

Chapter 1

Date Palm as a Healthy Food



P. Senthil Kumar and P. R. Yaashikaa

Abstract Date is an extremely rich-nutritious fruit that could develop in an exceptionally poor condition also. Date fruit is an imperative item on the planet and assumes a significant part in the monetary and political life in date developing districts. Date palm (*Phoenix dactylifera* L.) is a monocotyledon plant that experiences different stages amid aging. Despite the fact that more than three-fourths of the fruit comprises of sugars, the rest is extremely rich in vitamins, dietary strands, phenolic mixes or antioxidants, and minerals. An extremely profitable compound, for example, oleic acid could be removed from the seed with other unsaturated fats and utilized as food for humans and animals.

The medical advantage of dates is another vital viewpoint. Date concentrate could shield human bodies from the harm of free radicals or responsive oxygen species and even weaken the impact of diarrheal movement and turned out to be compelling as neuroprotective against two-sided regular carotid artery impediment. Lately, a lot of research has been carried on the various medical advantages of dates including identification and evaluation of different classes of photochemical with an awesome potential uses in the developing sectors of important sustenance and nutraceuticals. The health benefits and the importance of date palm fruit for human wellbeing are discussed in this chapter.

Keywords Date palm · Growth and development · Industrial uses · Medical applications · Healthy food · Nutritional constituents · Destruction

1.1 Introduction

Plants serve as a major natural source of nutrients to humans and animals. A transcending date palm (*Phoenix dactylifera*) resembles somewhat like a coconut tree, yet its enormous groups of organic product offer something which is sweeter.

P. Senthil Kumar (✉) · P. R. Yaashikaa
Department of Chemical Engineering, SSN College of Engineering, Chennai, India
e-mail: senthilchem8582@gmail.com

Apart from their richness, caramel flavoured and delicate, chewy substance, it's nothing unexpected that dates which are weighing about 70% sugar are normally alluded to as "nature's treat" (Farag 2016). Dates might be as sweet as confection; however they convey much more supplements – and potential medical advantages. The family Phoenix is composed of 17 palm species, for example, *canariensis*, *dactylifera*, *sabal*, *rupicola*, *reclinata*, and so forth. It is an individual from the palmae family (Arunachalam 2012). These palms are well known things in close ice free atmospheres around the globe. This palm is moderately developing when youthful, yet once the storage compartment achieves its full distance across the development rate increments and it grows completely in spring and summer. It is tolerant to very much depleted soils. The *Phoenix dactylifera* is a palm tree which is oftentimes planted for its elaborate characteristics. This palm is best utilized along lanes, on grounds and in parks. The developed *Phoenix dactylifera* dates are of red shading and contain a seed about 1 cm long. Fruits of date palm are not harmful but rather have a repulsive taste which renders them unfit for utilization yet when it is ripped totally this natural product is sweet (Ibrahim et al. 2001). The utilization of date pits as an animal feed in the customary way is still likely the most widely recognized practice. Date palms begin to hold up fruits at 4 years old to 5 years and achieve full development at 10 years old to 12 years contingent upon neighbourhood conditions influencing rate of development and improvement. Blossoms (flowers) are borne in strands on clusters at the highest point of the tree. The quantity of bundles per tree changes from 3 to 10 and each pack incorporates several strands and a huge number of individual dates. Contingent upon the flesh consistency and dampness content at gather when completely ready, date palm cultivars are partitioned into three gatherings, in particular delicate, semi-dry and dry. The fruit of any specific crop when left on the palm or presented to unreasonable curing conditions will lose dampness and build up a hard surface.

Dates with a hard surface texture are classified as second-grade dates. These dry dates are filled with nutrients with more benefits (Besbes et al. 2009). Different classifications can be found inside a similar gathering depending on natural product attributes, size and sugar content. Dates are devoured new, dried, or in different handled structures (Al-Abid et al. 2007). They are regularly devoured crisp in the wake of picking particularly at the fresh ripped stage. In a few cultivars, fruits are expended at the physiological development stage itself. Most dates, in any case, are devoured at the completely ready stage. The fruits at this stage are portrayed by low dampness content and hence are perfect for long period storage to be expended out of season. Any losses while collecting and handling in postharvest and advertising are high in most creating nations because of the frequency of physical, physiological and obsessive issue and to bug infection. Free radicals are involved in incessant incendiary ailments including rheumatoid joint inflammation. Free radicals assume an imperative part in the seriousness of rheumatoid joint inflammation and patients normally endure high oxidative pressure (Chaira et al. 2007). Antioxidants either engineered or normal are scavengers of free radicals and effectively affect human wellbeing and infection counteractive action. They may have a conceivable part in enhancing the incendiary condition in rheumatoid joint inflammation patients (Rahmani et al. 2014). The fluid concentrate of date organic product had in vitro

cell reinforcement movement because of the nearness of mixes with powerful free-radical-scavenging action. So it was of significance to think about the antioxidant action of a consumable part of date natural products separates *in vivo*, in order to affirm their action in an organic framework. Since the palatable part of natural products has been demonstrated to contain phenolic mixes, the methanolic and water concentrates may indicate mitigating action (Mohamed and Al-Okabi 2004; Biglari et al. 2008). In addition to its antioxidant activity, date palm fruits also terminate allergic responses and the fruit extracts acts as an anti-allergic agent (Karasawa and Otani 2012). The geographic origin of the date palms can be explored by determining the phenolic content (Mansouri et al. 2005; Saleh 2011).

Date palm is socio-financially and customarily critical for populaces where the way of life flourishes. Foundation of date palm forests made difference migrant populaces in the past to settle and sort out groups and start cultivating. These populaces turned into a centre point for advertising or exchanging items, a creature, and different items. A totally new industry has additionally been produced in late years around the date palm and dates (El Hadrami and Al-Khayri 2012). The dates have a high substance of sugars, which can possibly build serum glucose and triacylglycerol levels, and also serum oxidative pressure and weight file. No information is directly accessible on the impacts of information utilization by solid subjects on their serum glucose, lipids, and oxidative status (Rock et al. 2009).

1.2 Date Palm – Growth and Development

Date palm is a dioecious plant with singular male and female trees. The tree takes 5–7 years to blossom, and henceforth drawn out stretches of time are required before the sex of the plant is identified. It is quiet east to proliferate the female trees by branches or by utilizing tissue culture methods. In date palm, formative capture of sterile sex organs happens before the finish of cell division. It is trailed by the gifted cell separation and advancement of unisexual blossoms. Direct root meristem recoloring with chromomycin is adequate to distinguish the sex of the date palm plant. Blooms have three carpels yet on fertilization just a single creates and two prematurely end. The state of the fruit is generally pretty much elongated or ellipsoidal (Hammadi et al. 2009). Figure 1.1 represents unripe and riped date palm in unripe and dried date palm seed. The seed, or pit, is hard and stogie formed, somewhat pointed at the finishes, from grey to darker in shading, and with a little developing life. The seed of the date palm fruit is bizarre where it stores the nourishment materials for the developing embryo not as starch, but rather as hemi-celluloses (Ashraf and Hamidi-Esfahani 2010).

Fertilization is a standout amongst the most vital pre-collect factors influencing fruit quality in the date palm. In commercial estate, artificial pollination either using hand or mechanical means is used in case of female trees using pollens from male trees. Choice of a decent pollinizer is of primary significance in the date palm, as the sort of the pollen parent influences fruit size and time taken for fruit aging, and

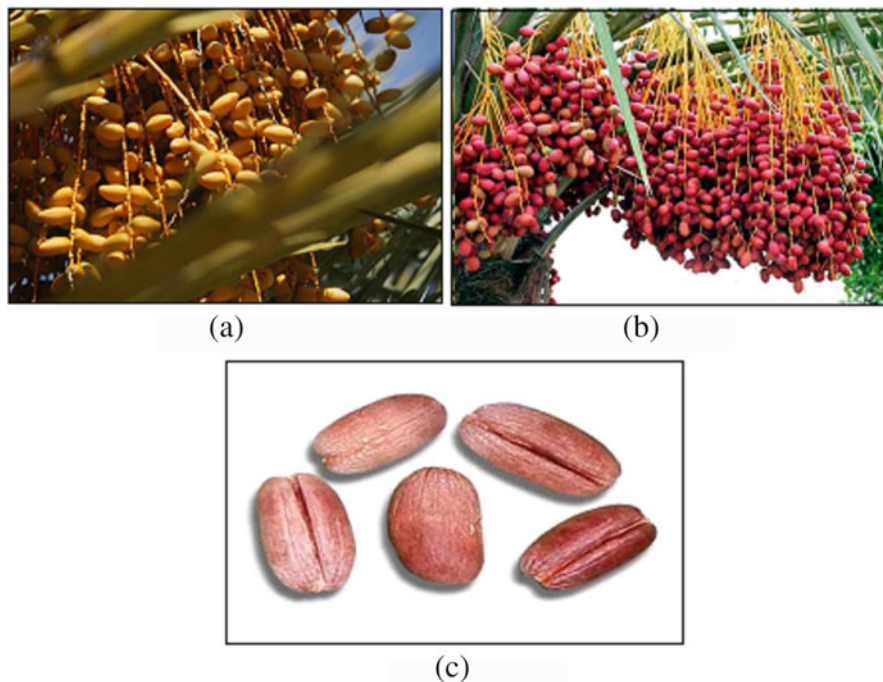


Fig. 1.1 Date palm – (a) Unripe date palm. (Reproduced from [http://www.junglemusic.net/New%20Plant%20Arrivals/Images3/Phoenix%20dactylifera%20fruit%20closepu%20\(Large\)%20\(Small\).JPG](http://www.junglemusic.net/New%20Plant%20Arrivals/Images3/Phoenix%20dactylifera%20fruit%20closepu%20(Large)%20(Small).JPG)) (b) Ripped date palm. (Reproduced from <http://realpalmtrees.com/palm-tree-store/canary-island-date-palm-seeds-pkg.html>) (c) Date palm seed

additionally the chemical constituent of the organic product. Such impacts of the pollen male parent on different parts of date fruit improvement are alluded to as mataxenia (Bazza 2008). Because of its nutritional properties, date fruit as such can have an extensive range of applications, but at present the processing applications are very limited (Kamal-Eldin et al. 2012).

Fermentation is one of the most seasoned advancements ever utilized for the protection of sustenance and determining esteem included nourishment items from sustenance materials over the globe. Fermentation using microbes yield a few esteem included items for fluctuated applications other than the expansion of nourishment such as yogurt, vinegar, mixed drinks and so forth that are specifically consumed (Cagno et al. 2017). All natural products, plant and animal items that fit to be utilized as nourishment have been subjected to microbial fermentation with a specific end goal to infer advance results and items, for example, natural acids, amino acids, vitamins, and so forth (Chandrasekaran and Bahkali 2013). In spite of the fact that date palm sap is the rich wellspring of microbes, it could likewise fill in as a substrate during fermentation. As of late lignocellulosic biomass speaks to the most imminent feedstock for ethanol generation. Fermentative microflora from date palm could be used for fermentation using ethanol fermenting significant feedstocks. These

microbes could be altered using hereditary and metabolic building strategies for higher production of ethanol (Gupta and Kushwaha 2011).

1.3 Variables Influencing Date Palm Development and Improvement

- **Precipitation and Humidity**

High precipitation and dampness at the time of blooming or later phases of fruit improvement may restrain the creation of date palms to an indistinguishable degree from deficient warmth unit. High stickiness and precipitation amid later phases of fruit advancement may cause certain physiological issue. Moreover, low relative moistness amid the fruit aging time frame may cause some physiological issue. High stickiness and precipitation pronouncedly affect the procedure of fertilization. Early precipitation amid flowering in the spring may cause the disease of the shut spathes with inflorescence spoil.

- **Temperature**

For appropriate date fruit maturing on the date palm, it is basic that the developing season is hot and free of precipitation amid the aging time frame. The normal ideal every day temperature from blooming until the point when the fruit aging is around 21 °C for early aging cultivars, 24 °C for mid season cultivars, and 27 °C for late maturing cultivars.

- **Mineral nourishment**

The presence of nitrogen is essential for effective growth and efficiency of date palm tree, and it is less delicate to other mineral supplements, for example, iron and boron, as contrasted to other fruit trees, for example, citrus.

- **Growth regulators**

The real increment in size of fruit is accomplished by the enlargement or vacuolation of the cells framed amid the early period of mitotic action. Auxins and gibberellins, splashed onto fruit groups, have been found to build fruit size and defer fruit maturing, with conflicting consequences for fruit compound structure. The inclination of the date palm flower to set parthenocarpic fruit if not pollinated might be identified with levels of endogenous hormones in the ovary of unpollinated flowers. Parthenocarpic date palm organic products may likewise be acquired by treating unpollinated flowers with hormones such as auxins, cytokinins or gibberellins. Such fruit are of low quality when contrasted with fruits delivered by hand fertilization and they won't age completely. Fruit aging is typically postponed in trees conveying a substantial harvest, which can be helped by fruit or bundle diminishing at a beginning period of development, with the goals of adjusting the quantity of green leaves and the quantity of fruiting packs (Yahia and Kader 2011).

1.4 Nourishing Constituents of Date Palm

Date palm fruits were found to contain the accompanying supplement creation:

- Carbohydrates – 44–88%
- Sugars – 60–80%
- Fats – 0.2–0.4%
- Proteins – 2.3–5.6%
- Fibres – 6.4–11.5%

The natural fruit are additionally rich in potassium, calcium and iron with little measures of protein (2%), lipids (under 2%), copper, chloride, zinc, sulphur and vitamins A, B1, B2 (Hasnaoui et al. 2010; Nehdi et al. 2010). Dates are rich wellsprings of copper, potassium, magnesium, selenium, and direct of calcium, iron, manganese, and phosphorus; and their normal utilization is accounted for to give the expected supplements to the human body. The high potassium and low sodium substance in dates are attractive for individuals experiencing hypertension. The presence of mixes, for example, phenolics with a possibility to scavenge free radicals, high antimutagenic impacts and to fortify the insusceptible framework may contribute towards the different pharmacological impacts (Baliga et al. 2011; Abdul and Allaith 2008). The unrefined fibre, which contains gelatin, lignin, hemicelluloses and cellulose, speaks to around 2–4% of fruit dry weight. Gelatin assumes an essential part in date surface. The protein substance of dates, which is accounted for to be of high nutritive esteem, goes in the vicinity of 1.5 and 2.0%, and the rough fat substance runs in the vicinity of 2.5 and 7.4%. The seed oil is made out of 45% oleic, 25% palmitic, 10% stearic and 10% linoleic corrosive, with some capric and caprylic corrosive substance. The relish and nature of dates are influenced by their natural acidic substance. The date palm kernel weighs about 12–15% of date palm fruit. It is filled with 5–6% of proteins, 10–13% of fat, 46–51% of fibre, 1–2% of ash and nearly 10% of moisture content in it (Mariod et al. 2017). The causticity of the fruit tends to increment with fruit development and afterward diminishes toward the start of the aging stage, while pH increments at development. High pH esteem means that dates is of high quality. Date corrosiveness achieves the largest amount amid the time of most quick development and reductions amid development and maturing. Palmitic corrosive is the most prevailing corrosive took after by capric and caprylic acids. Date fruits at the completely develop organize are rich in useful parts, including phenolic mixes. Tannins are the most prevailing phenolic mixes in date leafy foods intently connected with the fruit maturing process (Al-Farsi and Lee 2008; Sahari et al. 2007). Dates comprise 70% starches, the vast majority of which is as sugars. In many assortments, the sugar content is totally modified sugar, which is quickly consumed by the human body. There is a specific absence of data on utilitarian constituents of dates and their potential incentive as useful nourishments. Useful sustenance is defined as those nourishments that give health benefits beyond fundamental nutrition (Assirey 2015; Sirisena et al. 2015).

1.5 Physiological Clutters

A few physiological issues can influence dates, consequently influencing their quality in the market.

- **Obscuring**

Both enzymatic and non-enzymatic browning happens in dates and increments with higher dampness content and higher temperatures. Enzymatic browning can be restrained at low oxygen focuses and low temperatures.

- **Skin division (puffiness)**

Skin division happens when the skin winds up dry, hard and fragile, and isolates from the flesh. It is said to be serious when the skin isolates from the flesh in an inflatable like manner. This issue creates amid aging of delicate date cultivars, which change in vulnerability. High temperature and high stickiness at a phase before the start of aging may incline the dates to skin division. Puffiness or indented partition, caused by high temperature as well as high dampness before the start of aging, may increment amid curing and influences just delicate cultivars.

- **Sugaring**

Sugar spotting is described by the presence of light-shaded spots under the skin and in the flesh and happens primarily in delicate date cultivars otherwise called rearrange sugar dates in which glucose and fructose are the principle sugars. Rate and importance of sugar spotting increases with increase in capacity temperature and time. Sugar spotting diminishes as the temperature diminishes and when the dampness content falls beneath 22%. So stockpiling at suggested temperatures limits this issue. Sugaring might be diminished by delicate warming of the influenced dates, however returned if adverse conditions conquer.

- **Discolouration**

Because of their high dampness content, delicate date cultivars are defenceless to a physiological issue known as inner breakdown which causes dark discolouration of fruits, on the off chance that they are not put away at the right temperature.

- **White and Black Nose**

White nose is portrayed by the nearness of a stained ring close to the calyx territory, which at times covers half of the fruit. It has been recommended that dry breezes for a long time amid the rutab phase of maturing can make the basal locale of the fruit age more than the rest, causing the ring appearance. This physiological issue might be because of calcium inside the fruit with the basal end containing less calcium than the apical end. Dark nose is fruit checking at the tip area of the fruit that turns dull shading. It is caused by high moistness.

- **Splitting**

It can be caused by various climatic conditions. Over-hydration, caused by a sudden increment in stickiness, for example, unseasonal rain, can offer ascent to an adjustment in turgor weight inside the fruit, bringing about splitting.

1.6 Market Preparation Before Commercialization

There are few preparatory stages for date palm fruit before it is provided in the market for commercialization (Mahmoudi et al. 2008). Figure 1.2 demonstrates the steps engaged with advertising readiness.

1.7 Applications of Date Palm

Date palm owing to its vast nutrient and mineral content is widely used for various purposes. Figure 1.3 represents the benefits of date palm in various sectors.

1.7.1 Medical Advantages

Medicinal and health nourishments have as of late gotten tremendous enthusiasm among the wellbeing experts and the general population. Subsequently, the

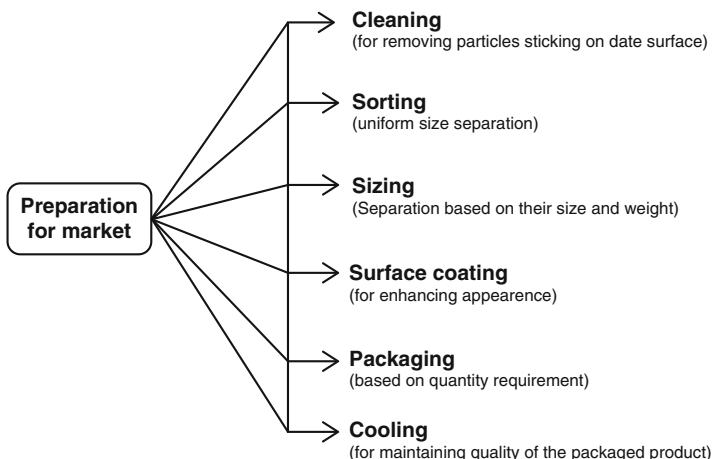
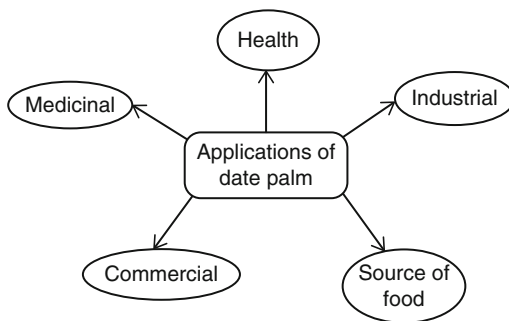


Fig. 1.2 Preparatory steps before commercialising

Fig. 1.3 Applications of date palm



worldwide wellbeing market has been overwhelmed with such items guaranteeing to enhance wellbeing and also avoid ceaseless ailments. Due to expanded business misuse of therapeutic sustenance, all assortments of products of the soil were re-assessed for their phytochemical piece and medical advantages under both research facility conditions and clinical settings (Vayalil 2012).

- **Gut Regularity**

Consuming dates can help counteract clogging. They're a phenomenal wellspring of dietary fiber. A lot of the fruit's fiber is insoluble, the kind that advances ordinary absorption. Concentrates of dates mash and palm sap have stimulatingly affect GIT movement. All the more imperatively, the outcomes contribute toward the approval of the conventional utilization of dates mash and palm sap for the treatment of stomach related issue such as constipation (Souli et al. 2014).

- **Cardiovascular Benefits**

Dates are a decent wellspring of a few cardio-defensive supplements, including potassium, copper and magnesium. Having ample potassium in one's eating regimen can help diminish hypertension, which may thusly bring down the danger of showing stroke or heart attack. Copper and magnesium are imperative for blood veins. Copper likewise keeps up the connective tissues in the heart and veins, while magnesium maintains typical heart rhythms. Moreover, dates are a decent wellspring of beta-D-glucan, a solvent fibre that can be especially compelling at decreasing elevated cholesterol levels (Ishurd et al. 2002).

- **Absence of additional sugars**

Dates can be consumed to fulfil one's sweet tooth while entirely constraining or previous the additional sugars found in numerous refined nourishments - likewise ensures cardiovascular wellbeing. Added sugars, or with any sort of sugar used to sweeten a supper or sustenance item, have been connected to stoutness, hypertension and undesirable cholesterol levels. Expending excessively numerous additional sugars is related with a significantly more serious danger of dying from coronary illness.

1.7.2 Potential Benefits

Vitamin C is absent in dates which is an important antioxidant commonly found in most of the fruits. They are as yet a decent wellspring of phytochemicals, in any case, which are generally present as phenols and carotenoids. A portion of these mixes display huge cancer prevention agent movement; they adequately protect cells from free-radical harm (Hamada et al. 2002). An eating routine rich in cell reinforcements or one focused on fruits, vegetables and other entire nourishments is generally thought to help ensure against growth, coronary illness and other perpetual conditions (Al-Humaid et al. 2010). Additionally presence of chemical constituents enhances the benefits of dates (Alshowiman 1990).

1.7.3 Minerals from Date Palm

- **Potassium**

Important electrolyte potassium is rich in dates. Potassium helps to control liquid levels and helps bring down the circulatory strain. It additionally makes the body less delicate to sodium, so people are more averse to endure a substantial spike in circulatory strain after a sodium-rich dinner. Expending potassium likewise benefits the nervous system, as the nerves depend on potassium communicates with each other.

- **Polyphenols**

Dates likewise contain polyphenols, a kind of gainful substance found in some plant-based nourishments. Polyphenols work as cancer prevention agents, shielding the cells from oxidative harm to the DNA, cell lipids and proteins that generally would cause ailment. While the impacts of date polyphenols on people requires assist examination, they demonstrate potential for ensuring one's wellbeing.

- **Dietary Fibre**

Dates fill in as a rich wellspring of starches, including dietary fibre. Fibre goes through the stomach related framework unaltered. Devouring fruits that contain fibre secures against coronary illness, and dietary fibre likewise benefits people with type 1 and sort 2 diabetes. Fibres are the strong insoluble piece of date substance, basically made out of cellulose, hemicellulose, insoluble proteins and lignin. The measure of these filaments is higher in beginning periods of fruit life. In any case, amid the aging procedure, cellulase and pectinase chemicals show in the natural product separate insoluble polymers into littler dissolvable atoms. These filaments can be utilized as dietary strands because of oil and water take-up, and swelling limit (Shafiei et al. 2010).

Other advantages

- Date palm fruits help in expanding platelet count in patients experiencing dengue fever.
- Immune framework gets fortified and bone loss is prevented.
- Whole framework picks up vitality with expanded platelet count.
- It gives different minerals (potassium, fibre, and so on.) and vitamins required for development of human body.
- Night visual impairment (blindness) and paleness (anaemia) can be avoided.

1.7.4 Industrial and Commercial Applications

Date palm tree is fundamentally planted for its fruits. It has different uses too in the commercial and modern aspects. Besides, a portion of these results equalled or are more imperative than the date fruit itself (Weber 2010). Date palm tree requires heaps of daylight. The normal and most direct business utilization of date palm tree is in arranging. Seeing avenues fixed with date palm trees will bring out an extraordinary and tasteful atmosphere to the region. It can withstand high and low temperature yet should not dip under 20 °F. Dates seed oils, which are rich in a few unsaturated fats are utilized as a part of cleansers and beauty care products. High tocol content is present in date palm than other oils such as olive, etc. This indicates better oxidative stability of date palm (Nehdi et al. 2018). The chemical nature of date seed oil makes it reasonable as an element for oxalic acid. Date seed medical advantages incorporate defensive impacts against early diabetic complexities, counteract DNA harm, and secure liver and kidney. Regardless of its little size, date seed can be subjected to burning and utilized as a viable charcoal. The date leaves stalk or spine is long and thin yet is solid and can stand the heaviness of a few men. They are utilized as rooftop rafters, networks, wall, flooring for little cabins, basic furniture, and so on (Khan and Khan 2016). Date palm fruits are broadly delivered and speak to rich wellsprings of sugar, fibre, and phenolic cancer prevention agents. Date fruits give high sustenance crude materials because of its conceivable utilization at three advancement stages from an extensive variety of assortments. In spite of the high generation, date fruits are underutilized and more engaged research is expected to increase the value of this yield. Date fruits have a tremendous degree and potential for use as nourishment due to their wholesome and financial esteem. There is a vast potential to particularly create healthy products using the high-esteem fibre and phenolic cancer prevention agents found in the fruits and seeds (Ghnimi et al. 2017).

Table 1.1 Medical applications of different parts of date palm

S. No	Parts of date palm	Uses
1.	Leaf	Aphrodisiac and liver treatment
2.	Flower	Fever, purgative and blood complaints
3.	Fruit	Leprosy, bronchitis, asthma, fever, vomiting and tuberculosis
4.	Seed	Inflammation, laxative, lesions and wounds
5.	Gum	Genitor-urinary system diseases and diarrhea

1.7.5 Therapeutic Uses

Taking date fruits once a day amid pregnancy will help reinforce the uterine muscles. It will aid the conveyance and deflect the post-conveyance dying. Dates are rich in potassium, glycine, and threonine that will enact prolactin which is the milk hormone. It will advance the stream of milk, which is useful for a breastfeeding lady. Along these lines, it regards keep eating dates even after pregnancy. Dates are rich in Vitamins A, B1, B2, B3, B5 and C, fiber, calcium, phosphorus, sulfur, potassium, copper, magnesium, and manganese. In spite of its sugar content, it is utilized to re-establish wellbeing to the iron deficient and delicate because of its extraordinary wellspring of supplement content. The most ideal route is to eat them crisp and not in cooking or squeezing. The date is a low-glycemic record sustenance and its high characteristic sugar substance won't essentially raise your glucose levels. Date fruits to give alleviation from fever, astringent, bronchial asthma, chest and throat contaminations. Table shows remedial utilizations of various parts of date palm (Kwaasi 2003) (Table 1.1).

1.7.6 Source of Food

The date is the staple sustenance. Dates are additionally prepared into glue, syrup, stick, jam, date solid shapes, date sugar powder, date vinegar and even date liquor. Dates are presently promoted as chocolate secured dates and sprinkled with slashed walnuts and raisins. Most agriculturists will do specific separating while date fruits are creating for more profitable collect. These winnowed date fruits will be dried out, grounded and blended with different grains and utilized as feedstock (Ibrahim 2004). Overload dried dates are given as sustenance to animals such as horse and camels. The terminal bud and youthful date leaves, which are rich in phosphorus, potassium, nitrogen, and fiery debris, can be transformed into a serving of mixed greens or cooked as a vegetable dish (Al-Farsi and Lee 2011; Al-Shahib and Marshall 2003).

1.8 Destruction of Date Palm

In the same way as other different plants, a few palms are in risk of ceasing to exist in view of human action. In spite of the fact that date palm development in the date developing districts of the world has a long history, yet the endeavours consumed for the advancement of this imperative yield, though important, yet still deficient and fall beneath desires. The item quality is still low, the field and post-harvest misfortunes are very high and the date items and side-effects can no uncertainty be enhanced and the product blend more differentiated (Jaradat and Zaid 2004). Production of Date palm is confronting significant issues, for example, low yields because of the absence of research, the spread of bugs, and additionally promoting imperatives. In the course of the most recent decade, profitability has declined in the customary developing zones. Pests and diseases caused by them have caused huge impacts upon date generation. Bayoud sickness which is caused by parasite undermines the date palms (Gassouma 2004). Therefore, the expenses of date production have outperforms incomes. In the meantime, the transportation of dates has declined to a base. Lessening in the profitable limit of date palms and the corruption of the nature of generation itself are the fundamental markers of debasement. Thus, the likelihood to gain a salary outside the desert garden, have incited mass movement. The maintaining date palms for the most part are limited. The outcome of this disregard is the running wild of the palm-forests, thickly developed with date palms, diminishing harvests and, subsequently. Regardless of the significance and expansive culture territories of ordinary date palm development, field and postharvest depletion are high, and techniques for estimating item quality and the utilization of date items and side-effects require change (Awad 2007). Amid the most recent 50 years, date palm forests have been subjected to corruption because of broad misuse coming about and because of the expansion in both the human populace and the quantity of residential animals. Likewise, the expanded capacity of most of the populace to profit by circumstances displayed by present day innovation has driven them to desert their date palms. Common variables have additionally added to the debasement of date palms, for example, dry spell, soil saltiness, bugs, natural change, and a decrease in the nature of ground water. Intense lack of trained and experienced workers with expanded wage requests, bringing about the disregard of numerous rural procedures required for appropriate date palm production. There is a recognizable shortcoming of government organizations for the augmentation and security of horticultural movement. Expanded pervasion of bugs and sicknesses bringing about a critical decrease in the efficiency of trees and have contributed altogether in destruction of date palm. The change of the present status of date palm development in the date producing nations and the upgrade of the nature of date items have turned out to be basic need that can't be overplayed (El-Juhany 2010).

Date palms must be comprehended to exist inside complex biological, social and economic organizations. Commercial products incorporate an expansive number of adjusted ecotypes. This perpetual dioecious plant is of extraordinary financial intrigue. To create natural dates, agriculturists must guarantee that natural organic composts are utilized to improve the sandy soil, and the dated must be permitted to age completely on the trees. The makers ought to consider, when fitting, the conceivable outcomes offered by naturally developed dates, as the natural market is developing quickly in numerous created nations. Thusly, as an ever-increasing number of buyers swing to natural sustenance, retailers will search for an entire scope of producing natural organic dates (Williams 2008).

1.9 Conclusion

Date palm is a customary product in the Arab world which has the ability to withstand unfavourable climatic conditions. The circulation of date palm is exceptionally impossible to miss due to the inalienable prerequisite for hot atmosphere which is important for effective fertilization and fruit setting. Lately, in light of overexploitation, the decent variety of the date palm forests has declined. The generation and use of the date fruits likewise differs from nation to nation because of the impact of current ecological conditions. There are various components which impede the generation of date palm, for example, significant nuisances and sicknesses, saltiness and dry spell, poor gather and postharvest honours. For a great many years date palm was engendered through ordinary reproducing which is a tedious and repetitive process. The utilization of the tissue culture systems gave date palm an enhanced productivity contrasted with different yields. The required data when accessible will upgrade our insight and thankfulness for the utilization of dates in our every day count calories. Because of its wealth and ease, dates remain a species with enormous potential and incalculable conceivable outcomes for future examination. Considering the way that dates are generally modest, nutritious and are without dangerous impacts it is protected to propose that their utilization ought to be prescribed on a day by day the reason for better wellbeing, essentialness, and force.

References

- Abdul A, Allaith A (2008) Antioxidant activity of Bahraini date palm (*Phoenix dactylifera* L.) fruit of various cultivars. *Int J Food Sci Technol* 43:1033–1040. <https://doi.org/10.1111/j.1365-2621.2007.01558.x>
- Al-Abid M, Al-Shoaily K, Al-Amry M, Al-Rawahy F (2007) Preparation of caramel colour from dates. *Acta Hort* 736:537–541. <https://doi.org/10.17660/ActaHortic.2007.736.53>
- Al-Farsi MA, Lee CY (2011) Chapter 53 – usage of date (*Phoenix dactylifera* L.) seeds in human health and animal feed. In: *Nuts and seeds in health and disease prevention*, pp 447–452. <https://doi.org/10.1016/B978-0-12-375688-6.10053-2>

- Al-Farsi MA, Lee CY (2008) Nutritional and functional properties of dates: a review. *Crit Rev Food Sci Nutr* 48:877–887. <https://doi.org/10.1080/10408390701724264>
- Al-Humaid AI, Mousa HM, El-Mergawi RA, Abdel-Salam AM (2010) Chemical composition and antioxidant activity of dates and dates–camel-milk mixtures as a protective meal against lipid peroxidation in rats. *Am J Food Technol* 5:22–30. <https://doi.org/10.3923/ajft.2010.22.30>
- Al-Shahib W, Marshall RJ (2003) The fruit of the date palm: it's possible use as the best food for the future. *Int J Food Sci Nutr* 54:247–259. <https://doi.org/10.1080/09637480120091982>
- Alshowiman SS (1990) Chemical-composition of some date palm seeds (*Phoenix dactylifera* L) in Saudi-Arabia. *Arab Gulf J Sci Res* 8(1):15–24
- Arunachalam V (2012) 4 – Date palm. In: Genomics of cultivated palms, pp 49–59. <https://doi.org/10.1016/B978-0-12-387736-9.00004-2>
- Ashraf Z, Hamidi-Esfahani Z (2010) Date and date processing: a review. *Food Rev Int* 27(2):101–133. <https://doi.org/10.1080/87559129.2010.535231>
- Assirey EAR (2015) Nutritional composition of fruit of 10 date palm (*Phoenix dactylifera* L.) cultivars grown in Saudi Arabia. *J Taibah Univ Sci* 9(1):75–79. <https://doi.org/10.1016/j.jtusci.2014.07.002>
- Awad MA (2007) Increasing the rate of ripening of date palm fruit (*Phoenix dactylifera* L.) cv Helali by preharvest and postharvest treatments. *Postharv Biol Technol* 43:121–127. <https://doi.org/10.1016/j.postharvbio.2006.08.006>
- Baliga MS, Baliga BRV, Kandathil SM, Bhat HP, Vayalil PK (2011) A review of the chemistry and pharmacology of the date fruits (*Phoenix dactylifera* L.). *Food Res Int* 44(7):1812–1822. <https://doi.org/10.1016/j.foodres.2010.07.004>
- Bazza M (2008) Irrigated date palm production in the Near East. In: Proceedings of workshop on “Irrigation of Date Palm and Associated Crops”, in collaboration with Faculty of Agriculture, Damascus University Damascus, Syrian Arab Republic, 2007, FAO/RNE pp 1–15
- Besbes S, Drira L, Blecker C, Deroanne C, Attia H (2009) Adding value to hard date (*Phoenix dactylifera* L.): compositional, functional and sensory characteristics of date jam. *Food Chem* 112(2):406–411. <https://doi.org/10.12691/ajfn-5-2-4>
- Biglari F, AlKarkhi AFM, Easa AM (2008) Antioxidant activity and phenolic content of various date palm (*Phoenix dactylifera*) fruits from Iran. *Food Chem* 107:1636–1641. <https://doi.org/10.1016/j.foodchem.2007.10.033>
- Cagno RD, Filannino P, Cavoski I, Lanera A, Mamdouh BM, Gobbetti M (2017) Bioprocessing technology to exploit organic palm date (*Phoenix dactylifera* L. Cultivar Siwi) fruit as a functional dietary supplement. *J Funct Foods* 31:9–19. <https://doi.org/10.1016/j.jff.2017.01.033>
- Chaira N, Ferchichi A, Mrabet A, Sghairoun M (2007) Chemical composition of the flesh and the pit of date palm fruit and radical scavenging activity of their extracts. *Pak J Biol Sci* 10(13):2202–2207
- Chandrasekaran M, Bahkali AH (2013) Valorization of date palm (*Phoenix dactylifera*) fruit processing by-products and wastes using bioprocess technology–review. *Saudi J Biol Sci* 20:105–120. <https://doi.org/10.1016/j.sjbs.2012.12.004>
- El Hadrami A, Al-Khayri JM (2012) Socioeconomic and traditional importance of date palm. *Emir J Food Agric* 24:371–385
- El-Juhany LI (2010) Degradation of date palm trees and date production in Arab countries: causes and potential rehabilitation. *Aust J Basic Appl Sci* 4(8):3998–4010
- Farag KM (2016) Date palm: a wealth of healthy food. Reference module in food science. *Encyclopedia of Food and Health* 356–360. <https://doi.org/10.1016/B978-0-12-384947-2.00215-4>
- Gassouma MS (2004) Pests of the Date Palm (*Phoenix dactylifera*). In: Regional workshop on Date Palm Development in the Arabian Peninsula, Abu Dhabi, UAE, pp 29–31
- Ghimi S, Umer S, Karim A, Kamal-Eldin A (2017) Date fruit (*Phoenix dactylifera* L.): an underutilized food seeking industrial valorization. *NFS J* 6:1–10. <https://doi.org/10.1016/j.nfs.2016.12.001>

- Gupta N, Kushwaha H (2011) Date palm as a source of bioethanol producing microorganisms. In: Date palm biotechnology. Springer, Dordrecht, pp 711–727. https://doi.org/10.1007/978-94-007-1318-5_33
- Hamada JS, Hashi IB, Sharif FA (2002) Preliminary analysis and potential uses of date pits in foods. Food Chem 76:135–137. [https://doi.org/10.1016/S0308-8146\(01\)00253-9](https://doi.org/10.1016/S0308-8146(01)00253-9)
- Hammadi HR, Mokhtar M, Elbekkay FA (2009) New approach for the morphological identification of date palm (*Phoenix dactylifera* L.) cultivars from Tunisia. Pak J Bot 41(6):2671–2681
- Hasnaoui A, Elhoumaizi MA, Asehraou A, Hakkou A (2010) Chemical composition and microbial quality of main varieties of dates grown in Figuig Oasis of Morocco. Int J Agric Biol 12:311–314
- Ibrahim AF, Attalla AM, El-Kobbia AM, Mostaffa LY (2001) Physico-chemical characteristics of fruits and pits of some date palm cultivars as affected by cultivars and seasons. Second international conference on Date Palms, Al-Ain, United Arab Emirates
- Ibrahim HM (2004) Date palm in the Gulf Council Countries (GCC): present status, constraints and prospective. In: Regional workshop on date palm development in the Arabian Peninsula. Abu Dhabi, UAE pp 29–31
- Ishurd O, Sun CR, Xiao P, Ashour A, Pan YJ (2002) A neutral beta-D-glucan from dates of the date palm, *Phoenix dactylifera* L. Carbohydr Res 337(14):1325–1328. [https://doi.org/10.1016/S0008-6215\(02\)00138-6](https://doi.org/10.1016/S0008-6215(02)00138-6)
- Jaradat AA, Zaid A (2004) Quality traits of date palm fruits in a center of origin and center of diversity. Food Agric Environ 2(1):208–217, WFL Publisher Science and Technology
- Kamal-Eldin A, Hashim IB, Mohamed IO (2012) Processing and utilization of palm date fruits for edible applications. Recent Pat Food Nutr Agric 4:78–86. <https://doi.org/10.2174/2212798411204010078>
- Karasawa K, Otani H (2012) Anti-allergic properties of a matured fruit extract of the date palm tree (*Phoenix dactylifera* L.) in mite-sensitized mice. J Nutr Sci Vitaminol 58(4):272–277. <https://doi.org/10.3177/jnsv.58.272>
- Khan H, Khan SA (2016) Date palm revisited. Res J Pharm, Biol Chem Sci 7(3):2010–2019
- Kwaasi AAA (2003) Date palms. Encyclopedia of food sciences and nutrition, 2nd edn. Elsevier Science, London, pp 1730–1740
- Mahmoudi H, Hosseininia G, Azadi H, Fatemi M (2008) Enhancing date palm processing, marketing and pest control through organic culture. J Org Syst 3:29–39
- Mansouri A, Embarek G, Kokkalou E, Kefalas P (2005) Phenolic profile and antioxidant activity of the Algerian ripe date palm fruit (*Phoenix dactylifera*). Food Chem 89(3):411–420. <https://doi.org/10.1016/j.foodchem.2004.02.051>
- Mariod AA, Mirghani MES, Hussein I (2017) Chapter 29 – *Phoenix dactylifera* date palm kernel oil. Unconventional oilseeds and oil sources, pp 181–185. <https://doi.org/10.1016/B978-0-12-809435-8.00029-9>
- Mohamed DA, Al-Okabi S (2004) In vivo evaluation of antioxidant and anti-inflammatory activity of different extracts of date fruits in adjuvant arthritis. Polish J Food Nutr Sci 13:397–402
- Nehdi I, Omri S, Khalil MI, Al-Resayes SI (2010) Characteristics and chemical composition of date palm (*Phoenix canariensis*) seeds and seed oil. Ind Crop Prod 32(3):360–365. <https://doi.org/10.1016/j.indcrop.2010.05.016>
- Nehdi IA, Sbihi HM, Tan CP, Rashid U, Si A-R (2018) Chemical composition of date palm (*Phoenix dactylifera* L.) seed oil from six Saudi Arabian cultivars. J Food Sci 83(3):624–630. <https://doi.org/10.1111/1750-3841.14033>
- Rahmani AH, Aly SM, Ali H, Babiker AY, Srikar S (2014) Therapeutic effects of date fruits (*Phoenix dactylifera*) in the prevention of diseases via modulation of anti-inflammatory, anti-oxidant and anti-tumour activity. Int J Clin Exp Med 7(3):483–491
- Rock W, Rosenblat M, Borochoy-Neori H, Volkova N, Judeinstein S, Elias M, Aviram M (2009) Effects of date (*Phoenix dactylifera* L., Medjool or Hallawi variety) consumption by healthy subjects on serum glucose and lipid levels and on serum oxidative status: a pilot study. J Agric Food Chem 57(17):8010–8017. <https://doi.org/10.1021/jf901559a>

- Sahari MA, Barzegar M, Radfar R (2007) Effect of varieties on the composition of dates (*Phoenix dactylifera* L.). Food Sci Technol Int 13:269–275. <https://doi.org/10.1177/1082013207082244>
- Saleh EA (2011) Phenolic contents and antioxidant activity of various date palm (*Phoenix dactylifera* L.) fruits from Saudi Arabia. Food Nutr Sci 02(10):1134–1141. <https://doi.org/10.4236/fns.2011.210152>
- Shafiei M, Karimi K, Taherzadeh M (2010) Palm date fibers: analysis and enzymatic hydrolysis. Int J Mol Sci 11:4285–4296. <https://doi.org/10.3390/ijms11114285>
- Sirisena S, Ng K, Ajlouni S (2015) The emerging Australian date palm industry: date fruit nutritional and bioactive compounds and valuable processing by-products. Compr Rev Food Sci Food Saf 14(6):813–823. <https://doi.org/10.1111/1541-4337.12162>
- Souli A, Sebai H, Rtibi K, Chehimi L, Sakly M, Amri M, El-Benna J (2014) Effects of dates pulp extract and palm sap (*Phoenix dactylifera* L.) on gastrointestinal transit activity in healthy rats. J Med Food 17:782–786. <https://doi.org/10.1089/jmf.2013.0112>
- Vayalil PK (2012) Date fruits (*Phoenix dactylifera* Linn): an emerging medicinal food. Crit Rev Food Sci Nutr 52:249–271. <https://doi.org/10.1080/10408398.2010.499824>
- Weber RW (2010) On the cover – date palm. Ann Allergy Asthma Immunol 105(4):A4. <https://doi.org/10.1016/j.anai.2010.09.001>
- Williams N (2008) Palm breach. Curr Biol 18(22):R1039–R1041. <https://doi.org/10.1016/j.cub.2008.10.057>
- Yahia EM, Kader AA (2011) 4 – Date (*Phoenix dactylifera* L.). In: Postharvest biology and technology of tropical and subtropical fruits pp. 41–79:80e–81e. <https://doi.org/10.1533/9780857092885.41>