

Dates Fruit (*Phoenix dactylifera*. Lynn): A Short Review

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Abstract: Date fruits (*Phoenix dactylifera* Lynn.) are cheap fruits but has high nutritional potentials. They are highly cultivated by Arab countries. They possess high economic value in Middle Eastern countries. They also contain therapeutic effects like anti-cancer and anti-inflammatory effects etc., they contain several stages in ripening. Natural ripening in trees causes a number of physical and chemical changes in it. So, due to high water content, they are easily affected by insects, bacteria and fungi. So the post-harvest handling methods should be strictly followed to prolong the shelf life of date fruits.

Keywords: Date Fruits, Physical Characteristics, Nutritional Values, Microbial Characteristics, Beneficial Uses.

1. INTRODUCTION

Date Palm fruit (*Phoenix dactylifera* L.) originated in Mesopotamia (currently Iraq) and its cultivation spread to the Arabian Peninsula, North Africa, and the Middle Eastern countries in ancient times about 5000 years ago (Kader and Hussein, 2009). Dates are very cheap fruits but rich in nutrition. The mineral contents in the dates have the potential to provide a good source of zinc, potassium, calcium, and sodium in the diet. (Mowunmi Sola Agboola, 2013). Egypt places top among the top date fruits exporting countries around the world by economizing 1,373 metric tonnes averagely each year. (UN Food and agricultural organisation, 2016). Fruits of the date palm are a main source of staple food in arid and semi-arid regions of North Africa, Middle East and South-Asian countries (Amina *et al.*, 2010) Dates have always played an important role in the economic and social lives of people of this area. These have abundant use as nutritional treat during Islamic holy month of Ramadan (Jamil *et al.*, 2012). Fresh dates compose of soft, easily consumable flesh and simple sugars like fructose and dextrose. When eaten, they replenish energy and revitalize the body instantly. They are deseeded and stuffed or chopped and used in a great variety of ways. They are mixed with cereals, in pudding, bread, cakes, cookies, ice cream or candy bars. Dates are also made into cubes, paste, spread, powder (date sugar), jam, jelly, juice, syrup, vinegar or alcohol. Date brittle, date arrack, a wine like drink were also prepared in Egypt from dates (Crueess, 1940).

2. PHYSICAL CHARACTERISTICS

Fruit weight ranges from 8 to 28 g. It may oblong or ovate shape (Sakr *et al.*, 2010). Dates are fairly dry fruits, with water and sugar contents of 10-15% and 60-88% (Barreweld, 1993). The length of fruit ranges as 29.80 mm to 40 mm. The width ranges from 15 mm to 19 mm. (Jahromi *et al.*) Based on the maturity level, the dates are categorised into different types. They are Hababouk, which is earlier stage of development, Kimir, Khalal, Biser, Rutab and Tamar. After their formation in plants, they becomes yellow and the colour slowly changes into red. The each stage of date varies from its physical characteristics like colour, moisture content etc., (Kader and Hussain, 2009). Natural ripening of date fruits on palm trees causes a number of physical changes in the final harvested fruits such as separation of the outer skin from the internal main date flesh (known as blistering), sticking unwanted impurities to the fruits and increasing its microbial load (Shamim *et al.*, 2013).

3. NUTRITIONAL CHARACTERISTICS

Dates fruits encompasses minerals in higher amount. Zinc concentration was high (74 ppm) followed by potassium (54.66 ppm), sodium (38.55 ppm), phosphorous (31.96 ppm), calcium (21.36 ppm), manganese (15.69 ppm) and copper (1.69 ppm). It is high in carbohydrate contents nearly 65% of in it. It contains 9.61% of fat, 17.69% of crude protein and 12.55% of fibre (Agboola and Adejumo, 2013). The most important carbohydrate components are glucose, fructose and sucrose which can reach up to 70 – 80% (Vayalil, 2002). Fat is mainly concentrated in the skin (2.5 to 7.5%) and has a more physiological importance in the protection of the fruit than contributing to the nutritional value of the date flesh (Barreveld, 1993). It holds appreciable amount of calcium, magnesium, phosphorous, potassium, iron, copper and zinc (Al. Hooti *et al.*, 1995). But the levels of components varies from the studies of Amina *et al.*, (2010), they found potassium as the major constituent in all their samples. They found 1376 mg/100gm. Next to it, magnesium found as 215 mg /100 mg. Six organic acids were pinpointed, among which malic acid was the predominant organic acid, and its concentration ranged from 5 to 10 mg/g followed by lesser amounts of succinic acid, isobutyric acid, citric acid, oxalic acid and formic acid (Ismail *et al.*, 2015). The relatively high calcium content is essential for healthy bone development and energy metabolism. The fruit was very plentiful in vitamin C followed by riboflavin and thymine. (Agboola and Adejumo, 2013).

4. MICROBIOLOGICAL CHARACTERISTICS

Dates are generally regarded as resistant to microbial spoilage. However some contaminants, especially some osmotolerant yeasts and moulds may survive longer times or even grow on the fruits (Siddig Hussain Hamad, 2012). Endophytic fungal species plays a major role in colonisation and survival of host plants. But sometimes it may contain pathological species (Ben *et al.*, 2013). Due to improper post processing, the fruits taste and shelf life may get affected. (Ragava *et al.*, 2016). The natural components and the high water activity also plays an important role in the contamination of microorganisms (Horner & Agnostopoulous, 1973). Moulds are considered to be the major causative agent of the spoilage of date fruits at all stage of ripening on trees as well as during storage and processing (Amina *et al.*, 2010). Increased storage period has reported as increasing in fungal contamination. Nearly seven *Aspergillus* species were found, even though the load was lower, and nine species of *Penicillium* were found (Atia, 2011). Fungal species like *Rhizopus*, *Mucor*, *Torula*, *Penicillium*, *Aspergillus*, *Alternaria* also found in significant number (Ibrahim and Rahma, 2009). *Aspergillus niger* were found as major contaminant in nearly 95% of all samples (Siddig Hussain Hamad, 2012). Works of Ahmad and Majid (2004) showed that aerobic bacteria load was also elevated which showed the contamination of date fruits. Bacteria like *Bacillus*, *Staphylococcus aureus* and coliforms were also found. But even after inoculated, the pathogens like *Salmonella* can't survive in the dates. The fungal species are easily gains growth in dates because of the high moisture content. They are also susceptible for fungal species like *Cladosporium cladosporioides* and *Sporobolomyces roseus*. Several case studies concluded with diseases of these fungal invasions into human body (Moore *et al.*, 2001). Ahmad and Ahmad (1996) reported that the dates are more susceptible to *Aspergillus* species which results in aflatoxin production. So these kind of dates are dangerous for human consumption. Date fruits also contains some anti-nutritional factors like tannins, phytates and oxalate contents. Consumption of tannin in large doses may cause bowel irritation, damage the liver, stomach and kidney irritation and gastrointestinal pain, chelate minerals and makes them unavailable to the body. Phytate is a complex fibre content which cause mineral deficiency and pellagra. Oxalic and precipitates out in the excretory system of the kidneys and responsible for the formation of kidney stone (Coe *et al.*, 2005).

5. POST-HARVEST HANDLING

Dates are subject to major types of deterioration, one by fermentation and moulding and the other by physiological disorders including darkening, aroma and flavour loss. Both deteriorations increase with the increase of water content (Shamim *et al.*, 2013). Mostly, all the samples were found in microbial contamination of most studies. Half dry and dry dates are considered more shelf stable, they are susceptible to quality deterioration due to insect infestation and mould growth (Jowkar *et al.*, 2005). Fumigation by phosphine, ionizing radiation, the use of low or high temperatures and Modified Atmosphere treatments are registered to be used for insect control in dates. Furthermore, the current technique of disinfestation using chemicals like methyl bromide is prohibited by the year 2015. After ripening, the dates are immediately stored at -18⁰C (Kader and Hussain, 2009). Modified Atmosphereic Packaging is known as a suitable

method for preservation of date fruits. However, if the fruit is infested by insects, then this technique has to be modified in the percentages of component gases (Zeinab and Abbasi, 2008). Hamad and Aleid (2013) reported that washing the dates by using electrolyzed water showed the decrease of microbial load in high number. To control the number of coliforms, it is just enough to soak in deionized water for five minutes. Washing the dates for five minutes before eating in a clean tap water helps to remove maximum number of microbes.

6. BENEFICIAL USES

Date extracts were contains stronger antibacterial activity against Gram positive bacteria than Gram negative bacteria. It has observed that dates has a notable antibacterial activity against *Staphylococcus saprophyticus* (Salah and Otiabi, 2013). The ultra sound treated syrup is used as a media for the cultivation of microbes. The studies showed that these type of media enriched the growth level of *Aspergillus* and *Mucor spp.*, (Nazari, 2011). The fungal species isolated from dates contain ability of producing cell wall polysachcharide degrading enzymes (Ahmed Najada, 2014).

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