



HYG-5347-09

Drying Fruits and Vegetables

Drying is the oldest method of preserving food. Throughout history, the sun, the wind, and a smoky fire were used to remove water from fruits, meats, grains, and herbs.

By definition, food dehydration is the process of removing water from food by circulating hot air through it, which prohibits the growth of enzymes and bacteria.

Nutritional Benefits of Dried Food

Dried foods are tasty, nutritious, lightweight, easy-to-prepare, and easy-to-store and use. The energy input is less than what is needed to freeze or can, and the storage space is minimal compared with that needed for canning jars and freezer containers.

The nutritional value of food is only minimally affected by drying. Vitamin A is retained during drying; however, because vitamin A is light sensitive, food containing it should be stored in dark places. Yellow and dark green vegetables, such as peppers, carrots, winter squash, and sweet potatoes, have high vitamin A content. Vitamin C is destroyed by exposure to heat, although pretreating foods with lemon, orange, or pineapple juice increases vitamin C content.

Dried fruits and vegetables are high in fiber and carbohydrates and low in fat, making them healthy food choices. Dried fruit has a higher concentration of carbohydrate than fresh fruit and therefore serving sizes tend to be smaller. According to MyPyramid Dietary Guidelines for Americans, 1/2 cup of dried fruit is equivalent to 1 cup of fresh fruit. Diabetic individuals must especially take into consideration smaller serving sizes when planning meals and snacks to avoid elevated blood glucose levels.

Equipment Needed for Drying

To be certain of the final quality and consistent drying of foods, a dehydrator is recommended, especially with unpredictable Ohio weather. Sharp knives and a food processor or blender will also make the drying task easier.

Many guidelines call for blanching, steaming, or pretreating foods. Equipment for these processes includes a deep kettle with a lid and a wire basket, a colander, or an open mesh cloth bag to hold produce. A non-metal bowl is best for pretreating fruits and vegetables to prevent discoloring.

Preparing Food for Drying

Select ripe fruit for drying. Bruised fruit can be used if you trim away any bruised spots. Do not use molded food for drying.

Slicing foods allows the dry air to circulate and dry the surface area of the food first. Cut foods into 1/8-inch to 1/2-inch slices. The higher the water content, the larger you should make the slice size. Small slices of high-moisture foods, such as watermelon, would disappear when all the moisture has evaporated.

Peel fruits and vegetables, including bananas, melons, winter squash, and other fruits and vegetables.

Pretreatment

Pretreatments are recommended techniques used to make quality products. Pretreatments not only prevent darkening and improve quality, they also cause the destruction of pathogens that could cause foodborne illness, like *Escherichia coli* O157:H7, *Salmonella* species, and *Listeria monocytogenes*. Pretreatments include dipping, blanching, cooking, or candying.

Dipping prevents oxidation or color changes in fruits and vegetables. Dip fruits in pineapple or orange juice. Dip vegetables in diluted bottled lemon juice (dilute 1/4 cup of lemon juice in 2 cups water, then dip vegetables and some fruits for 2 to 3 minutes).

Commercial fresh fruit stabilizers can also be used (dilute 1/2 Tablespoon of stabilizer in 2 cups water). Sodium sulfite is another commercial product for pretreating foods. To make a homemade stabilizer, mix 1 Tablespoon of salt or vinegar with 8 cups of water or dissolve one 500 mg tablet of vitamin C per 1 cup of water.

Blanching is recommended for asparagus, green beans, broccoli, brussels sprouts, cauliflower, and peas. Blanch for a very short period to cause checking of skins.

Test for Dryness

Drying fruits and vegetables is a very imprecise process and exact drying times cannot be predicted. Complete drying is important since foods that are not completely dry are susceptible to mold and may still harbor harmful pathogens that could cause foodborne illness.

To test for dryness, cool a piece of the food to room temperature, squeeze in your hand to check that no moisture is present. If there is none, then the food is dry enough to proceed to the next steps.

Pasteurization

If food was dried outdoors, *which is not recommended in the Ohio climate*, there could be eggs on the food from insects that touched the food during drying. To pasteurize and kill the eggs post-drying, either place food in a freezer bag and freeze for 48 hours, or heat the dried food at 150 degrees F for 30 minutes or 175 degrees F for 15 minutes. Be careful not to scorch the food.

Conditioning

After drying or pasteurizing, condition dried foods before final storage. Place dried food on a flat pan, cover, and store in a dry location. Shake daily to prevent sticking. If moisture forms during conditioning, return the food to the dehydrator for additional drying. Package dried food for long-term storage after conditioning for 4 to 10 days.

Making Fruit Leathers

Leathers from Fresh Fruit

Select ripe or slightly overripe fruit. Wash fresh fruit or berries in cool water. Remove peel, seeds, and stem. Cut fruit into chunks. Use 2 cups of fruit for each 13-inch by 15-inch fruit leather. Puree fruit until smooth. Add 2

teaspoons of lemon juice or 1/8 teaspoon ascorbic acid (375 mg) for each 2 cups of light-colored fruit to prevent darkening.

If you choose to sweeten the leather, add corn syrup, honey, or sugar. Corn syrup or honey is best for longer storage because they do not crystallize. Sugar is fine for immediate use or short-time storage. Use 1/4 to 1/2 cups sugar, corn syrup, or honey for each 2 cups of fruit. Saccharin-based sweeteners could also be used to reduce tartness without adding calories. Aspartame sweeteners may lose sweetness during drying.

Leathers from Canned or Frozen Fruit

Home-preserved or store-bought canned or frozen fruit may also be used to make leathers. Drain fruit and save liquid. Use 1 pint of fruit for each 13-inch by 15-inch leather. Puree fruit until smooth—if too thick, add liquid. Add 2 teaspoons of lemon juice or 1/8 teaspoon ascorbic acid (375 mg) for each 2 cups of light-colored fruit to prevent darkening. Applesauce can be dried alone or added to any fresh fruit puree as an extender. It decreases tartness and makes the leather smoother and more pliable.

Preparing the Trays

For drying in the oven, a 13-inch by 15-inch cookie pan with edges works well. Line pan with plastic wrap, being careful to smooth out wrinkles. Do not use waxed paper or aluminum foil.

To dry in a dehydrator, purchase specially designed plastic sheets or line plastic trays with plastic wrap.

Pouring the Leather

Fruit leathers can be poured into a single large sheet (13-inch by 15-inch) or into several smaller sizes pieces. Spread puree evenly, about 1/8-inch thick, onto drying tray. Avoid pouring puree too close to the edge of the cookie sheet. The larger fruit leathers take longer to dry. Approximate drying times are 6 to 8 hours in a dehydrator, up to 18 hours in an oven, and 1 to 2 days in the sun.

Drying the Leather

Dry fruit leathers at 140 degrees F. Leather dries from the outside edge toward the center. Test for dryness by touching center of leather; no indentation should be evident. While warm, peel leather from plastic and roll. Then, allow the leather to cool and rewrap the roll in plastic.

Chances are the fruit leather won't last long enough for storage. If it does, it will keep up to 1 month at room temperature. For storage up to 1 year, place tightly wrapped rolls in the freezer.

Drying Table		
Food	Preparation for drying	Dryness test
Fruits		
Apples	Pare, core, and cut into 1/8 inch slices or rings. Pretreat dipping for 2 minutes.	Pliable, springy feel, creamy white. No moist area when cut.
Bananas	Peel, cut into 1/4 inch slices. Dip in 1/2 cup pineapple juice mixed with 1/4 cup honey.	Sticky, chewy, and a carmel-like color.
Berries	Leave whole, except slice strawberries in half.	No visible moisture when crushed.
Cherries (any kind)	Remove stems and pits. If juicy, drain 1 hour.	Leathery but sticky.
Grapes	Leave whole, remove stems. Dip in boiling water to crack skins.	Pliable, dark brown.
Peaches and apricots	Peel if desired, remove pits, slice. Pretreat dipping solution.	Pliable and leathery.
Pears	Pare and remove core and woody tissue. Cut into 1/4 inch slices or rings, or into quarters or eighths. Pretreat dipping solution.	Leathery, springy feel.
Pineapple	Peel, core, and slice 1/2 inch thick.	Pliable, spongy to the touch.
Plums	Same as prunes. Use freestone varieties. Pretreat.	Pliable and leathery.
Prunes	Cut in halves and remove pits or leave whole. Halves: No pretreatment. Whole: To soften and crack skins and to help fruit dry better, hold in steam or boiling water for 2 minutes.	Pliable and leathery.
Vegetables		
Beans, green and lima	Shell. Steam 15 to 20 minutes, or until tender but firm.	Shatter when hit.
Beans, snap	Trim and slice lengthwise (or cut in 1 inch pieces). Steam about 3 to 5 minutes, or until tender but firm. Spread about 1/2 inch deep on trays.	Brittle, dark green to brownish.
Beets	Trim off all but 1 inch of tops and roots. Steam whole about 30 to 60 minutes, depending on size, or until cooked through. Cool and peel. Cut in 1/4 inch cubes, or slice 1/8 inch thick. Spread not more than 1/4 inch deep on trays.	Brittle, dark red.
Broccoli	Trim, slice lengthwise in 1/2 inch strips. Steam 10 minutes or until tender but firm.	Brittle, very dark green.
Cabbage	Trim, cut in strips 1/8 inch thick. Steam 5 to 10 minutes, or until tender but firm. Spread evenly to a depth of not more than 1 inch. Pretreat with lemon juice.	Crisp, pale yellow to green.
Carrots	Scrape or peel. Slice crosswise 1/8 inch thick, or dice in 1/4 inch cubes. Steam small pieces 3 minutes (or shred before steaming). Spread in thin layer on trays.	Very brittle, deep orange.
Celery	Remove leaves, cut stalks into 1/2 inch pieces. Water blanch 1 to 2 minutes or until tender. Stir occasionally during drying.	Very brittle.
Corn	Husk and trim. Blanch whole ears 9 minutes. For medium or raw kernels 3 to 5 minutes. Cut corn from cob after blanching.	Shatters when hit.
Eggplant	Peel and slice 1/8 to 1/4 inch thick. Dip in lemon juice solution for 5 minutes or steam 5 minutes (or until tender).	Leathery to brittle.

Drying Table		
Food	Preparation for drying	Dryness test
Vegetables		
Greens	Trim off tough stems. Steam 5 minutes or until tender. Spread leaves that mat, such as spinach, about 1/4 inch deep.	Crisp, very dark green.
Mushrooms	Peel the larger mushrooms. Dry whole or slice, depending on size. No precooking necessary. If stems are tender, slice for drying; if tough discard. Spread on trays.	Leathery to brittle.
Onions	Peel, slice into 1/8 inch rings. Blanch 1 minute. If dried for seasoning, do not steam.	Very crisp.
Peas, green	Steam shelled peas 3 minutes or until tender. Stir during drying.	Shatter when hit with a hammer.
Peppers, all kinds, and pimentos	Cut into 1/2 inch strips or rings. Remove seeds. Steam 10 minutes. Spread rings 2 layers deep, strips not more than 1/2 inch deep.	Pliable.
Pumpkin, winter squash	Quarter, remove seeds and pit, cut in 1 inch strips, and peel. Slice strips crosswise 1/4 inch thick. Bake at 300 degrees F until soft. Place in dehydrator.	Leathery.
Soybeans, edible green	Blanch pods in steam 10 to 15 minutes, or until beans are tender but firm. Shell.	Shatter when hit.
Squash, summer and zucchini	Trim, slice 1/4 inch thick without peeling, steam 6 to minutes or until just tender. Pretreat optional.	Leathery to brittle, yellow.
Tomatoes (meaty varieties only)	Dip in boiling water for 1 minute. Peel, remove stem end, slice 1/8 inch thick.	Leathery, dull red.

References

- Bell, Mary. *Complete Dehydrator Cookbook*, New York: William Morrow and Company, Inc., 1994.
- Kendall, P., and Sofos, J. Drying fruits. Food and Nutrition Series, No. 9.309. Colorado State University Extension, Fort Collins CO. Accessed on October 14, 2008 from <http://www.ext.colostate.edu/pubs/foodnut/09309.html>.
- MyPyramid.gov. United States Department of Agriculture. Accessed on August 10, 2008 from <http://www.mypyramid.gov>.

Prepared by Doris Herringshaw, Extension Educator, Family and Consumer Sciences, Wood County

Reviewed by Lydia Medeiros, Ph.D., R.D., Extension Specialist, Ohio State University Extension; and Dan Remley, Extension Educator, Family and Consumer Sciences/Community Development

EMPOWERMENT THROUGH EDUCATION

Visit Ohio State University Extension's web site "Ohioline" at: <http://ohioline.osu.edu>

Ohio State University Extension embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to race, color, religion, sex, age, national origin, sexual orientation, gender identity or expression, disability, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Keith L. Smith, Ph.D., Associate Vice President for Agricultural Administration and Director, Ohio State University Extension

TDD No. 800-589-8292 (Ohio only) or 614-292-1868