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# WARTIME FOOD PROCESSING AIDS

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This year more than ever before in our country's history it is imperative that every item of food be conserved until it can be used. For this reason we must employ all the familiar methods of food preservation and perhaps supplement them with other methods which are not so familiar.

If we have supplies and equipment for canning and pickling, it is our duty to make the best possible use of such supplies and equipment. Family food reserves may be greatly increased by the use of trenches, pits, or cellars for storage. Sun-drying, dehydration[2], and freezing[2] may be adopted as additional methods of preservation.

This publication has been prepared primarily to aid those who do not have or cannot obtain pressure cookers to use in canning. It should be understood that when a pressure cooker is available, canning by the pressure-cooker method is to be preferred for all non-acid foods. This is true because the high temperatures possible with a pressure cooker inhibit development of the deadly botulinus organism[3]. *Because of botulinus, all home-canned vegetables should be boiled 15 minutes before they are tasted; even a sip of the juice from home-canned vegetables in which botulinus has developed can be fatally poisonous if the vegetables have not been boiled after opening.*

Listed in this bulletin are concise outlines of the methods recommended for canning fruits and vegetables without a pressure cooker and procedures for pickling and brining.

A means of stretching canning sugar rations by sweetening corn sirup with saccharin-soluble to give the sirup approximately the same sweetening power as ordinary table sugar is included in the section on canning fruit. Both sweetened corn sirup and honey can be used successfully in canning, but no other sugar is as generally satisfactory as table sugar.

Non-acid vegetables can be safely processed by the boiling-water-bath method with little danger of the development of botulinus, *if the*

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[2] The Colorado Agricultural Experiment Station in Fort Collins can furnish bulletins 477, "Making and Using a Food Dehydrator"; and 478, "Freezing Vegetables and Fruits." These bulletins may also be obtained from county extension and home demonstration agents.

[3] Botulinus cannot develop in a medium as acid as that recommended in this bulletin. It is possible, however, for certain molds to develop, permitting growth of the botulinus organism. Under such conditions the food will be quite evidently spoiled. Proper processing and sealing of the food eliminate the possibility of the development of these molds. Even so, however, vegetables canned by this method should be boiled 15 minutes before they are tasted.

*product is acidified with citric acid or vinegar.* The amounts of these edible acids required to convert non-acid-type vegetables into products which behave as acid-type foods during canning are given in table 2.

The home-acidified non-acid canned foods are very palatable. Vitamin destruction is minimized in the slightly acid medium and the boiling-water-bath method of processing is made safer by this modification. The only limitation in using these slightly acid products is that they are not so readily combined with milk as are less-acid foods. However, this only slightly limits the variety of uses to which these foods may be put.

## Canning Methods

### 1. Boiling-Water-Bath

The jars are placed on a rack or false bottom for support and are immersed in boiling water to the neck. The time of processing is counted from the time the water begins to boil after the jars are placed in the container. Immediately upon removal from the boiling water bath, the jars are sealed. Composition-top lids will seal as they cool and *they should not be tightened after they have cooled.* Zinc-top lids and glass tops will need tightening as soon as they come from the hot-water bath.

The hot-water-bath method is not recommended for non-acid vegetables unless they are converted to acid-type behavior by the addition of citric acid or vinegar.

CAUTION: *Do not substitute benzoic acid or salicylic acid* for citric acid or vinegar. Information on acidifying non-acid vegetables is given with the vegetable processing table on page 4.

### 2. Pressure Cooker

The Colorado State College Extension Service can furnish complete information on canning with a pressure cooker. Extension bulletins D-13, "Home Canning of Meats"; D-40, "Home Canning of Vegetables"; and D-41, "Home Canning of Fruits"; may be had by writing to the Extension Service in Fort Collins, or by contacting county extension or home demonstration agents.

### 3. Oven Canning

Oven canning is not recommended. Uniform results cannot be obtained with equipment generally available.

**CAUTION: Invariably, as a safety measure, boil home-canned vegetables 15 minutes before placing any portion thereof in your mouth.**

## Wartime Fruit Canning

Honey or a sweetened corn syrup may be used to supplement wartime canning sugar allotments of 1 pound for every 4 quarts of finished fruit. One cup of sugar for each quart of fruit gives the heavy sirup desired by most home-canners, but this exceeds rationing allotments by 100 percent.

One-half ounce of saccharin-soluble dissolved in ¼ cup of hot water and mixed with a 10-pound pail of corn sirup produces a substitute with approximately the same sweetening power as table sugar. Sweetose-type corn sirups are somewhat sweeter than other types.

Canning sirups can be made by heating together the required amount of sugar, honey, sweetened corn sirup, or combinations of these, and the necessary amount of water or fruit juice. The fruit may or may not be heated in the sirup, depending on its characteristics and the individual desires of the canner.

The sweetening agents may be combined in numerous ways to make a heavy sirup. Suggested combinations are ½ cup sugar and ½ cup honey or sweetened corn sirup; ¼ cup sugar and ¾ to 1 cup honey or sweetened corn sirup; and others as desired.

Some fruits, such as cherries or berries canned for pies, may be water-packed.

Additional flavorings sometimes make canned products more palatable. Suggestions for these are: 1 grated lemon rind per quart of apples; whole cloves or ginger with pears; orange juice added to

TABLE 1.—*Processing procedure for fruits.*

| Fruit | Preliminary preparation | Processing time in hot-water-bath |
|---|---|---|
| Apples | Peel. Quarter or slice. Blanch by boiling 1 to 3 minutes. Pack hot fruit tightly into hot jars. Cover with boiling syrup. | 20 minutes |
| Pears | Same as above, or whole with stems. | 25 minutes |
| Peaches<br>Apricots<br>Nectarines | Scald. Dip in cold water. Peel.* Use whole or halve. Blanch by boiling in syrup 1 to 3 minutes. Pack tightly in hot jars. Cover with boiling sirup. | 30 minutes |
| Cherries, sour, pitted | Bring to boil with sweetening agents, and simmer 5 to 8 minutes. Pack hot in hot sterile jars. (Water pack may be used for pie cherries.) | 20 minutes |
| Strawberries<br>Cranberries | Bring to boil with sweetening agents, and simmer 5 to 8 minutes. Let stand overnight. Bring to boil next day and pack hot in hot sterile jars. | 10 minutes |
| Plums | Prick skins. Simmer fruit in sirup 5 minutes. Pack hot in hot jars. | 20 minutes |
| Currants; all other berries; cherries with pits | Handle gently. Sort and wash. Pack in clean jars as soon after picking as possible. Shake or tap jar for solid pack. Cover immediately with boiling sirup. | 25 minutes |
| Fruit juices, including tomato | Wash fruit or berries. Mash in double boiler over low flame and heat to 160° F. throughout. Puree, strain, or drip through flannel bag, depending on clarity desired. Bring to 160° F. Pour into hot, sterile jars. Process in water bath held at 160° F. | 30 minutes in water bath at 160° F. |

*Apricots and peaches may be halved, stoned, and immediately steamed until peel will lift from the flesh. After peeling, pack hot and cover with boiling sirup or bring to boil in sirup and pack hot.

strawberries or cranberries; almond extract or lemon with currants and berries; salt and other desired seasonings in tomato juice.

Pre-cooked fruits are blanched in boiling sirup, packed hot into hot jars, and processed. Cold-packed fruits are packed raw, the jars filled with hot sirup, and processed.

Fruit juices, including tomato juice, are "pasteurized" in a hot-water-bath held at 160° F. for 30 minutes.

Detailed instructions for canning fruits are given in table 1. Processing times listed are for quart jars.

## Wartime Vegetable Canning

People who do not have a pressure cooker and cannot obtain one may process non-acid vegetables in a boiling-water-bath if edible acid is added in amounts sufficient to inhibit development of the botulinus organism.

Processing non-acid vegetables such as asparagus, snap beans, shell beans, beets, broccoli, celtuce, carrots, corn, cauliflower, greens, peas, peppers, pumpkin, squash, and eggplant, is not recommended unless the products are acidified with citric acid or vinegar. Spoilage is high in non-acid vegetables processed in a boiling-water-bath without additional acid, and the danger of food poisoning is much greater. Both spoilage and the danger from food poisoning are minimized in the acid medium.

**CAUTION: All home-canned vegetables should be boiled 15 minutes before they are tasted.**

The non-acid vegetables are blanched before they are packed in jars. The required amount of acid is added to the product before liquid is put in to fill the jar. Other seasonings may be included at the same time. The amounts of acid needed for preserving non-acid vegetables are given in table 2.

Processing methods for vegetables are given in table 3. Processing times are for quart jars.

TABLE 2.—*Acid needed to preserve non-acid vegetables.*

| Vegetable | Citric acid USP Granular* | Vinegar‡ |
|---|---|---|
| Asparagus, snap beans, beets, broccoli, celtuce, carrots, corn, cauliflower, greens, peas, peppers, pumpkin, squash, eggplant. | 1 teaspoon per quart | 4 tablespoons per quart |
| Shell beans | 2 teaspoons per quart | 6 tablespoons per quart |
| Shell beans (with tomato sauce and molasses added) | 1 teaspoon per quart | 3 tablespoons per quart |

*Citric acid, USP granular, may be obtained from any druggist.
‡Use strong vinegar (the type used for pickling); if using weak vinegar (the usual table vinegar) use double the amount.

TABLE 3.—*Processing procedure for vegetables.*

| Vegetable | Preliminary preparation | Processing time in boiling-water-bath | | |
|---|---|---|---|---|
| | | 5,000 feet alt. | 7,500 feet alt. | 10,000 feet alt. |
| Asparagus | Wash. Blanch in boiling water or steam. For hot-water blanch, tie in bundles and set in boiling water to 2/3 of length for 3 minutes. Tip over horizontally for 1 minute longer. For steam blanch, steam 5 minutes or till wilted. Remove and pack tips toward neck of jar, with aid of spatula in jar laid horizontally. When jar is 2/3 full, set vertically and arrange tips about circumference. Finish packing in center of jar. Add acid. Fill jars with boiling water used for blanching. | 65 min. | 80 min. | 105 min. |
| Snap beans: green or wax | Wash. Pack whole, in strips, or cut, according to maturity. Blanch for 3 minutes in boiling, salted water, or steam 5 minutes or till wilted. Pack loosely in hot jar. Add acid. Fill jars with boiling water used for blanching. | 65 min. | 80 min. | 105 min. |
| Lima beans Shell beans | Wash. Shell. Discard overmature beans. Blanch 3 minutes, and pack into hot jars. Add acid. Fill with water used for blanching. | 90 min. | 110 min. | 125 min. |
| Beets | Wash. Boil or steam 10 minutes, till skins slip easily. Skin. Pack whole or cubed. Add acid. Fill with water used for blanching. | 65 min. | 80 min. | 105 min. |
| Broccoli Celtuce | Wash. Blanch 3 minutes in open pan of boiling, salted water. Pack in hot jar, using procedure similar to packing asparagus. Add acid. Fill with water used for blanching. | 65 min. | 80 min. | 105 min. |
| Carrots | Scrub. Boil 3 minutes. Pack hot. Add acid. Fill with boiling carrot water. | 65 min. | 80 min. | 105 min. |
| Corn off cob | Cook on cob till tender; cut off. Reheat, then pack hot. Add acid. Cover with hot juice. For succotash, add baby limas before packing. | 65 min. | 80 min. | 105 min. |
| Corn on cob | Boil 2 minutes before packing in jars. Don't crowd. Add acid. Cover with boiling water. | 65 min. | 80 min. | 105 min. |
| Cauliflower | Florets canned in pint jars for salad. Wash in cold water. Blanch 2 minutes in boiling, salted water. Pack loose. Add acid. Cover with boiling water used for blanching. | 65 min. | 80 min. | 105 min. |
| Greens: dandelion, kale, spinach, chard, turnip, radish tops, mustard, sorrel, beet, lamb's quarter | Wash thoroughly in cold water. Blanch till wilted in boiling water or by steaming. Pack loosely in hot jar. Don't mash. Add acid. Cover with boiling water. Use fork or spatula to remove entrapped air bubbles. | 65 min. | 80 min. | 105 min. |
| Peas | Shell. Blanch in boiling salted water 3 minutes. Pack loosely in hot jars. Add acid. Fill with water used for blanching. | 65 min. | 80 min. | 105 min. |
| Peppers | Quarter. Scrape out seeds. Blanch 1 minute. Pack in half pints or pints. Add acid. Fill with boiling water used for blanching. | 65 min. | 80 min. | 105 min. |

| | | | | |
|---|---|---|---|---|
| Pumpkin<br>Squash<br>Eggplant | Scrub. Peel. Slice or use small chunks or cubes. Blanch in boiling salted water 1 to 10 minutes. Pack hot. Add acid. Fill with boiling water used for blanching. | 65 min. | 80 min. | 105 min. |
| Tomatoes (no acid needed) | Wash, scald, peel. Pack whole or chunk, precook and pack. Agitate contents of jar to release air bubbles. Fill with boiling tomato juice. | Cold pack<br>65 min. | 80 min. | 110 min. |
| | | Hot pack<br>45 min. | 45 min. | 45 min. |
| | | Cold pack puree<br>90 min. | 100 min. | 110 min. |

# Pickling and Brining

## Pickling

The term, pickling, is generally applied to preserving food in brine or acid solution either with or without subsequent fermentation. When the salt or acid content reaches a sufficiently high percentage, fermentation will no longer occur. Heavily brined vegetables are generally used in soups or for later conversion into special pickled products. Mold growth may be minimized or eliminated by various handling methods.

When the salt content is low, fermentation occurs. When properly controlled, the fermentation, usually of the lactic-acid type, may serve as a means of food preservation. Dill pickles, snap beans, and leafy green vegetables, except spinach, are readily preserved in this manner.

Since the fermentation processes use up a portion of the nutrients in the food, it is often more desirable to add to the brine, at the start, the acid normally formed in the fermentation process. Edible lactic acid, vinegar, or sometimes citric acid, may be used to furnish acidity.

Pickled foods are stored in sealed containers to eliminate possible contamination from the air and to prevent evaporation.

## Brining

A brine of high salt content, 15 percent by weight, does not permit the growth of micro-organisms. Trials at the Colorado Agricultural Experiment Station indicate that a 15 percent brine solution is sufficient to preserve foods. Fifteen percent brine is made by dissolving 3 cups of salt in 1 gallon of water.

If the preserved material is weighted down below the surface of the brine, and the surface is covered with a thin layer of tasteless mineral oil (the so-called Russian mineral oil), evaporation of the brine becomes negligible. The objection to this type of brining is the limited use of the food because of its high salt content.

When the salt content of a brine solution is 4½ or 5 percent of the weight of the material, a lactic-acid-type fermentation follows. If edible acid is added in appropriate amount, this fermentation is

TABLE 4.—*Procedures for pickling and brining.*

| Vegetable | Pretreatment | Strength of brine | Acid to be added to brine at start | Storage | Remarks |
|---|---|---|---|---|---|
| | | **High-Salt Brining** | | | |
| Cauliflower, florets, cucumbers, unshelled peas or lima beans, seeded peppers, celery. | Wash and cleanse thoroughly, then drain; do not cut peas or beans. | 15 percent by weight, 1½ pounds salt per gallon water, or 3 cups salt per gallon water. | None. But for each 10 pounds unshelled peas and beans preserved this way, 1½ pounds additional salt should be added a few days later. | In stone jars, in cool place, covered with film of tasteless mineral oil. Cover jar. | Products most be freshened before use, i.e., soak overnight in 1 gallon water to each pound of material. |
| | | **Low-Salt-Sour Brining** | | | |
| Snap beans, shell beans, cauliflower, green tomatoes, greens, (except spinach), carrots, beets. | Wash and cleanse. Stem and cut snap-beans. Steam-blanch cauliflower, snap beans, shelled beans, greens, for 3 minutes; carrots and beets for 5 minutes. | 4½ percent by weight, ½ pound salt per gallon water, about 1 cup salt per gallon water. | 8 ounces vinegar per gallon or ½ ounce edible lactic acid of 87½ percent strength per gallon. | Allow to stand 10 days covered. Heat; pack in glass containers with glass-top seals. Process in boiling water bath till heated to boiling throughout. Keep in cool place. | Wash products when removed from container. Add water and seasoning for cooking. Resalting unnecessary. |
| | | **Dry-Salt Brining** | | | |
| Snap beans | Wash, blanch 5 minutes, cut. | 5 percent salt, ½ pound for each 10 pounds material. Use layer pack. | 8 ounces vinegar for each 10 pounds of material | Weight down so brine formed will cover food in 24 hours. Cover with muslin cloth tied to jar. Store in cool place. | Ready for use in about 3 weeks. Keep scum removed. Products may be canned after fermentation. Food heated through before or after packing to prevent further fermentation. |
| Cabbage<br>Cauliflower<br>Lettuce | Wash, trim, shred or slice, then pack. | 3 percent salt, 5 ounces for each 10 pounds of material. Use layer pack. | None. | | |
| Beets | Wash, steam until peeling slips, then peel; slice or shred. | Same as for snap beans. | 8 ounces vinegar for each 10 pounds of material. | | |
| Turnips, Rutabagas | Wash, peel, slice or shred. | Same as for snap beans. | None. | | |

held to a minimum, and comparable food preservation occurs. A 3-minute steam blanch before brining is desirable.

Foods preserved in this low-salt-sour brine should be stored in sealed containers. Food preserved this way may be held at least 9 months before using if it is kept in a cool place.

No "freshening" is needed for foods preserved in the low-salt-sour brine. They are simply washed free of the brine, cooked, and seasoned. Bacon, salt-pork, ham hocks, or butter may serve as seasonings. The products do not have a flavor identical with fresh-cooked vegetables, but they are very palatable. Nutritive values are well-retained in this type of brining.

All brined foods should be cooked before they are tasted or eaten.

Pickling and brining procedures are given in table 4.