of soil provided that are up to 4 -5 deep; fertile, well drained and having assured irrigation facility. It can be said that the climate of soils is quite suitable to date cultivation in many parts of India. It is unfortunate that this plant is yet remained unexploited in India. The plant crop has good potential to become an



important source of food and cash in Indian economy. Its experiments and demonstrations can prove success in many regions of Maharashtra also.

Propagation: Date palm is propagated through the offshoots, through seeds and through tissue culture seedlings.

Varieties: the most commonly grown and useful varieties are as under with comments:

- i. **Barhi:** Fruit is cylindrical light amber to dark brown when ripe. Soft with thick flesh and rich flavor of superb quality. Very good for fresh consumption.
- ii. **Dayri (the monastery date):** Fruits are long slender, nearly black soft. Palm requires more care.
- iii. **Deglet nor:** It is semi dry, not very sweet, keeps well and much used for cooking. Palm is high yielding.
- iv. **Halawy (Halawi):** Fruit is soft, extremely sweet, small to medium, somewhat tolerant to humidity.
- v. **Hayany (Hayani):** The fruit is dark red to nearly black; soft. The plant is most tolerant to cold, good for fresh consumption.
- vi. **Khadrawy (Khadrawi):** Important in Iraq and Saudi Arabia. It is a soft date of highest quality. It is early ripening. Fairly tolerant to rain and humidity.
- vii. **Saidy (Saidi):** Fruit is soft, very sweet, plant is heavy bearer. Needs very hot climate.
- viii. **Sayer (Sayir):** the most widely grown cultivar, dark orange, brown, medium sized, soft, syrupy. The plant is one of the most tolerant to salt and other adverse factors.
- ix. **Medjool:** Very large fruit, it is elongated to broadly oblong to oval, 15 cm long and 3.2 cm diameter. Yield/plant – 80- 120 kg , early ripening. This variety is originated from only one palm in Boudenils (Morocco).
- x. **Amari and Zahidi are medium sized varieties.** Medium in sweetness and quality.

Date products

The date palm is one of the greatest producers of food per hectare and making it one of the most nourishing natural foods available to man.

Dates are very nutritious, assimilative and energy producing. Fruit is rich in nutrients and due to its dietetic value, it has always been held in high esteem by people. Dates are especially



delicious as a fresh fruit. When used in baking they provide superb taste and nutritive value to the final product. Dates are also used as a component in food preparation like sweets, snacks, confectionary, baking products, institutional feeding, health foods, baby foods, breakfast foods, date jams, date cream, date juice, desserts, liquid sugar, fermented products like wine, alcohol, organic acids etc.

Other uses of date palm

Seeds: seeds are soaked in water until soft and fed to cattle, buffalo's, sheep, goats, poultry etc.

Leaves: Mats, screens, baskets, crates, fans, insulating boards, brooms, fuel, fibre rope, cloth, hats etc.

Stem: wood, fuel etc.

Plant spacing: In India 8 x 8 meter is recommended. However, in present trend spacing of 6 x 6 m for higher plant population is also recommended. Pit size 1 x 1 x 1 m.

Time of planting: Rainy season i.e., July to September.

Irrigation: Frequent irrigation depending on soil type and temperature.

Manure requirement: For a full mature plant: FYM @ 30-40 kg in January and 30 -40 kg in March-April. If possible, vermicompost @ 2-5 kg/plant is given depending on availability.

Inorganic fertilizers: An adult tree be fed @ 600 g N/year + 100 g P₂O₅/ year + 70 g K₂O/year. Boron is an essential nutrient.

Pests: Insect pests like termites, thrips, scale insects, rhinoceros beetle and Indian palm weevil, caterpillars etc have been observed. These can be controlled by spraying of insecticides like chlorpyrifos. Such insecticides can also be given through roots.

Diseases: The most common disease is false smut or Graphiola leaf spot caused by Graphiola phoenicis which attacks the leaves forming dark brown or black pustules full of yellow spores particularly under humid conditions. Chemicals like 0.1 % bayleton or bavistin, 0.2 % fytolan sprays have been found to keep the disease under check.

Harvesting: Colour of dates indicate harvesting time that time fruit shows yellow or red colour. Harvesting is labour intensive as the dates are hard picked from the bunches. Workers have to climb the tree or cranes are used.