Practical Approaches to Home Food Dehydration

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ABSTRACT

Preserving foods by drying is one of the oldest known methods of food preservation. Until recently, freezing and canning have been the methods most people used to preserve foods at home. During the past 50 years, science and technology developed during World War II led to increased commercial drying of a wide variety of foods. Most of this information has not been readily available to the individual who wants to dry foods at home. Individuals wanting to do home drying, until approximately the last 10 years, could only find bits and pieces of information on how to do it. Hopefully, this article will help eliminate some of the confusion that occurs because of conflicting information found in the scarce literature that is available on drying foods at home.

Drying foods at home is at best a very inexact science. A large number of variables are responsible for the confusing and misleading information available. The variables can include, weather, quality of produce, variety of produce, environment, preparation, pretreatment, drying, amount dried, packaging, storage, and philosophy of the individual doing the drying.

REVIEW OF THE LITERATURE

Drying is preservation of food by extraction of water. Dried products are variously designated as “dried”, “sun-dried”, “evaporated”, or “dehydrated”. The term “dried” may be applied to any method of drying, “sun-dried” implies use of the natural heat of the sun, “evaporated” refers to drying by means of artificial heat circulated by mechanical means (6). For this article, I will use the term “dried” for any and all of the methods of drying. Drying on a large scale was not used until the beginning of World War I when tremendous quantities of food were needed to feed troops in the field (3). Drying is an alternative if canning supplies are low (3,9). In hot, dry climates, foods will be reduced in a few days to a moisture level that preserves them. In any climate you can create satisfactory drying conditions at moderate expense by using artificial heat and circulating air over the food (1-9). Controlling temperature and air circulations prevents food from spoiling while it is drying. If the temperature is too low or the humidity too high, the food will dry too slowly, allowing the growth of microorganisms (1,6).

MATERIALS AND METHODS OF FOOD DRYING AT HOME

The purpose of this article is to briefly discuss the importance of selection, preparation, pretreatment, drying, packaging and storage of foods dried at home. I will discuss materials and methods in the above order. I would like to preface all my remarks by saying that in Kansas the two preferred methods of drying foods are: oven-drying and dehydrator-drying, with the exception of western Kansas. The lower relative humidity of western Kansas makes outdoor drying acceptable.

As with any method of food preservation, the quality of food that is dried is no better than the food you begin with. An interesting factor that seems to be more critical in drying foods than canning or freezing is the maturity of the food to be dried. If the food is not at the peak of its maturity, the quality of the dried product will be greatly reduced. With fruits, one way to use over-ripe produce is to make fruit leather. Storage time also affects the quality of the dried product, especially if it is immature. If the individual plans to use the dried product in a short time (less than 2 months) they may choose to use produce that is not at the peak of maturity.

Another interesting factor that seems to be more noticeable when you dry foods, is the variety of the produce. Certain varieties of fruits and vegetables dry better than others. There are few references that list the desirable varieties for drying.
Most foods to be dried do require some form of pretreatment. Fruits that tend to darken upon exposure to the air should be pretreated. The most effective treatment for retarding oxidation and spoiling is sulfur dioxide (3). Pretreatment with sulfur dioxide helps in retention of vitamins A and C as well as improving the flavor and shelf life of the food. Pretreating fruits with sulfur dioxide is done by sulfuring or sulfiting. Sulfuring exposes the fruit to sulfur dioxide fumes by burning flowers of sulfur. Sulfiting is soaking the produce in a solution of sodium bisulfite and water. Sulfuring is the most effective but it is more complicated, time consuming and expensive. Sodium bisulfite can be obtained from a wine-making supply company. Steam and syrup blanching are two more methods of pretreating fruits.

The preferred method of pretreatment for vegetables is steam blanching. Adding sodium bisulfite to the water for steam blanching of corn, green beans, potatoes and mushrooms can improve their keeping quality. Some of the “purists” recommend no pretreatment. Most foods need some method of pretreatment to produce a high-quality dried product.

Temperatures for drying of foods can vary widely. It is the area of much disagreement. Most sources suggest starting most foods at 140 F (60 C) for 1 to 3 h and then drying at 90 F to 130 F until the food is dry. These temperatures dry food fast enough to prevent spoilage. Drying times vary widely depending on the food being dried, the amount of food being dried, the pretreatment method used and the relative humidity of the room. Fruits should feel pliable and leather-like, with no pockets of moisture after they have cooled to room temperature. Most vegetables should be very brittle when they are dried. Because fruits tend to dry unevenly, conditioning may be necessary. Conditioning is a process used to distribute the residual moisture evenly in fruit (1,2,3,4). To condition fruit, pack it into a plastic or glass container with a tight-fitting lid. Let it sit for 4 to 10 days, shaking occasionally to separate the fruit. If condensation occurs at any time during the conditioning process, dry it longer.

Foods that have been dried outdoors should be pasteurized. Dried food that has been conditioned and sealed in a heavy plastic bag can be frozen for at least 48 h before storing. The second way to pasteurize foods is done after conditioning but before packaging. Place the food in a preheated oven 175 F (80 C) for 15 min or 160 F (70 C) for 30 min. Vitamin loss is high with this method.

All dried foods should be packaged in a container that excludes air, light and moisture. Package food in small quantities that can be used in a short time. Store smaller plastic bags of foods inside airtight plastic, metal or glass containers. Dried foods should be stored in a cool, dry, dark place. The optimum temperature for storing dried foods is 60 F (15 C).

RESULTS AND DISCUSSION

Maturity and the variety of produce is a critical factor in obtaining a high quality dried food. Discovering which variety of fruit or vegetable dries best is done on a trial and error basis, as this type of information is not readily available.

Pretreatment of most fruits and vegetables is necessary for a quality dried product. Sulfuring is the method most recommended for pretreatment of fruit. It produces the highest quality of dried fruit. Sulfuring is the second choice of pretreatment for fruits. Fruits can be syrup- or steam-blanching, but these methods destroy much of vitamins A and C. Syrup-blanching adds sugar to fruit that is naturally quite sweet. Dipping in an ascorbic acid or lemon juice solution is only recommended for holding the fruit before pretreating with one of the previously listed methods.

Steam-blanching is the preferred method for pretreatment of vegetables. Water-blanching destroys the water-soluble vitamins. Adding sodium bisulfite to water for steam-blanching is recommended for corn, green beans, potatoes and mushrooms as this improves their keeping quality. Green beans are much tastier and rehydrate quicker if they are steamed, sulfited and frozen solid (approximately 30 to 40 min) before they are dried. Some vegetables can be dried successfully without pretreatment.

Foods should be dried at a high enough temperature to prevent souring or spoiling. Drying foods at 140 F (60 C) for 1 to 3 h and then drying them at 90 F to 130 F until they are dry is the most recommended way to dry most foods. Conditioning of fruits can help even out the amount of moisture in fruits, but is not necessary if the fruit is taken from the oven or dehydrator when it is dry. Pasteurization is necessary to kill insect larva or bugs that might have contaminated fruit dried outdoors.

All dried foods should be stored in an air-tight, opaque container. Small plastic bags that allow for the air to be driven out and then sealed so they are air-tight are excellent for dried foods, especially if these bags are then stored in an opaque plastic or metal container. Glass containers can be used but they do allow light to reach the dried food and are not air-tight. Dried food should be packaged in small amounts that can be used quickly.

Dried foods should be stored in a cool, dry, dark place, preferably below 60 F (15 C). For every 18 F (10 C) drop in temperature, the shelf life of fruits increases 3 to 4 times.

REFERENCES