

Home Drying of Fruits and Vegetables

Along with a general revival of interest in the way things used to be done, there has been new emphasis lately on drying as a way of putting food by. Dried herbs are widely used, and many people are growing their own. Dried fruits have always been popular, and people have long recognized the importance of dried beans and peas as a source of inexpensive protein in their diets.

Drying foods, one of the oldest preservation methods, is simple and inexpensive. But it's long been overshadowed by canning and freezing, which do a better job of holding the taste, looks, and nutritive value of foods. Following are several ways of drying fruits and vegetables. Choose among them, according to your personal preferences, equipment, and weather conditions.

WHAT TO DRY

Apples, herbs, dry beans and peas, corn, sweet potatoes, green beans, and onions are the easiest foods to dry at home.

Select fresh, prime-quality fruits and vegetables for drying. Fruits should be just ripe enough for good eating. Wash fruits and vegetables thoroughly before preparing them for drying.

The following need no antidarkening or other pretreatment before drying: herbs, dry-shelled beans and peas, peppers, pitted cherries, berries, and onions.

Two other foods that are traditionally not pretreated in West Virginia are green beans and apples. Pretreat them for a better tasting and more attractive product.

All other fruits and vegetables covered in this publication are given some type of pretreatment before they are dried in order to prevent darkening, loss of color and nutrients, or undesirable changes in flavor and texture.

SPECIAL TREATMENTS FOR FRUITS

Several methods are available to prevent darkening of fruit. An ascorbic-acid coat or salt-water-and-vinegar dip are used to hold the color of fruit temporarily as it is peeled, pitted, and sliced for drying. Following that, fruit can be sulfured or steam blanched to prevent further darkening during drying and storage.

Temporary Antidarkening Treatments ascorbic-acid coat

Mix pure ascorbic acid or use a commercial ascorbic acid mixture found with canning and freezing supplies in grocery stores. Follow directions on the package for fresh-cut fruit. You may also use six 500-milligram Vitamin C tablets in 1 gallon of water. Sprinkle the solution over the fruit and turn the pieces over and over to coat each piece thoroughly.

salt-water-and-vinegar dip

Mix 4 tablespoons of salt and 2 tablespoons of vinegar in 1 gallon of water. Drop the cut fruit into the solution as you prepare it for drying.

Sulfuring

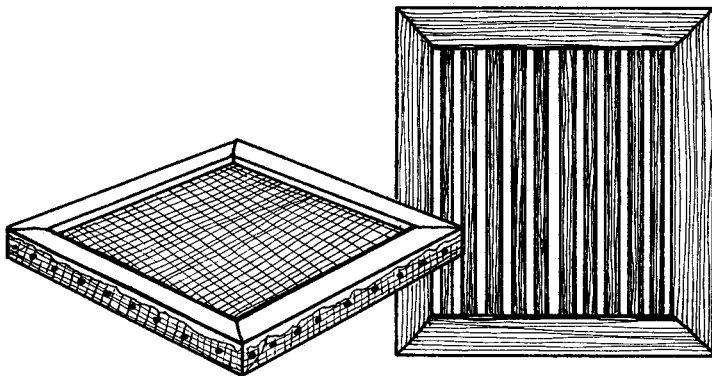
Without the follow-up of a sulfuring treatment, many fruits—especially apples, pears, and peaches—will gradually darken during drying and storage. Fruits may certainly be dried without sulfuring, but this treatment decreases the loss of vitamins A and C, as well as preserving color and flavor. Sulfuring also helps keep fruit from bugs and souring.

There are two sulfuring methods—one uses pure sulfur fumes, the other is a sodium-bisulfite dip.

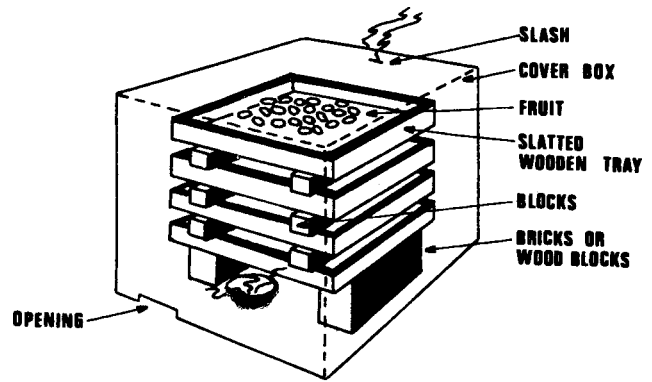
sulfur fumes treatment

You will need trays for this method, a box to place over the fruit, and a place to work outdoors. You can buy refined pure sulfur (sublimed) at the drug store. You can also buy sulfur candles, but these take longer to burn than the pure sulfur.

Use 1 level teaspoon powdered sulfur for each pound of prepared fruit. A 2-ounce box of sulfur will treat 16 to 18 pounds of prepared fruit. Sulfur only the amount of fruit you can dry at one time.



Use trays made of wood strips or a wood frame covered with a loosely woven cloth that will allow the fumes to circulate. Don't use metal trays or screening because sulfur will corrode them. You'll need to stack the trays one above the other, separating them with blocks of wood, bricks, or stones. The bottom tray should be 6 to 10 inches above the ground to allow space above the burning sulfur. Allow from 2 to 3 inches of space between the rest of the trays. Leave a 6-inch space between the top tray and the top of the box used to cover the stacked trays.



This box can be a large cardboard carton, or a wooden crate covered with building paper. Make a small opening close to the bottom edge of the box, near one corner, to let air in so that the sulfur will burn. Make about a $\frac{1}{2}$ -inch hole near the top of the back of the box to create a draft.

step-by-step directions

1. Follow instructions given for washing, peeling, and preparing individual fruit.
2. Place fruit on trays. Don't crowd it. Stack trays as previously directed.
3. Place sulfur in a clean, flat, small dish or pan. Use a metal or enameled dish, or a small aluminum pie tin, or shape a dish from a double thickness of aluminum foil.
4. Roll sulfur loosely in a small piece of paper, twist the ends closed, and place it on the dish.
5. Light the paper and as soon as the sulfur starts to burn, slide the dish under the bottom tray and put the sulfuring box over the stacked trays. Sulfur first melts at 240 degrees F, becomes a pasty-looking brown, and then burns with a clear blue flame. (The sulfur-dioxide fumes you smell protect the fruit. But don't breathe the fumes, because they will irritate your nose and eyes and could make you feel sick.)
6. After the sulfur has finished burning, close the openings in the box with masking tape and start counting the sulfuring time. See directions for each fruit.
7. When time is up, lift the box off, tilting it away from you so that fumes don't come up in your face. Remove trays carefully.
8. Start, at once, whichever drying method you have chosen.

sodium-bisulfite dip

Use 1 teaspoon sodium bisulfite for each gallon of water. Mix thoroughly. Soak prepared fruit in solution for 5 minutes; drain. Follow directions for drying fruit.

Steam Blanching

If you do not wish to sulfur fruits, you can steam blanch them instead, particularly if you plan to dry them in either oven or dehydrator. This is not as effective as sulfuring, but it is an acceptable alternative method. See directions for steam blanching in the Special Treatments for Vegetables section. Steam-blanching fruits take longer to dry.

SPECIAL TREATMENTS FOR VEGETABLES

Blanching vegetables, just the way you do before freezing them, stops the action of enzymes that cause poor texture and loss of color and flavor. Blanched vegetables also reconstitute more easily than ones that haven't been blanched.

Steam blanching is better than blanching in boiling water because fewer nutrients are leached out. Both methods are acceptable. If you don't have a blancher, you can adapt other equipment found in most kitchens.

Steam Blanching

Put about 2 inches of water in a big kettle with a close-fitting lid. Bring water to a brisk boil. Put a layer of vegetables no more than 2 or 3 inches deep into a wire basket, colander, or sieve that will fit into the kettle over boiling water. Place lid on kettle and start counting time given in step-by-step directions for each vegetable. Remove from blancher when time is up. Start drying procedure.

Boiling-water Blanching

Fit a wire basket into a big kettle with a close-fitting lid. Put vegetables (1 pound per gallon of water) into blanching basket and lower into

boiling water. Cover and start counting time immediately.

Remove blanched vegetables from kettle when time is up and let moisture drain. You do not need to cool vegetables. Start drying procedure.

METHODS OF DRYING

Successful drying depends on three things: heat, low humidity, and good circulation of air. These can happen outdoors naturally, or they can be created indoors in a dehydrator or oven.

You can get information on constructing a home dehydrator from your county Extension office. Keep in mind the added cost of energy when foods are dried in a dehydrator or oven.

Sun Drying

Because of the weather in West Virginia, it may not be practical to depend solely on the sun. Dry in quantities that can be finished in the oven if rainy weather interrupts your sun-drying plans. Food will sour or mold if they stay warm and damp too long.

You can make drying trays from screens or from wood slats attached to a frame. Cover with clean cheesecloth or other thin cloth that will let the air circulate.

After pretreatment, spread fruits or vegetables on cloth-covered trays. Put a layer of cheesecloth or other thin material over food to help keep out dust and insects. Place loaded trays on a roof or other high surface to help keep animals and people from bothering them. Choose a spot away from traffic exhaust and dust.

Be sure to bring loaded trays into the house each night, or the dew will remoisten foods. Generally, fruits and vegetables will dry in 2 to 4 days, if conditions are right.

You can dry small quantities of food inside a car parked in the sun. Keep windows open for ventilation.

Indoor Drying

oven drying

Oven drying can take anywhere from 4 to 12 hours. Careful watching is a must.

Dry no more than 4 to 6 pounds of prepared fruit or vegetable at one time. Place fruit or vegetables on trays that let the air circulate from below, as well as from the sides. Use trays made of screening or wood slats attached to a frame and covered with clean cheesecloth or other thin cloth. Don't use cookie trays or cake pans, because air cannot circulate through the food, making the drying time extremely long.

Preheat oven to 140 degrees F. If your oven thermostat cannot be set this low, put it at the lowest possible setting and use a thermometer placed inside the oven to check the temperature. Leave door propped open slightly to keep oven from getting too hot. You can use an electric fan, placed in front of the oven door, to create a continuous flow of air and speed up the drying. Turn foods over and stir every half hour or so, because as foods become dry, they tend to scorch easily.

It's also a good idea to turn trays front-to-back and shift their positions in oven to help foods dry evenly. If you stack two trays on each oven rack, use wood blocks at corners to separate them.

dehydrator

Temperature must also be controlled when you dry food in a dehydrator. Start out between 140-160 degrees F and reduce the temperature as the food dries. It takes from 6 to 12 hours to dry fruits and vegetables in a dehydrator.

attic

A ventilated attic can be a good place to dry food. If your attic seems suitable, be sure to use a protective cover, such as cheesecloth, to keep dust and fiberglass-insulation particles from settling on the food.

Drying food over furnace ducts and heat registers is not recommended because of problems with dust.

Dryness Test

Check the instructions given under step-by-step directions for individual fruits and vegetables to determine when they are ready. Test them by squeezing a handful. If no moisture is left on the hand and foods spring apart when you open your hand again, the product has reached a properly dried state. In general, vegetables should be dried until they are brittle. Fruits should be pliable.

CONDITIONING

It's hard to dry foods evenly, especially in an oven or dehydrator. Some pieces will be underdried and some will be overdried, depending on the size of food and its location on the trays.

After drying, cool the food on trays and put into a large closed container, about $\frac{2}{3}$ full, for conditioning. This should make the whole batch equally dry. Shake them daily for 2-4 days.

PASTEURIZING

Pasteurize (heat treat) sun-dried vegetables to get rid of any insects or insect eggs. This is usually not necessary for fruits that have been sulfured. Foods that have been dried in the oven or dehydrator will be free of insects or eggs. However, if they are allowed to stand out in the air without protection for very long, they may also need pasteurizing.

Use your oven for pasteurizing. Place a thermometer in the oven to monitor the temperature, and time each batch. Set the oven on the lowest temperature setting. Spread the fruit or vegetable in a single layer on shallow pans or cookie sheets. Heat for 10 to 15 minutes at 175 degrees F or for 30 minutes at 150 degrees F.

Remove each batch of dried food and spread out to cool on clean dish towels. Package when food reaches room temperature.

Drying Fruits

Step-by-Step Directions

FRUIT	PREPARATION	PRETREATMENT	DRYING
apples	Use fall or winter cooking apples. Wash, peel, core. Trim out blemishes. Cut into slices or rings about $\frac{1}{8}$ -inch thick. Slice into salt-water-and-vinegar or ascorbic-acid solution. Drain.	Sulfur 60 minutes, or steam blanch 5 minutes and sulfur 30 minutes. (Apples may be dried without any pretreatment, but they will be darker and have a different flavor).	Spread one layer deep on trays. Dryness test: should be leathery, with no moisture when cut and squeezed. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
berries	Wash, leave whole, or cut strawberries in half.	No treatment necessary. Steam blanch $\frac{1}{2}$ to 1 minute, if desired.	Spread one layer deep on cloth covered tray to prevent sticking. Dryness test: berries should not show moisture when crushed between fingers. They should rattle. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
cherries	Wash and pit, halve, or leave whole.	If cherries are not pitted, blanch in boiling water 30 seconds, or steam blanch 1 minute. (This is necessary to break skin so drying will penetrate cherries.) Cool at once and drain.	Spread one layer deep on trays. If oven drying, reduce heat near end of drying time to prevent scorching. Dryness test: should be leathery, but not sticky. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
grapes	Use seedless grapes. Wash and leave whole. Remove stems.	Blanch in boiling water 15 to 30 seconds to crack skin. Cool at once and drain.	Same as for cherries. Dryness test: should be pliable and leathery.

FRUIT	PREPARATION	PRETREATMENT	DRYING
peaches	Wash fully ripe freestone peaches. Loosen skins by dipping each peach in boiling water for 30 seconds. Cool quickly and peel. Slice into anti-darkening solution. Drain.	Sulfur 1 hour, or steam blanch 7 or 8 minutes.	Spread one layer deep on trays. If oven drying, lower temperature near end of drying time to prevent scorching. Dryness test: should be leathery. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
pears	Wash. Peel, cut in half, core. Slice $\frac{1}{8}$ - to $\frac{1}{4}$ -inch thick. You can leave skin on, if desired. Slice into anti-darkening solution. Drain.	Sulfur 1 hour, or steam blanch 5 minutes and sulfur 30 minutes.	Spread one layer deep on trays. Dryness test: should be springy, but no moisture when cut. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
persimmons	Wash. Force through a strainer to remove seeds and stems.	To each quart of pulp, add 1 teaspoon ascorbic acid and mix well.	Spread very thin on aluminum foil-covered cookie sheet. Dryness test: should be flaky, with no moisture when broken. Condition, package, and store.
plums	Wash. Remove seeds and slice.	Sulfur 1 hour.	Same as for peaches. Dryness test: should be leathery and limber. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.

Drying Vegetables

Step-by-Step Directions

VEGETABLE	PREPARATION	PRETREATMENT	DRYING
Beans, green	Wash and string, if necessary. Cut in 1-inch lengths. Split larger varieties lengthwise so they will dry faster.	Steam blanch for 5 minutes. Or blanch in boiling water 3 minutes.	Spread one layer deep on trays. Dry until brittle. Condition, package, and store. If sun dried, pasteurize. Cool, package, and store.
Beans, shucky	Wash and string. White half-runner beans are best.	None.	String through middle of beans with a clean string. Hang in warm, dry, well-aired room until brittle. Or sun dry. Pasteurize, cool, package, and store.
Carrots	Leave on $\frac{1}{2}$ inch of tops. Wash, leave whole, and do not peel.	Steam 15 to 20 minutes, or cook in boiling water 8 to 15 minutes—until cooked through, but still firm. Remove tails, crowns, any whiskers. Slice into $\frac{1}{8}$ -inch rounds, or shred using coarse blade of vegetable grater.	Spread one layer deep on trays. Dryness test: slices should be very tough and leathery; shreds should be brittle. Cool, package, and store. If sun dried, pasteurize. Cool, package, and store.
Corn	Husk corn at good eating stage and remove silks. Wash.	Steam on cob for 10 to 15 minutes, or in boiling water 7 to 11 minutes—until milk is set. Cut kernels off cob.	Spread $\frac{1}{2}$ -inch deep on trays. Stir often to prevent lumping. Dryness test: corn should be brittle, glassy, and semi-transparent. Cool, package, and store. If sun dried, pasteurize.
Herbs	Swish in cold water to remove dust.	None	Hang in warm, dry, well-ventilated room until leaves crumble when touched. (Sunlight fades green color.) Temperatures over 100° F cause loss of aroma. Package and store.

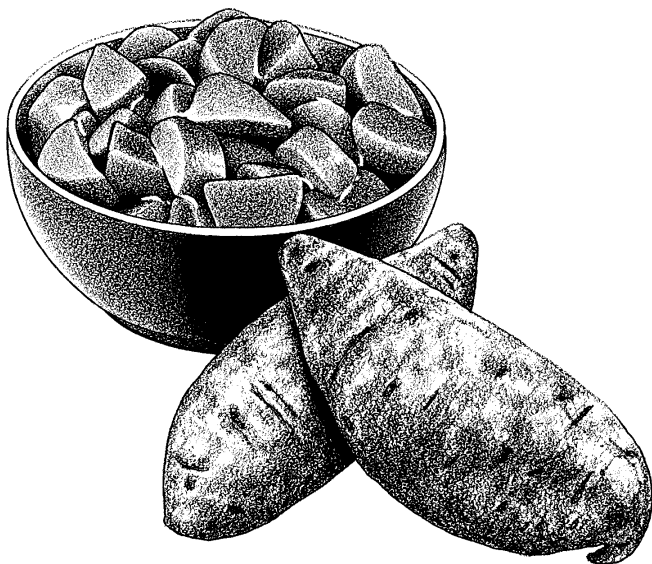
VEGETABLE	PREPARATION	PRETREATMENT	DRYING
Legumes, dry shelled	Allow beans or peas to mature and dry on vines. Shell, wash.	None.	Spread one layer deep on trays. Dry until beans are hard, brittle, and break clean when broken. Pasteurize, cool, package, and store.
Legumes, mature	Harvest beans or peas when pods are mature and leathery, but not dry.	Steam blanch 5 minutes or blanch in boiling water 3 minutes.	Spread one layer deep on trays. Dry until hard and brittle. If using dehydrator, heat should be 110° to 120° F at start. Stir beans often during first few hours of drying. Gradually raise dehydrator temperature to 140° F. Cool, package, and store. If sun dried, pasteurize.
Onions	Wash, peel, and slice $\frac{1}{8}$ - to $\frac{1}{4}$ -inch thick.	None.	Spread one layer deep on trays. Dry until brittle. Crush or break into smaller pieces, if desired. Cool, package, and store. If sun dried, pasteurize.
Peppers, green	Use full-grown peppers. Peel. Cut open and remove seeds. Slice for quick drying.	None	Spread one layer deep on trays. Dry until brittle. Crush or break into smaller pieces if desired. Cool, package, and store. If sun dried, pasteurize.
Soybeans	Use green soybeans. Wash.	Steam blanch pods 8 minutes or blanch in boiling water 5 minutes. Shell.	Spread one layer deep on trays. Dry until hard and wrinkled. Cool, package, and store. If sun dried, pasteurize.
Sweet potatoes	Scrub with vegetable brush under cold running water.	Boil until cooked through, but still firm—about 30 minutes. Cool. Dice or slice $\frac{1}{8}$ - to $\frac{1}{4}$ -inch thick.	Spread one layer deep on trays. Dry until tough and leathery and starting to get brittle. Cool, package, and store. If sun dried, pasteurize.

STORING

Dried foods must be cooled down to room temperature before storage. If they are too warm, they will sweat in the packages. Use moisture-vapor-proof containers with tight-fitting lids such as glass jars, coffee cans, plastic boxes, or plastic frozen-food bags that can be fastened tightly with a twist-tie.

Small packages may be stored in a larger container with a tight-fitting lid in a dry, cool place. Once you open a package of dried food, store it in the refrigerator.

If you have enough space in your freezer you can keep dried foods there. Label the packages with the name of the food, the date, and the food preservation method.



USING DRIED VEGETABLES

When you reconstitute vegetables, they should plump up to nearly the same size they were when they were fresh. Start with $1\frac{1}{2}$ to 2 cups of water for each cup of dried vegetables. If necessary, add more water during the soaking process, with almost enough water remaining at the end to cover the food.

Blanched vegetables need about 2 hours of soaking time before cooking. Unblanched vegetables will take longer. Soak shucky beans and dry shelled beans overnight before cooking.

Herbs are used without soaking.

Cook vegetables in same water in which they have soaked to save nutrients. Boil or simmer them in soups, stews, or other dishes cooked in liquid. Season with herbs to help make up for flavor lost during drying.



USING DRIED FRUITS

Dried fruit, just as it is, makes an excellent snack. It's good to take along when you are camping or hiking.

Properly dried reconstituted fruits are a tasty addition to meals. They return to almost their original size, form, and appearance. About 1 to 2 cups of dried fruit will serve six people.

Pour boiling water over dried fruit in a saucepan. Use just enough water to cover. Add more water if needed, rather than starting with too much and wasting nutrients. Simmer until tender—about 15 minutes.

Or you can soak the fruit for a few hours before cooking—but don't oversoak, because fruit will get mushy and lose flavor. Cook fruit in water used for soaking.

Sweeten to taste near the end of cooking or after taking pan from heat. Most dried fruits need no extra sweetening. They are especially good in pies and cakes.

NUTRITIVE VALUE

Fruits and vegetables in any form supply useful amounts of necessary fiber in your diet. Because of their high natural-sugar content, dried fruits are rich in food energy. Many are also rich in iron and other minerals. Dried beans and peas are high in protein.

Drying destroys most of the vitamin C in vegetables and in unsulfured fruits. Much of the vitamin A is also destroyed, especially in sun-dried foods. Sulfuring does protect against the loss of vitamins C and A in fruits, but in the process it destroys thiamine; this doesn't matter much.

Minerals and many vitamins, too, are water-soluble. That's why it's a good idea to find a use for any leftover water in which dried foods are soaked and cooked. You might use them in gelatin salads and desserts, in fruit and vegetable juice drinks, and in soups.

Adapted from WP-106, reviewed by Amy O'Dell, M.S., Graduate Assistant, and Guendoline Brown, Ph.D., Health and Nutrition Specialist, 1999.

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