PREPARATION

Drying Fruits no. 9.309

by P. Kendall and J. Sofos[1]

Drying is a creative way to preserve foods and use home-grown fruit, extra produce (e.g., ripe bananas) and roadside market specials. Like all methods of preservation, drying causes some nutrient loss. See fact sheet 9.308, *Drying Vegetables*, for specific information on nutrient loss.

Quick Facts...

Successful drying depends on heat, air dryness and good air circulation.

Select fresh, fully-ripened fruits.

Pretreat fruit pieces by dipping in an ascorbic acid, citric acid, lemon juice or sodium metabisulfite solution.

When dry, allow fruit to condition for four to 10 days before packaging for storage.

Package dried fruits in tightly sealed containers and store in a cool, dry place.

Drying Trays

Drying trays may be simple or complex, purchased or built. Good air circulation without reaction between food and tray is most important. See 9.308, *Drying Vegetables*, for specific information on selecting and building trays.

Selecting and Pretreating Fruits

See Table 1 for approximate yields of dried fruits. Select fresh and fully ripened fruits. Immature produce lacks flavor and color. Overmature produce can be tough and fibrous or soft and mushy. Drying does not improve food quality.

Thoroughly wash and clean fruits to remove dirt or spray. Sort and discard any fruit that shows decay, bruises, or mold. Such defects can affect all foods being dried.

Pretreating fruits prior to drying is highly recommended. Pretreating helps keep light-colored fruits from darkening during drying and storage and it speeds the drying of fruits with tough skins, such as grapes and cherries. Research studies have shown that pretreating with an acidic solution or sodium metabisulfite dip also enhances the destruction of potentially harmful bacteria during drying, including *Escherichia coli* O157:H7, *Salmonella* species and *Listeria monocytogenes*. Several methods can be used.

Table 1: Yield of dried fruits.

Produce	Amount purchased or picked Pounds	Amount dried product Pounds	Amount dried product Pints
Apples	12	1 1/4	3
Grapes	12	2	3
Peaches	12	1 to 1 1/2	2 to 3
Pears	14	1 1/2	3
Tomatoes	14	1/2	2 1/2 to 3

Ascorbic Acid Pretreatment

Ascorbic acid (vitamin C) is an antioxidant that keeps fruit from darkening and enhances destruction of bacteria during drying. Pure crystals usually are available at supermarkets and drug stores. Stir 2 1/2 tablespoons (34 grams) of pure ascorbic acid crystals into one quart (1000 milliliters) of cold water. For smaller batches prepare a solution using 3 3/4 teaspoons (17 grams) of pure ascorbic acid crystals per 2 cups of cold water. Vitamin C tablets can be crushed and used (six 500 milligram tablets equal 1 teaspoon

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ascorbic acid). One quart of solution treats about 10 quarts of cut fruit. Cut peeled fruit directly in ascorbic acid solution. Soak for 10 minutes, remove with a slotted spoon, drain well and dehydrate. Commercial antioxidant mixtures are not as effective as ascorbic acid but are more readily available in grocery stores. Follow directions on the container for fresh cut fruit.

Citric Acid or Lemon Juice Pretreatment

Citric acid or lemon juice may also be used as antidarkening and antimicrobial pretreatments. Prepare the citric acid solution by stirring 1 teaspoon (5 grams) of citric acid into one quart (1000 milliliters) of cold water. For the lemon juice solution, mix equal parts of lemon juice and cold water (i.e., 1 cup lemon juice and 1 cup water). Cut the peeled fruit directly into the citric acid or lemon juice solution. Allow to soak 10 minutes, then remove with a slotted spoon, drain well and dehydrate.

Sodium Metabisulfite Pretreatment

Sulfur and sulfite compounds have been used for centuries to prevent discoloration and reduce spoilage during the preparation, dehydration, storage, and distribution of many foods. However, in recent years, sulfites have been implicated as initiators of asthmatic reactions in some people, especially those with asthma. As a result, the Food and Drug Administration (FDA) has banned the use of sulfites on fresh fruits and vegetables for sale or served raw to consumers. They are still used as an antimicrobial agent and to help preserve the color of some dried fruit products.

If you choose to use a sulfiting agent, use U.S.P. (food grade) or Reagent Grade sodium metabisulfite, not Practical Grade. Sodium metabisulfite is often available at pharmacies or where wine-making supplies are sold. Stir 1 tablespoon (21 grams) sodium metabisulfite into one quart (1000 milliliters) of cold water. Cut the peeled fruit directly into the sodium metabisulfite solution. Allow to soak 10 minutes, then remove with a slotted spoon, drain well and dehydrate. Because of health and safety issues, we do not recommend the burning of sulfur as a method for pretreating fruits prior to drying.

Cracking Skins

Fruits such as grapes, prunes, small dark plums, cherries, figs, and firm berries have tough skins with a wax-like coating. To allow inside moisture to evaporate, crack or “check” skins before drying whole fruits. To crack skins, dip fruit in briskly boiling water for 30 to 60 seconds, then dip in very cold water. Drain on absorbent towels before placing on drying trays.

Drying Methods

Arrange pretreated fruits on drying trays in single layers, pit cavity up. Dry at 140 degrees F (60°C) in an oven or dehydrator. The length of time needed to dry fruits will depend on the size of the pieces being dried, humidity and the amount of air circulation in the dehydrator or oven. Thinner slices and smaller pieces will dry more quickly than larger, thicker pieces or whole fruits. Also, products will generally dry more quickly in convection ovens or electric dehydrators than in conventional ovens. At a drying temperature of 140 degrees F, plan on about 5 hours for thin apple slices to 24 hours for peach halves. If possible, stir food and turn large pieces over every 3 to 4 hours during the drying period. Fruits scorch easily toward the end of drying. Therefore, it’s best to turn the power off when drying is almost complete and open the door wide for an additional hour before removing pieces.

Testing for Dryness

Foods should be dry enough to prevent microbial growth and subsequent spoilage. Dried fruits should be leathery and pliable. See Table 2 for dryness test on individual fruits. To test foods for dryness, remove a few pieces and let cool to room temperature. When warm or hot, fruits seem more soft, moist and pliable than they actually are. Squeeze a handful of the fruit. If no moisture is left on the hand and pieces spring apart when released, they are dry.

Post-Drying Treatment

Conditioning. When drying is complete, some pieces will be more moist than others due to their size and placement during drying. Conditioning is a process used to evenly distribute the minimal residual moisture throughout all pieces. This reduces the chance of spoilage, especially from mold. To condition, place cooled, dried fruit loosely in large plastic or glass containers, about two-thirds full. Cover and store in a warm, dry, well-ventilated place for four to 10 days. Stir or shake containers daily to separate pieces. If beads of moisture form inside, return food to drying trays for further drying, then repeat conditioning process.

Pasteurizing. Foods that might have been exposed to insects (including fruit flies and Indian meal moths) before or during the drying process should be pasteurized to destroy insect eggs. Pasteurizing also helps remove excess moisture that may have been reabsorbed during conditioning.

- **Freezer method.** Seal dried food in heavy freezer containers (boxes or bags). Freeze for 48 hours to kill insects and insect eggs. Remove and package promptly for permanent storage. Do not allow sweating to take place inside bags.
- **Oven method.** Reheat dried foods on trays at 150°F for 30 minutes or 175°F for 15 minutes. Remove, cool quickly and package for permanent storage. This method of pasteurizing results in additional loss of vitamins, and, if not done carefully, may scorch food.

Packaging and Storage

Pack cooled, dried foods in small amounts in dry, scalded glass jars (preferably dark) or in moisture- and vaporproof freezer containers, boxes or bags. Store in a cool, dry, dark place. See 9.308 for complete instructions on packaging and storing. Properly stored, dried fruits keep well for six to 12 months.

Using Dried Fruits

To cook dried fruit, cover with boiling water and simmer covered until tender (about 15 minutes). If needed, sweeten to taste near the end of cooking or after removing from heat. Most dried fruits need no extra sweetening. If desired, add a few grains of salt to help bring out the fruit's natural sweetness, or add a little lemon, orange or grapefruit juice just before serving. This helps give fruits a fresh flavor and adds vitamin C.

To reconstitute fruit for use in a cooked dish, such as a pie, place it in a bowl and cover with boiling water. Let soak until tender and liquid is absorbed (one hour or longer). Thinly sliced fruits may not require soaking before using in cooked dishes.

Reconstituted or dried fruits are excellent in cobblers, breads, pies, puddings, gelatin salads, milk shakes and cooked cereals. Any liquid that remains after soaking can be used as part of the water needed in the recipe.

Table 2: Steps for drying fruit.

Fruit	Drying Procedure
Apples	Select mature, firm apples. Wash well. Pare, if desired, and core. Cut in rings or slices 1/8 to 1/4 inch thick or cut in quarters or eighths. Dip in ascorbic acid or other antidarkening/antimicrobial solution for 10 minutes. Remove from solution and drain well. Arrange in single layer on trays, pit side up. Dry until soft, pliable, and leathery; no moist area in center when cut.
Apricots	Select firm, fully ripe fruit. Wash well. Cut in half and remove pit. Do not peel. Dip in ascorbic acid or other antidarkening/antimicrobial solution for 10 minutes. Remove from solution and drain well. Arrange in single layer on trays, pit side up with cavity popped up to expose more flesh to the air. Dry until soft, pliable, and leathery; no moist area in center when cut.
Bananas	Select firm, ripe fruit. Peel. Cut in 1/8 inch slices. Dip in ascorbic acid or other solution for 10 minutes. Remove and drain well. Arrange in single layer on trays. Dry until tough and leathery.
Berries	Select firm ripe fruit. Wash well. Leave whole or cut in half. Dip in boiling water 30 seconds to crack skins or dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain well. Arrange on drying trays not more than two berries deep. Dry until hard and berries rattle when shaken on trays.
Cherries	Select fully ripe fruit. Wash well. Remove stems and pits. Dip whole cherries in boiling water 30 seconds to crack skins. May also dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain well. Arrange in single layer on trays. Dry until tough, leathery, and slightly sticky.
Citrus peel	Select thick-skinned oranges with no signs of mold or decay and no color added to skin. Scrub oranges well with brush under cool running water. Thinly peel outer 1/16 to 1/8 inch of the peel; avoid white bitter part. Dip in ascorbic acid or other antidarkening/antimicrobial solution for 10 minutes. Remove from solution and drain well. Arrange in single layers on trays. Dry at 130°F for 1 to 2 hours; then at 120°F until crisp.
Figs	Select fully ripe fruit. Wash or clean well with damp towel. Peel dark skinned varieties if desired. Leave whole if small or partly dried on tree; cut large figs in halves or slices. If drying whole figs, crack skins by dipping in boiling water for 30 seconds. For cut figs, dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain well. Arrange in single layers on trays. Dry until leathery and pliable.
Grapes and black currants	Select seedless varieties. Wash, sort, remove stems. Cut in half or leave whole. If drying whole, crack skins by dipping in boiling water for 30 seconds. If halved, dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain well. Dry until pliable and leathery with no moist center.
Melons	Select mature, firm fruits that are heavy for their size; cantaloupe dries better than watermelon. Scrub outer surface well with brush under cool running water. Remove outer skin, any fibrous tissue and seeds. Cut into 1/4- to 1/2-inch thick slices. Dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain well. Arrange in single layer on trays. Dry until leathery and pliable with no pockets of moisture.
Nectarines and peaches	Select ripe, firm fruit. Wash and peel. Cut in half and remove pit. Cut in quarters or slices if desired. Dip in ascorbic acid or other antidarkening/antimicrobial solution for 10 minutes. Remove and drain well. Arrange in single layer on trays pit side up. Turn halves over when visible juice disappears. Dry until leathery and somewhat pliable.
Pears	Select ripe, frim fruit. Bartlett variety is recommended. Wash fruit well. Pare, if desired. Cut in half lengthwise and core. Cut in quarters or eighths or slice 1/8- to 1/4-inch thick. Dip in ascorbic acid or other antidarkening/ antimicrobial solution for 10 minutes. Remove and drain. Arrange in single layer on trays pit side up. Dry until springy and suede-like with no pockets of moisture.
Plums and prunes	Wash well. Leave whole if small; cut large fruit into halves (pit removed) or slices. If left whole, crack skins in boiling water 1 to 2 minutes. If cut in half, dip in ascorbic acid or other antimicrobial solution for 10 minutes. Remove and drain. Arrange in single layer on trays pit side up, cavity popped out. Dry until pliable and leathery; pit should not slip when squeezed if prune not cut.

[1]*P. Kendall, Colorado State University Cooperative Extension foods and nutrition specialist and professor, food science and human nutrition; and J. Sofos, Colorado State University professor, animal sciences.*

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