

Dehydrating Basics

Basic Food Safety

Wash Hands Frequently

- Personal cleanliness is a must. Wash your hands thoroughly and frequently. E. coli resides in the human nose and intestines. Wash your hands if you rub your nose, or if you wipe your face or skin.
- Bandage any cuts or burns on hands before handling food, or use disposable gloves.

Avoid Cross Contamination

- Rinse all fresh fruits and vegetables well under running water before preparing or eating them. Dry them with a clean cloth or paper towel.
- **ALWAYS** wash your hands, knives, cutting boards, and food preparation surfaces well with soapy water before and after any contact with raw meat, fish, or poultry.
- Use a disinfecting solution of 1½ teaspoon of chlorine bleach to 1 pint of water. Dispense with a spray bottle to disinfect countertops, cutting surfaces, sinks, etc. Let sit one minute then wipe. Make a new solution daily.

When In Doubt, Throw It Out

- Never taste food that looks or smells strange to see if it can still be used.
- Most bacteria that cause foodborne illness are odorless, colorless, and tasteless.

Dehydrating Foods

The overall objective in dehydrating foods is to remove moisture before the food spoils. To maintain safety and quality, several factors must be considered when drying fruits, vegetables, and herbs. Keep in mind that specific food products often have recommendations that are unique to them. Drying removes the moisture from food so that microorganisms such as bacteria, yeasts, and molds are less likely to grow; however, drying does not effectively destroy them. Because there is not a heat treatment that effectively destroys disease-causing microorganisms, it is critical to use safe food-handling practices when growing and handling fruits, vegetables, and herbs for drying.

- The optimum drying temperature is 140°F. If higher temperatures are used, the food will develop “case hardening” and moisture will not be able to escape from the food; this, in turn, will lead to a moldy food product. Therefore, do not rush the drying process.
- Low humidity is also needed when drying foods. If the surrounding air is humid, the foods will not dry effectively. Increasing the air movement away from the food will assist in the drying process.
- Foods can be dried in the oven, under the sun, on the vine, or indoors using a dehydrator. There are several resources that provide tested methods for dehydrating vegetables, fruits, and herbs ask your County Extension office for information on specific drying methods.



Additional Food Safety

When dehydrating foods, using good sanitary practices is critical to reducing the risk of contaminating foods with pathogens and spoilage microorganisms.

1. After harvesting produce or herbs, place in containers and locations that are free from additional contamination (for example, pets and wild animals will not have access).
2. Begin the dehydration process soon after harvesting.
3. Clean and sanitize all utensils, containers, the food-contact surfaces of dehydrating equipment and work surfaces.
4. Always wash hands before handling foods—that includes harvesting.
5. Consider using disposable gloves when preparing foods for dehydrating. Dispose of gloves after use.

Dehydrating Fruits

Pretreating fruits is a personal preference; food safety is not affected. Pretreating some fruits before drying will reduce vitamin loss, flavor loss, browning, and deterioration during storage.

- Ascorbic Acid is used by dissolving 1 tablespoon of the powder in 1 quart of cold water. Dip the fruit in the solution, drain, and dehydrate.
- Crazing: Some fruits have a protective wax coating, such as plums, figs, cranberries, blueberries, grapes, etc. It is necessary to pretreat these fruit by dipping them in boiling water for 1 to 2 minutes, according to the size and toughness of the skin.
- Sodium bisulfate is used by dissolving 2 teaspoons of the powder in 1 quart of water and adding the cut fruit. Dip the fruit in the solution, drain, and dehydrate.
- Citric Acid is only one-eighth as effective as ascorbic acid. Dissolve 1 tablespoon in 1 quart of water. Dip the fruit in the solution, drain, and dehydrate.
- Citrus Juice: pineapple, lemon, and lime juice may be used, but are only one-sixth as effective as ascorbic acid. Use 1 cup of lemon or lime juice to 1 quart of water. Dip the fruit in the solution, drain, and dehydrate.
- Sulfuring means exposing fruit to fumes of burning sulfur. Some people are allergic to sulfur, especially those who suffer from asthma. Sulfuring must be done outside.

Testing for Dryness

Fruit should be pliable and leather like, without any pockets of moisture.

Dehydrating Vegetables

Just as with freezing, you must blanch vegetables to deactivate enzymes that cause flavor and color deterioration during the dehydration process. Blanch with hot water or steam for the time stated in the separate handout, Freezing Fruits and Vegetables Guide. Do not blanch green peppers, onions, garlic, mushrooms and okra.

Testing for Dryness

Vegetables may dry unevenly and some pieces may need to be removed before others. Most vegetables will be hard and brittle when dried. If using a vertical fan & heat source, rotate trays to help dry food evenly.

Finishing

Conditioning

All dried foods should be conditioned before packing. Too much moisture left in a few pieces may cause the whole batch to mold.

- Place dried foods in a tightly closed large container.
- Stir or shake each day for a week. This will equalize the moisture.
- If moisture forms on the inside of the container the food has not been dried sufficiently. Return the food to the dehydrator for a few more hours.
- Pasteurize any food products that could have been exposed to insect infestation or larva prior to handling or during the drying process by freezing it in airtight containers at 0° F for at least two days.

Storage

Moisture must be kept from dried foods when they are in storage. First, cool completely. Warm food causes sweating which could provide enough moisture for mold to grow. Pack foods into clean, dry insect-proof containers as tightly as possible without crushing. Store dried foods in clean, dry home canning jars, plastic freezer containers with tight-fitting lids or in plastic freezer bags. Vacuum packaging is also a good option. Pack foods in amounts that can be used in a recipe or all at once.

Dried foods maintain the best quality and nutritional value if they are used in less than 12 months. Dried foods may still be edible after many months or years in storage. They may not be as tasty or nutritious. Some people prefer to store dried food in the freezer because it takes up little space and there are no problems with mold or insects.

Rehydrate

There are three basic methods used to rehydrate dried foods: soak in liquid, boil in water, cook in liquid.

- Do not add salt or sugar during the first 5 minutes of rehydration as they hinder the water absorption process.
- Various fruit juices, yogurt, cordials, and fruit liqueurs may be used instead of water to reconstitute fruits. Place fruit pieces in a shallow pan and cover with the liquid.
 - The general rule is to use 2 cups of fruit to 1 cup of liquid. Add more liquid as needed.
 - Fruit will usually reconstitute in a couple of hours. Refrigerate if it takes longer.
- Vegetables may be reconstituted in consommé, bouillon, vegetable juice, water, or milk.
 - Refrigerate during rehydration.
 - Allow plenty of time - from 1 to 2 hours up to 8 hours, depending upon the vegetable.

Resources

National Center for Home Food Preservation [Internet]. University of Georgia [cited 2014 September 4]. Available from: <http://nchfp.uga.edu/>

Complete Guide to Home Canning. 2009. USDA Agricultural Information Bulletin 539. National Institute of Food and Agriculture. Available from: http://nchfp.uga.edu/publications/publications_usda.html. Also available in paper copy from Purdue Extension (online store is located at https://mdc.itap.purdue.edu/item.asp?item_number=AIG-539)

Kingry, J., & Devine, L., editors. 2006. Ball Complete Book of Home Preserving. Toronto, Canada: Robert Rose Inc.

So Easy to Preserve Fifth Edition. 2006. Bulletin 989. Cooperative Extension/The University of Georgia/Athens Ball Blue Book Guide to Preserving. 2004. Altrista Consumer Products

Rehydrating Dried Foods

| Product | Water to Add to 1 Cup Dried Food (Cups) | Minimum Soaking Time (Hours) |
|--------------------------------|---|------------------------------|
| Fruits* | | |
| Apples | 1 1/2 | 1/2 |
| Pears | 1 3/4 | 1 1/4 |
| Peaches | 2 | 1 1/4 |
| Vegetables** | | |
| Asparagus | 2 1/4 | 1 1/2 |
| Beans, lima | 2 1/2 | 1 1/2 |
| Beans, green snap | 2 1/2 | 1 |
| Beets | 2 3/4 | 1 1/2 |
| Carrots | 2 1/4 | 1 |
| Cabbage | 3 | 1 |
| Corn | 2 1/4 | 1/2 |
| Okra | 3 | 1/2 |
| Onions | 2 | 3/4 |
| Peas | 2 1/2 | 1/2 |
| Pumpkin | 3 | 1 |
| Squash | 1 3/4 | 1 |
| Spinach | 1 | 1/2 |
| Sweet Potatoes | 1 1/2 | 1/2 |
| Turnip Greens and other greens | 1 | 3/4 |

* Fruits – Water is at room temperature.

** Vegetables – Boiling water used.

Drying Fruits at Home

| Fruit | Preparation | Pretreatment (Choose One) | | | | Drying Times Dehydrator* (hours) |
|--------------------|--|---------------------------|-------------------------------|------------------------|--|----------------------------------|
| | | Sulfur (hours) | Blanch | | Other | |
| | | | Steam (minutes) | Syrup (minutes) | | |
| Apples | Peel and core, cut into slices or rings about 1/8 inch thick. | 3/4 | 3-5 min, depending on texture | 10 | -ascorbic acid mixture -ascorbic acid solution -fruit juice dip -sulfite dip | 6-12 |
| Apricots | Pit and halve. May slice if desired. | 2 | 3-4 | 10 | -ascorbic acid mixture -ascorbic acid solution -fruit juice dip -sulfite dip | 24-36** |
| Bananas | Use solid yellow or slightly brown-flecked bananas. Avoid bruised or overripe bananas. Peel and slice 1/4-inch to 3/8-inch thick, crosswise or lengthwise. | | | | -honey dip -ascorbic acid solution -ascorbic acid mixture -fruit juice dip -sulfite dip | 8-10 |
| Berries | | | | | | |
| Firm | Wash and drain berries with waxy coating (blueberries, cranberries, currants, gooseberries, huckleberries). | | | | -plunge into boiling water 15-30 seconds to "check" skins. Stop cooking action by placing fruit in ice water. Drain on paper towels. | 24-36 |
| Soft | Wash and drain. (boysenberries, strawberries) | | | | -No pretreatment necessary. | |
| Cherries | Stem, wash, drain and pit fully ripe cherries. Cut in half, chop, or leave whole. | | | 10 (for sour cherries) | -Whole: dip in boiling water 30 seconds or more to check skins. -Cut and pitted: No -Pretreatment necessary. | 24-36 |
| Citrus Peel | Peels of citron, grapefruit, kumquat, lime, lemon, tangelo and tangerine can be dried. Thick-skinned navel orange peel dries better than thin-skinned Valencia peel. Wash thoroughly. Remove outer 1/6 to 1/8 inch of peel. Avoid white bitter pith. | | | | -No pretreatment necessary. | 8-12 |
| Figs | Select fully ripe fruit. Immature fruit may sour before drying. Wash or clean whole fruit with damp cloth. Leave small fruit whole, otherwise cut in half. | 1 (whole) | | | -Whole: Dip in boiling water 30 seconds or more to check skins. Plunge in ice water to stop further cooking. Drain on paper towels. | 6-12** |
| Grapes | | | | | | |
| Seedless | Leave whole. | | | | -Whole: Dip in boiling water 30 seconds or more to check skins. Plunge in ice water to stop further cooking. Drain on paper towels. | 12-20 |
| With seeds | Cut in half and remove seeds. | | | | -Halves: no pretreatment necessary. | |

Drying Fruits at Home (continued)

| Fruit | Preparation | Pretreatment (Choose One) | | | | Drying Times Dehydrator* (hours) |
|-------------------------------|---|---------------------------|--------------------|-----------------|---|----------------------------------|
| | | Sulfur (hours) | Blanch | | Other | |
| | | | Steam (minutes) | Syrup (minutes) | | |
| Nectarines and Peaches | When sulfering, pit and halve; if desired, remove skins. For steam and syrup blanching, leave whole, then pit and halve. May also be sliced or quartered. | 2-3 (halves) 1 (slice) | 8 | 10 | -ascorbic acid solution -ascorbic acid mixture -fruit juice dip -sulfiting | 36-48** |
| Pears | Cut in half and core. Peeling preferred. May also slice or quarter. | 5 (halves) 2 (slices) | 6 minutes (halves) | 10 | -ascorbic acid solution -ascorbic acid mixture -fruit juice dip -sulfiting | 24-36** |
| Persimmons | Use firm fruit of long, soft varieties and fully ripe fruit of round drier varieties. Peel and slice using stainless steel knife. | | | | -may syrup blanch | 12-15** |
| Pineapple | Use fully ripe, fresh pineapple. Wash, peel and remove thorny eyes. Slice lengthwise and remove core. Cut in 1/2-inch slices, crosswise. | | | | No pretreatment necessary | 24-36 |
| Plums (Prunes) | Leave whole or if sulfuring, halve the fruit. | 1 | | | -Sun drying: (whole) dip in boiling water 30 seconds or more to check skins. -Oven or dehydrator drying: rinse in hot tap water. | 24-36** |

* Because of variations in air circulation, drying times in conventional ovens could be up to twice as long. Drying times for sun drying could range from 2 to 6 days, depending on temperature and humidity.

** Drying times are shorter for slices and other cuts of fruit.

Drying Vegetables at Home

| Vegetable | Preparation | Blanching Time | | Drying Time Dehydrator* (hours) |
|--|--|-------------------------|--------------------------------|---------------------------------------|
| | | Steam (minutes) | Water (minutes) | |
| Artichokes-Globe | Cut hearts into 1/8-inch strips. Heat in boiling solution of 3/4 cups water and 1 tablespoon lemon juice. | | 6-8 | 4-6 |
| Asparagus | Wash thoroughly. Cut large tips in half. | 4-5 | 3 1/2 - 4 1/2 | 4-6 |
| Beans, green | Wash thoroughly. Cut in short pieces or lengthwise. (May freeze for 30 to 40 minutes after blanching for better texture.) | 2-2 1/2 | 2 | 8-14 |
| Beets | Cook as usual. Cool; peel. Cut into shoestring strips 1/8-inch thick. | Already cooked | no further blanching required. | 10-12 |
| Broccoli | Trim, cut as for serving. Wash thoroughly. Quarter stalks lengthwise. | 3-3 1/2 | 2 | 12-15 |
| Brussels Sprouts | Cut in half lengthwise through stem. | 6-7 | 4 1/2 - 5 1/2 | 12-18 |
| Cabbage | Remove outer leaves; quarter and core. Cut into strips 1/8-inch thick. | 2 1/2-3** | 1 1/2-2 | 10-12 |
| Carrots | Use only crisp, tender carrots. Wash thoroughly. Cut off roots and tops; preferably peel, cut in slices or strips 1/8-inch thick. | 3-3 1/2 | 3 1/2 | 10-12 |
| Cauliflower | Prepare as for serving. | 4-5 | 3-4 | 12-15 |
| Celery | Trim stalks. Wash stalks and leaves thoroughly. Slice stalks. | 2 | 2 | 10-16 |
| Corn, cut | Husk, trim and blanch until milk does not exude from kernel when cut. Cut the kernels from the cob after blanching. | 2-2 1/2 | 1 1/2 | 6-10 |
| Eggplant | Use the same directions as for summer squash | 3 1/2 | 3 | 12-14 |
| Garlic | Peel and finely chop garlic bulbs. No other pretreatment is needed. Odor is pungent. | No blanching is needed. | | 6-8 |
| Greens (chard, kale, turnip, spinach) | Use only young tender leaves. Wash and trim very thoroughly. | 2-2 1/2** | 1 1/2 | 8-10 |
| Horseradish | Wash; remove small rootlets and stubs. Peel or scrape roots. Grate. | none | | 4-10 |
| Mushrooms (WARNING, see footnote***) | Scrub thoroughly. Discard any tough, woody stalks. Cut tender stalks into short sections. Do not peel small mushrooms or "buttons." Peel large mushrooms, slice. | none | | 8-10 |

Drying Vegetables at Home (continued)

| Vegetable | Preparation | Blanching Time | | Drying Time Dehydrator* (hours) |
|---------------------------------------|---|--------------------|--------------------|---------------------------------------|
| | | Steam (minutes) | Water (minutes) | |
| Okra | Wash, trim, slice crosswise in 1/8- to 1/4-inch disks. | | none | 8-10 |
| Onions | Wash, remove outer "paper shells." Remove tops and root ends, slice 1/8- to 1/4-inch thick. | | none | 3-9 |
| Parsley | Wash thoroughly. Separate clusters. Discard long or tough stems. | | none | 1-2 |
| Peas, Green | Shell | 3 | 2 | 8-10 |
| Peppers, and Pimientos | Wash, stem, core. Remove "partitions." Cut into disks about 3/8 by 3/8 inch. | | none | 8-12 |
| Potatoes | Wash, peel. Cut into shoestring strips 1/4-inch thick, or cut in slices 1/8-inch thick. | 6-8 | 5-6 | 8-12 |
| Pumpkin and Hubbard Squash | Cut or break into pieces. Remove seeds and cavity pulp. Cut into 1-inch wide strips. Peel rind. Cut strips crosswise into pieces about 1/8-inch thick. | 2 1/2-3 | 1 | 10-16 |
| Squash: Summer | Wash, trim, cut into 1/4-inch slices. | 2 1/2-3 | 1 1/2 | 10-12 |
| Tomatoes, for stewing | Steam or dip in boiling water to loosen skins. Chill in cold water. Peel. Cut into sections about 3/4-inch wide, or slice. Cut small pear or plum tomatoes in half. | 3 | 1 | 10-18 |

* Drying times in a conventional oven could be up to twice as long, depending on air circulation.

** Steam until wilted.

*** WARNING: The toxins in poisonous varieties of mushrooms are not destroyed by drying or by cooking. Only an expert can differentiate between poisonous and edible varieties.