

Dates

Revised 2018

Thermal Properties

	English	Metric
Moisture, %	22.50	--
Protein, %	1.97	--
Fat, %	0.45	--
Carbohydrate, %	73.51	--
Fiber, %	7.50	--
Ash, %	1.58	--
Specific Heat Above Freezing	0.55 Btu/lb*°F	2.31 kJ/(kg*K)
Specific Heat Below Freezing	0.55 Btu/lb*°F	2.30 kJ/(kg*K)
Latent Heat of Fusion	32 Btu/lb	75 kJ/kg

Storage Conditions

Semi-Soft Dates, 20-30% moisture					
Temperature	70°F (21°C)	60°F (15°C)	40°F (4.4°C)	32°F (0°C)	0°F (-18°C)
Storage Period	1 month	3 months	8 months	1 year	over 1 year
Relative Humidity	75% or less				
Soft Dates, >30% moisture					
Temperature	32°F (0°C)	0°C (-18°C)			
Storage Period	6 months	More than 6 months			
Relative Humidity	75% or less				

Most dates are grown in the Middle East and North Africa. All the commercial dates grown in the U.S. come from the hot desert area in southeastern California (Coachella Valley). The main cultivars grown are the Deglet Noor, Halawy, Khadrawy, Zahidi, Barhee and Medjool. The Deglet Noor, a relatively dry fibrous type of date, accounts for 95% of the total 40-million-pound average annual date crop in the US. Production of the Medjool date is increasing in several countries including the US, and it is a popular soft sweet date.

Deglet Noor is a cane-sugar date whereas the other semidry varieties are invert sugar dates. The Barhee and Medjool are soft varieties and contain invert sugars. Medjool dates are increasing in popularity

among domestic consumers and have long been popular in Europe where about 45% of the U.S. Medjool crop is exported. Dates consumption is year-round in the Middle East and North Africa, but the majority of the date crop is sold in the US, Europe and Latin America by Christmas because the holidays are the peak demand time. The Medjool harvest in the US begins in September and most of this variety is picked by mid-October.

Maturity stages of dates include “khimri”, “khalal”, “rutab”, and “tamar”. Most dates are harvested at the fully-ripe "Rutab" (light-brown and soft) and "Tamar" or “Tamr” (dark-brown and soft, semidry, or dry) stages, and that’s the stages when they are soft, have high levels of sugars, and lower moisture and tannin content. Moisture contents of khalal, rutab, and tamar dates range from 45-85, 30-45, and <30%, respectively. Some cultivars (such as Deglet Noor, Halawy, Barhee, Hayany, Samany, and Zaghlol) are harvested in Africa and the Middle East at the "Khalal" stage (partially-ripe) when they are yellow or red (depending on cultivar), but some consumers may find them astringent due to high tannins.

Dates quality indices include fruit size, shape, color, texture (chewiness), cleanliness, and freedom from defects such as sunburn, insect damage, sugar migration to fruit surface, and fermentation, and decay-causing pathogens. CODEX quality standards for dates include: 1) dates should possess the characteristic color and flavor for the variety, be of proper stage of ripeness, and be free of live insects and insect eggs and mites; 2) Moisture content of 26 to 30%, depending on the variety; 3) Minimum fruit size of 4.75g (un-pitted) or 4.0g (pitted); 4) Absence of defects, including blemishes, mechanical damage, unripe, unpollinated, embedded dirt or sand, damaged by insects and/or mites, souring, mold, and decay. Dates and their products should be free from objectionable matter and free from microorganisms that represent a hazard to human health. The CODEX standards include three sizes based on the number of dates per 500g: small (>110 dates without seeds or >90 dates with seeds), medium (90-110 dates without seeds or 80-90 dates with seeds), and large (<90 date without seeds or <80 dates with seeds). In the U.S. Standards for Grades of dates, quality score includes 20 points for color, 10 points for uniformity of size, 30 points for absence of defects, and 40 for character (well developed, well fleshed, and soft). U.S. grade A or U.S. Fancy are given to whole or pitted dates of one cultivar that achieve a score of 90 or higher. Lesser grades include U.S. Grade B or U.S. Choice, and U.S. Grade C or U.S. standard. Defects that reduce their score include discoloration, broken skin, deformity, decay, puffiness, scars, sunburn, insect injury, improper hydrating, mechanical injury, lack of pollination, blacknose, side spot, black scald, improper ripening, souring, mold, dirt, and insect infestation. In addition, Medjool dates growers in the USA use a Grading standard that differentiates 4 grades based on fruit size and freedom from defects as follows: “Jumbo”: 35-42 dates/Kg, with no blemishes, skin separation, or dryness, “Large”: 44-51 dates/Kg, with no blemishes, skin separation, or dryness, “Extra Fancy”: 44-53 dates/Kg, with minor blemishes, packed all sizes together, and “Fancy”: 44-57 dates/Kg, with some dryness and skin separation, packed all sizes together.

Only dates that have been properly dehydrated can be kept any length of time without refrigeration. Dates are usually placed in cold storage after they have been cleaned and graded. When necessary, certain grades are matured and dehydrated before storage. Often, at the peak of harvest, from mid-August to December, when packinghouses receive dates faster than they can be handled, a considerable tonnage of field-run dates may be put in cold storage until packing facilities become available later.

The expected good quality storage life of both soft and semi-soft dates is influenced greatly by their moisture content and the temperature and relative humidity of storage. The higher the moisture content of the fruit the more perishable it is and the greater the need for refrigeration. Low moist dates, 26% moisture, or lower, preferably 20% or below, can be stored longer and at higher temperatures than more moist dates. High moist dates, 30-35% moisture range, should be held at 32 to 5°F (0 to -15°C).

Dates absorb moisture readily from storage room air and this should be kept below 75% if possible. If dates are stored wrapped with a moisture-vapor-proof material it is not necessary to control the air moisture. Also, at temperatures well below 32°F (0°C), the natural low relative humidity will be satisfactory and air moisture control is not required. In fact in the freezer 0°F (-18°C) dates will gradually lose moisture.

Avoid rapid or extreme temperature fluctuations to prevent moisture condensation on dates unless they are wrapped or packaged in moisture-proof material. When dates are not wrapped, it may be necessary to warm them gradually to prevent moisture condensation when cold dates are removed from refrigerated storage. For information on tempering techniques, see **Condensation Control** elsewhere in this manual.

Graded dates are often stored for several months, refrigerated, in bins or other bulk containers, before marketing. Following storage, they are re-graded, when necessary, to remove dates that have changed grade, and are packaged. Packed dates are not stored for long so that fresh-appearing packages are sent to distributors. Dates should be kept refrigerated in warm weather during transit to distant markets. Dates, like other dried processed fruits, should be stored and shipped at cool temperatures, with a generally recommended upper maximum temperature of 45°F (7°C). During hot weather, properly pre-cooled dates should be shipped in refrigerated railcars, trucks or ship containers set at 35 to 40°F (2 to 4.4°C). During cooler parts of the year, refrigeration is not necessary. Low temperature protection is not needed as freezing does not harm dates.

Storage temperatures used for dates are determined by considering cost of refrigeration in relation to minimum requirements of the dates. The lower storage temperature limit selected is determined by its cost and desired storage duration. There are no adverse effects of low temperature on dates even at freezing temperatures and keeping quality of dates apparently improves as the temperature is lowered. The lowest temperature possible, considering cost, is recommended. Khalal dates should be stored at 32°F (0°C) and 85-95% relative humidity. Packaging in plastic bags or use of plastic liner in the box help in reducing water loss. Khalal dates should be stored at 0°C (32°F) and 85-95% relative humidity. Packaging in plastic bags or use of plastic liner in the box help in reducing water loss. Tamar dates can be stored 32°F (0°C) for 6-12 months; depending on cultivar (semi-soft dates have longer storage-life than soft dates). Dates with 20% moisture or lower can be kept at 0°F (-18°C) for more than one year, or at 32°F (0°C) for one year, or at 40°F (4.4°C) for 8 months, or at 68°F (20°C) for one month. The most adequate RH range (except for Khalal) is 65-75%. Packaging of "Tamar" dates in nitrogen (to exclude oxygen) reduces darkening and prevents insect infestation.

Low temperature is the single most important factor to maintain quality of dates. Quality losses that can occur in dates and that can be minimized by low temperature storage are:

1. Loss of color, flavor and texture
2. Development of syrupiness -- inversion of sugars into reducing sugars
3. Souring of excessively moist dates
4. Insect infestation
5. Sugar spotting
6. Molds and yeasts develop due to excess moisture

Sugar spotting is more common in soft than semi-soft cultivars, and in fruit of 22 to 33% moisture content than in fruit outside this critical range. Sugar spotting may be delayed or prevented entirely at

sufficiently low storage temperatures. Appearance and texture may be impaired but otherwise sugar spotting is harmless. Sugar spotting is a crystallization of sugars beneath the skin and in the flesh and may be reversed by gentle heating. Sugar spots may reappear in time if conditions are again suitable for their formation.

Avoid storage of dates with aromatic products. Dates absorb volatiles and take on flavors of other commodities. Especially avoid storage with, or following, onions, apples, potatoes, meat, fish, plastics, gasoline, etc. Exposure to ammonia or sulfur dioxide can be detrimental to quality of dates.

Freezing

Fresh dates, not cured and not dried, may be frozen for preservation as fresh fruit without any preparation. A moisture-vapor-proof package or wrapping material is needed to prevent drying of the fresh, non-dried dates during freezing and frozen storage.

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