

# Date

## Recommendations for Maintaining Postharvest Quality

---

Adel A. Kader  
Department of Plant Sciences, University of California, Davis, CA 95616

---

### Maturity Indices

A small quantity of dates is harvested at the "Khalal" stage (partially-ripe) when they are yellow or red (depending on cultivar), but many consumers find them astringent (high tannin content). Most dates are harvested at the fully-ripe "Rutab" and "Tamar" stages, when they have much greater levels of sugars, lower moisture and tannin content, and softer than the "Khalal" stage dates.

---

### Quality Indices

Fruit size, color, texture, cleanliness, and freedom from defects (such as sunburn, insect damage, sugar migration to fruit surface, and fermentation) and decay-causing pathogens

Sweetness. Sucrose is the main sugar in some cultivars while reducing sugars are predominant in others; total sugars represent about 50% (fresh wt basis) or 75% (dry wt basis).

---

### **Optimum Temperature**

0°C (32°F) for 6-12 months, depending on cultivar (semi-soft dates, such as "Deglet Noor" and Halawy", have longer storage-life than soft dates, such as "Medjool" and "Barhi").

-18°C (0°F) for longer storage durations. [Freezing temperature is -15.7°C (3.7°F)]

---

### **Optimum Relative Humidity**

70-75%; at higher relative humidities, dates will absorb moisture from the room air unless they are packaged in moisture-proof containers.

---

### **Rates of Respiration**

<5ml/kg·hr for "Khalal" stage dates; [ $<1\text{ml/kg} \cdot \text{hr}$  for "Rutab" and "Tamar" stage dates kept at 20°C (68°F). The rates increase with the moisture content increases.

<sup>2</sup>To calculate heat production, multiply ml CO<sub>2</sub> / kg·hr by 440 to get BTU/ton/day or by 122 to get kcal/metric ton /day.

---

## Rates of Ethylene Production

<0.1 ml/kg·hr for "Khalal" stage dates; none for "Rutab" and "Tamar" stage dates kept at 20° C (68°F).

---

## Responses to Ethylene

Ripe dates are not influenced by ethylene but can readily absorb the aroma of other products. Thus, dates should not be stored with garlic, onion, potato, or other commodities with strong odor.

---

## Responses to Controlled Atmosphere (CA)

Packaging in nitrogen (to exclude oxygen) reduces darkening of dates and prevents insect infestation.

---

## Physiological and Physical Disorders

**Darkening.** Both enzymatic and non-enzymatic browning occur in dates and increase with higher moisture content and higher temperatures. Enzymatic browning can be inhibited at low oxygen concentrations.

**Souring.** Yeasty fermentation results in souring of dates with moisture content above 25%.

**Sugar Spotting.** Crystallization of sugars below the skin and in the flesh of soft date cultivars. Although it does not influence taste it alters fruit texture and appearance. Storage at recommended temperatures minimizes this disorder, which occurs mainly in cultivars in which glucose and fructose are the main sugars.

---

## Pathological Disorders

Microbial spoilage can be caused by yeasts (most important), molds and bacteria. Yeast *species of Zygosaccharomyces* are more tolerant of high sugar content than others found in dates. Yeast-infected dates develop an alcoholic odor (become fermented). Acetobacter bacteria may convert the alcohol into acetic acid (vinegar). Fungi (*Aspergillus*, *Alternaria*, and *Penicillium* spp) may grow on high-moisture dates, especially when harvested following rain or high humidity period.

## Control Strategies

- Dry the dates to 20% moisture or lower to greatly reduce incidence of molds and yeasts.
- Maintain recommended temperature and relative humidity ranges throughout the handling system.
- Avoid temperature fluctuations to prevent moisture condensation on dates, which may encourage growth of decay - causing microorganisms.
- Use adequate sanitation procedures in the packinghouse and storage rooms.

---

## **Insect Infestations**

- Dates can be infested with some of the stored-products insects and must be fumigated with an approved fumigant for disinfestation followed by packaging in insect-proof containers.
- "Organic" dates may be treated with 100% carbon dioxide for 1-2 days since chemical fumigants (such as methyl bromide) cannot be used.
- Storage below 13°C (55°F) will prevent insect feeding damage and reproduction. Storage at 5°C (41°F) or below will control insect infestation.