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### Title

Harvesting and Storing Your Home Orchard's Nut Crop: Almonds, Walnuts, Pecans, Pistachios, & Chestnuts.

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# Harvesting and Storing Your Home Orchard's Nut Crop: Almonds, Walnuts, Pecans, Pistachios, and Chestnuts

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**T**he quality and quantity of your home orchard's nut crop depend on the harvesting, processing, and storage techniques that you use. This publication offers advice for handling almonds, chestnuts, pecans, pistachios, and walnuts.

## GENERAL TIPS

### When to Harvest

Harvest all types of nuts as soon as they are ready. Late harvesting reduces crop volume, lowers nut quality, and shortens storage life. In California, harvest timing varies somewhat with location. The earliest harvest generally occurs in the southern San Joaquin Valley, followed by the central San Joaquin Valley, the Sacramento Valley, and finally the coastal valleys. An interval of about seven days separates the beginning dates for harvest in each succeeding district.

### Harvesting

To harvest nuts (except chestnuts), knock or shake them from their trees with long wooden, fiberglass, or plastic (PVC) poles. You can knock almonds from the trees using rubber mallets or poles that are available from farm supply stores.

**CAUTION:** When harvesting nuts with a pole, use extreme caution. Any contact between the pole and power lines will result in serious injury or death. Do not use aluminum or other metal poles to harvest nuts: these are especially hazardous around power lines. Loosened nuts often follow the pole to the ground, striking the person holding the pole. Wear protective head and eye gear to avoid injury while harvesting nuts.

### Hulling and Drying

Nuts have an inedible outer *hull* (also called a *husk*, *shuck*, or *bur*) that you must remove promptly after harvest so the nuts can dry properly. The longer the hulls remain on nuts after harvest, the more the nut quality deteriorates. After harvesting and hulling, you have to dry nuts (except chestnuts) properly to reduce kernel moisture. Undried or improperly dried nuts are more likely to develop molds and a disagreeable flavor (rancidity), and have a shorter storage life.

### Storage

The length of time you can store nuts depends upon storage temperature and humidity. In general, storage life is shorter at room temperature than in a refrigerator or freezer, where nuts may last 1 or 2 years. Nuts are often shelled before

storage to reduce weight and bulk. Shelled nuts readily absorb moisture and external flavors, so good packaging and careful handling are very important for maintaining the best quality.

## ALMONDS

### When to Harvest

Depending upon variety, almonds are ready for harvest from early August to late September. Harvest should begin when about 95 percent of the nuts have hulls that have split open to expose the in-shell almond inside. Hull split begins in the top of the tree and progresses downward. To prevent birds such as scrub jays from stealing your crop and insects such as the navel orangeworm from infesting the nuts, harvest as soon as most (75 percent or more) of the hulls have split open. It is also important to keep your tree well watered up to the time of harvest, since the hulls will not split well if the tree is water stressed.

### Harvesting

The best way to knock almonds from trees is to strike the small branches with a pole or to strike the major branches with a rubber mallet made for that purpose. It is a good idea to spread a tarp beneath the tree to help catch the falling nuts. Pick nuts up promptly to prevent ants from invading and damaging kernels.

### Hulling and Drying

After harvest, remove hulls promptly from the nuts; in the home orchard, hull removal is best done by hand.

Almonds harvested at the proper time usually require additional drying to prevent mold growth in storage. To dry the nuts, spread them in a thin layer on a tray or screen to allow good air circulation. Stir often. Birds commonly steal almonds while they are drying; you may need to cover the drying nuts with screen or plastic netting to prevent loss. If rain threatens, cover the nuts or move them to a covered patio.

Check the nuts often for dryness. Remove shells from several nuts and break the kernels. Rubbery kernels indicate that additional drying is necessary. Almonds are ready for storage when their kernels are crisp to brittle when broken.

### Storage

When properly dried, in-shell almonds can be stored for 8 months at room temperature (68°F [20.0°C]), and for a year or more at 32° to 45°F (0° to 7.2°C). Shelled almonds will retain quality for 1 year at 32°F (0°C) and for a year or more at 0°F (-17.8°C) (see Table 1).

Before storing almonds at room temperature, you can freeze them to kill storage pests such as navel orangeworm. Freezing the nuts at 0°F (-17.8°C) for 48 hours kills insect pests and eggs. You can also use dry ice (frozen carbon dioxide) to destroy insect pests in almonds prior to storage. For information on how to treat almonds with dry ice, see UC Cooperative Extension Publication 7184, *Dry Ice: Easy Fumigation for Navel Orangeworm Control in Stored Almond Meats*.

Almond kernels can absorb objectionable odors in storage. Take care to store them in airtight containers away from strong-smelling materials such as onions or garlic.

## WALNUTS

### When to Harvest

Depending on variety and location, you can harvest walnuts from early September to early November.

Walnuts are considered mature when the packing tissue (the membrane between the kernel halves) turns completely brown. At this point, kernels are at their lightest color and highest quality. Usually, harvest must wait until the hull begins to split from the nut. As fall approaches, crack open a few nuts, especially from the upper part of the tree. Browning of the packing tissue and loosening of the hull are good signs of the approaching harvest. Hulls loosen last in the tree top, so it is important to sample nuts there to determine when to harvest. It is also important to keep the tree well watered through harvest time to promote hull split; hulls will not separate readily from nuts if the tree is water stressed.

For best kernel quality, harvest as soon as you can separate the hulls from the in-shell nuts. Serious problems may result if you delay harvest past the optimum time, including darkened kernels, insect infestation of both the hull (walnut husk fly) and the kernel (navel orangeworm), and losses to birds. Begin harvesting when most (85 percent or more) of the nuts can easily be removed from the tree, and when the hulls can readily be removed from all or nearly all (95 percent or more) of the harvested nuts.

**Table 1.** Typical storage lives and optimum relative humidities for nuts stored under various degrees of refrigeration

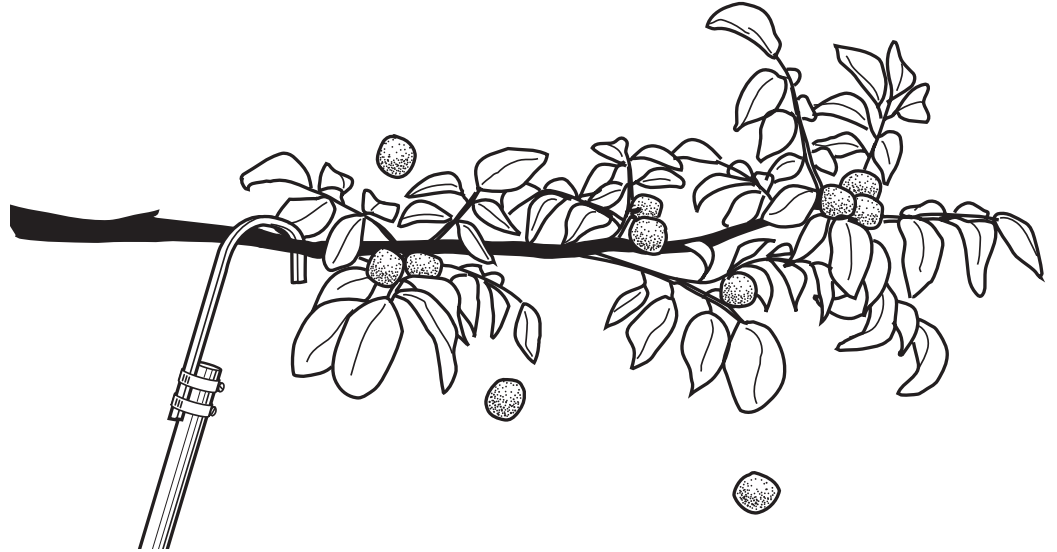
Nut species	Storage temperature			Relative humidity <sup>‡</sup>
	32° to 45°F* (0° to 7.2°C)	32°F† (0°C)	0°F (-17.8°C)	
Almonds				
in-shell	1 year +		1 year +	60 to 75%
shelled		1 year	1 year +	60 to 75%
Walnuts				
in-shell	1 year		2 years +	70 to 75%
shelled		1 year +	2 years +	70 to 75%
Pecans				
in-shell	1 year		2 years +	65 to 70%
shelled		1 year	2 years +	65 to 70%
Pistachios				
in-shell	1 year		3 years	65 to 70%
shelled		1 year	3 years	65 to 70%
Chestnuts				
in-shell	1 month	2 to 3 months	1 year +	90 to 95%
shelled, dried	1 year +	1 year +	1 year +	65 to 70%

\*Typical home refrigerator temperatures are 38° to 45°F (3.3° to 7.2°C). Nuts stored at these temperatures will have at least 90 percent of the storage life reported in the table.

†Typical home freezer temperatures may be slightly higher.

‡Except for in-shell chestnuts, relative humidity need not be controlled for nut meats in freezer storage.

SOURCE: *Commodity Storage Manual*. 1995. The Refrigeration Research Foundation (942). Bethesda, MD.



**Figure 1.** A hook affixed to a pole can be used to shake nut tree branches for harvest.

### Harvesting

Knock the walnuts from the tree by striking the branches and small shoots with a long, stout pole. For small trees, you will only need a pole; for larger trees, use a long pole with a large hook affixed to one end to enhance shaking (Figure 1). The hook should be large enough to go over a branch up to 3 inches in diameter. Use the hook to shake nuts loose.

Pick the walnuts up immediately after harvest. Nuts that lie on the ground are very susceptible to mold infections, darkened kernels, and ant invasion.

### Hulling and Drying

Hull the walnuts as soon as possible after harvest. You can hull a small quantity of nuts by hand using a pocket knife. For larger quantities, use a table fitted with an expanded metal top (Figure 2). Rub the nuts over the expanded metal to remove the hulls and other debris, which will then fall through, leaving the hulled in-shell nuts on top of the table. To help loosen the hulls of green *stick-tights* (nuts with hulls that adhere tightly to the shells), moisten them and store them for a day or two under a wet canvas tarp. Wash the nuts after hulling; this helps prevent shell staining and removes any adhering soil before drying.

**CAUTION:** Walnut hulls contain chemical compounds (phenols) that stain hands and can cause skin irritation. Wear rubberized gloves when hulling walnuts.

To dry walnuts, spread the hulled in-shell nuts in a single layer on a smooth, flat surface in a shady area where the air can circulate freely. Stir the nuts daily. If rain threatens, cover the nuts with a tarp or move them to a covered patio. If necessary, cover the nuts with screen or plastic netting to prevent theft by scrub jays and other birds.

At normal September air temperatures, walnuts will dry adequately in 3 to 4 days. Drying will take longer as harvest progresses into the fall and temperatures turn cooler. Walnuts are considered adequately dried when they have brittle kernels and brittle packing tissue; those with rubbery kernels require further drying. Inadequately dried walnuts are susceptible to mold and quickly become rancid.

### Storage

When properly dried and stored, in-shell walnuts will retain their quality and flavor for 1 year at 32° to 45°F (0° to 7.2°C), and for 2 years or more at 0°F (−17.8°C). Shelled walnuts will store well for a year or more at 32°F (0°C) and for 2 years or more at 0°F (−17.8°C) (see Table 1).

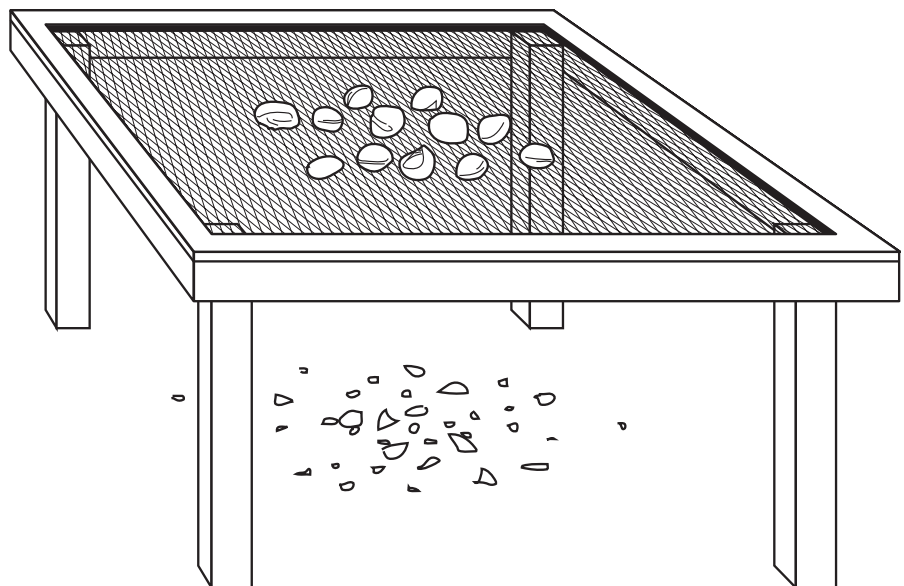
High kernel moisture content, high storage temperatures, external odors, and storage insect pests all reduce the storage life of walnuts. Be sure to package walnuts in tight containers and store them away from strong-smelling materials such as onions and garlic.

## PECANS

### When to Harvest

Pecans mature from late September through November in the interior valleys of California, depending on variety. Shucks that are split open and shells that are completely brown indicate mature kernels. You can begin to harvest once you can remove the hulls from the nuts. When fall temperatures are abnormally warm, hulls can be removed from nuts before the shells are completely brown. In such cases, delay harvest until shell browning is complete to ensure complete kernel development.

You can leave pecans on the tree into the winter months since they do not readily drop from the trees like other nuts and they are not readily infested by insects. However, nut quality (especially kernel darkening) and losses to birds such as scrub jays increase as harvest is delayed. To ensure the greatest quantity of high quality nuts that will store well, harvest as soon as the hulls have split and the shells are brown.



**Figure 2.** A table fitted with an expanded metal top can be used for hulling walnuts. Pecans and pistachios can be hulled in the same way, using smaller mesh screens to keep the nuts from falling through.

### Harvesting

Hand harvesting the nuts from the upper portions of a tall, mature pecan tree is difficult. To make harvesting easier, prune every year to keep the tree small.

Knock nuts from the tree with a long, stout pole. Use a pole with a hook at one end to shake branches. Pick the nuts up as soon as possible after harvest. Nuts left on the ground for very long invite damage from ants, birds, and molds.

### Hulling and Drying

To prevent mold growth and ensure best kernel quality, hull the nuts promptly. The shucks (hulls) on many of the pecans will drop off the nuts or remain in the tree after shaking, especially if you harvest late and the shucks are dry. Shucks do adhere to some of the nuts, and you will need to hull those. A large number of *stick-tights* (nuts with tightly adhering shucks) usually indicates that the nuts are not yet fully mature and ready for harvest. The few green stick-tights that remain after harvest are usually blanks (shells with no kernels inside).

Pecans harvested at the optimum time still have considerable shell and kernel moisture, so you have to dry them before storage. Even late-harvested nuts will require some drying.

To prevent shell cracking, you have to dry the nuts slowly at ambient air temperatures (75° to 85°F [23.9° to 29.4°C]). Spread the pecans in a thin layer on a plastic sheet somewhere with partial shade where air can circulate freely, such as on a covered patio, and stir the nuts daily. A fan blowing air across the nuts will speed the drying process. Depending upon air temperatures and the harvest date, drying will take 2 to 10 days.

During the drying process you may need to cover the nuts with screen or netting to prevent loss to birds. Pecans are properly dried when the kernels are brittle and the packing tissue (the membrane between the kernel halves) separates readily from the kernel.

### Storage

Pecans are semi-perishable: unless you store them properly mold, storage insects, poor flavor, and kernel discoloration will render them inedible. Temperature and humidity are the most important factors affecting storage life, but rodent- and odor-free storage are also important. Whole kernels have less exposed surface area than kernel pieces, so they have a longer storage life. You can store in-shell pecans for 1 year at 32° to 45°F (0°C to 7.2°C) and for 2 years or more at 0°F (−17.8°C). Shelled pecans will store for 1 year at 32°F (0°C) and for 2 years or more at 0°F (−17.8°C) (see Table 1).

## PISTACHIOS

### When to Harvest

The first sign that pistachio kernels are mature and nearing harvest is when the hulls covering the nuts change from green to a reddish color. This color change occurs in late August or early September, depending upon the growing area. You can remove the red hull from a nut easily by squeezing the hull between finger and thumb. The hulls that remain green after most have turned red will not separate easily from the nut shells, and indicate blanks.

Harvest pistachios as early as possible in order to avoid navel orangeworm infestations and losses in kernel quality. You can begin to harvest when you can easily dislodge the nuts from the cluster, usually within one to three weeks after hulls turn red. Periodically tap a few fruiting branches in the tree to see how many nuts fall free and so determine when the tree is ready for harvest. It is best to wait until most of the crop is mature and then to harvest the whole tree at once.

### **Harvesting**

Harvest pistachios by using a stout pole to knock the nuts from the branches onto a tarp spread beneath the tree. Because the nuts have split shells and hulls at harvest, they are very susceptible to contamination. Do not allow the nuts to come into direct contact with the ground.

### **Hulling and Drying**

Remove the hulls right after harvest. If you allow the hulls to remain on the nuts for an extended period after harvest you will encourage shell and kernel staining and possibly mold growth.

To remove the hulls easily, spread the nuts out on a table with a screen top (see Figure 2) and gently rub the nuts over the screen. Hardware cloth works well as a hulling screen: it is rigid, and the ½-inch mesh allows hulls, but not nuts, to fall through. You can make a smaller huller by placing the screen over the top of a five-gallon bucket.

Blank nuts are common wherever pistachios are grown. The number of blank nuts you harvest each year depends upon the pistachio variety, the climate, the rootstock, and your cultural practices. After removing the hulls, float the nuts in water to separate blank nuts (which float) from filled nuts (which sink).

You can dry pistachios in the sun on a plastic tarp somewhere with good air circulation. Spread the nuts in a shallow layer no more than two nuts deep. Under normal fall temperatures, sun-drying pistachios to the proper moisture content will take 3 to 4 days. You can also dry pistachios in a household oven at 140° to 160°F (60.0° to 71.1°C) for 10 to 14 hours. For oven drying, spread the nuts on a pan or tray in a shallow layer and stir occasionally to promote uniform drying. Pistachios are properly dried when the kernels are crisp but not brittle.

### **Storage**

Store pistachios in-shell. Pack the nuts in sturdy containers with tight-fitting lids to prevent insect infestation. In-shell pistachios can be stored for 1 year at 32° to 45°F (0° to 7.2°C) and for 3 years at 0°F (–17.8°C). Shelled pistachios can be stored for 1 year at 32°F (0°C) or for 3 years at 0°F (–17.8°C) (see Table 1).

## **CHESTNUTS**

### **When to Harvest**

The chestnuts on a tree do not mature all at one time, but ripen over a 10- to 30-day period in late August and September. Some years, depending upon chestnut variety and weather conditions, it may take as long as 5 weeks for an entire crop to mature. As chestnuts mature, they fall naturally from the tree. Do not knock the nuts from the tree, but allow them to fall naturally—a chestnut accumulates more than 50 percent of its final weight in the two weeks just before natural drop. Shaking or knocking would cause many immature nuts to fall.



### Harvesting

Gather the fallen chestnuts at least every other day as they drop. The *bur* (hull) of a mature nut will usually split open and drop with the nut. Gather only those nuts with split burs, since those with burs intact are usually blanks. A tarp spread beneath the tree makes nuts easier to pick up, and thick leather gloves make the spiny burs easier to handle. Step on nuts with split burs to pop out the nuts inside.

### Hulling

Using leather gloves, remove the burs from the nuts as soon after harvest as possible; otherwise, the nuts may mold. Because chestnuts sink in water and burs float, you can use a tub of water to sort the burs from the nuts. In rare cases, nuts may not separate from the burs. Set those nuts aside for a day or two at 55° to 65°F (12.8° to 18.3°C); after that, the burs and nuts should separate from one another.

### Storage

The chestnut is a perishable, high-starch, low-fat food more like a potato or apple than a tree nut. You have to handle chestnuts very carefully to avoid cracking or scratching the shell, and you must store them properly to prevent mold. They will roast properly and taste fresh if you store them at 32°F (0°C) and at least 90 percent relative humidity starting within one or two days of harvest. Maintain proper moisture conditions by storing in-shell nuts in a plastic bag or closed plastic container in a refrigerator. You can store in-shell chestnuts for 1 month at 32° to 45°F (0° to 7.2°C) or for a year or more at 0°F (−17.8°C) (see Table 1).

You can store shelled, dried chestnuts for a year or more at 32° to 45°F (0° to 7.2°C) or at 0°F (−17.8°C). Dried chestnuts will store longer, but they lose both flavor and texture and will not roast properly. To re-hydrate dried chestnuts, soak them in cold water for 3 or 4 hours before use.

Chestnuts lose moisture quickly at room temperature and humidity, causing the kernels to dry and harden. If stored at room temperature (above 50°F [10.0°C]), chestnuts usually mold within 2 weeks.

## FOR MORE INFORMATION

You'll find detailed information on all aspects of walnut, almond, and pistachio production and pest management in these UC DANR publications:

**Walnut Production Manual**, publication 3373

**Integrated Pest Management for Walnuts**, publication 3270

**Almond Production Manual**, publication 3364

**Integrated Pest Management for Almonds**, publication 3308

**Pistachio Production**, publication 2279

**Insect and Mite Pests of Pistachios in California**, publication 21452

To order these publications, or to request of catalog of UC DANR publications, slide sets, and videos, contact

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