

# Dates, Fruit of Passion

**W**orld Date Production is about Nine million eight hundred thousand tons of fruit. The date fruit, which is produced largely in the hot arid regions of Middle East and North Africa, is marketed all over the world as a high value confectionery or fruit, and remains an extremely important subsistence crop in most of the desert regions. The following is a short narrative of the date harvesting, packinghouse management, and marketing aspects for selling the produce as whole or processed dates.

	Pro	duct name	
	Arabic	Tamar	
	English	Dates, dried	0
	German	Datteln, getrocknet	
	French	Dattes séchées	
	Spanish	Dátiles secados	
	Scientific	Phoenix dactylifera	
	CN/HS number *	0804 10 00	

(\* EU Combined Nomenclature/Harmonized System)

## Product information

## **Product description**

Dates are the fruit of the date palm, which is a type of palm tree known worldwide, reaching a length of about 25 meters.

Palm trees are among the oldest cultivated plants in the world and are native to the lands around the Arabian Gulf.

Date palm trees are considered dioecious, meaning that there are male and female trees, and their females do not produce fruits except through pollination.

Many date palm trees can be produced by planting offshoots, through a process similar to childbirth.

The date palm is dioecious, and only a few male palms are kept; the female trees are pollinated by hanging pollen-impregnated cotton cloths over the female inflorescences, which then develop up to 200 dates per fruit spike.

The single-seeded oval berry fruit, approximately the size of a plum, is golden yellow to brownish red in color and has soft flesh and an inedible stone.

The water content of dates is reduced to 20% by natural or artificial drying. The latter process is preceded by immersion in boiling sodium hydroxide solution.

Sometimes the pits, which constitute 15% of the fruit, are left in, resulting in dates with an attractive rounded appearance; pits may on the other hand be removed, but then dates have a sunken appearance.



# Quality/Duration of storage

Good dates are light to dark brown and shiny, do not stick to one another and are not infested with mites. One of the most popular variety is Deglet Noor from North Africa, which is light brown and has soft juicy flesh and a shiny appearance.

Old or incorrectly handled goods have a dull appearance and dry floury flesh and lack the distinctive sweet flavor.

Dates may become sour as a result of inadequate processing or an excessively long storage period. Sour fruit can only be used as animal feedstuff.

Provided that the recommended storage temperature and relative humidity are complied with, dried dates may be kept for approx. 6 - 12 months.

## Intended use

The sweet, soft varieties ("fruit" dates) are exported and are eaten raw, while the starch-rich dried dates constitute a staple food in the countries where they are cultivated. The seeds can be grounded for various uses.

Countries of origin		
Africa	Algeria, Morocco, Tunisia	
Asia	Iraq, Saudi Arabia ,Iran	
America	USA (California, Arizona)	
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This Table shows only a selection of the most important countries of origin and should not be thought of as exhaustive.

# Date Harvesting

Agha Pack long expertise in date's handling, processing and packaging can assist you to navigate the fruit's complex farmer to consumer journey. There are specific harvesting and packing considerations for each date variety and the form in which they will be consumed. Differences in the state of the fruit, from the point of view of harvesting, are great. These differences are both visible, such as the fruit color and the degree of ripeness; and invisible, such as the percentage of water and of sugar and the activity of various enzymes. Whole dates are harvested and marketed at three stages of their development. The choice for harvesting at one or another stage depends on date fruit characteristics, climate conditions and market demand. The three stages are as follows:

Besser: Physiological mature, hard, and crisp, moisture content: 50 - 85 %, bright yellow, or red in color, Perishable.

Rutab: Partially browned, reduced moisture content (30 - 45 %), fibers softened, perishable.

*Tamar:* Color from amber to dark brown, moisture content further reduced (below 25% down to 10% and less), texture from soft Pliable to firm to hard, protected from insects it can be kept without special precautions over longer periods.

Cellulose enzymes mainly influence the softening of the fruit. The activity of these enzymes depends on the slow drying of the fruit. In addition, the level of fructose and glucose influences both the speed of drying and the extent of shelf life. Equilibrium Moisture Content (EMC)

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expressed in percentages can describe the sensitivity of the fruit to microbiological infestation. **EMC** below 65 % ensures resistance to microbiological factors such as moulds, yeast, and bacteria that attack the fruit. Harvesting must be faultless and clean, since it significantly affects the rest of the process (packing and marketing). Harvesting the fruit straight into containers suitable for transport to the packinghouse prevents the infection of the fruit by the soil and sand under the palm and ensures that the fruit arrives in good condition, and that it is not crushed.

Many merchants, especially from European markets, demand that the growers document the quality control processes used; especially a report concerning treatment against insects. Such a report includes a list of the materials permitted for use and approved by an official agent, in addition to the timetable of the spraying with details of materials used, the date, and concentration, number of days before harvesting and the level of residue of pesticides.

## Processing

Packing is a vital stage in both the traditional and modern methods of marketing. Many varieties of varying quality, water level and rate of pest infestation can be preserved up to a year and longer for post processed products. The aims of packing are obvious and Agha Pack can help you along every step.

*Agha Pack* machines have been designed to improve or maintain fruit quality. Our machines are integrated with the following steps: fumigation, washing, storage, hydration, dehydration and curing.

#### **Fumigation**

In order to store the fruit for a long period (several months to one year), it must be completely cleaned of any pests (eggs, pupas, larva or adults). This is done by fumigation, either in the field under various kinds of plastic sheets, or at the packaging warehouse in special sealed rooms.

The substance most frequently used for fumigation is methyl bromide (CH<sub>3</sub> Br), which makes most of the insects come out before they are killed by the gas. The concentration of the gas is 30 ppm, i.e. 30 g methyl bromide in  $1 \text{ m}^3$  of air. The time recommended for fumigation is 12 - 24 hours. The temperature must be above  $16^{\circ}$  C. It is important for the air to swirl within the fumigation chamber, in order for it to spread uniformly. Methyl bromide is a dangerous poison. This fumigation process must, therefore, be done according to the law and all the regulations concerning the equipment and the protection of the people involved. It should be noted that in 1992 methyl bromide was placed under the Montreal Protocol on substances that deplete the ozone layer, because of international concern about the continued increase in its production and its damaging effect on the ozone layer. Alternatives for methyl bromide are: 1-

**Phosphine** is the principal alternative to methyl bromide for fumigation of durable commodities and is widely used in developing countries. 2- Controlled atmospheres high in carbon dioxide are in regular use for disinfecting bag-stacked durable commodities. 3- The applications of physical control methods such as filtering, heating or cooling regimes, active-oxygen (ozone, hydrogen peroxide) and irradiation. However, some of these methods are very costly.

#### Storage and refrigeration

After packing, the fruit will be sent according to market orders, or stored as the finished product. During storage, the material in which the fruit is packed must also be taken into account, for example: cardboard is sensitive to humidity; various plastics are sensitive to low temperatures; wooden surfaces may be attacked by various pests.

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The current market demands fruit with higher moisture content. Preservation is ensured by storage under low temperatures. The temperature at which the fruit is stored is adapted to the time lag until the next treatment or until marketing. The temperature must ensure the continued extermination of insects that have survived fumigation, and prevent loss of moisture, or in the case of dry fruit, increase the moisture. Refrigeration must not influence properties, such as texture, moisture, and color.

The temperature and the speed of refrigeration also affect physiological phenomena, such as sugar crystallization. Today, the temperature commonly used for long-term preservation of dates of several varieties is 18° C (0° F) (without Besser -18° C.).

## Washing

Just like all agricultural products, dates are exposed to various types of contamination of physical, chemical or/and microbiological nature. Agha Pack's washing machines are designed to remove sand and soil, remnants of pesticides and some or most of the microbiological pollution. Clean water must be used and care taken that all the fruit is washed. When the fruit is packed immediately after washing, it is important to dry it using our drying machines.

## Hydration, curing, and dehydration

The aim of dehydration and hydration is to improve the quality of the fruit, to produce uniform fruit with regard to moisture, and to extend its durability during storage and marketing.

Agha Pack hydration and dehydration machines are adjustable to the required moisture of the fruit depending on variety, the region and the weather at the time of harvesting or packaging. Agha Pack machines ensure moisture uniformity by controlling the following factors: temperature, moisture, speed of airflow and length of hydration or dehydration time. Dehydration is carried out in specially designed chambers. Agha Pack chambers control the entry and flow of hot air, to ensure the appropriate moisture level. All these conditions must preserve the quality of the fruit, especially with regard to skin separation. The temperature must not rise above 70°C in order to prevent "the burning of sugars". High temperatures will also cause the fruit to darken. Different temperatures suit different date varieties: Halawy 55°C (and 20 % moisture during the process); Deglet Noor and Medjool 50°C.

#### **Sorting**

In order to ensure that the results of sorting are appropriate to client requirements, it is important to provide sorters with precise, unambiguous definitions of the defects of the fruit they are to transfer to another category. The following defects can be identified in date fruits:

**1. Defects stemming from microbiological processes:** fermentation (alcoholic) resulting from the activity of yeast; souring resulting from lactobacilli, acetobacteri or aspergilus niger, a fungus which creates a black promycelium which fills up the stone cavity. These types of defects cannot be tolerated, such fruit must not reach the customer, nor can it serve as raw material for products. These defects may be due to inappropriate conditions during storage (for example wet fruit without refrigeration) or may arise while the fruit is still in the field.

2. <u>Defects caused by pests</u>: resulting from the activity of insects and various mites. The most common are the remains of various moths, sour bugs and mites. Some of these pests leave signs of nibbling inside the fruit; some spoil the look of the skin. Tolerance for these defects differs according to various standards, going up to a maximum of 4 %. In all cases, there must be no live insects inside the package. Defects caused by birds,

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mice, bats or other rodents (mainly signs of nibbling on the outside) are often found on fruit grown without being covered by a net or paper, or stored under inappropriate conditions. Such fruit must be removed. These pests may leave remains of feathers, excrement of mice or birds, which stick to the fruit and may cause microbiological contamination.

3. <u>Mechanical defects</u>: as a result of the fruit being crushed while wet after harvesting, or grazed or scraped during the period of growth, leaving scars on the fruit. Sometimes the fruit is so badly soiled by earth and by mud that washing does not clean it.

## **Grading/Selecting**

This is usually done together with sorting, on the same installation, thus avoiding the need to transfer to a different storage (at the intermediate stages) and additional pouring of fruit onto the conveyer belt. The aim of grading is to produce packed fruit that is uniform in size, shape, color, texture, moisture and skin separation.

## Packaging

Dates are packaged in, among other things, paperboard cartons (5 -12 kg) and boxes (10kg), dates for industrial use also being packaged in barrels and bags.

Fresh dates are perishable and are highly susceptible to losses from damage and deterioration between harvest and the final consumer. Within the range of measures that can be applied to prevent such mechanical and/or biologically induced losses, appropriate packaging plays a vital role in protecting produce from avoidable deterioration. Packing the fruit in various ways is the last stage of its preparation for the consumer. Therefore, there is no contact with the fruit itself, and we depend on packaging to protect, contain, and market the product. Agha Pack machines applies modern methods used for fruit intended mainly for export. The methods of packing are of two kinds: in bulk and for retail sales.

#### **Bulk Packaging**

The dates are usually packed in cardboard boxes (sometimes in plastic bags for additional protection and preservation of moisture, before being placed in boxes). The usual weight is 5 kg or 15 lbs. (depending on the country where the fruit was produced or where it is to be marketed). The quality of the fruit may differ according to customer requirements.

#### **Retail Packaging**

Retail packing has been greatly developed in recent years. Agha Pack introduced many date fruit mechanization and automation systems to the Middle East in order to save on packing and weighing and to provide high quality products to your consumers.

#### **Risk factors and loss prevention**

#### **Temperature**

Dates require particular temperature, humidity/moisture and possibly ventilation conditions. Precise details should be obtained from the manufacturer as to the storage temperature to be maintained.

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Term	Temperature range
Favorable travel temperature	10 - 20°C

At temperatures 10°C, possible mite growth is inhibited while it is promoted by heat.

At temperatures up 25°C, syrup forms and fermentation may occur. There is a risk of the syrup ("date honey") seeping out of the packaging and damaging other goods. Discoloration may also occur, such as darkening or blotchiness.

The product should not be stored close to heat sources. Humidity/Moisture

Dates require particular temperature, humidity/moisture and possibly ventilation conditions. Precise details should be obtained from the processor as to the relative humidity to be maintained.

Term	Humidity/water content
Relative humidity	50 - 60%
Water content	14 - 20%
Maximum equilibrium moisture content	65%

# Ventilation

Dates require particular temperature, humidity/moisture and possibly ventilation conditions. If the product is at "shipping dryness", i.e. if there is no risk of degradation by mold etc. due to water content, ventilation is not required. If this is not the case, the following ventilation measures should be implemented: Recommended ventilation conditions: air exchange rate: 6 changes/hour (airing)

Odor		
Active behavior	Dried dates have a slight, pleasant odor.	
Passive behavior	Dried dates are highly odor-sensitive and should not be stowed in the vicinity of onions and other alliaceous vegetables as their essential oils cause odor-tainting.	

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#### **Contamination**

Active behavior	At temperatures > $25^{\circ}C$ , syrup forms and fermentation may occur. There is a risk of the syrup seeping out of the packaging and damaging other goods. Syrup removal is extremely difficult. Washing out of the hold/container with fresh water is problematic, as the water and the syrup form a sticky foam, which is difficult to remove.

## Mechanical influences

The packages must be secured appropriately in the hold or container so that they cannot move during transport. In the case of container transport, it is also important for the goods to be secured in the door area so that they cannot fall out of the container when the doors are opened.

## Toxicity/Hazards to health

Mite infestation may cause gastrointestinal conditions if the product is eaten. Inhalation of mite dust may cause asthma attacks and frequent contact with mites may result in skin conditions.

## Shrinkage/Shortage

The normal weight loss due to a reduction in the moisture content of the product may be approx. 1 - 2%.

## Insect infestation/Diseases

Exposure to heat and moisture may result in mite infestation, which may make the dates inedible and cause severe gastrointestinal conditions. Mite infestation may be determined by examination with a magnifying glass: mites may be distinguished from crystallized glucose because they are whitish, slow moving dots. Development from the egg to imago (sexually mature insect) takes 10 days.

If mite infestation is slight, the product may usually still be rescued by heating.

Infestation with moths (almond moth, meal moth), beetles (sap beetle, saw-toothed grain beetle, flour beetle), rats, mice and ants leads to contamination and loss of volume. It often has its origin in the country of production and entails depreciation of the product together with the fumigation and heating costs involved in reconditioning. A fumigation certificate must be provided.

## Other date palm products and by-products

The raw material used for the products usually consists of dates of a lower quality, with a low percentage of sugar, but on no account rotten, sour or fermented dates. Good quality dates may also be used when there is a surplus of fruit on the market.

Most of the dates are sold without seeds, 80 % of Deglet Noor are sold in the USA in this way for consumer convenience. Agha Pack's machines remove the seeds. The methods range from seed removal while ensuring the dates remain whole and their texture is not harmed, to the complete grinding of the product. When seed removal is done by machine, some seeds may remain, and a warning must be included on the packed product.

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## Pitted pressed dates

This is a very useful basic product both in producing and in importing countries (European countries, the USA and South Africa). The dates are pitted by machine, pressed into a mould and vacuum packed. Packing in this way and with the right amount of moisture (less than 20%) preserves the stability of the product over time without refrigeration. If these rules are not adhered to, the product may be harmed by microbiological processes or through sugar crystallization. This product is used mainly as a filling for cakes and biscuits, especially during the Muslim Feast of Holy Ramadan.

## Date paste

In order to preserve the stability of the products over time and prevent their going bad, specific rules must be followed during the date-paste production stage. Brix must not be less than 65° and the acidity must not rise above pH 4.5. In this case, the paste can remain in its natural state (without the need for preservatives). If the above conditions do not exist, the product must be pasteurized or sterilized. These pastes can be used as fillings for cakes (with the addition of various flavors, as required). The great advantage of these pastes is that their melting temperature is higher than that used in baking, so that the filling does not run out of the cake during baking.

## Date syrup

(Sometimes called dibs or rub): Five production stages are involved: pretreatment, extraction of juice, clarification, concentration and filtration. The rules with regard to brix and sourness must be strictly kept. The syrup is used to sweeten various foods.



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