

Date

Recommendations for Maintaining Postharvest Quality

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



Produce Facts

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
- 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

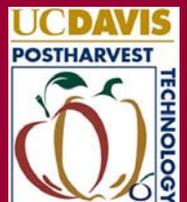
<25ml/kg-hr for "Khalal" stage dates; <5ml/kg-hr for "Rutab" and "Tamar" stage dates kept at 20°C (68°F).

The respiration rates increase with higher moisture content.

To calculate heat production, multiply ml CO₂/kg-hr by 440 to get BTU/ton/day or by 122 to get kcal/metric ton/day.

RATES OF ETHYLENE PRODUCTION

<0.5 microliter/kg-hr for "Khalal" stage dates; <0.1 microliter/kg-hr for "Rutab" and "Tamar" stage dates kept at 20°C (68°F).



RESPONSES TO ETHYLENE

We found no effect of exposing Khalal stage, yellow Barhee dates to 100ppm ethylene for up to 48 hours at 20°C (68°F) and 85-90% relative humidity. However, Khalal stage dates may respond to ethylene action at higher temperatures of 30-35°C (86-95°F), which are more optimal for their ripening. Rutab and tamar stage dates are not influenced by exposure to 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 ATMOSPHERES (CA)

Packaging of "Tamar" dates in nitrogen (to exclude oxygen) reduces darkening of dates and prevents insect infestation. Yellow "Khalal" Barhee dates can be stored in 20% carbon dioxide-enriched air at 0°C (32°F) and 90-95% relative humidity for up to 26 weeks as compared to 7 weeks for air-stored dates. The elevated carbon dioxide concentration is fungistatic (inhibits growth of fungi, but once the dates are transferred to air, the fungal growth will resume, especially under higher temperatures). Thus, it is important to market the CA-stored dates soon after removal from storage.

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.

POSTHARVEST PHOTO GUIDE

MATURITY AND QUALITY



Abada



Barhee



Deglet Noor



Medjool



Honey



Khadravy

DATE CULTIVARS



QUALITY INDICES

DISORDERS



SUGAR SPOTTING

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.



It is the policy of the University of California not to engage in discrimination against or harassment of any person, employed by or seeking employment with the University, or in any of its programs or activities, on the basis of race, color, national origin, religion, sex, gender, gender expression, gender identity, pregnancy, physical or mental disability, medical condition (cancer-related or genetic characteristics), genetic information (including family medical history), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services, as well as state military and naval service. This policy is intended to be consistent with the provisions of applicable state and federal laws and University policies. University policy also prohibits retaliation against any employee or person seeking employment for bringing a complaint of discrimination or harassment pursuant to this policy. This policy also prohibits retaliation against a person who assists someone with a complaint of discrimination or harassment, or participants in any manner in an investigation or resolution of a complaint of discrimination or harassment. Retaliation includes threats, intimidation, reprisals, and/or adverse

In addition, it is the policy of the University of California to undertake affirmative action, consistent with its obligations as a Federal Contractor, for minorities and women, for persons with disabilities, and for covered veterans. The University commits itself to apply every good faith effort to achieve prompt and full utilization of minorities and women in all segments of its workforce where deficiencies exist. These efforts conform to all current legal and regulatory requirements, and are consistent with University standards of quality and excellence. In conformance with Federal regulations, written affirmative action plans shall be prepared and maintained by each campus of the University of California, by the Lawrence Berkeley National Laboratory, by the Office of the President, and by the Division of Agriculture and Natural Resources. Such plans shall be reviewed and approved by the Office of the President and the Office of the General Counsel before they are officially promulgated. Inquiries regarding the University's equal employment opportunity policies may be directed to the Affirmative Action Contact, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618 (530) 750-1318.