

Back to Basics: Drying Vegetables

For thousands of years people have dried vegetables to preserve them for leaner times. Preserving foods by drying is still useful, convenient, inexpensive, and needs less storage space.

Basically, drying preserves food by removing sufficient moisture from food to prevent its decay. Drying requires a method of heating the food to evaporate the moisture and some means of removing the water vapor formed.

Selection of Produce

Select mature yet tender vegetables that have their characteristic color, flavor, and texture. Wilted or inferior vegetables will not make a satisfactory dried product. Over mature vegetables will be tough and fibrous or soft and mushy.

After gathering, begin immediately preparing the vegetables for drying. From the garden to the drying tray within 2 hours is a good rule to follow. Wash the vegetables gently but thoroughly to remove dirt and insecticides. Wash them before you cut, shell, or snap them. Sort and discard any that have decay, bruises, or bad spots. Most vegetables need to be pared, trimmed, cored, cut, sliced, or shredded. Keep pieces uniform so they will dry at the same rate.

Pre-treating

Enzymes in vegetables are responsible for color and flavor changes during ripening. These changes will continue during drying and storage unless the produce is pre-treated to slow down enzyme activity.

Blanching is the recommended pre-treatment for vegetables. It helps save

some of the vitamin content, sets color, and hastens drying by relaxing tissues. Blanching may also prevent undesirable changes in flavor during storage and improve reconstitution during cooking.

You can blanch by steaming or immersing the vegetable in boiling water. Steaming allows the vegetable to retain more of the water-soluble nutrients, but it takes a little longer than immersing.

Steam-blanching.

Use a deep kettle that has a tight-fitting lid and a wire basket, colander, or sieve placed so that steam can circulate freely around the vegetables. Layer the vegetables loosely in the basket no more than 2 1/2 inches deep. Add 2 inches of water to the kettle and bring to a rolling boil. Place the basket of prepared vegetables in the kettle. The water should not come in contact with the vegetables. Cover tightly with the lid and steam until each piece is heated through and is wilted. Test by removing a piece from the center of the container and pressing it. It should feel soft but not completely cooked. Drain vegetables on paper towels or clean cloths.

Water-blanching.

Use a deep kettle that has a tight-fitting lid. Fill full of water and bring to a vigorous boil. Place the vegetables in a wire basket or colander and submerge them in the boiling water. Work with small quantities only. The water should not stop boiling. Cover tightly with the lid. Remove the vegetables, dip in ice water to cool, and drain on paper towels or clean cloths.

Drying

Drying in the kitchen oven or in a dehydrator is recommended; however, you can use sun drying under proper conditions.

Arrange the pre-treated vegetable pieces on drying trays in a thin layer, leaving a little space between pieces for air circulation. Dry pieces of similar size on the same tray.

Successful drying depends on the following conditions:

- Enough heat to draw out moisture but not so much to cook the food. Hot sunny days are best for sun drying. Low heat, about 140 °F, dries it even faster. Do not let the heat go above 165 °F.
- Dry air to absorb the released moisture. Rainy, humid weather is a bad time to dry food unless you are using heat.
- Air circulation to carry the moisture off. A light breeze, a fan, or a draft supplies moving air.

Try to interrupt the drying process as little as possible. Prolonged drying at low temperatures or interrupting the drying process may cause mold or spoilage.

Sun drying.

Drying vegetables in the sun is unpredictable unless temperatures are above 100 °F and the relative humidity is low. If the temperature is too low, humidity too high, or both, souring or molding may occur. Place trays of pre-treated vegetables in direct sun in a flat or tilted position so that air can circulate underneath them. To keep out insects, cover trays with netting. Raise trays off the ground to protect them from dust, dirt, and animals. Stir the vegetables occasionally to help them dry evenly. Bring trays indoors at night to protect the food from dew or rain.

Oven drying.

Oven drying is faster than sun drying. However, oven drying is done on a smaller scale and is more expensive. Limit oven load to 4 to 6 pounds of prepared vegetables. Trays should be at least 1 1/2 inches smaller than the width and depth of the oven. Separate trays by about 2 1/2 inches. Allow a 3-inch clearance from the top and bottom of the oven. An oven temperature of 140 °F is desirable for drying. Disengage the top heating element of an electric oven. Preheat the oven at its lowest setting. Place the trays of vegetables in the oven. Prop open the door of an electric oven 1 inch, a gas oven, 8 inches. This helps control heat and lets out moist air. A fan can help circulate the air and speed the drying. Use an oven thermometer to check the temperature throughout the drying process. As food dries it takes less heat to keep the oven at the specified temperature. Stir the vegetables occasionally from the outside to the center and shift the trays from

top to bottom every 1 to 2 hours. Foods dried in the oven must be watched closely. It is easy to scorch vegetables that overheat near the edges of trays. When drying is almost completed, turn off the oven and open the door wide. Most vegetables will oven dry in 4 to 12 hours. Times will vary according to the kind of vegetable, size of the pieces, and the tray load.

Dehydrator drying.

Prepare foods and load trays as for oven drying. Preheat the dehydrator to 160 °F. After much of the water has been removed, lower the temperature to 130 °F to 140 °F.

Testing for Dryness

Cool the food before testing for desired dryness. Foods that are warm or hot seem softer, more moist, and more pliable than they will when cooled. Foods should be dry enough to prevent microbial growth and subsequent spoilage. Dried vegetables should be hard and brittle.

Conditioning & Pasteurizing

When drying is completed, small pieces will be drier than large pieces, even on the same tray. When dried in the oven or dehydrator, some food dries faster in some spots on the tray. To condition or equalize the moisture, place the dried vegetables in a glass or plastic container or crock. Cover tightly and let stand for a week. Stir or shake the vegetables everyday. If there is evidence of moisture, return them to the drying trays and heat in a 150 °F oven for 30 minutes. Cool and package.

Pasteurizing is recommended when vegetables are sun dried. Insects may have gotten on foods dried outdoors and may cause spoilage. To pasteurize, spread the dried vegetables on trays in a single layer. Place in a preheated oven, 175 °F for 15 minutes or at 160 °F for 30 minutes. Remove and cool. You may also pasteurize vegetables by sealing them in heavy plastic bags and placing the bags in the freezer at 0 °F for at least 48 hours.

Packaging

Cool vegetables before packaging. Package dried vegetables in small quantities you can use within one week after opening. Every time you open the container, the food is exposed to air and humidity and the quality deteriorates. Small glass jars, metal cans with tight lids, plastic freezer cartons, and plastic freezer bags that you can seal with heat, twist tapes, string, or rubberbands all make good containers. Scald and dry them thoroughly. Pack the dried food into the container as tightly as possible without crushing and seal to keep out moisture.

Storing

Store containers of dried vegetables in a dry, cool, and dark place. Low storage temperatures extend the shelf life of the dried product. Check vegetables occasionally to insure that moisture has not been reabsorbed. If moisture occurs, reheat the food to 150 °F for 15 minutes, then cool and reseal. If there is any sign of spoilage (off-color or mold growth), discard the food. Recommended storage time is 6 to 12 months.

Cooking

Water removed during drying must be replaced either by soaking, cooking, or a combination of both. Soak root, stem, and seed vegetables for 1/2 to 2 hours in enough cold water to keep them covered. After soaking them, simmer until tender, allowing excess water to evaporate.



Greens, cabbage, and tomatoes do not need to be soaked. Simply add enough water to keep them covered, and simmer until tender.

Many vegetables lose their fresh flavor during drying. For this reason, you may add flavoring such as basil, garlic, onions, and chili sauce during cooking to improve flavor.

Dehydrated vegetables are usually not used as cooked side dishes. They are best when used as ingredients for soups, casseroles, sauces, stuffings, and stews. You may use various combinations of dried vegetables, but be careful not to add too much dried onion or garlic.

Drying Vegetables

Vegetable	Preparation	Pretreatment	Approximate Drying Times (hours)	Test for Dryness
Beans, lima and other fresh shelled	Shell.	Choose one: • Steam 10 to 15 minutes • Place in boiling water 5 minutes. Drain.	Dehydrator: 6-10 Oven: 6-10 Sun: 12-24	Hard and brittle. Beans will break clean when hit with a hammer.
Beans, snap	Remove defective pods. Wash. Remove strings. Split lengthwise or cut diagonally in pieces to hasten drying.	Choose one: • Steam 4 to 6 minutes. • Place in boiling water 3 to 4 minutes. Drain.	Dehydrator: 3-6 Oven: 3-6 Sun: 8-12	Brittle, crisp.
Beets	Select, small, tender beets free of woodiness. Wash; trim tops.	Steam 30 to 45 minutes. Cool. Trim off roots and crowns; pare. Cut into 1/8-inch strips or 3/4-inch cubes.	Dehydrator: 2-4 Oven: 3-6 Sun: 8-10	Tough, leathery.
Carrots	Select crisp, tender carrots. Wash. Trim off roots and tops and pare if desired. Cut into 1/8-inch slices or 3/8 inch cubes.	Steam 8 to 10 minutes.	Dehydrator: 2-4 Oven: 3-6 Sun: 8-10	Tough, leathery.
Corn	Select young, sweet corn. Harvest during milk stage. Husk and trim.	Choose one: • Steam on the cob 10 to 15 minutes or until milk is set. Cut corn from cob. • Dip in boiling water 5 to 10 minutes or until milk is set. Drain. Cut corn from cob.	Dehydrator: 3-6 Oven: 4-8 Sun: 8-12	Dry, brittle.

Herbs, for seasoning	Gather when leaves are mature but before flowers develop. Wash thoroughly. Separate clusters. Discard long or tough stems.	None.	Dehydrator: 1-2 Oven: 2-4 Sun: 6-8	Brittle, flaky.
Okra	Select young, tender pods. Wash. Trim off stems. Slice crosswise 1/4-inch thick.	Choose one: • Steam 4 to 5 minutes. • Dip in boiling water 3 to 4 minutes. Drain.	Dehydrator: 2-3 Oven: 2-4 Sun: 8-12	Tough to brittle.
Onion	Select firm onion bulbs. Wash and remove paper shells. Trim tops and root ends. Slice 1/8 to 1/4-inch thick.	None.	Dehydrator: 2-4 Oven: 3-6 Sun: 8-12	Brittle.
Peas	Select young, tender pods. Shell.	Choose one: • Steam 8 to 10 minutes. • Dip in boiling water 4 minutes. Drain.	Dehydrator: 2-4 Oven: 3-6 Sun: 8-12	Crisp, wrinkled.
Peppers, chili	Select mature pods. May dry whole or diced.	None.	Dehydrator: 3-6 Oven: 3-6 Sun: 6-12	Shriveled, dark red, crisp.
Peppers, green and red	Select firm peppers. Wash. Cut in half, remove core and seeds. Cut in 1/2-inch strips.	Steam 10 minutes.	Dehydrator: 3-6 Oven: 3-6 Sun: 6-12	Brittle.
Soybeans	Select edible, green soybeans. Shell.	Steam 10 to 15 minutes.	Dehydrator: 2-4 Oven: 3-6 Sun: 6-12	Crisp, wrinkled.



Revised by Jason M. Behrends, Ph.D., CCS, Assistant Extension/Research Professor, Food, Science, Nutrition, and Health Promotion.

Discrimination based upon race, color, religion, sex, national origin, age, disability, or veteran's status is a violation of federal and state law and MSU policy and will not be tolerated. Discrimination based upon sexual orientation or group affiliation is a violation of MSU policy and will not be tolerated.

Information Sheet 723

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. VANCE H. WATSON, Director (POD 09-07)