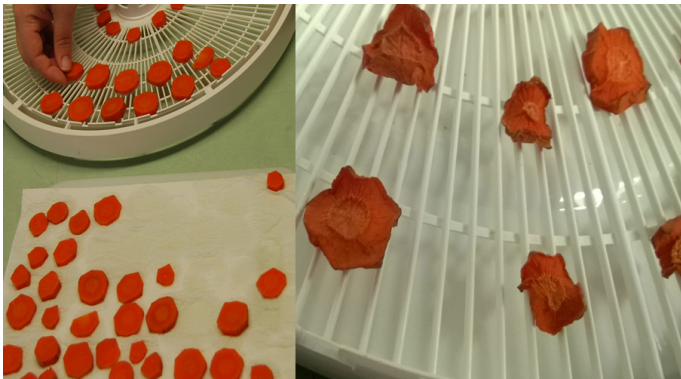




Home Food Preservation: Drying Vegetables

Melissa Wyatt, Hope Wilson, Asuka Suzuki, and Nobuko Hongu



Introduction

Food drying (dehydration) has been used to preserve food for centuries.¹ Drying removes water from foods so that bacteria, mold, and yeast cannot grow and spoil the foods. It also slows down enzyme activities. Enzymes are naturally occurring substances within foods that, after harvesting, can cause foods to decay. Dried foods take little room to store and can be used for an extended time. This article provides the step-by-step instructions for drying vegetables and recipes using them for your meals and healthy snacks.

To start drying vegetables, you will need a dehydrator, fresh vegetables, a large pot with a lid, knife and cutting board, vegetable peeler, a timer and air-tight food storage containers.

(Note: This article only details how to safely dry vegetables using a dehydrator. There are many methods for drying vegetables including ovens and sun drying. Check the National Center for Home Food Preservation nchfp.uga.edu for more information to dry foods.²)

Dehydrator

A dehydrator is a device that is built specifically for drying foods. There are many models and it is important that you find the right one for your budget and needs. Below, Table 1 lists the essential elements along with upgraded elements in a dehydrator.

Dehydrators come in two different layouts, horizontal or vertical. Both dry food equally well. If you find a dehydrator that does not have dial or other way of regulating temperature, the machine should be set to a standard drying temperature of 140°F.

Table 1- What to look for in a dehydrator³

Essentials in a Dehydrator	Upgraded Elements in Dehydrators (models with these may cost extra)
<ul style="list-style-type: none">• Double Wall Construction• Made of metal or food grade plastic• Counter top design• Enclosed heating elements• Enclosed thermostat (85-160°F)• Fan or blower• Four to ten open mesh trays• Easy to clean and care for	<ul style="list-style-type: none">• Dial for temperature regulation• Built in timer (This will time the length of drying and shut off the machine that prevents scorching)• Herb mesh inserts (placed on drying racks to prevent herbs from falling through the tray openings.)• Fruit leather trays (for drying fruit or vegetable leathers)

Selecting Vegetables

No matter if you get your fresh vegetables from a garden or purchased in bulk, preparation will be the same. It is recommended to choose vegetables that are at peak maturity and quality.³

Step 1: Wash your hands thoroughly with soap and water for 20 seconds before and after handling food.

Step 2: Wash and air dry the dehydrator thoroughly, along with the other necessary utensils, and containers before and after each use. Follow dehydrator cleaning instructions for cleaning and drying methods.

Step 3: Wash vegetables with water and a brush. If there is any dirt on the vegetables, make sure it is cleaned off. (Figure 1)



Figure 1. Wash thoroughly, trim, peel, according to directions in Table 2.

Step 4: Cut vegetables into pieces that are $\frac{1}{8}$ to $\frac{1}{2}$ inches thick (Figure 2). The pieces will shrink as they dry. Those vegetables higher in water content will shrink more, therefore, make thicker slices of those vegetables. It is important to keep sizes uniform, so they dry at the same rate. See Table 2 for the appropriate thickness of slices for different vegetables. (Table 2 was adapted from Colorado State University Extension.⁴)

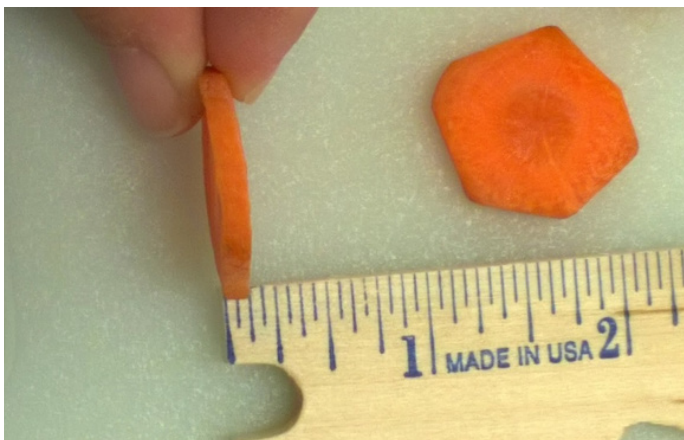


Figure 2. Cut vegetables – uniform pieces

Step 5: Pretreat vegetables by blanching. Blanching is a cooking technique that includes briefly boiling or steaming vegetables. It slows or stops the enzyme activity that would otherwise cause unwanted changes in color and flavor to the vegetables during drying. Blanching also enhances the destruction of potentially harmful bacteria during drying vegetables.⁴

Not all vegetables need blanching, and the length of blanching time varies with the vegetable. Over blanching causes loss of flavor and color. Follow recommended blanching times in Table 2.

Boiling Water Bath Blanching

- Fill a large pot $\frac{2}{3}$ full of water and bring it to boil.
- Put vegetables into a colander (wire basket, coarse mesh bag, or metal strainer) and place them into the boiling water.
- Cover the pot. Set a timer once the water returns to boil. If it takes more than 1 minute to return to boil, reduce the amount of vegetables that you are putting in at a time.⁵
- Blanch for the amount of time shown in Table 2.



Figure 3. Steam blanching vegetables

Steam Blanching

- Use a deep pot with a tight lid and a steamer basket or colander that holds the vegetables at least 3 inches above the bottom of the pot. Add water into the bottom of a pot and bring to a rolling boil (Figure 3).
- Put the vegetables in the basket in a single layer, so that steam reaches all parts.³
- Cover the pot and set a timer as soon as the lid is on. Keep heat high.
- Blanch for the amount of time shown in Table 2.

Step 6: Cool and dry the prepared vegetables. At the end of blanching, place the vegetables in ice water or cold running water to stop the blanching process. (Figure 4). When they are warm to touch, drain well and blot the pieces dry on paper towel to remove excess moisture (Figure 5). Save the water for immediate use in cooking. You can use it in soups and stews in place of vegetable or chicken stock. It will add flavor and some vitamins and minerals to your soups, stews, and gravies.⁵



Figure 4. Cooling blanched vegetables – place the vegetables in ice water.



Figure 5. Cooling and drying the blanched vegetables on paper towel.

Step 7: Drying vegetables in the dehydrator.

- a. Once the pieces have been dried from blanching, they are ready to place on the dehydrator trays. Place the vegetable pieces on trays in a single layer. Avoid overfilling or overlapping. See Figure 6 for a placement of vegetables on the trays.
- b. Place the dehydrator in a well-ventilated room.
- c. Preheat the dehydrator to 125°F-140°F. For best results, follow the directions that came with your dehydrator.

- d. Place the tray in the dehydrator. The time for drying varies to vegetables, size of pieces, and load on the tray. See Table 2 for drying times of various vegetables.
- e. Once the drying time is complete, check for dryness. Vegetables should be dried until they are brittle or “crisp.”
- f. Remove the dried vegetables from the dehydrator using tongs or a fork and let it cool on a rack. Then place cooled vegetables into an air-tight container.
- g. After you finished drying vegetables and dehydrator has cooled, trays must be cleaned with soapy water, rinse and dried. Wash all utensils (knife, cutting board, etc.) that you have used.



Figure 6. Distribute vegetables on a dehydrator tray

Step 8: Package and store dried vegetables. The following are several tips that will help you ensure safe packing and storing of your dried vegetables.

Tips for packaging dried vegetables

- Package dried vegetables only after are completely cooled. Warm dried vegetables will hold some moisture, which is then released when it cools.
- Package your dried vegetables in clean, dry, dark glass jars, air-tight containers or freezer bags. If you are using freezer bags, be sure to remove all air from the bags.
- Pack dried vegetables in amounts that can be used all in a recipe at once.
- Label each container with the name of the vegetable and the date it was packaged.

Tips for storage of dried vegetables

- Store containers in a cool, dry and dark area. A temperature of 60 degrees is best to store dried vegetables. Acceptable storage temperatures range from 60 to 80 degrees.
- Dried vegetables can be stored for up to six months.⁶ Always label your containers with the date you dried the product. You can also put a use by date to ensure you use the product.
- To extend the shelf-life of dried vegetables, store them in the refrigerator or freezer.
- Check dried vegetables during storage to ensure they stay dry. Discard dried vegetables that develop mold.

Remember – moisture, heat, air and light are the cause of food spoilage in dried foods.

Using Dried Vegetables

In addition to being a delicious, healthy snack, dried vegetables provide convenient, economical and delicious addition to meals. An easy way to use dried vegetables is adding them to a soup, stew, casserole or sauce. You do not need to rehydrate or refresh vegetables before using. Just throw them in a pot and simmer! Generally, one cup of dried vegetables would be equivalent to about 2 cups of fresh vegetables.⁴

In other recipes like vegetable stir-fry and vegetable side dishes with the addition of cheese sauce, herbs, or seeds (Figure 7), it is best to rehydrate the vegetables before using them. To rehydrate the dried vegetable, soak in water prior to use for



Figure 7. Vegetable stir-fry, dried carrots and sesame green beans

one to two hours. Using boiling water reduces the soaking time. If they are soaked for more than two hours or overnight, they should be refrigerated as they soak. Do not over-soak the vegetables, because it produces less flavor and loss of texture. Leafy vegetables and tomatoes do not need to be soaked.⁶ Don't toss the soaking liquid. You can use it immediately for cooking, as it contains nutrients and flavor. Check out more delicious recipes using dried vegetables in the following articles!

- University of Missouri, Extension. How to use dried foods.⁷ <https://extensiondata.missouri.edu/pub/pdf/hesguide/foodnut/gh1564.pdf>
- A Pacific Northwest Extension Publication (Idaho • Oregon • Washington). Drying Fruits & Vegetables, 3rd Edition.⁸ <http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0397.pdf>

Table 2: Preparations for Drying vegetables⁴

Vegetable	Preparation	Blanching Time* (mins.)	Drying Time (hrs.)
Asparagus	Wash thoroughly. Halve large tips.	4-5	6-10
Beans, green	Wash. Cut in pieces or strips.	4	8-14
Beets	Cook as usual. Cool, peel. Cut into shoestring strips 1/8" thick.	None	10-12
Broccoli	Wash. Trim, cut as for serving. Quarter stalks lengthwise.	4	12-15
Brussels sprouts	Wash. Cut in half lengthwise through stem.	5-6	12-18
Cabbage	Wash. Remove outer leaves, quarter and core. Cut into strips 1/8" thick.	4	10-12
Carrots	Use only crisp, tender vegetables. Wash. Cut off roots and tops; peel. Cut in slices or strips 1/8" thick.	4	6-10

Table 2: Preparations for Drying vegetables⁴

Vegetable	Preparation	Blanching Time* (mins.)	Drying Time (hrs.)
Cauliflower	Wash. Trim, cut into small pieces.	4-5	12-15
Celery	Trim stalks. Wash stalks and leaves thoroughly. Slice stalks.	4	10-16
Chili peppers, green	Wash. To loosen skins, cut slit in skin, then rotate over flame 6-8 minutes or scald in boiling water. Peel and split pods. Remove seeds and stem. (Wear gloves if necessary.)	None	12-24
Chili peppers, red	Wash thoroughly. Slice or leave whole if small.	4	12-24
Corn, cut	Husk, trim. Wash well. Blanch until milk in corn is set. Cut kernels from the cob.	4-6	6-10
Eggplant	Wash, trim, cut into 1/4" slices.	4	12-14
Horseradish	Wash, remove small rootlets and stubs. Peel or scrape roots. Grate.	None	6-10
Okra	Wash thoroughly. Cut into 1/2" pieces or split lengthwise.	4	8-10
Onions	Wash, remove outer paper skin. Remove tops and root ends, slice 1/8 to 1/4" thick.	4	6-10
Parsley; other herbs	Wash thoroughly. Separate clusters. Discard long or tough stems.	4	4-6
Peas	Shell and wash.	4	8-10
Peppers; pimentos	Wash, stem. Remove core and seeds. Cut into 1/4 to 1/2" strips or rings.	4	8-12
Potatoes	Wash, peel. Cut into 1/4" shoestring strips or 1/8" thick slices.	7	6-10
Spinach; greens like Kale, Chard, mustard	Trim and wash very thoroughly. Shake or pat dry to remove excess moisture.	4	6-10
Squash, summer or banana	Wash, trim, cut into 1/4" slices.	4	10-16
Squash, winter	Wash rind. Cut into pieces. Remove seeds and cavity pulp. Cut into 1" wide strips. Peel rind. Cut strips crosswise into pieces about 1/8" thick.	4	10-16
Tomatoes	Steam or dip in boiling water to loosen skins. Chill in cold water. Peel. Slice 1/2" thick or cut in 3/4" sections. Carry tomato: cut into half. Dip in solution of 1 tsp. citric acid/quart water for 10 minutes.	None	6-24

* Blanching times are for 3,000 to 5,000 feet. Times will be slightly shorter for lower altitudes and slightly longer for higher altitudes or for large quantities of vegetables.

Source: The information of Table 1 was adapted from the University of Georgia Extension³ and the Colorado State University Extension⁴.

References

1. Nummer, B.A. (May 2002). Historical Origins of Food Preservation. National Center for Home Food Preservation. https://nchfp.uga.edu/publications/nchfp/factsheets/food_pres_hist.html
2. How Do I? ... Dry. (2011). National Center for Home Food Preservation. Available from <http://nchfp.uga.edu/how/dry.html>
3. Anderess, E.L. & Harrison, J.A. (2014). So easy to preserve. (6th Edition), University of Georgia Cooperative Extension Service.
4. Kendall, P., DiPersio, P. & Sofos, J. (2012). Drying vegetables. Colorado State University Extension. Fact Sheet no.9.308. Food and Nutrition Series, Preparation. Available at <http://extension.colostate.edu/topic-areas/nutrition-food-safety-health/drying-vegetables-9-308/>
5. Keith, M. (1984). Drying Food. University of Illinois at Urbana-Champaign. College of Agriculture. Cooperative Extension Service. Circular 1227. Available at http://www.aces.uiuc.edu/vista/html_pubs/DRYING/dryfood.html#toc
6. Schmutz, P.H. Hoyle, E.H. (1999). Drying vegetables. Clemson, Cooperative Extension. Available <http://www.clemson.edu/extension/hgic/food/pdf/hgic3085.pdf>
7. Mills-Gray, S. (2015). How to use dried foods. University of Missouri, Extension. Available <https://extensiondata.missouri.edu/pub/pdf/hesguide/foodnut/gh1564.pdf>
8. Swanson, M.A., McCurdy, S.M. (2009). Drying Fruits & Vegetables, 3rd Edition. Available <http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0397.pdf>



THE UNIVERSITY OF ARIZONA
Cooperative Extension

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721

MELISSA WYATT, MS.,

Area Assistant Agent, Family Consumer Health Sciences, La Paz County/Yuma County

HOPE WILSON, M.PH., R.D.N.,

Area Assistant Agent, Family Consumer Health Sciences, Yavapai/Gila County

ASUKA SUZUKI, BS, RD, RN.

Doctoral student, Department of Human Nutrition, Food and Animal Sciences, University of Hawai'i, at Mānoa

NOBUKO HONGU, PH.D., M.ED., R.D., FACS

Professor, Nutrition & Physical Activity Extension Specialist, Department of Nutritional Sciences

CONTACT:

MELISSA WYATT

melb2@email.arizona.edu

This information has been reviewed

by University faculty.

extension.arizona.edu/pubs/az1802-2019.pdf

**Other titles from Arizona Cooperative Extension
can be found at:**

extension.arizona.edu/pubs

Any products, services or organizations that are mentioned, shown or indirectly implied in this publication do not imply endorsement by The University of Arizona.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, Division of Agriculture, Life and Veterinary Sciences, and Cooperative Extension, The University of Arizona.

The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information in its programs and activities.