

POSTHARVEST HANDLING OF PISTACHIO NUTS ON A SMALL SCALE

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The final quality of pistachio nuts depends on time of harvest and proper management postharvest handling procedures. This leaflet is aimed at briefly discussing the various steps involved in harvesting, hulling, drying, roasting, salting, and storage of pistachio nuts on a small scale.

HARVESTING

The time to harvest pistachio nuts is critical and the easiest indicator used to determine optimum harvest time is when the hull slips from the shell. In the Central Valley of California this normally occurs during the first two weeks of September. At that time change in color of the skin (epicarp) from translucent to opaque is evident and the hull (epicarp and mesocarp) easily slips from the shell (endocarp) when the fruit is pressed between the thumb and fingers. Harvest before or after this period results in inferior nut quality. Serious deterioration after harvest during high temperature occurs if the nuts are left in the hull. Shell staining and decay incidence are the major causes of deterioration.

HULL REMOVAL

Hulling must be done as soon as possible after harvest to reduce the chances for fungal growth and to avoid shell staining. Abrasive peeling machines such as a vegetable peeler can be used to remove the hulls. It consists of an electric motor and a revolving disc or plate in the bottom of an upright cylinder lined on the inside surface with an abrasive material. As much of the leaves, twigs, and other foreign materials as possible should be removed from the fruits before hulling. The fruits are thrown by the revolving plate against the abrasive surface while water is introduced from the top to wash the nuts and flush away the hull remnants into a catch basket. Hull removal usually requires about 3 to 5 minutes. The quantity that can be hulled each time depends on the capacity of the peeling machine.

An alternate and primitive method: (for very small amounts, 100 pounds or less) a quantity of 5 to 10 pounds of fruits are placed in a large burlap bag on a concrete floor. Roll, beat, and press with a piece of wood until most of the hulls are separated from the nuts.

After hulling, good nuts can be separated from empty (blank) nuts by floatation. When the hulled nuts are loaded into a wire basket, which

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is placed in water, the blank nuts float and can be removed and discarded. When the wire basket is removed, water drains off and the good nuts remain in the basket. These can be transferred into appropriate containers for transporting them to the drying area.

DRYING

Nuts at harvest contain 40 to 50 percent water (on fresh weight basis) and must be dried to about 5 percent moisture as soon as possible to prevent fungal infection, to slow down deterioration and to increase storage-life. Drying can be done using solar energy or heated air.

Sun Drying:

The pistachio nuts should be spread on trays which can then be placed in the sun to dry. It usually takes 3 to 4 days for drying depending on ambient temperatures; the higher the temperature the faster the drying. The drying trays should be covered with hardware cloth to protect the nuts from birds and rodents.

It is possible but not recommended, to dry the nuts in the sun before hulling. Hull removal after drying can be done using the same procedures described above. The disadvantage of this approach is the need for wetting the nuts during hulling which results in residual surface moisture on the hulled nuts. Thus, the nuts should be kept in the sun for a few hours to remove surface moisture before storage or packaging. This step is unnecessary if the nuts are to be salted and/or roasted immediately after hulling.

Heated-Air Drying:

This method is much faster than sun drying. A forced-air draft oven or a rotary-screen drier can be used. The time required to dry the nuts to about 5 percent moisture depends on the temperature used. At 160°F it takes about 10 hours. Higher temperatures (up to 200°F) will reduce drying time (to about 7 hours at 180°F and 5 hours at 200°F), but will also increase the extent to which the shells separate. This may become undesirable if the shell opens to a point where the kernel falls out during subsequent handling. We found an average of 1, 3, and 6 percent of the nuts dried at 160°, 180°, and 200°F respectively, to have excessive shell opening following drying. Drying at temperatures above 200°F can cause changes in flavor quality.

ROASTING AND SALTING

Dried nuts should be sorted to remove defective ones before subsequent processing and packaging.

Salting before roasting is done by soaking the nuts in a 15 percent salt solution for about 20 to 30 minutes. Lower or higher salt concentrations can be used depending on personal preference for the degree of salting. After soaking in the brine salt solution, the nuts can be dried at 160°F to 200°F for about 10 to 15 minutes to remove excess water before roasting.

Roasting is accomplished by heating the dried pistachio nuts in a rotating drum of a roaster and gradually raising the temperature to 250°F or other roasting temperatures until the desired degree of roasting is obtained. There are various capacity roasters available commercially. Alternatively roasting of small quantities can be done in the same forced-air draft oven used for drying provided that the nuts are manually rotated on the drying trays once or twice during roasting. This ensures more even heating of the nuts and more uniform roasting.

Various combinations of roasting temperatures and times can be used: 250°F for 25 minutes, or 300°F for 20 minutes, or 350°F for 15 minutes. The exact temperature-time combination depends on personal preference for the degree of roasting desired.

For salting and roasting relatively very small batches, the following procedures can be used:

1. Dissolve one tablespoon of salt in one cup of water.
2. Pour this salt solution into a deep sauce pan over a high heat setting on the stove top.
3. Pour in 10 to 12 cups of pistachio nuts and stir until all water has evaporated and salt is deposited in and on the nuts.
4. Spread nuts on cookie sheet, place in a preheated (250°F) oven, and roast for 1.5 hours (stir the nuts every 30 minutes).
5. Cool the nuts with oven door open.

STORAGE

Pistachio nuts need to be stored between drying and roasting and after roasting. Maintenance of quality and extension of storage-life depend upon:

1. Moisture content of the nuts: Reducing moisture content to 5 percent or lower is essential to maximizing their storage life.
2. Relative humidity of storage: A relative humidity of about 65 percent or lower is best for storage of pistachio nuts.
3. Storage temperature: In general, the lower the temperature the longer the storage life. Dried pistachio nuts can be stored at 68°F for a year or at 50°F for 18 months or at 32°F for 2 years with minimal quality deterioration.
4. Effective insect control: It is essential that insect infestation be controlled. Commercially, this may be done by fumigating the nuts with methyl bromide. On a small scale, it is safer to use one of the following alternatives to kill the insects if any are present:
 - a. For very small quantities, it is possible to place the nuts in a freezer for a few days. This would kill any live insects without affecting quality of the nuts.

- b. Placing the nuts in a nitrogen atmosphere (to exclude oxygen) or in an atmosphere containing 60 percent or higher carbon dioxide for a few days at ambient temperature will kill the insects.

To prevent reinfestation, the nuts must be stored in an insect-proof container such as one made of glass or heavy plastic materials.

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April 1985
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